

RESOURCE
SYSTEMS GROUP
INCORPORATED

MEMORANDUM

To: Lebanon Planning Board
From: Massoud Javid
Subject: DHMC TIS corrections
Date: 10 December 2001
Copy to: Ken Kaliski

This memorandum is to correct some of the figures and tables in the Dartmouth Hitchcock Medical Center Traffic Impact Study submitted, July 2001.

Since this submission, there have been several changes in the assumptions and data used in the study. Therefore, we have updated the following figures and tables to reflect these changes. We have corrected Figures 5, 6, 9, 10, 11 and 12 and Tables 3, 4, 9, 11, 13 and 15 (enclosed).

I apologize for the inconvenience. Please contact Ken Kaliski or me if you have any further questions or concerns.

Figure 5: 2015 AM Peak Hour No Build Traffic

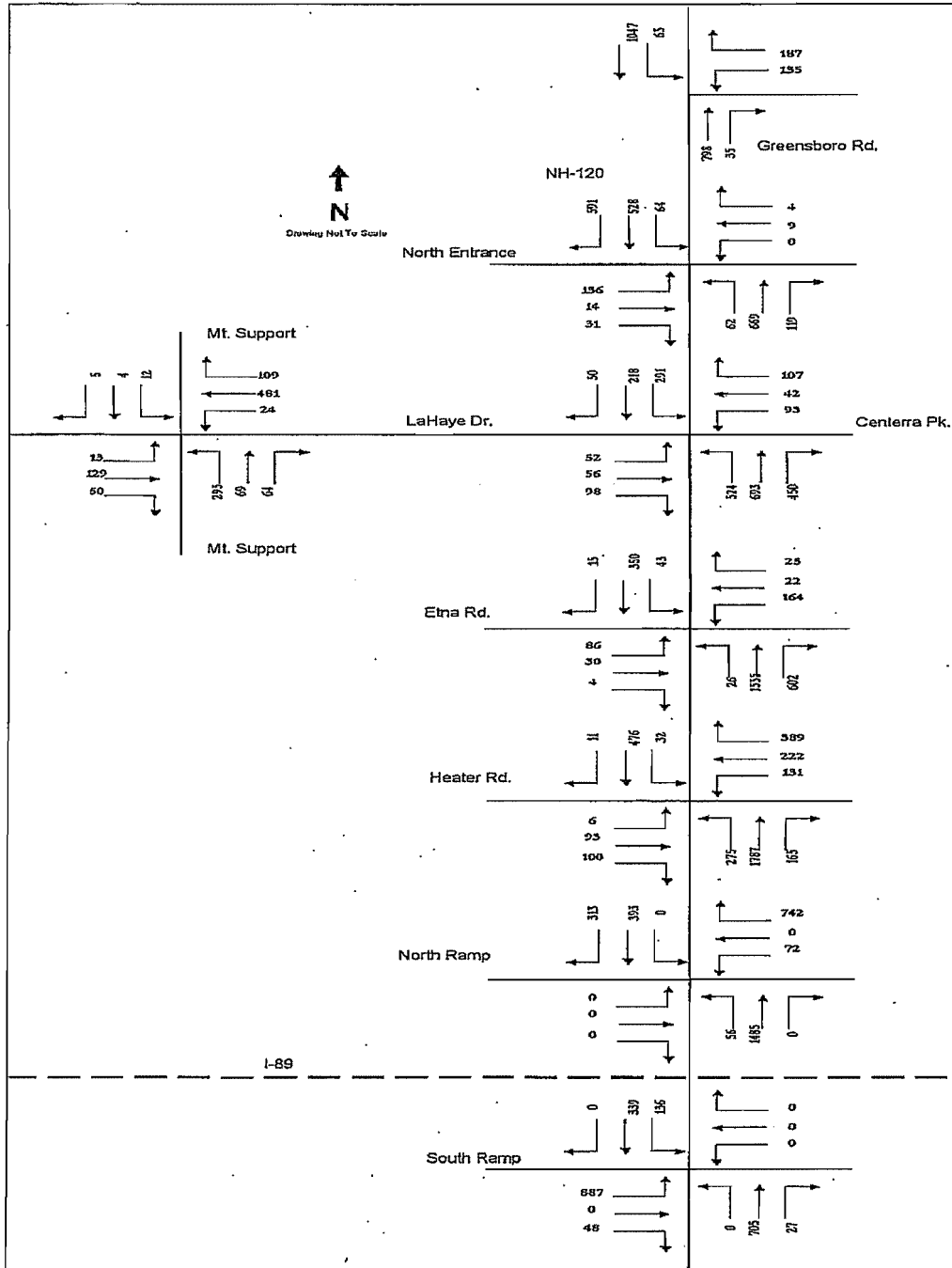
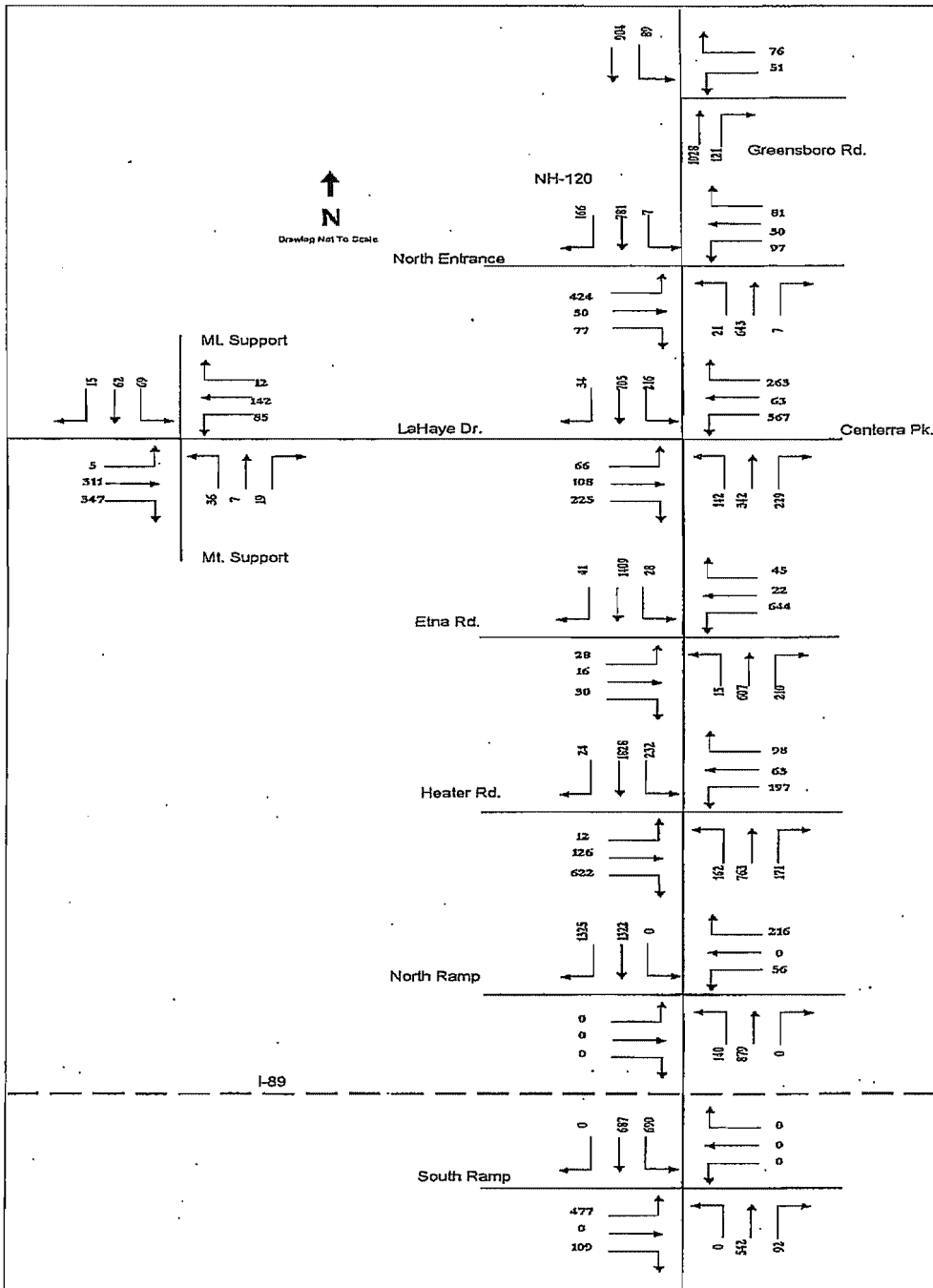


Figure 6: 2015 PM Peak Hour No Build Traffic



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Table 3: AM Peak Hour Trip Generation

INDEPENDENT VARIABLE	TOTAL EXISTING	TRIP GENERATION RATE	EXPANSION ONLY	PERCENT INCREASE	UNWEIGHTED TOTAL TRIPS
Floor Space (sq. feet)	1,209,848	0.0014	466,850	39%	654
Total Employees	4,467	0.39	809	18%	312
Daily Outpatient Visits	1,509	1.1	538	36%	614
WEIGHTED AVERAGE - New Trips from Expansion					570

