



April 23, 2024

Amy Kruse
Dreams Properties LLC
2020 Tower Road
Aurora, CO 80011

2024-08-30 (DJK) reviewed, minor comments:
- verify size of intended warehouse, existing building said not being modified is only 1,448 sf
- correct North Arrow on Fig 2

- Area Updated
- Figure Updated

**RE: 2020 Tower Road / Traffic Generation Analysis and Signal Warrant Analysis
Aurora, Colorado**

Dear Amy,

SM ROCHA, LLC is pleased to provide traffic generation information for the development entitled 2020 Tower Road. This development is located at the northeast corner of the intersection of Tower Road and E Montview Boulevard in Aurora, Colorado.

The intent of this analysis is to present traffic volumes likely generated by the proposed development and consider potential impacts to the adjacent roadway network. This analysis is also provided to conduct a signal warrant analysis for the intersection of Tower Road and E Montview Boulevard.

The following is a summary of analysis results.

Site Description and Access

Site Plan with application only indicates 1,448 sf building

Land for the development is currently occupied by an existing building. This site is surrounded by a mix of industrial and residential uses. The redevelopment project entails the reuse of the existing structures for an approximate 1,300 square foot office. It is noted that no new building construction is proposed, however a paved parking area will be provided to support the existing structures.

The concrete pad next to the existing storage was included, however this analysis has been updated to only include the building.

Proposed access to the development is provided via one full-movement access onto E Montview Boulevard (referred to as Site Access). With the proposed redevelopment, the current two full-movement accesses onto Tower Road are anticipated to be closed.

General site and access locations are shown on Figure 1.

A site plan, as prepared by Outside Dreams Landscape Design & Construction, is shown on Figure 2. This plan is provided for illustrative purposes only.



2020 TOWER ROAD
Traffic Generation Analysis

SM ROCHA, LLC
Traffic and Transportation Consultants

Figure 1
SITE LOCATION

Vehicle Trip Generation

Standard traffic generation characteristics compiled by the Institute of Transportation Engineers (ITE) in their report entitled Trip Generation Manual, 11th Edition, were applied to the proposed land use in order to estimate the average daily traffic (ADT) and peak hour vehicle trips. A vehicle trip is defined as a one-way vehicle movement from point of origin to point of destination.

Table 1 presents average trip generation rates for the development area proposed. Use of average trip generation rates presents a conservative analysis. ITE land use codes 150 (Warehousing) and 712 (Small Office Building) were used for analysis because of their best fit to the proposed land uses.

Table 1 – Trip Generation Rates

ITE CODE	LAND USE	UNIT	TRIP GENERATION RATES						
			24 HOUR	AM PEAK HOUR			PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
150	Warehousing	KSF	1.71 ✓	0.13	0.04	0.17 ✓	0.05	0.13	0.18 ✓
712	Small Office Building	KSF	14.39	1.37	0.30	1.67	0.73	1.43	2.16

Key: KSF = Thousand Square Feet Gross Floor Area.
Note: All data and calculations above are subject to being rounded to nearest value.

Table 2 summarizes the projected ADT and peak hour traffic volumes likely generated by the land use area proposed.

Verify size being used

Building area updated

Table 2 – Trip Generation Summary

ITE CODE	LAND USE	SIZE	TOTAL TRIPS GENERATED						
			24 HOUR	AM PEAK HOUR			PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
150	Warehousing	3.4 KSF	6	1	0	1	0	1	1
712	Small Office Building	1.3 KSF	18	2	0	2	1	2	3
<i>Total:</i>			24	3	0	3	1	3	4

Key: KSF = Thousand Square Feet Gross Floor Area.
Note: All data and calculations above are subject to being rounded to nearest value.

As Table 2 shows, the development area has the potential to generate approximately 24 daily trips with 3 of those occurring during the morning peak hour and 4 during the afternoon peak hour.

Adjustments to Trip Generation Rates

A development of this type is not likely to attract trips from within area land uses nor pass-by or diverted link trips from the adjacent roadway system, therefore no trip reduction was taken in this analysis.

Trip Generation Distribution and Assignment

Overall directional distribution of site-generated traffic was determined based on existing area land uses, the site location within the City, and the available roadway network. Site-generated traffic is anticipated to be distributed through the proposed access. Distribution along Tower Road is general and assumed to be 40 percent to/from the north and 60 percent to/from the south.

