

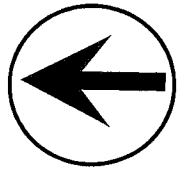
Date : 07/17/14

Count Number : TMC1415

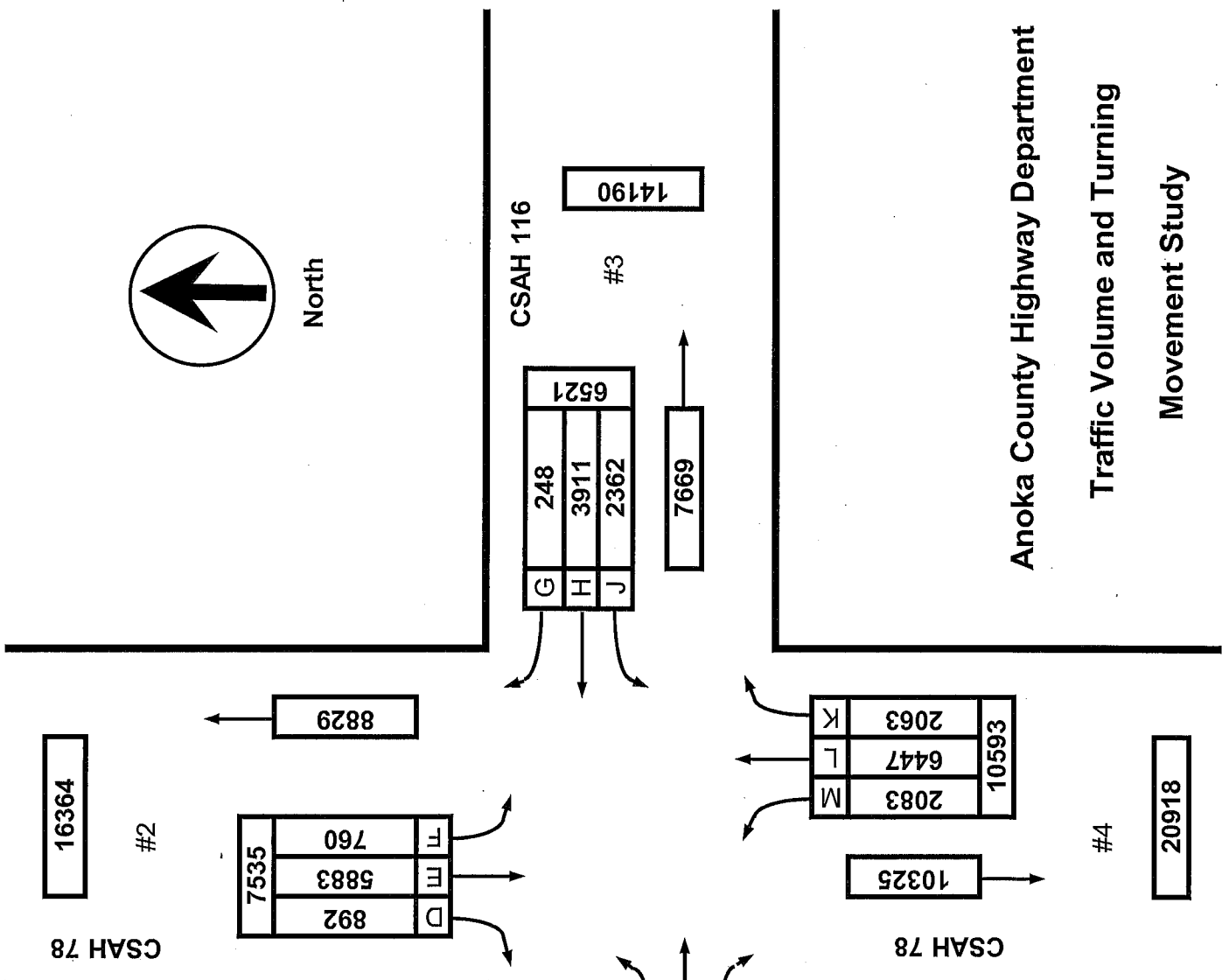
Location : CSAH 116 (Bunker Lake Blvd.)

@ CSAH 78 (Hanson Blvd.)

Collection Period : 6:00 AM - 10:00 PM



North



EXISTING LANES OF APPROACH				TOTAL
RIGHT TURN LANE	LEFT TURN LANE	THRU LANES		
#1	1	2	2	5
#2	1	2	2	5
#3	1	2	2	5
#4	1	2	2	5

Anoka County Highway Department
 Traffic Volume and Turning
 Movement Study

Date : 07/17/14

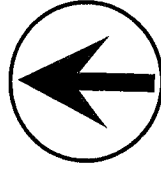
Count Number : TMC1415

Location : CSAH 116 (Bunker Lake Blvd.)

