Public Works & Transportation
Traffic Engineering and Parking Divisions
David C. Dryer, P.E., City Traffic Engineer and Parking Manager
30 W. Mifflin, Suite 900
P.O. Box 2986
Madison, Wisconsin 53701-2986
Phone: (608) 266-4761
Fax: (608) 267-1158
traffic@cityofmadison.com
www.cityofmadison.com

October 28, 2016

Re: Draft Traffic Signal Priority List

The schedule for the Traffic Signal Priority List (TSPL) is planned as follows:

November 29 **Opportunity offered at Pedestrian/Bicycle/Motor Vehicle Commission (PBMVC) meeting for comments (written or oral) from interested residents to be presented. Room GR-22, City-County Building, 210 Martin Luther King Jr. Blvd, at 5 p.m.**

PBMVC review/discussion of the Traffic Signal Priority List.

Additional data needs to be identified.

January 24 Final Signal Priority List and Action Plan reviewed and adopted by PBMVC.

Please note that the November 29 meeting is your opportunity to offer comments on specific intersections.

Signal warrants are the framework for analyzing and comparing the need for traffic signal control at intersections. Madison's Priority List is an annual effort to evaluate relative needs for traffic signal control at major unsignalized intersections. While all of the data on the Priority List is valuable, additional factors are also considered and evaluated before decisions to install signals are made. For example, an intersection with volumes somewhat below the minimum volumes to meet a signal warrant may still be a prime candidate for signals if volumes are expected to increase significantly in the immediate future. On the flip side, intersections with volumes above the threshold for traffic signals may not be recommended for signals when crash rates or congestion are expected to worsen with signal control.

A copy of the last year's 2015 TSPL is enclosed along with the detailed descriptions of the signal warrants. This information is also available on our web page:
http://www.cityofmadison.com/trafficEngineering/trafficSignals.cfm

Jerry Schippa, Traffic Engineer (261-1969), can respond to your questions or comments regarding technical aspects of the priority list.

Sincerely,

David Dryer, P.E.
City Traffic Engineer and Parking Manager

Enclosures: 2015 Traffic Signal Priority List

CRITERIA FOR TRAFFIC SIGNALS

INTRODUCTION

Difficult deliberations often precede the decision to install a new traffic signal. The *Manual on Uniform Traffic Control Devices* (MUTCD) lists eight different ways that a traffic signal can be "justified." These eight different ways will be called "criteria" in this report. In the *MUTCD*, the criteria are called warrants. Regardless of the terminology, the eight criteria provide a nationally used, systematic method to evaluate the need for traffic signals. Meeting just one of these eight criteria can be justification for installing signals. However, many other factors need to be considered. Addressing travel needs by alternative means without installing signals may be desirable at some locations even when one or more of the eight signal criteria are met.

PROCESS

The City Traffic Engineering Division will use the eight criteria published as warrants in the *MUTCD*. Traffic will be counted, typically by automatic machine methods that segregate traffic for each approach. Locations that appear close to meeting one or more criteria will receive more intense study, including manual counts that segregate traffic by type (motor vehicle, bicycle, pedestrian) and movement (left turn, right turn, straight through); vehicle delay study; field review of existing intersection conditions; etc.

Special Considerations:

(1) When a manual count has been made, on-street bicycle traffic will be included in vehicle volumes before comparing to the criteria.

(2) Pedestrian volume will generally include those crossing at the intersection and within one-half block of the intersection. The adequacy of alternative pedestrian crossings (safety, travel route, etc.) to meet pedestrian needs will be considered.

(3) Where "side street" right-turn traffic exceeds 25% of approach volume, all or a portion of right-turn traffic will be deducted before the volumes are compared to the criteria.

(4) Intersection topography and geometry will be considered.

(5) The effect and influence of nearby roadway features will be considered. Such features would include driveways, intersections, railroad crossings, etc.

(6) Future traffic, especially in a growing area, will be considered.

(7) Traffic redirection resulting from a signal will be considered. This especially includes the impact on neighborhood streets of installing and not installing the signal.

(8) Benefits to land uses having access to a potential signalized intersection need to be considered.

(9) The effects of new signals for travel along an arterial highway need to be considered.

PRIORITY LIST AND COMMENTARY

A rank order priority list will be prepared for review by the Pedestrian/Bicycle/Motor Vehicle Commission. Staff will prepare commentary on those intersections of most interest to the Commission. The commentary will cover special consideration items listed earlier and other issues.