Table 4: PM Peak Hour Trip Generation

INDEPENDENT VARIABLE	TOTAL EXISTING	TRIP GENERATION RATE	EXPANSION ONLY	PERCENT INCREASE	UNWEIGHTED TOTAL TRIPS
Floor Space (sq. feet)	1,209,848	0.0013	466,850	39%	607
Total Employees	4,467	0.35	809	18%	283
Daily Outpatient Visits	1,509	1.0	538	36%	556
WEIGHTED AVERAGE - New Trips from Expansion					510

The total new trips from the expansion are based on a weighted average, with the weight being the percent increase in the particular variable. For example, in the PM peak hour, if we calculated the trip generation rate of the Medical Center based solely on employee growth, we would estimate that it would generate 283 PM peak hour trips. However, if we calculate the trip generation based on floor space, we would forecast 487 new PM peak hour trip, and based on projected outpatient visits, we would forecast 556 new PM peak hour trips. These are not disaggregate. That is, the actual trip generation rate is not the sum of these, but the average. The average is not a straight average. It is instead weighted by the growth in the particular variable. For example, floor space is weighted more than employees and outpatient visits, since floor space is growing by 31%, while employees and outpatient visits are growing by 18% and 36%, respectively.

In summary, we forecast that the proposed expansion will generate 520 new AM and 470 new PM peak hour trips.