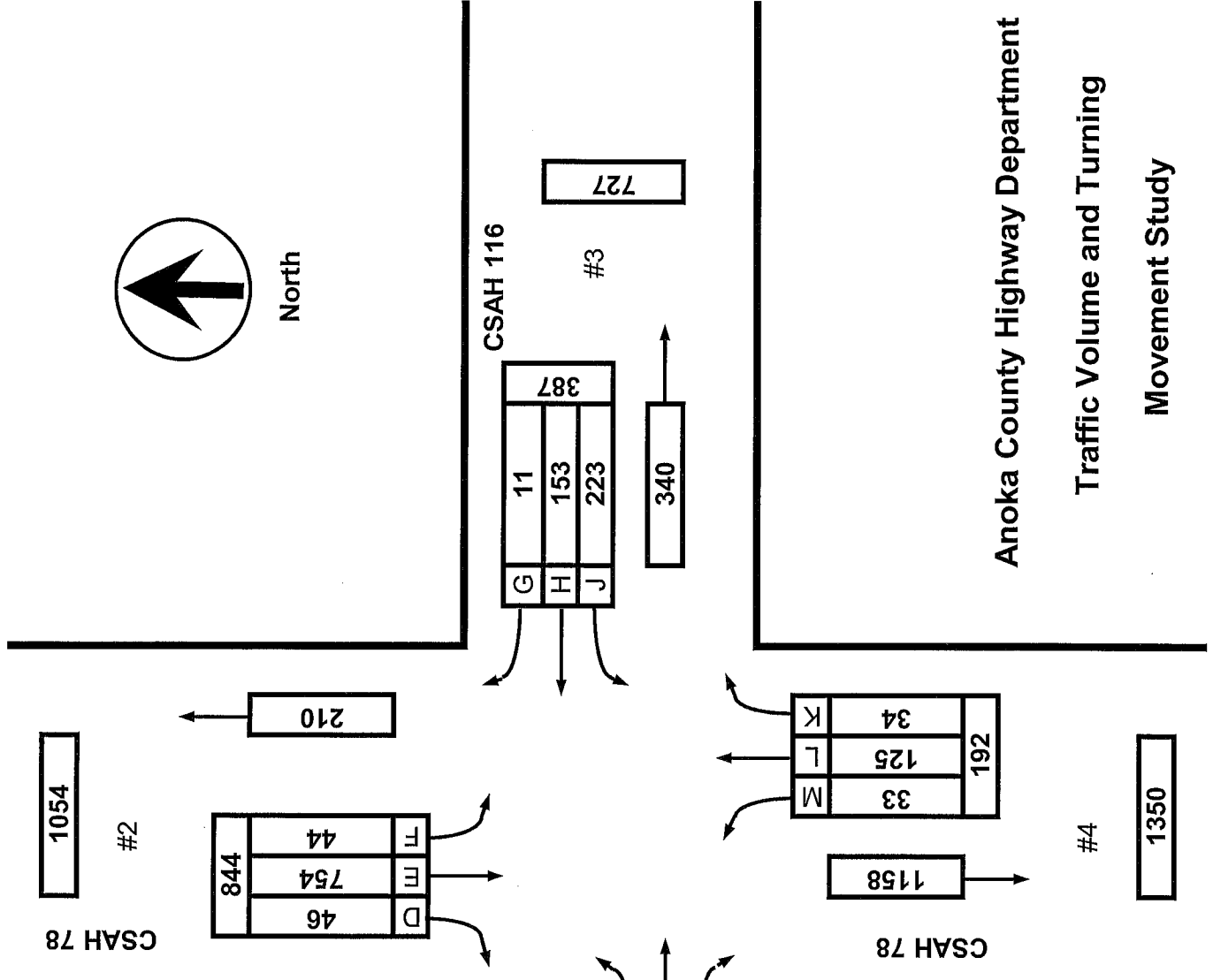
@ CSAH 78 (Hanson Blvd.)

Collection Period : AM PEAK

Hour : 6:30 - 7:30 AM



North



	EXISTING LANES OF APPROACH			TOTAL
	RIGHT TURN LANE	LEFT TURN LANE	THRU LANES	
#1	1	2	2	5
#2	1	2	2	5
#3	1	2	2	5
#4	1	2	2	5

Anoka County Highway Department
 Traffic Volume and Turning
 Movement Study

Date : 07/09/14

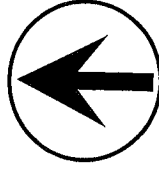
Count Number : TMC1415

Location : CSAH 116 (Bunker Lake Blvd.)