TRAFFIC SIGNAL WARRANTS: PARAPHRASED DESCRIPTION

Warrant #1-A: Minimum Vehicular Volume

The "side street" traffic volume is the principal reason for signals under this warrant. Typical minimum volume thresholds needed for at least 8 hours:

Main Street: 600 vehicles each hour
Side Street: 200 vehicles each hour

Warrant #1-B: Interruption of Continuous Traffic

The high volume on the major street and lack of traffic bunching does not allow enough gaps for side street traffic. Typical minimum volume thresholds needed for at least 8 hours:

Main Street: 900 vehicles each hour
Side Street: 100 vehicles each hour

Warrant #1-C: Combination of Warrants

For exceptional cases, warrants 1-A and 1-B are each over 80% of the minimum threshold volumes.

Warrant #2: Four-hour Volumes

Traffic volumes for four hours fall above the threshold lines on the warrant chart. Traffic concentrated within a four-hour period justifies signal control.

Warrant #3-A: Peak-hour Delay

The side street traffic needs to wait too long on average during a one-hour period. Typical minimum thresholds:

- Five vehicle-hours of delay for a two-lane side street approach, and
- Side street volume exceeds 150 vehicles during the same hour, and
- Total intersection traffic exceeds 800 vehicles during the same hour.

Warrant #3-B: Peak-hour Volume

Traffic volumes for one hour fall above the threshold lines on the warrant chart. Traffic concentrated within a one-hour period justifies signal control.

Warrant #4: Minimum Pedestrian Volume

The high volume and lack of traffic bunching on the major street does not allow enough gaps for pedestrians to cross. Typical minimum volume thresholds needed are as follows:

- 100 pedestrians crossing each hour for any four hours.
- The frequency of gaps in major street traffic average less than one per minute.

The study location must be suitable for maintaining existing platoons of vehicles created by nearby signals.

Warrant #5: School Crossing

The high volume and lack of traffic bunching on the major street does not allow enough gaps for students to cross. Adequate gaps occur less frequently than once a minute or once each signal cycle when adjacent signals create gaps.

Warrant #6: Coordinated Signal System

Traffic signal control is needed to keep traffic bunched (i.e., to keep platoons from getting too spread out). Traffic bunching or platooning is helpful in reducing speeding and allowing gaps at non-signalized intersections.

Warrant #7: Crash Experience

Traffic signal control is determined to be the safer control type. Other measures to maintain safety have not proven effective. This is one of the most controversial warrants to justify signal control. Typical minimum thresholds:

- Five or more accidents in the past 12 months of a type that could theoretically have been prevented if signal control had been in operation.
- Warrants 1-A, 1-B or 4 are at least 80% met.
- Progressive traffic flow would not be significantly affected.

Warrant #8: Roadway Network Warrant

Signals are needed to keep traffic on the major streets. Typical minimum thresholds:

- Vehicle volume of 1000 vehicles during the peak hour.
- Projected volumes will meet warrants 1, 2, or 3 within five years.

To request a copy of the section on Traffic Signal Warrants in the 2009 edition of the MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, call Brian Smith at 261-9625.

2015 TRAFFIC SIGNAL PRIORITY LIST

In accordance with criteria adoped by the transportation commission and common council