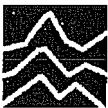


Figure 8: AM Peak Hour Trip Generation of the Proposed Facility Expansion

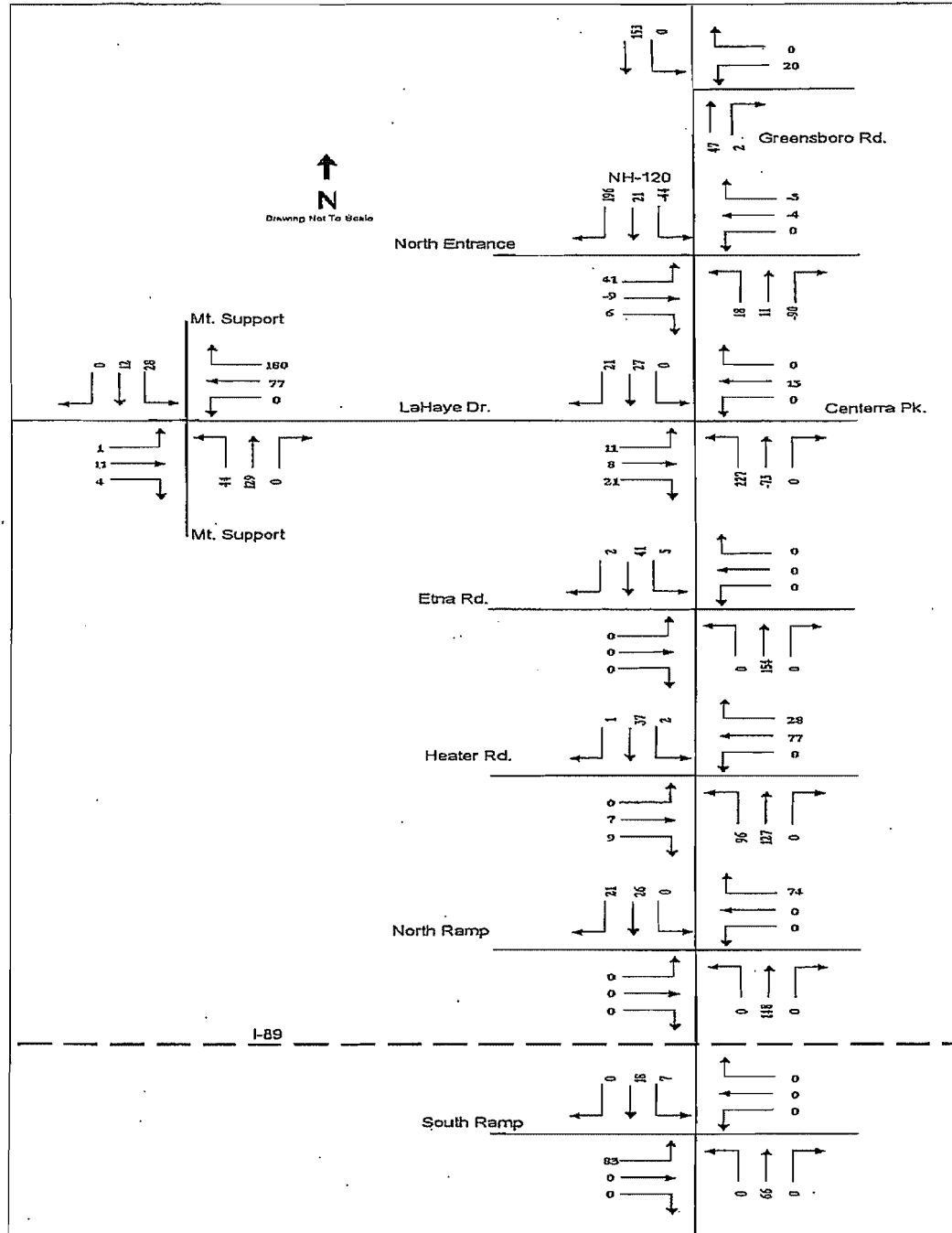


Figure 9: PM Peak Hour Trip Generation of the Proposed Facility Expansion.

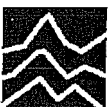
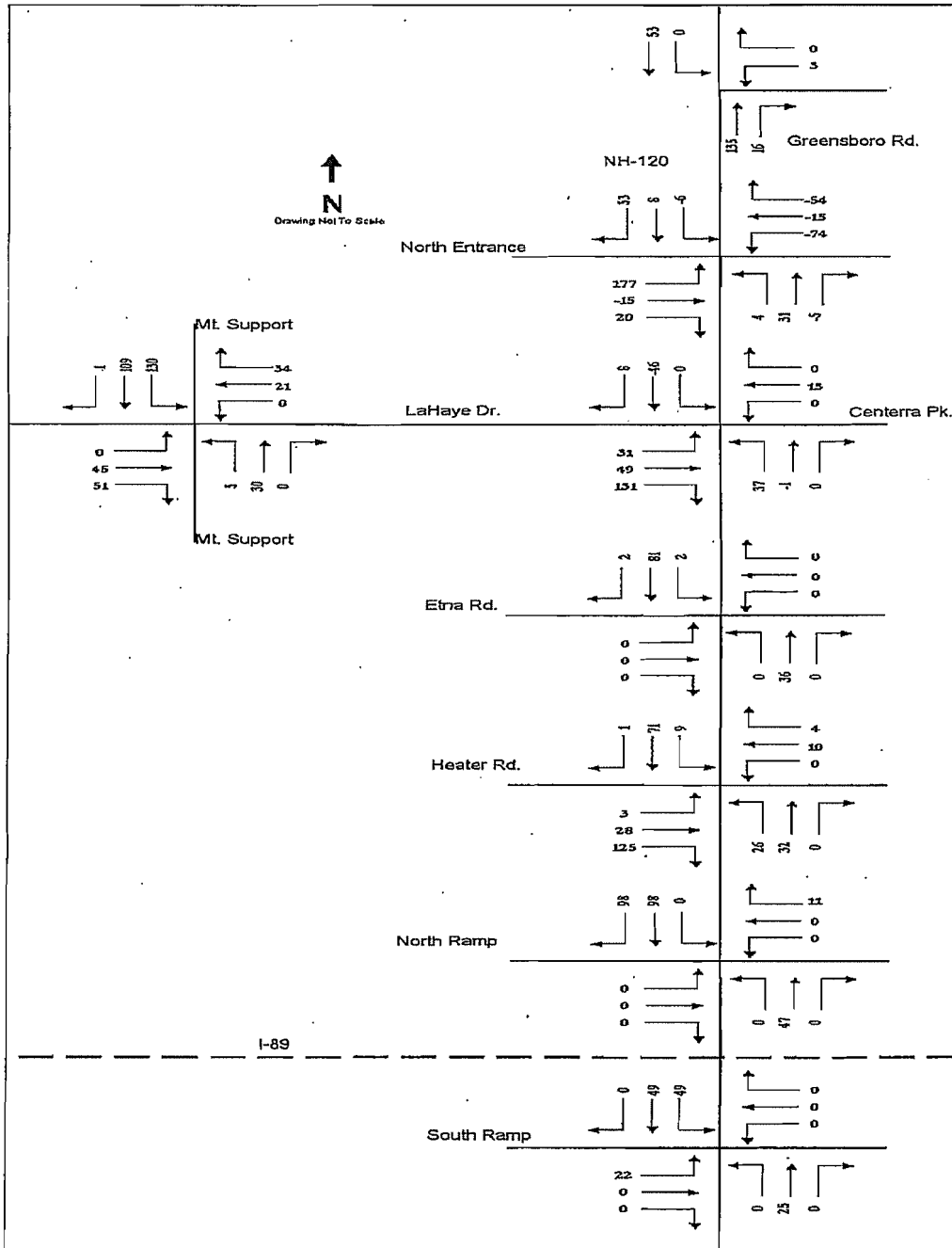