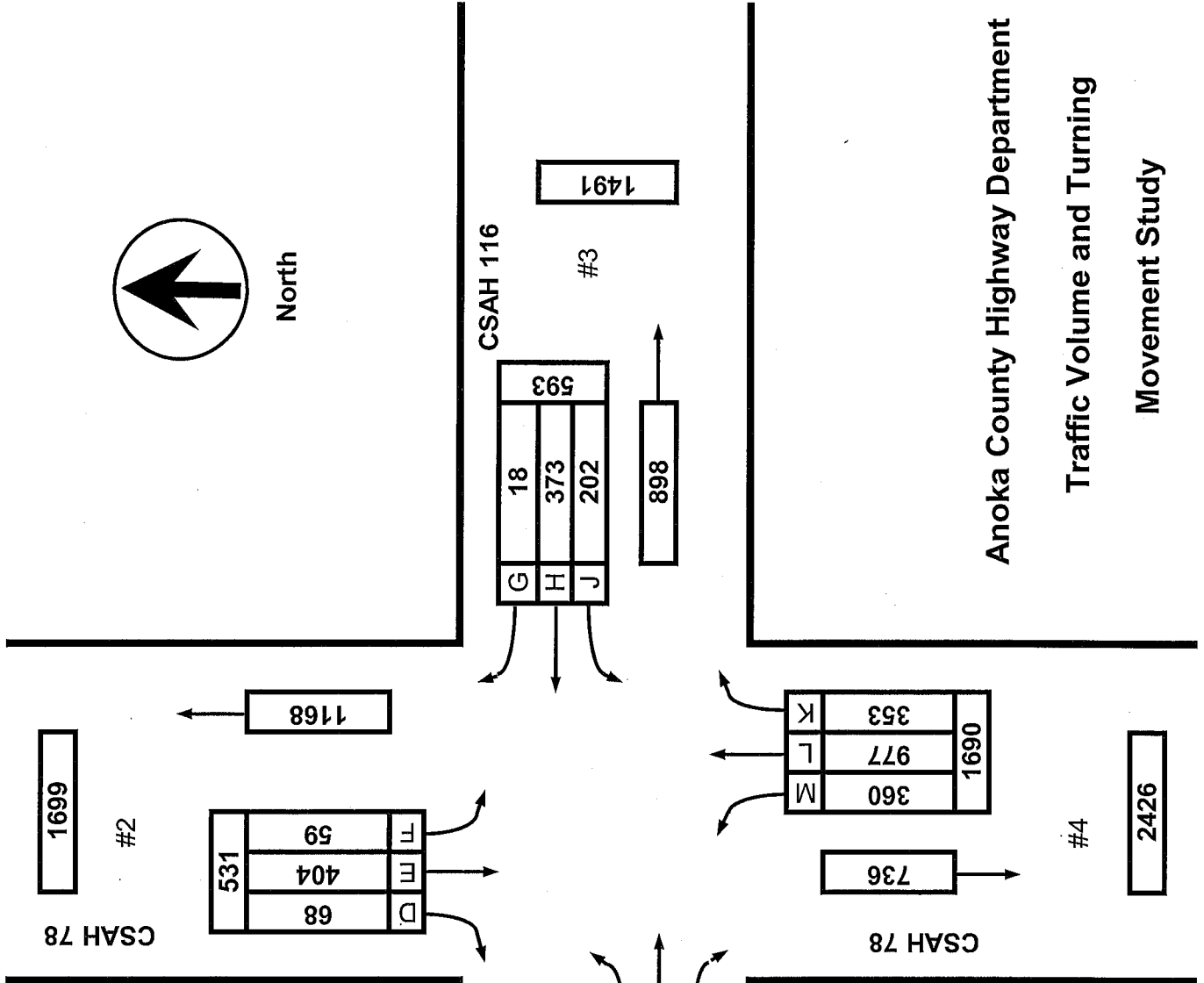
@ CSAH 78 (Hanson Blvd.)

Collection Period : PM PEAK

Hour : 4:45 - 5:45 PM



North



EXISTING LANES OF APPROACH				
	RIGHT TURN LANE	LEFT TURN LANE	THRU LANES	TOTAL
#1	1	2	2	5
#2	1	2	2	5
#3	1	2	2	5
#4	1	2	2	5

Anoka County Highway Department
 Traffic Volume and Turning
 Movement Study



Anoka County Highway Department

Traffic Engineering Section

Traffic Volume and Turning Movement Study

Default Comments
 Weather: Warm and P. Cloudy
 Counter: DB-400
 Study Conducted By: Jack and Steven