			WARRANT 1-A				WARRANT 1-B				CRASHES							
		Overall %	Major Street		Minor Street		Major Street		Minor Street		# With Property	# With			Peak	Peak		
	Location	Below Warrant	# Hrs.	% Met	# Hrs.	% Met	# Hrs.	% Met	# Hrs.	% Met	Damage Only	Personal Injuries	Crash Rate	Pedestrian Warrant	Hour Warrant A	Hour Warrant B	4 Hour Warrant	Comments
	Side Street Stop Controlled Intersections Studied but Not Meeting the Minimum Numerical Requirements of either Warrant 1-A or Warrant 1-B.														% Met			
1	**Bedford & North Shore (D-4)**	-12	15	224	0	44	13	149	0	88	0	1	0.23	N	-	N	N-0 HRS	D E
2	**Junction and Driveway at Target (D-9)**	-13	13	156	0	62	8	87	9	132	0	0	0	N	-	N	N-2 HRS	D E
3	**McKee (CTH PD) & Muir Field (D-7)**	-16	14	129	4+	51	8	83	8+	117	0	0	0.19	N	-	Y	Y-5 HRS	F
4	**Cottage Grove (CTH BB) & Thompson (D-3, 16)**	-16	13	154	0	44	6	92	3	92	1	0	0.13	N	11	N	N-3 HRS	F
5	**Mineral Point & Yellowstone (D-19)**	-28	17	306	0	36	15	204	1+	72	3	0	0.08	N	9	Y	N-1 HRS	A B E F
6	**Fordem & Sherman (D-12)**	-33	12	114	0	39	4	113	5	67	0	0	0.2	N	-	N	N-0 HRS	A C E
7	**Schroeder & Struck (D-19, 20)**	-33	6	117	2+	64	1	67	6+	157	2	0	0	N	-	N	N-2 HRS	
8	**Gammon, Longmeadow & Stonefield (D-19)**	-34	13	162	0	33	7	108	1+	66	0	0	0	N	-	N	N-0 HRS	D E
9	**Edgewood & Monroe (D-13)**	-37	13	158	0	32	11	105	0	63	1	1	0.17	N	-	N	N-0 HRS	A B C E F
10	**DickInson & East Washington (D-2, 6)**	-37	19	368	0	32	17	245	1	63	0	0	0.10	N	-	Y	N-2 HRS	A E
11	**Butler & Gorham (D-2)**	-39	17	209	0	31	14	139	1	61	0	0	0.16	N	-	N	N-1 HRS	B
12	**Packers & Sixth (D-12)**	-40	16	350	0	30	14	233	1	60	0	0	0	N	-	N	N-0 HRS	E
13	**Mesta & Thompson (D-15, 17)**	-40	10	105	0	33	5	84	0	76	0	0	0	N	-	N	N-0 HRS	F
14	**Milwaukee-Wittwer (D-3, 15)**	-42	14	153	0	29	10	102	1	58	0	0	0.33	N	-	N	N-0 HRS	