Figure 12: 2015 AM Peak Hour Build

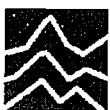
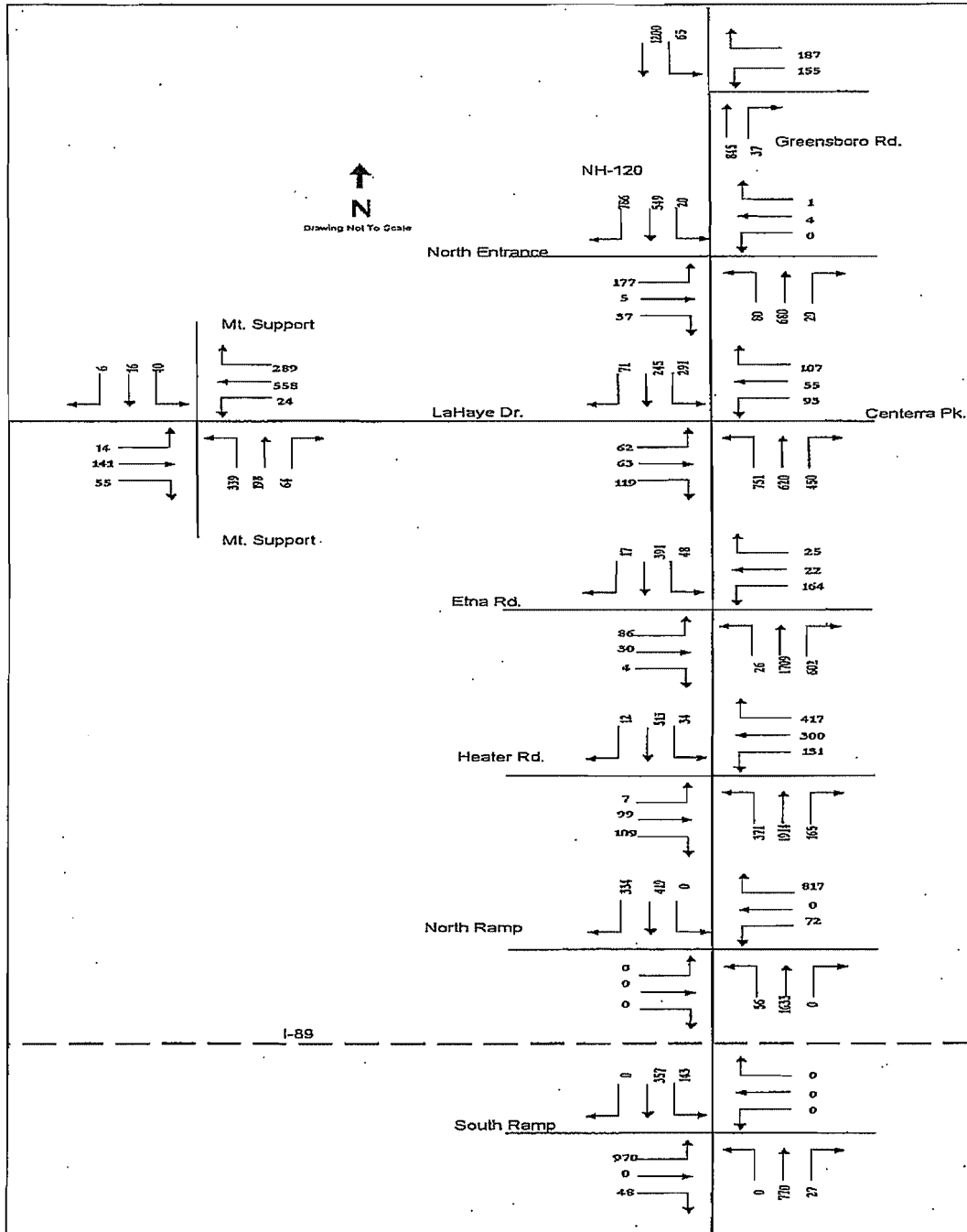