File Name : TMC 1415
 Site Code : 14150202
 Start Date : 07/09/2014
 Page No : 2

Groups Printed- Unshifted

Start Time	CSAH 78 Southbound					CSAH 116 Westbound					CSAH 78 Northbound					CSAH 116 Eastbound					Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Heavys	App. Total	Left	Thru	Right	Heavys	App. Total	Left	Thru	Right	Heavys	App. Total	Left	Thru	Right	Heavys	App. Total			
17:45	21	83	19	2	123	46	91	7	4	144	67	202	102	3	371	38	110	27	9	175	18	813	831
Total	66	388	65	6	519	209	367	21	7	597	321	907	363	16	1591	174	482	126	15	782	44	3489	3533
18:00	22	93	15	0	130	41	83	3	1	127	61	172	69	10	302	44	101	38	4	183	15	742	757
18:15	13	78	8	1	99	27	68	0	0	95	42	168	44	0	254	45	97	17	1	159	2	607	609
18:30	11	76	7	1	94	40	79	1	2	120	43	113	56	3	212	37	76	47	2	160	8	586	594
18:45	12	58	15	2	85	42	78	9	2	129	32	138	55	0	225	44	101	26	2	171	6	610	616
Total	58	305	45	4	408	150	308	13	5	471	178	591	224	13	993	170	375	128	9	673	31	2545	2576
19:00	16	73	10	1	99	34	54	1	0	89	35	127	33	2	195	45	81	41	0	167	3	550	553
19:15	4	73	8	0	85	26	69	2	1	97	28	87	40	3	155	43	66	34	1	143	5	480	485
19:30	19	44	10	0	73	25	57	1	0	83	37	105	24	1	166	36	80	33	2	149	3	471	474
19:45	7	82	12	1	101	33	58	5	0	96	43	129	44	1	216	49	80	25	0	154	2	567	569
Total	46	272	40	2	358	118	238	9	1	365	143	448	141	7	732	173	307	133	3	613	13	2068	2081
20:00	7	56	8	0	71	32	56	2	0	90	42	131	25	0	198	43	68	37	1	148	1	507	508
20:15	6	50	8	1	64	35	67	5	2	107	27	89	31	2	147	42	73	27	0	142	5	460	465
20:30	5	68	10	2	83	28	46	4	0	78	31	99	28	0	158	46	79	33	0	158	2	477	479
20:45	15	36	9	0	60	18	34	7	0	59	23	107	38	2	168	45	57	16	1	118	3	405	408
Total	33	210	35	3	278	113	203	18	2	334	123	426	122	4	671	176	277	113	2	566	11	1849	1860
21:00	1	51	10	0	62	15	18	4	1	37	36	89	42	1	167	30	62	16	0	108	2	374	376
21:15	3	48	6	0	57	26	39	1	0	66	30	92	24	0	146	39	69	28	0	136	0	405	405
21:30	1	69	7	1	77	14	41	2	0	57	20	85	20	1	125	21	41	18	0	80	2	339	341
21:45	2	28	5	0	35	19	26	1	0	46	23	71	24	0	118	24	37	4	0	65	0	264	264
Total	7	196	28	1	231	74	124	8	1	206	109	337	110	2	556	114	209	66	0	389	4	1382	1386
Grand Total	760	5883	892	248	7535	2362	3911	248	159	6521	2083	6447	2063	279	10593	2134	4846	2080	301	9060	987	33709	34696
Apprch %	10.1	78.1	11.8			36.2	60	3.8			19.7	60.9	19.5			23.6	53.5	23					
Total %	2.3	17.5	2.6		22.4	7	11.6	0.7		19.3	6.2	19.1	6.1		31.4	6.3	14.4	6.2		26.9	2.8	97.2	

Start Time	CSAH 78 Southbound				CSAH 116 Westbound				CSAH 78 Northbound				CSAH 116 Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 06:00 to 11:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:30																	
06:30	11	210	12	233	63	45	4	112	6	29	4	39	21	55	30	106	490
06:45	10	230	20	260	70	48	1	119	9	27	13	49	17	60	60	137	565
07:00	7	141	6	154	38	27	1	66	7	35	7	49	20	67	49	136	405
07:15	16	173	8	197	52	33	5	90	11	34	10	55	16	80	42	138	480
Total Volume	44	754	46	844	223	153	11	387	33	125	34	192	74	262	181	517	1940
% App. Total	5.2	89.3	5.5		57.6	39.5	2.8		17.2	65.1	17.7		14.3	50.7	35		
PHF	.688	.820	.575	.812	.796	.797	.550	.813	.750	.893	.654	.873	.881	.819	.754	.937	.858