15	**Franklin & Johnson (D-2)**	-42	15	234	0	29	11	94	0	64	0	0	0.24	N	-	N	N-0 HRS	
16	**Doty & Pickney (D-4)**	-43	12	142	0	32	6	80	1	77	0	1	0.19	N	-	N	N-0 HRS	
17	**Old Middleton & Rosa (D-11, 19)**	-44	11	110	2	56	5	73	6+	42	0	0	0	N	-	N	N-2 HRS	
18	**Atwood, Miller & Waubesa (D-6)**	-44	16	241	0	28	12	161	0	56	0	0	0	N	-	N	N-0 HRS	A E
19	**Appleton & Fish Hatchery (D-13)**	-47	15	186	0	27	13	127	0	53	3	0	0	N	-	N	N-0 HRS	A E F
20	**Colony & Gammon (D-9, 19)**	-47	14	211	0	27	12	141	2	53	3	0	0.28	N	-	N	N-1 HRS	E
21	**Odana & Medical Circle (D-19)**	-48	14	220	0	26	11	147	0	52	0	0	0.15	N	-	N	N-0 HRS	D
22	**Blackhawk & Pleasant View (D-9)**	-49	13	138	0	29	6	92	4+	59	0	0	0.30	N	20	N	N-2 HRS	C D F
23	**Lien & Thierer (D-17)**	-49	2	82	2	69	0	49	8+	162	0	0	0.26	N	-	N	N-0 HRS	
24	**Elderberry & Junction (D-9)**	-50	13	191	0	26	11	95	0	55	0	0	0	N	-	Y	Y-8 HRS	E
25	**Aberg & Huxley (D-12)**	-51	9	123	0	33	2	82	3	67	0	0	0	N	-	N	N-0 HRS	F
26	**Ray-O-Vac & Schroeder (D-19, 20)**	-52	7	93	0	43	1	62	4	86	0	0	0	N	-	N	N-0 HRS	
27	**Milwaukee & Waubesa (D-6)**	-52	6	91	0	41	0	54	5	94	0	0	0.00	N	-	N	N-0 HRS	
28	**Milwaukee & Schenk (D-15)**	-53	14	170	0	24	11	113	4	47	0	0	0.16	N	-	N	N-1 HRS	E
29	**Carroll & Doty (D-4)**	-53	12	135	0	25	5	102	3	47	1	0	0	N	-	Y	N-3 HRS	E
30	**Sherman & Trailsway (D-12)**	-53	11	151	0	31	3	82	0	65	1	0	0	N	-	N	N-0 HRS	
31	**Bassett & Dayton (D-4)**	-54	2	84	0	44	0	58	6+	88	0	1	0.50	N	-	N	N-1 HRS	E
32	**Prairie & Raymond (D-20)**	-54	14	360	0	25	9	109	2	46	3	0	0.6	N	17	N	N-0 HRS	F
33	**Heartland & Old Sauk (D-9)**	-55	4	67	4+	68	1	45	6+	300	0	0	0	N	-	N	N-2 HRS	
34	**Carroll & Dayton (D-4)**	-56	5	95	0	39	0	90	4+	54	1	0	0	N	-	N	N-0 HRS	E F
35	**Blount & Williamson (D-6)**	-56	15	277	0	22	14	185	0	44	2	0	0	N	-	N	N-1 HRS	A E F