Traffic assignment is how the site-generated and distributed trips are expected to be loaded on the roadway network. Applying assumed trip distribution patterns to site-generated traffic provides the peak hour trip volume assignments for the proposed access. These volumes are then divided further upon travel through adjacent roadways serving the overall development area. Table 3 below uses the trip generation volumes from Table 2 and denotes projected traffic volumes at the proposed access and adjacent intersection.

Table 3 – Site Generated Trip Assignment

DEVELOPMENT ACCESS TURNING MOVEMENTS	AM PEAK HOUR		PM PEAK HOUR	
	Inbound Volume	Outbound Volume	Inbound Volume	Outbound Volume
Site Access / E Montview Boulevard				
Eastbound Left	3	-	1	-
Southbound Right	-	0	-	3
Tower Road / E Montview Boulevard				
Westbound Left	-	0	-	2
Westbound Right	-	0	-	1
Northbound Right	2	-	1	-
Southbound Left	1	-	0	-

Development Impacts

As Tables 2 and 3 show, there is an increase in peak hour traffic volumes anticipated for the proposed development, however these additional volumes are considered minor. These minor volumes are not likely to negatively impact operations of Tower Road nor other adjacent roadways or intersections.

Signal Warrant Analysis

A signal warrant analysis was conducted for the Tower Road intersection with E Montview Boulevard in order to review potential for traffic signal control. Signal Warrants were performed for Year 2024 existing traffic volumes, as well as for existing volumes with the addition of site generated traffic.

Average daily traffic (ADT) volumes were collected over a 72-Hour period on Tower Road and E Montview Boulevard. Counts were collected beginning on Thursday, March 28, 2024. Traffic count data is included for reference in Attachment A.

Warrant analysis was performed using Warrant 1 – Eight-Hour Vehicular Volume, Warrant 2 – Four-Hour Vehicular Volumes, and Warrant 3 – Peak Hour, from the Manual on Uniform Traffic Control Devices (MUTCD)¹. Daily Traffic patterns for the proposed land use were referenced from the ITE Trip Generation Manual, which includes percentages of daily traffic on a per hour basis for the proposed land use.

Analysis results conclude that, under existing Year 2024 conditions, the study intersection was found to be below the minimum vehicle volumes required to meet Warrant 1, Warrant 2, and Warrant 3, for the installation of a traffic signal at Tower Road and E Montview Boulevard. With the addition of site generated traffic from the proposed development, the study intersection continues to be below the minimum volumes to meet Warrant 1, Warrant 2, and Warrant 3. Warrant study worksheets are provided for reference in Attachment B.

¹ Manual on Uniform Traffic Control Devices, 2009 Edition, Federal Highway Administration, May 2012.

Conclusion

This analysis assessed traffic generation for the 2020 Tower Road development and potential impacts to the adjacent roadway network.

It is our professional opinion that the proposed site-generated traffic is expected to create no negative impact to traffic operations for the surrounding roadway network and proposed site access, nor at the Tower Road intersection with E Montview Boulevard. Analysis of site-generated traffic concludes that proposed development traffic volumes are minor.

Traffic signal warrants conclude that the intersection of Tower Road and E Montview Boulevard will likely not meet warrants for installation of a traffic signal upon buildout of the proposed development.

We trust that our findings will assist in the planning and approval of the 2020 Tower Road development. Please contact us should further assistance be needed.

Sincerely,

SM ROCHA, LLC
Traffic and Transportation Consultants



Zac Trotter, EIT
Traffic Engineer



Fred Lantz, PE
Traffic Engineer

ATTACHMENT A
Traffic Count Data

Start Time	28-Mar-24 Thu	NB	SB	Total
12:00 AM		103	299	402
01:00		53	166	219
02:00		169	134	303
03:00		139	207	346
04:00		257	210	467
05:00		418	409	827
06:00		764	805	1569
07:00		634	1102	1736
08:00		649	974	1623
09:00		597	843	1440
10:00		484	751	1235
11:00		554	977	1531
12:00 PM		486	1069	1555
01:00		520	997	1517
02:00		503	1021	1524
03:00		629	961	1590
04:00		661	1059	1720
05:00		570	1026	1596
06:00		556	958	1514
07:00		626	924	1550
08:00		510	696	1206
09:00		375	558	933
10:00		214	544	758
11:00		144	410	554
Total		10615	17100	27715
Percent		38.3%	61.7%	
AM Peak	-	06:00	07:00	-
Vol.	-	764	1102	-
PM Peak	-	16:00	12:00	-
Vol.	-	661	1069	-