Peak Hour Analysis From 12:00 to 21:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:45																	
16:45	14	99	22	135	39	97	4	140	106	272	92	470	37	114	31	182	927
17:00	18	108	21	147	53	106	7	166	94	252	79	425	42	134	37	213	951
17:15	14	113	16	143	61	81	7	149	82	225	95	402	44	98	29	171	865
17:30	13	84	9	106	49	89	0	138	78	228	87	393	50	140	33	223	860
Total Volume	59	404	68	531	202	373	18	593	360	977	353	1690	173	486	130	789	3603
% App. Total	11.1	76.1	12.8		34.1	62.9	3		21.3	57.8	20.9		21.9	61.6	16.5		
PHF	.819	.894	.773	.903	.828	.880	.643	.893	.849	.898	.929	.899	.865	.868	.878	.885	.947



**ANOKA COUNTY HIGHWAY
PC-WARRANTS
TRAFFIC SIGNAL WARRANT ANALYSIS**

Study Name : TMC 1415
Study Date : 07/24/14
Page No. : 1

Signal Warrants - Summary

Major Street Approaches

Northbound: CSAH 78
Number of Lanes: 2
85% Speed > 40 MPH.
Total Approach Volume: 10,593

Southbound: CSAH 78
Number of Lanes: 2
85% Speed > 40 MPH.
Total Approach Volume: 7,535

Minor Street Approaches

Eastbound: CSAH 116
Number of Lanes: 2

Total Approach Volume: 9,060

Westbound: CSAH 116
Number of Lanes: 2

Total Approach Volume: 6,521

Warrant Summary (Rural values apply.)

Warrant 1 - Eight Hour Vehicular Volumes	Satisfied
Warrant 1A - Minimum Vehicular Volume	Satisfied
Required volumes reached for 16 hours, 8 are needed	
Warrant 1B - Interruption of Continuous Traffic	Satisfied
Required volumes reached for 16 hours, 8 are needed	
Warrant 1 A&B - Combination of Warrants	Satisfied
Required volumes reached for 16 hours, 8 are needed	
Warrant 2 - Four Hour Volumes	Satisfied
Number of hours (16) volumes exceed minimum >= minimum required (4).	
Warrant 3 - Peak Hour	Satisfied
Warrant 3A - Peak Hour Delay	Satisfied
Number of hours (63) volumes exceed minimum >= required (1). Delay data not evaluated.	
Warrant 3B - Peak Hour Volumes	Satisfied
Volumes exceed minimums for at least one hour.	
Warrant 4 - Pedestrian Volumes	Not Evaluated
Warrant 5 - School Crossing	Not Evaluated
Warrant 6 - Coordinated Signal System	Not Evaluated
Warrant 7 - Crash Experience	Not Evaluated
Warrant 8 - Roadway Network	Not Evaluated
Warrant 9 - Intersection Near a Grade Crossing	Not Evaluated