			WARRANT 1-A				WARRANT 1-B				CRASHES							
		Overall %	Major Street		Minor Street		Major Street		Minor Street		# With Property	# With			Peak	Peak		
	Location	Below Warrant	# Hrs.	% Met	# Hrs.	% Met	# Hrs.	% Met	# Hrs.	% Met	Damage Only	Personal Injuries	Crash Rate	Pedestrian Warrant	Hour Warrant A	Hour Warrant B	4 Hour Warrant	Comments
36	**Gammon, McKenna & New Washburn (D-1)**	-57	16	214	0	22	12	125	0	43	1	0	0	N	-	N	N-0 HRS.	C F
37	**Marquette & Milwaukee (D-6)**	-57	13	162	0	23	7	123	0	41	0	0	0	N	-	N	N-0 HRS	F
38	**Gilman & Wisconsin (D-2)**	-57	0	65	2	54	0	43	8+	108	0	0	0.27	N	-	N	N-0 HRS	E
39	**Commerce & Watts (D-9)**	-58	7	91	0	41	1	60	4	82	1	0	0.21	N	-	N	N-0 HRS	D F
40	**Milwaukee & Oak (D-6)**	-59	6	91	0	41	0	60	0	81	0	0	0	N	24	N	N-0 HRS	F
41	**American Parkway & Tancho (D-17)**	-60	7	143	0	28	1	40	3+	161	0	0	0	N	5	N	N-0 HRS	D E F
42	**Knickerbocker & Monroe (D-13)**	-61	14	289	0	19	12	192	0	39	0	0	0	N	-	N	N-0 HRS	A D E
43	**Odana Lane & Odana Rd (D-10)**	-61	14	149	0	20	11	99	0	40	0	0	0	N	-	N	N-0 HRS	
44	**Monona (CTH BB), Panther & Tompkins (D-16)**	-62	15	294	0	21	14	175	0	38	0	0	0	N	-	N	N-0 HRS	A B E F
45	**Northport & School (D-18)**	-63	13	250	0	19	13	167	0	37	1	0	0.56	N	-	N	N-0 HRS	B E
46	**Knutson-Northport (D-18)**	-64	13	197	0	18	13	131	0	36	1	0	0.26	N	-	N	N-0 HRS	E F
47	**Few & Williamson (D-6)**	-64	15	181	0	20	10	89	0	47	0	0	0	N	-	N	N-0 HRS	A E
48	**East Park Blvd & East Terrace Dr (D-17)**	-64	4	54	3	69	0	36	6+	137	1	0	0.32	N	-	N	N-0 HRS	D F
49	**Carver & Fish Hatchery (CTH D) (D-14)**	-65	17	270	0	18	14	180	0	35	0	0	0.09	N	12	N	N-0 HRS	D
50	**Odana & West Platte (D-19)**	-68	14	214	0	16	11	142	0	32	3	1	0.4	N	-	N	N-0 HRS	A B D E F
51	**Fairchild & Mifflin (D-4)**	-68	7	98	0	34	0	65	3	67	0	0	0.26	N	-	N	N-0 HRS	
52	**Big Sky, Mineral Point & Tree (D-9)**	-68	16	400	0	16	16	267	0	32	0	0	0.08	N	-	N	N-0 HRS	A C E F
53	**Cottage Grove (CTH BB) & Mc Lean (D-3, 16)**	-69	11	109	0	29	5	73	0	58	0	0	0.23	N	-	N	N-0 HRS	
54	**Gorham & Henry (D-2, 4)**	-69	16	229	0	16	15	153	0	31	1	0	0	N	-	N	N-0 HRS	E
55	**Bedford & Main (D-4)**	-69	0	57	0	55	0	31	+5	127	0	0	0.35	N	-	N	N-0 HRS	
56	**Badger & Cypress (D-14)**	-72	1	90	0	33	0	49	3+	79	0	0	0	N	-	N	N-0 HRS	
57	**Mandrake & Northport (D-18)**	-73	16	204	0	14	15	136	0	27	0	0	0	N	-	N	N-0 HRS	
58	**Gilbert & Whitney (D-10, 20)**	-73	16	192	0	13	12	128	0	27	0	1	0.13	N	-	N	N-0 HRS	A D E F
59	**Mineral Point & Owens (D-11)**	-74	14	115	0	14	12	134	0	26	0	1	0	N	-	N	N-0 HRS	ABE
60	**MLK Jr. & Wilson (D-4)**	-76	4	69	0	39	0	46	4	78	0	0	0.00	N	-	N	N-0 HRS	
61	**Packers & Schlimgen (D-12)**	-77	19	698	0	11	18	465	0	23	2	0	0	N	-	N	N-0 HRS	C E F
62	**Gammon , Ponwood & Sawmill (D-19)**	-77	13	137	0	16	7	91	0	32	0	0	0	N	-	N	N-0 HRS	
63	**Kelab & Segoe (D-11)**	-79	8	99	0	22	0	66	0	44	1	0	0	N	-	N	N-0 HRS	E F
64	**Eau Claire & Old Middleton (D-11, 19)**	-79	13	122	0	16	6	80	0	41	0	1	0	N	-	N	N-0 HRS	
65	**Blue Ridge & Old Sauk (D-19)**	-80	9	161	0	20	2	70	0	42	0	1	0	N	-	N	N-0 HRS	
66	**Cottage Grove & Ellen (D-3, 16)**	-81	6	83	0	29	2	70	6	49	0	0	0	N	-	N	N-0 HRS	
67	**East Pass, Maple Grove & Westin (D-7)**	-82	4	80	0	33	2	53	2	65	1	1	0.86	N	-	N	N-0 HRS	
68	**Blackhawk, Erdman & University (CTH MS) (D-11)**	-82	19	671	0	9	17	447	0	18	1	3	0	N	-	N	N-0 HRS	A D E F
69	**McKenna & Pilgrim (D-1, 20)**	-82	6	82	0	36	2	64	1	49	0	0	0	N	-	N	N-0 HRS	
70	**Gammon & Farmington Way (D-9, 19)**	-82	14	220	0	11	10	122	0	18	0	0	0.21	N	-	N	N-0 HRS	