Start Time	29-Mar-24	NB	SB	Total
12:00 AM	Fri	121	249	370
01:00		67	176	243
02:00		141	131	272
03:00		130	195	325
04:00		220	246	466
05:00		332	376	708
06:00		612	689	1301
07:00		673	974	1647
08:00		558	929	1487
09:00		541	879	1420
10:00		552	887	1439
11:00		561	924	1485
12:00 PM		596	1062	1658
01:00		615	1034	1649
02:00		632	1039	1671
03:00		646	933	1579
04:00		655	1058	1713
05:00		690	1005	1695
06:00		629	1160	1789
07:00		599	900	1499
08:00		460	711	1171
09:00		309	639	948
10:00		275	549	824
11:00		149	428	577
Total		10763	17173	27936
Percent		38.5%	61.5%	
AM Peak	-	07:00	07:00	-
Vol.	-	673	974	-
PM Peak	-	17:00	18:00	-
Vol.	-	690	1160	-

Start Time	30-Mar-24 Sat	NB	SB	Total
12:00 AM		148	284	432
01:00		84	170	254
02:00		97	156	253
03:00		98	154	252
04:00		105	123	228
05:00		179	215	394
06:00		279	323	602
07:00		311	478	789
08:00		494	679	1173
09:00		535	885	1420
10:00		614	961	1575
11:00		632	929	1561
12:00 PM		609	836	1445
01:00		570	893	1463
02:00		614	991	1605
03:00		620	860	1480
04:00		568	987	1555
05:00		474	922	1396
06:00		585	818	1403
07:00		497	786	1283
08:00		409	688	1097
09:00		320	574	894
10:00		261	551	812
11:00		183	496	679
Total		9286	14759	24045
Percent		38.6%	61.4%	
AM Peak	-	11:00	10:00	-
Vol.	-	632	961	-
PM Peak	-	15:00	14:00	-
Vol.	-	620	991	-
Grand Total		30664	49032	79696
Percent		38.5%	61.5%	
ADT		ADT 26,565	ADT 26,565	AADT 26,565

Start Time	28-Mar-24 Thu	EB	WB	Total
12:00 AM		23	6	29
01:00		8	4	12
02:00		6	7	13
03:00		5	10	15
04:00		4	22	26
05:00		8	66	74
06:00		24	88	112
07:00		31	96	127
08:00		24	52	76
09:00		24	36	60
10:00		42	50	92
11:00		52	59	111
12:00 PM		58	44	102
01:00		56	51	107
02:00		52	65	117
03:00		56	62	118
04:00		47	57	104
05:00		47	61	108
06:00		65	56	121
07:00		81	61	142
08:00		72	31	103
09:00		35	29	64
10:00		58	15	73
11:00		28	6	34
Total		906	1034	1940
Percent		46.7%	53.3%	
AM Peak Vol.	-	11:00 52	07:00 96	-
PM Peak Vol.	-	19:00 81	14:00 65	-

Start Time	29-Mar-24 Fri	EB	WB	Total
12:00 AM		10	7	17
01:00		4	1	5
02:00		8	5	13
03:00		5	11	16
04:00		11	23	34
05:00		6	51	57
06:00		15	84	99
07:00		44	86	130
08:00		41	47	88
09:00		41	45	86
10:00		46	56	102
11:00		67	64	131
12:00 PM		54	68	122
01:00		63	57	120
02:00		70	81	151
03:00		36	53	89
04:00		64	56	120
05:00		74	50	124
06:00		83	83	166
07:00		81	51	132
08:00		66	54	120
09:00		54	31	85
10:00		50	25	75
11:00		47	19	66
Total		1040	1108	2148
Percent		48.4%	51.6%	
AM Peak	-	11:00	07:00	-
Vol.	-	67	86	-
PM Peak	-	18:00	18:00	-
Vol.	-	83	83	-

Start Time	30-Mar-24 Sat	EB	WB	Total
12:00 AM		20	5	25
01:00		12	8	20
02:00		13	4	17
03:00		4	4	8
04:00		4	15	19
05:00		7	26	33
06:00		11	29	40
07:00		19	55	74
08:00		30	49	79
09:00		43	52	95
10:00		67	57	124
11:00		57	59	116
12:00 PM		63	79	142
01:00		60	66	126
02:00		76	74	150
03:00		71	54	125
04:00		104	65	169
05:00		85	60	145
06:00		90	53	143
07:00		73	63	136
08:00		95	63	158
09:00		70	34	104
10:00		45	28	73
11:00		43	23	66
Total		1162	1025	2187
Percent		53.1%	46.9%	
AM Peak	-	10:00	11:00	-
Vol.	-	67	59	-
PM Peak	-	16:00	12:00	-
Vol.	-	104	79	-
Grand Total		3108	3167	6275
Percent		49.5%	50.5%	
ADT		ADT 2,092	ADT 2,092	

ATTACHMENT B

Warrant Analysis

engineering study, but it is not intended to be the only factor or even the overriding consideration. Agencies can install a traffic control signal at a location where no warrants are met, but only after conducting an engineering study that documents the rationale for deciding that the installation of a traffic control signal is the best solution for improving the overall safety and/or operation at the location.