Figure 13: 2015 PM Design Hour Build

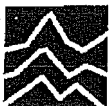
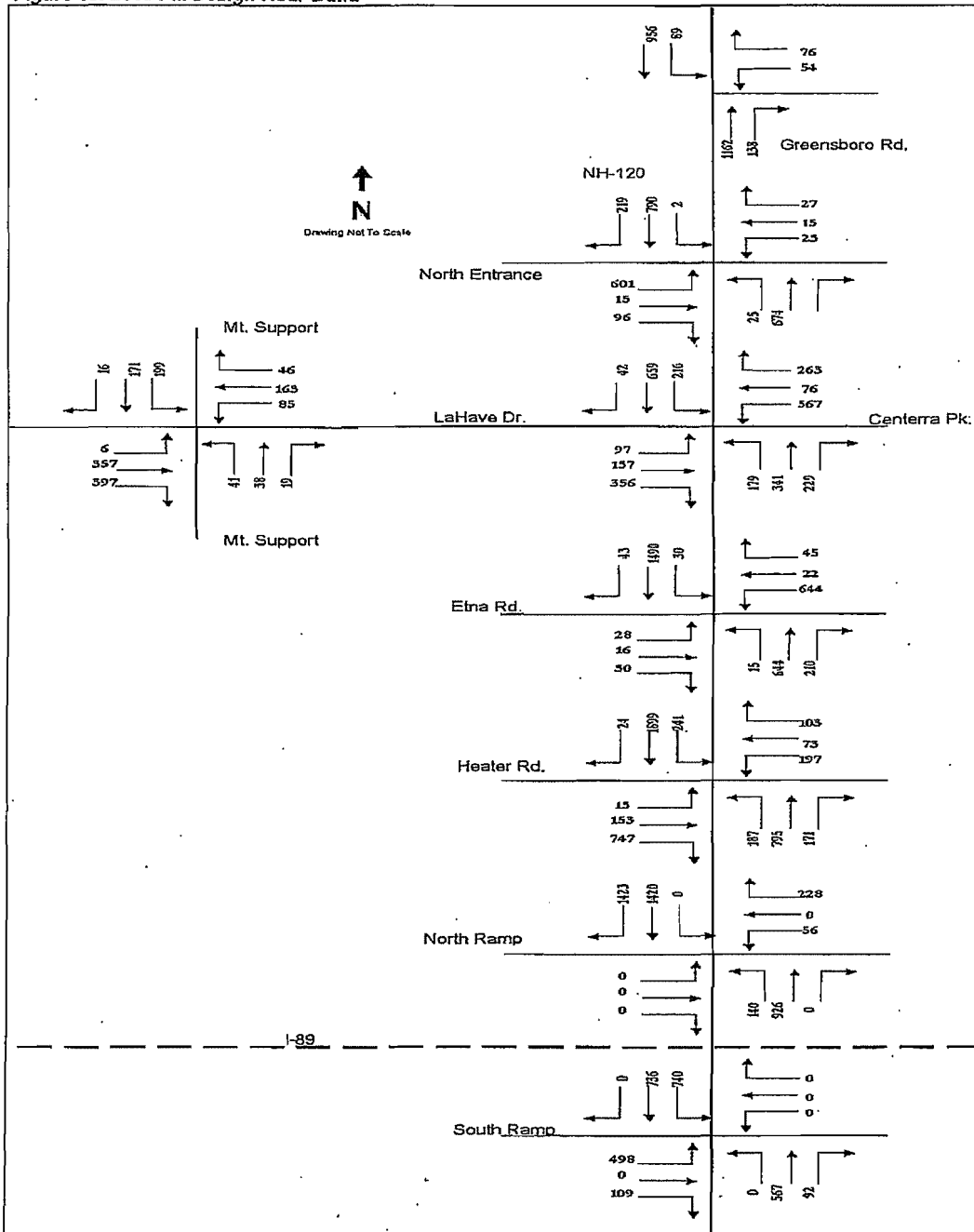