ANOKA COUNTY HIGHWAY

PC-WARRANTS

TRAFFIC SIGNAL WARRANT ANALYSIS

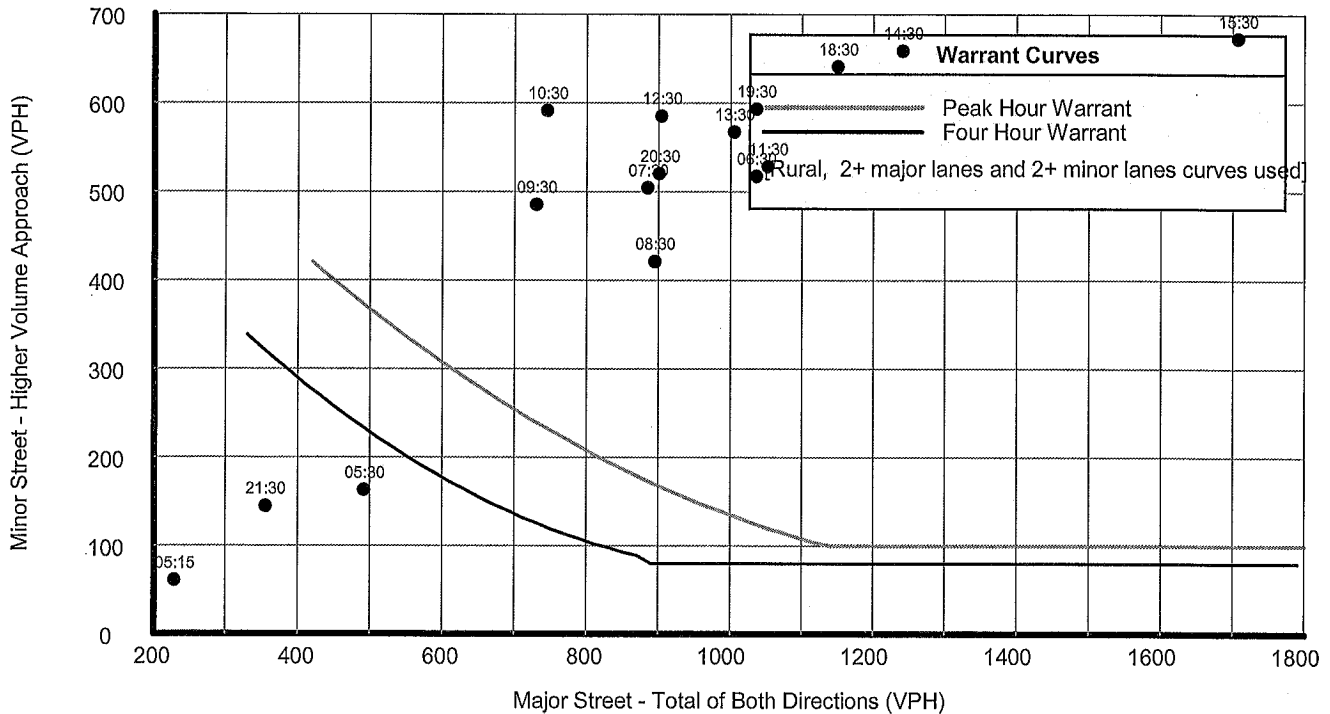
Signal Warrants - Summary

Study Name : TMC 1415

Study Date : 07/24/14

Page No. : 2

16:30
17:30



Analysis of 8-Hour Volume Warrants:

War 1A-Minimum Volume

War 1B-Interruption of Traffic

War 1C-Combination of Warrants

Hour Begin	Major Total	Minor Vol Dir	Maj 420	Min 140	Hour Begin	Major Total	Minor Vol Dir	Maj 630	Min 70	Hour Begin	Major Total	Minor Vol Dir	Maj 504	Min 112
16:30	2,216	769 EB	Yes	Yes	16:45	2,221	789 EB	Yes	Yes	16:45	2,221	789 EB	Yes	Yes
17:30	1,778	740 EB	Yes	Yes	15:45	1,849	711 EB	Yes	Yes	15:45	1,849	711 EB	Yes	Yes
15:30	1,707	673 EB	Yes	Yes	17:45	1,585	677 EB	Yes	Yes	17:45	1,585	677 EB	Yes	Yes
14:30	1,241	659 EB	Yes	Yes	14:45	1,336	662 EB	Yes	Yes	14:45	1,336	662 EB	Yes	Yes
18:30	1,150	641 EB	Yes	Yes	11:45	1,102	542 EB	Yes	Yes	11:45	1,102	542 EB	Yes	Yes
11:30	1,052	528 EB	Yes	Yes	18:45	1,083	630 EB	Yes	Yes	18:45	1,083	630 EB	Yes	Yes
19:30	1,036	593 EB	Yes	Yes	19:45	1,038	602 EB	Yes	Yes	19:45	1,038	602 EB	Yes	Yes
06:30	1,036	517 EB	Yes	Yes	13:45	1,001	598 EB	Yes	Yes	13:45	1,001	598 EB	Yes	Yes
13:30	1,005	567 EB	Yes	Yes	07:45	965	498 EB	Yes	Yes	07:45	965	498 EB	Yes	Yes
12:30	904	585 EB	Yes	Yes	06:45	899	527 EB	Yes	Yes	06:45	899	527 EB	Yes	Yes
20:30	901	520 EB	Yes	Yes	12:45	882	562 EB	Yes	Yes	12:45	882	562 EB	Yes	Yes
08:30	895	421 EB	Yes	Yes	08:45	868	435 EB	Yes	Yes	08:45	868	435 EB	Yes	Yes
07:30	885	504 EB	Yes	Yes	20:45	862	442 EB	Yes	Yes	20:45	862	442 EB	Yes	Yes
10:30	745	591 EB	Yes	Yes	10:45	819	596 EB	Yes	Yes	10:45	819	596 EB	Yes	Yes
09:30	730	485 EB	Yes	Yes	05:45	764	275 W	Yes	Yes	05:45	764	275 W	Yes	Yes
05:30	492	163 W	Yes	Yes	09:45	701	496 EB	Yes	Yes	09:45	701	496 EB	Yes	Yes
21:30	355	145 EB	No	Yes	05:30	492	163 W	No	Yes	05:30	492	163 W	No	Yes
05:15	229	61 W	No	No	05:15	229	61 W	No	No	05:15	229	61 W	No	No
21:45	153	65 EB	No	No	21:45	153	65 EB	No	No	21:45	153	65 EB	No	No
22:45	0	0 W	No	No	22:45	0	0 W	No	No	22:45	0	0 W	No	No
22:30	0	0 W	No	No	22:30	0	0 W	No	No	22:30	0	0 W	No	No
22:15	0	0 W	No	No	22:15	0	0 W	No	No	22:15	0	0 W	No	No
22:00	0	0 W	No	No	22:00	0	0 W	No	No	22:00	0	0 W	No	No
05:00	0	0 W	No	No	05:00	0	0 W	No	No	05:00	0	0 W	No	No



**ANOKA COUNTY HIGHWAY
PC-WARRANTS
TRAFFIC SIGNAL WARRANT ANALYSIS**

Study Name : TMC 1415
Study Date : 07/24/14
Page No. : 1

Multi-Way Stop Warrant Report

Major Street Approaches

Northbound: CSAH 78
Total Approach Volume: 10,593
85% Speed > 40 MPH.