		Overall %	WARRANT 1-A				WARRANT 1-B				CRASHES							
			Major Street		Minor Street		Major Street		Minor Street		# With Property	# With			Peak	Peak		
	Location	Below Warrant	# Hrs.	% Met	# Hrs.	% Met	# Hrs.	% Met	# Hrs.	% Met	Damage Only	Personal Injuries	Crash Rate	Pedestrian Warrant	Hour Warrant A	Hour Warrant B	4 Hour Warrant	Comments
71	**Johnson & Sixth (D-12)**	-83	0	75	0	34	0	51	0	66	0	0	0.58	N	-	N	N-0 HRS	
72	**Commercial & Mesta (D-3, 15, 17)**	-83	5	88	0	29	0	59	0	57	0	0	0	N	-	N	N-0 HRS	
73	**Scott & Packers (CV) (D-12)**	-84	13	130	0	15	4	87	0	29	0	0	0.19	N	-	N	N-0 HRS	
74	**Mineral Point & Westmorland (D-11)**	-85	14	171	0	8	12	114	0	15	0	0	0.15	N	-	N	N-0 HRS	F
75	**Milwaukee & Swanton (D-3, 15)**	-85	10	108	0	15	2	72	0	31	0	0	0	N	-	N	N-0 HRS	A E F
76	**Hammersley & McKenna (D-1, 20)**	-85	11	153	0	7	8	102	0	15	1	0	0.15	N	20	N	N-0 HRS	F
77	**Roth & Sherman (D-12)**	-86	14	121	0	7	11	107	0	14	0	0	0	N	-	N	N-0 HRS	F
78	**Cottage Grove & McClellan (CTH BB) (D-3, 16)**	-88	6	94	0	18	2	65	0	29	0	0	0	N	-	N	N-0 HRS	
79	**Regent & Roby (D-5)**	-88	13	190	0	7	8	106	0	12	0	0	0	N	-	N	N-0 HRS	
80	**Corporate Dr & Blettner (D-15)**	-95	3	68	0	30	0	45	3	60	0	0	0	N	-	N	N-0 HRS	
81	**Odana & Segoe (D-10)**	-95	12	103	0	5	5	83	0	16	0	0	0	N	-	N	N-0 HRS	
82	**American Pkwy & American Family Dr (D-17)**	-99	3	81	1	20	0	54	2+	40	2	0	0.51	N	-	N	N-0 HRS	D E F
83	**Buckeye (CTH AB) & Thompson (D-16)**	-104	3	72	0	24	0	48	2	47	0	0	0	N	-	N	N-0 HRS	
84	**Hickory & Olin (D-13)**	-117	1	71	0	12	0	44	0	25	0	0	0	N	-	N	N-0 HRS	
85	**Marston & Sherman (D-2)**	-122	3	67	0	11	0	41	0	25	0	0	0	N	-	N	N-0 HRS	
86	**Jeffy & Midtown (D-1)**	-127	1	59	0	14	0	40	0	27	1	0	0	N	-	N	N-0 HRS	
87	**Midtown, Hawks Landing & Hawks Ridge (D-1)**	-129	0	47	0	20	0	29	0	42	0	0	0.53	N	-	N	N-0 HRS	
88	**Mayfield & Sherman (D-12, 18)**	-132	1	64	0	4	0	40	0	13	0	0	0	N	-	N	N-0 HRS	
	ALL-WAY STOP INTERSECTIONS STUDIED																	
1	**Highland, Regent & Speedway (D-5, 13)**	27	13	141	11	127	5	94	16	254	1	0	0.28	N	-	Y	Y-9 HRS	B C
2	**Swanton & Thompson (D-3, 15)**	-22	2	78	8+	153	0	52	8+	307	0	0	0	N	-	Y	Y-4 HRS	C
3	**Old Middleton & Old Sauk (D-11, 19)**	-34	4	89	2	77	1	59	8+	154	0	0	0	N	-	N	Y-4 HRS	B F
4	**American Pkwy, Hoepker & Rattman (D-17)**	-38	3	62	7+	101	0	47	8+	306	0	1	0.23	N	-	Y	Y-6 HRS	
5	**Milwaukee-Sprecher (D-3)**	-32	8	118	3	61	3	68	8+	109	0	0	0.25	N	-	N	N-3 HRS	
6	**Buckeye (AB) & Vondron (D-16)**	-50	5	70	3	70	0	50	7+	124	1	0	0	N	-	N	N-0 HRS	
7	**High Point & Midtown (D-1)**	-54	0	48	6+	98	0	33	7+	217	0	0	0	N	-	Y	N-1 HRS	
8	**Commercial & Nakoosa (D-15)**	-78	0	33	0	55	0	22	7+	110	0	0	0	N	-	N	N-0 HRS	
	TWO-WAY STOP INTERSECTIONS STUDIED AND MEETING THE MINIMUM NUMERAL REQUIREMENTS OF EITHER WARRANT 1-A OR WARRANT 1-B.																	
1	**Carroll & Gorham (D-2, 4)**	17	17	239	0	59	15	159	11	117			0.52	N	-	Y	Y-7 HRS	E F

Warrant 1-A: Eight-Hour Vehicular Volume: Condition A-Minimum Vehicular Volume

Warrant 1-B: Eight0Hour Vehicular Volume: Condition B-Interruption of Continuous Traffic

Y=Yes N=No

Accident Rate: Number of accidents "preventable" with traffic signals per million entering vehicles.

Peak Hour Warrant A: Total vehicle hours of delay is listed for intersections where delay data was collected.

4-Hour Warrant: Number of hours shown are those that exceed the volume thresholds.

The intersections that do not meet the minimum numerical Warrant are listed in order of "closeness" to meeting either Warrant 1-A or Warrant 1-B.

Both the Major and Minor street volumes must meet 100% of the minimum Warrant in order to be classified as "meeting the minimum numerical Warrant."

Key to Comments:

A = Signal coordination problems

B = Geometric problems

C = Intersection reconstruction needs to be considered.

D = Part of cost could be assessed to benefitting property owners.

E = Coordination with adjacent signals is necessary.

F = "Side Street" volumes adjusted for high right-turn percentage.