Table 9: 2015 AM Peak Hour Levels of Service with Mitigation

Intersection		2015 No Build	2015 Build with Mitigation		
			Left Turn	Through	Right Turn
Greensboro Rd./Rt.120	EB				
	WB	11.7s - "D"	38.2s - "D"		5.3s - "A"
	NB	58.2s - "E"		7.8s - "A"	0.5s - "A"
	SB	4.8s - "A"	44.8s - "D"	4.5s - "A"	
	Overall	25.4s - "C"		13.4s - "B"	
N. Entrance/Rt.120/Jesses	EB	34.2s - "C"	Left Turn	Through	Right Turn
	WB	35.5s - "D"		35.3s - "D"	9.2s - "A"
	NB	24.2s - "C"	26.1s - "C"	25.4s - "C"	
	SB	8.5s - "A"	41.8s - "D"	1.7s - "A"	1.6s - "A"
	Overall	16.7s - "B"		7.2s - "A"	
Mt. Support Rd./LaHaye Dr.	EB	16.1s - "C"	Left Turn	Through	Right Turn
	WB	340.8s - "F"	4.5s - "A"	12.4s - "B"	
	NB	159.2s - "F"		33.7s - "C"	
	SB	11.5s - "B"	45.2s - "D"	231.3s - "F"	22.6s - "C"
	Overall	217.7s - "F"		90.8s - "F"	
LaHaye Dr./Rt.120/Centerra	EB	30.7s - "C"	Left Turn	Through	Right Turn
	WB	28.0s - "C"	53.9s - "D"	52.1s - "D"	13.7s - "B"
	NB	19.7s - "B"	61.7s - "E"	62.1s - "E"	8.7s - "A"
	SB	40.7s - "D"	31.6s - "C"	22.0s - "A"	13.1s - "B"
	Overall	26s - "C"	33.8s - "C"	26.8s - "C"	5.8s - "A"
Etna Rd./Rt.120	EB	22.2s - "C"	Left Turn	Through	Right Turn
	WB	25.9s - "C"	34s - "C"	27.6s - "C"	
	NB	13.7s - "B"	37.2s - "D"	17.5s - "B"	
	SB	10.1s - "A"	32.5s - "C"	5.2s - "A"	0.1s - "A"
	Overall	14.5s - "B"	67.1s - "E"	12.2s - "B"	
Heater Rd./Rt.120	EB	68.3s - "F"	Left Turn	Through	Right Turn
	WB	135.2s - "F"		30.4s - "C"	5.5s - "A"
	NB	22.9s - "C"	23.5s - "C"	140.6s - "F"	15.1s - "B"
	SB	15.0s - "B"	42.6s - "D"	75.2s - "E"	2s - "A"
	Overall	47s - "D"		8.7s - "A"	
NB-189 Ramp/Rt.120	EB		Left Turn	Through	Right Turn
	WB	18.7s - "B"	21.5s - "C"		29.3s - "C"
	NB	14.3s - "B"	35.8s - "D"	10.5s - "B"	
	SB	9.8s - "A"		4.6s - "A"	0.5s - "A"
	Overall	14.4s - "B"		14.0s - "B"	
SB-189 Ramp/Rt.120	EB	17.3s - "B"	Left Turn	Through	Right Turn
	WB		25.0s - "C"		0s - "A"
	NB	20.8s - "C"		26.7s - "C"	8.7s - "A"
	SB	15.9s - "B"	30.4s - "D"	6.9s - "A"	
	Overall	18s - "B"		22.2s - "C"	

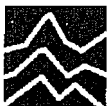


Table 11: 2015 PM Peak Hour Levels of Service with Mitigation

Intersection		PM Peak Hour			
		2015 No Build	2015 Build with Mitigation		
Greensboro Rd./Rt.120	EB		Left Turn	Through	Right Turn
	WB	14.5s - "C"	39.7s - "D"		9s - "A"
	NB	133.4s - "F"		18.7s - "B"	1s - "A"
	SB	4.3s - "A"	70.7s - "E"	2.2s - "A"	
	Overall	70.2s - "E"	13.8s - "B"		
N. Entrance/Rt.120/Jesses	EB	83.4s - "F"	Left Turn	Through	Right Turn
	WB	18.2s - "B"		64.3s - "E"	3.1s - "A"
	NB	35.7s - "D"	41.2s - "D"	32.1s - "C"	
	SB	17.4s - "B"	46s - "D"	21.1s - "C"	1.9s - "A"
	Overall	37.5s - "D"	32.3s - "C"		
Mt. Support Rd./LaHaye Dr.	EB	10.3s - "B"	Left Turn	Through	Right Turn
	WB	10.1s - "B"	4.7s - "A"	20.7s - "C"	
	NB	38.3s - "E"		2.7s - "A"	14.1s - "B"
	SB	11.7s - "B"	40.4s - "D"	35s - "D"	
	Overall	26.9s - "D"	33.7s - "C"		
LaHaye Dr./Rt.120/Centerra	EB	24.1s - "E"	Left Turn	Through	Right Turn
	WB	24.2s - "C"	37.6s - "D"	39s - "D"	21.1s - "C"
	NB	26.7s - "C"	37.2s - "D"	38.8s - "D"	3.5s - "A"
	SB	41.4s - "D"	40s - "D"	30.6s - "C"	7.8s - "A"
	Overall	30.3s - "C"	43.5s - "D"		
Etna Rd./Rt.120	EB	11.6s - "B"	Left Turn	Through	Right Turn
	WB	101.9s - "F"	16.3s - "B"	8.3s - "A"	
	NB	14.4s - "B"	92.6s - "F"	7.4s - "A"	0.1s - "A"
	SB	52s - "D"	31.8s - "C"	3.5s - "A"	
	Overall	52.6s - "D"	42.2s - "D"		
Heater Rd./Rt.120	EB	122.3s - "F"	Left Turn	Through	Right Turn
	WB	232.6s - "F"		30.2s - "C"	105.5s - "F"
	NB	11.1s - "B"	30.0s - "C"	109.2s - "F"	6.2s - "A"
	SB	51.7s - "D"	34.1s - "C"	14.8s - "B"	2.8s - "A"
	Overall	69.5s - "E"	112.1s - "F"		
NB-189 Ramp/Rt.120	EB		Left Turn	Through	Right Turn
	WB	4.9s - "A"	39.7s - "D"		0s - "A"
	NB	5.5s - "A"	39.9s - "D"	1.7s - "A"	
	SB	54.6s - "D"		2.3s - "A"	40.5s - "D"
	Overall	38.5s - "D"	16.7s - "B"		
SB-189 Ramp/Rt.120	EB	18.0s - "C"	Left Turn	Through	Right Turn
	WB		33.8s - "C"		0.2s - "A"
	NB	18.4s - "B"		24.8s - "C"	5.1s - "A"
	SB	6.1s - "A"	27.6s - "C"	6.2s - "A"	
	Overall	11.6s - "B"	20.6s - "C"		