Southbound: CSAH 78
Total Approach Volume: 7,535
85% Speed > 40 MPH.

Minor Street Approaches

Eastbound: CSAH 116
Total Approach Volume: 9,060

Westbound: CSAH 116
Total Approach Volume: 6,521

Warrant Summary

Criteria A - Interim Measure **Not Evaluated**
If traffic signals are justified, stop signs can be installed as an interim measure.

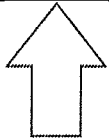
Criteria B - Crash Experience **Not Evaluated**

Criteria C - Minimum Volumes and Delays **Satisfied**
Delay data not evaluated
Required volumes reached for 17 hours, 8 are needed

Criteria D - 80% of Volumes, Delays, and Crashes **Not Evaluated**
Delay data not evaluated
Number of crashes (-1) is less than the minimum required (4).
Required volumes reached for 17 hours, 8 are needed

Analysis of 8-Hour Volume Warrants:

Time	Major	Minor	Crit C			Crit D		
	Total	Total	Major	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
05:30 - 06:30	492	285	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
06:30 - 07:30	1,036	904	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
07:30 - 08:30	885	906	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
08:30 - 09:30	895	828	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
09:30 - 10:30	730	854	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
10:30 - 11:30	745	958	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
11:30 - 12:30	1,052	890	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
12:30 - 13:30	904	948	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
13:30 - 14:30	1,005	1,026	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
14:30 - 15:30	1,241	1,146	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
15:30 - 16:30	1,707	1,157	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
16:30 - 17:30	2,216	1,382	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
17:30 - 18:30	1,778	1,244	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
18:30 - 19:30	1,150	1,076	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
19:30 - 20:30	1,036	969	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
20:30 - 21:30	901	760	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
21:30 - 22:30	355	248	210-Yes	140-Yes	Both	240-Yes	160-Yes	Both
05:15 - 06:15	229	104	210-Yes	140-No	Major	240-No	160-No	No
00:00 - 01:00	0	0	210-No	140-No	No	240-No	160-No	No
00:15 - 01:15	0	0	210-No	140-No	No	240-No	160-No	No
00:30 - 01:30	0	0	210-No	140-No	No	240-No	160-No	No
00:45 - 01:45	0	0	210-No	140-No	No	240-No	160-No	No
01:00 - 02:00	0	0	210-No	140-No	No	240-No	160-No	No
01:15 - 02:15	0	0	210-No	140-No	No	240-No	160-No	No



NORTH

COUNT LOCATION:

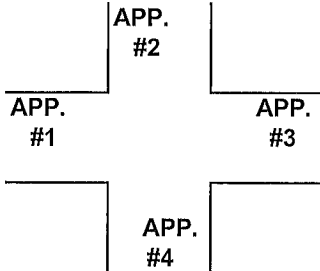
CSAH 116 (Bunker Lake Blvd.)

DATE:

07/17/2014

@ CSAH 78 (Hanson Blvd.)

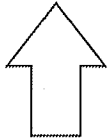
APP. #1 = CSAH 116
APP. #2 = CSAH 78
APP. #3 = CSAH 116
APP. #4 = CSAH 78



- HEAVY VEHICLE- ANY VEHICLE HAVING MORE THAN FOUR TIRES TOUCHING THE PAVEMENT
- A. TRUCKS- A HEAVY VEHICLE INVOLVED PRIMARILY IN THE TRANSPORT OF GOODS OR IN THE DELIVERY OF A SERVICE.
 - B. RV- A HEAVY VEHICLE OPERATED BY A PRIVATE MOTORIST AND INVOLVED IN THE TRANSPORT OF RECREATIONAL EQUIPMENT OR FACILITIES.
 - C. BUSES- A HEAVY VEHICLE INVOLVED IN THE TRANSPORTATION OF GROUPS OF PEOPLE.