Table 13: Queuing Analysis - 2015 AM Build

Intersection		Left Turn Queue (ft)	Left Turn Storage (ft)	Through Queue (ft)	Through Storage (ft)	Right Turn Queue (ft)	Right Turn Storage (ft)
Greensboro Rd./Rt.120	EB						
	WB	167	30			60	30
	NB			178	2272	3 *	45
	SB	91	45	186	>600		
N. Entrance/Rt.120/Jesses	EB			171	500	24	100
	WB			11	150		
	NB	79 *	500	41	4665		
	SB	28 *	250	167	2272	282	250
Mt. Support Rd./LaHaye Dr.	EB			137	1320		
	WB	3 *	50	77 #	1067		
	NB			652 #	5500	60	100
	SB	63	75	27	75		
LaHaye Dr./Rt.120/Centerra	EB	75 #	100	75 *	1067	39	50
	WB	127 #	250	131 #	700	46	50
	NB	694 #	525	565	6862	346	50
	SB	313 #	530	71	4665	0	630
Elna Rd./Rt.120	EB	96	65	40	100		
	WB	182	350	41	120		
	NB	17 *	350	124 *	3026	0 *	350
	SB	69 *	150	151	6862		
Heater Rd./Rt.120	EB			99	400	42	100
	WB			586 #	250	245	220
	NB	277 *	525	998 #	1228	7 *	525
	SB	40 *	150	83	3026		
NB-189 Ramp/Rt.120	EB						
	WB	61	500			342	500
	NB	45 *	320	425	320		
	SB			35 *	1228	11 *	500
SB-189 Ramp/Rt.120	EB	331	525			0	500
	WB						
	NB			300	1500	18	50
	SB	86	320	40	320		

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

* Volume for 95th percentile queue is metered by upstream signal.



Table 15: Queuing Analysis - 2015 PM Build

Intersection		Left Turn Queue (ft)	Left Turn Storage (ft)	Through Queue (ft)	Through Storage (ft)	Right Turn Queue (ft)	Right Turn Storage (ft)
Greensboro Rd./Rt.120	EB						
	WB	72	30			39	30
	NB			981 *#	2272	6 *	45
	SB	154 #	45	104	>600		
N. Entrance/Rt.120/Jesses	EB			660 #	500	25	100
	WB			36	150		
	NB	24 *	500	648 *#	4665		
	SB	4 *	250	297	2272	26	250
Mt. Support Rd./LaHaye Dr.	EB			518 #	1320		
	WB	13 *	50	16 *	1067		
	NB			109	5500	16	100
	SB	216 #	75	196	75		
LaHaye Dr./Rt.120/Centerra	EB	93 *	100	153 *	1067	214	50
	WB	316	250	353 #	700	46	50
	NB	213 #	525	368 #	6862	121	50
	SB	249 #	530	166	4665	0 *	630
Etna Rd./Rt.120	EB	27	65	27	100		
	WB	720 #	350	33	120		
	NB	20 *	350	30	3026	0 *	350
	SB	24	150	753 #	6862		
Heater Rd./Rt.120	EB			157	400	636 #	100
	WB			383 #	250	41	220
	NB	207	525	171	1228	90	525
	SB	168 #	150	867 *#	3026		
NB-I89 Ramp/Rt.120	EB						
	WB	70	500			0	500
	NB	138	320	77	320		
	SB			54 *	1228	102 *	500
SB-I89 Ramp/Rt.120	EB	204	525			3	500
	WB						
	NB			232	1500	36	50
	SB	298	320	95	320		

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

* Volume for 95th percentile queue is metered by upstream signal.