TIME	PEDESTRIANS					HEAVY VEHICLES		
	APP. #1	APP. #2	APP. #3	APP. #4	15 MIN TOT	TRUCKS	RV	BUS
6:00-6:15AM						6		1
6:15-6:30			1		1	10		
6:30-6:45			2		2	12		6
6:45-7:00				1	1	4		14
HOURLY TOTAL					4	HOURLY TOTAL		53
7:00-7:15				1	1	9		11
7:15-7:30						9		2
7:30-7:45	2	2		1	5	10		7
7:45-8:00			1		1	10		18
HOURLY TOTAL					7	HOURLY TOTAL		76
8:00-8:15			1		1	12	1	9
8:15-8:30			1		1	11		8
8:30-8:45						12		7
8:45-9:00						14	2	10
HOURLY TOTAL					2	HOURLY TOTAL		86
9:00-9:15						18		13
9:15-9:30						10		14
9:30-9:45	1	1			2	17		7
9:45-10:00				1	1	17		1
HOURLY TOTAL					3	HOURLY TOTAL		97
10:00-10:15		1		1	2	18		5
10:15-10:30						12	1	6
10:30-10:45			1		1	12		5
10:45-11:00						13		7
HOURLY TOTAL					3	HOURLY TOTAL		79
11:00-11:15						13		14
11:15-11:30			1	1	2	19		15
11:30-11:45	1	4	2	1	8	13		3
11:45-12:00		2			2	17		16
HOURLY TOTAL					12	HOURLY TOTAL		110
12:00-12:15						25		16
12:15-12:30	2		2		4	14		7
12:30-12:45						15	1	8
12:45-1:00				1	1	20		11
HOURLY TOTAL					5	HOURLY TOTAL		117
1:00-1:15	2	1			3	21		5
1:15-1:30			1	1	2	13		16
1:30-1:45				2	2	14	1	5
1:45-2:00						16		2
HOURLY TOTAL					7	HOURLY TOTAL		93
					TOTAL		TOTAL	711
					43			

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NORTH

COUNT LOCATION:

CSAH 116 (Bunker Lake Blvd.)

DATE:

07/09/2014

@ CSAH 78 (Hanson Blvd.)

APP. #1 = CSAH 116
APP. #2 = CSAH 78
APP. #3 = CSAH 116
APP. #4 = CSAH 78

APP. #2		
APP. #1	APP. #3	
	APP. #4	

HEAVY VEHICLE- ANY VEHICLE HAVING MORE THAN FOUR TIRES TOUCHING THE PAVEMENT

- A. TRUCKS- A HEAVY VEHICLE INVOLVED PRIMARILY IN THE TRANSPORT OF GOODS OR IN THE DELIVERY OF A SERVICE.
- B. RV- A HEAVY VEHICLE OPERATED BY A PRIVATE MOTORIST AND INVOLVED IN THE TRANSPORT OF RECREATIONAL EQUIPMENT OR FACILITIES.
- C. BUSES- A HEAVY VEHICLE INVOLVED IN THE TRANSPORTATION OF GROUPS OF PEOPLE.

TIME	PEDESTRIANS					HEAVY VEHICLES		
	APP. #1	APP. #2	APP. #3	APP. #4	15 MIN TOT	TRUCKS	RV	BUS
2:00-2:15PM	1			1	2	17		4
2:15-2:30	1	2			3	10		7
2:30-2:45						7		7
2:45-3:00	3			2	5	20		1
HOURLY TOTAL					10	HOURLY TOTAL	73	
3:00-3:15						11		3
3:15-3:30				5	5	16		2
3:30-3:45						13		2
3:45-4:00		1	2	1	4	12		
HOURLY TOTAL					9	HOURLY TOTAL	59	
4:00-4:15	2	1		1	4	9		4
4:15-4:30						7		1
4:30-4:45	1		3		4	11	1	1
4:45-5:00			2		2	8		
HOURLY TOTAL					10	HOURLY TOTAL	42	
5:00-5:15		1		4	5	5	1	
5:15-5:30			3		3	11		
5:30-5:45			3		3	7	1	
5:45-6:00				1	1	15	1	1
HOURLY TOTAL					12	HOURLY TOTAL	42	
6:00-6:15			1		1	8	1	
6:15-6:30						2		
6:30-6:45			1		1	8		
6:45-7:00						6		
HOURLY TOTAL					2	HOURLY TOTAL	25	
7:00-7:15			1		1	3		
7:15-7:30						5		
7:30-7:45						3		
7:45-8:00						2		
HOURLY TOTAL					1	HOURLY TOTAL	13	
8:00-8:15						1		
8:15-8:30						5		
8:30-8:45						2		
8:45-9:00						2		1
HOURLY TOTAL						HOURLY TOTAL	11	
9:00-9:15						2		
9:15-9:30						1		
9:30-9:45						1		
9:45-10:00								
HOURLY TOTAL						HOURLY TOTAL	4	
					TOTAL	87		
						TOTAL	980	

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