Section 4C.02 Warrant 1, Eight-Hour Vehicular Volume

Support:

- 01 The Minimum Vehicular Volume, Condition A (see Table 4C-1), is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.
- 02 The Interruption of Continuous Traffic, Condition B (see Table 4C-1), is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.
- 03 It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and analyses of Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and an analysis of the combination of Conditions A and B is not needed.

Guidance:

- 04 *The need for a traffic control signal should be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:*
 - A. *The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major street and the more critical minor-street approach, respectively, to the intersection; or*
 - B. *The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major street and the more critical minor-street approach, respectively, to the intersection.*

Standard:

- 05 **These major-street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours that are selected for the Condition A analysis shall not be required to be the same 8 hours that are selected for the Condition B analysis.**

**Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume
Condition A—Minimum Vehicular Volume**

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on more critical minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on more critical minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

^a Basic minimum hourly volume
^b Used for combination of Conditions A and B after adequate trial of other remedial measures
^c May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
^d May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume

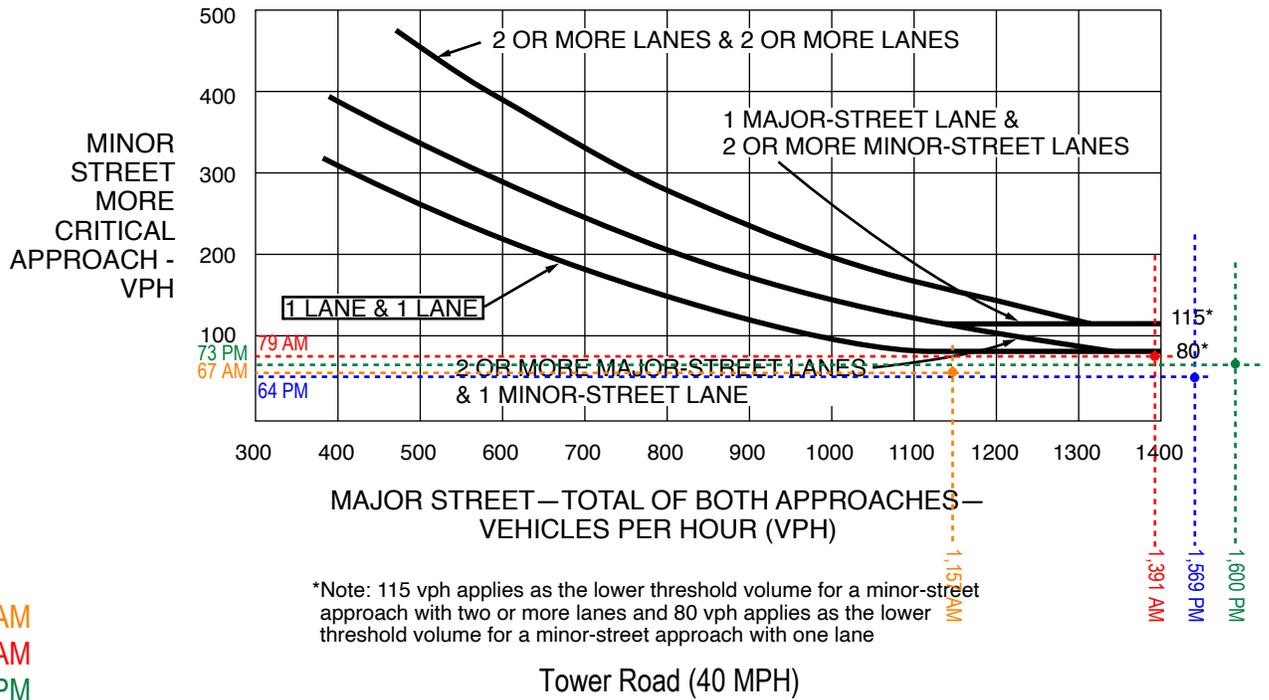


Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

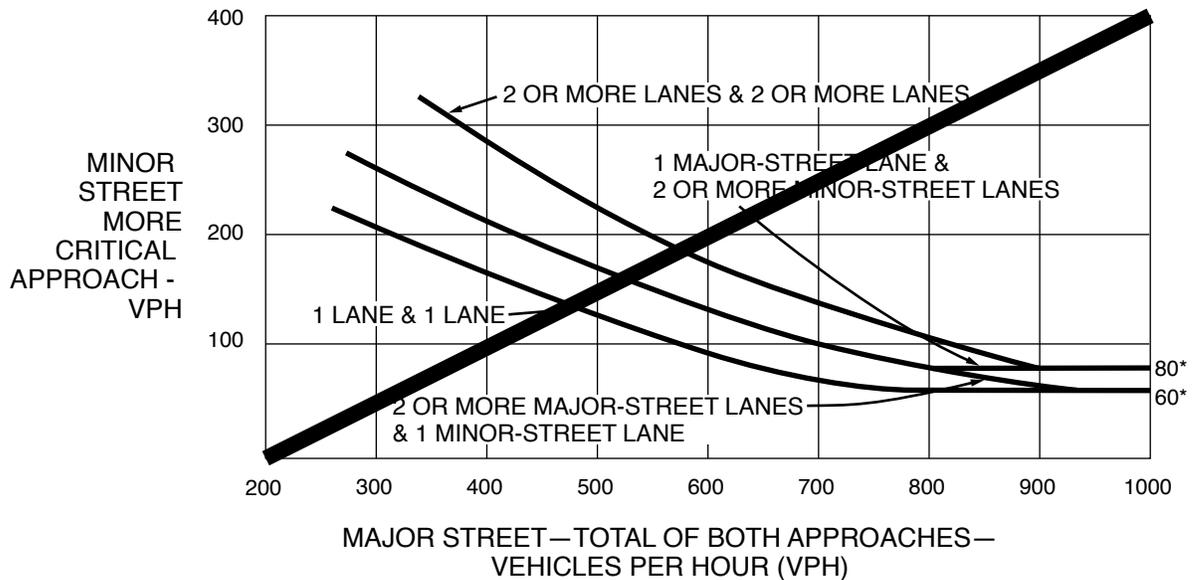


Figure 4C-3. Warrant 3, Peak Hour



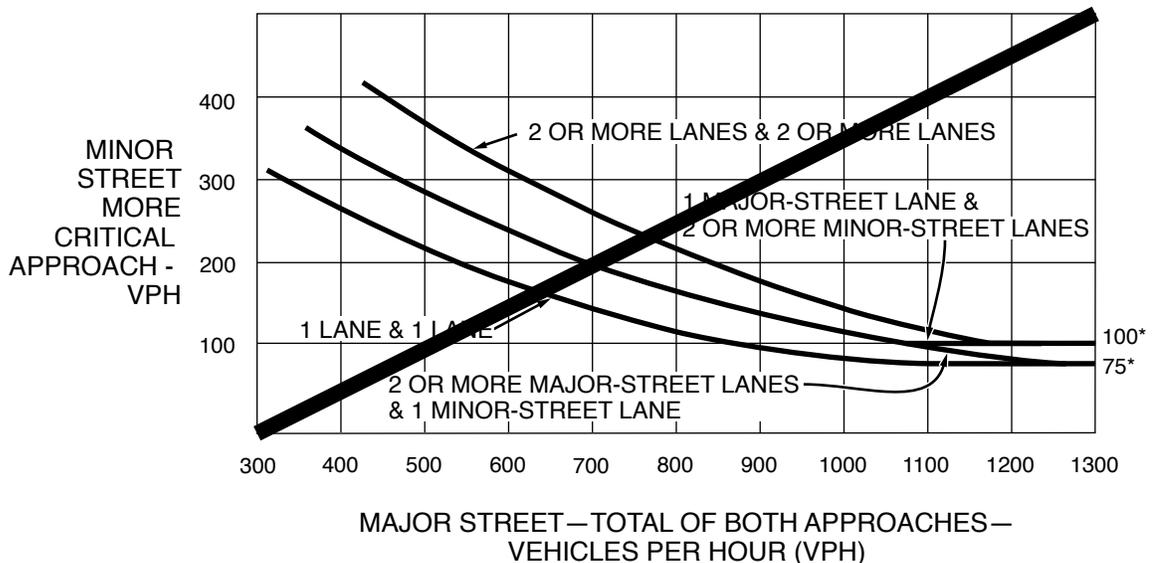
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane

Note: No right turn reduction applied.

Tower Road (40 MPH)

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume

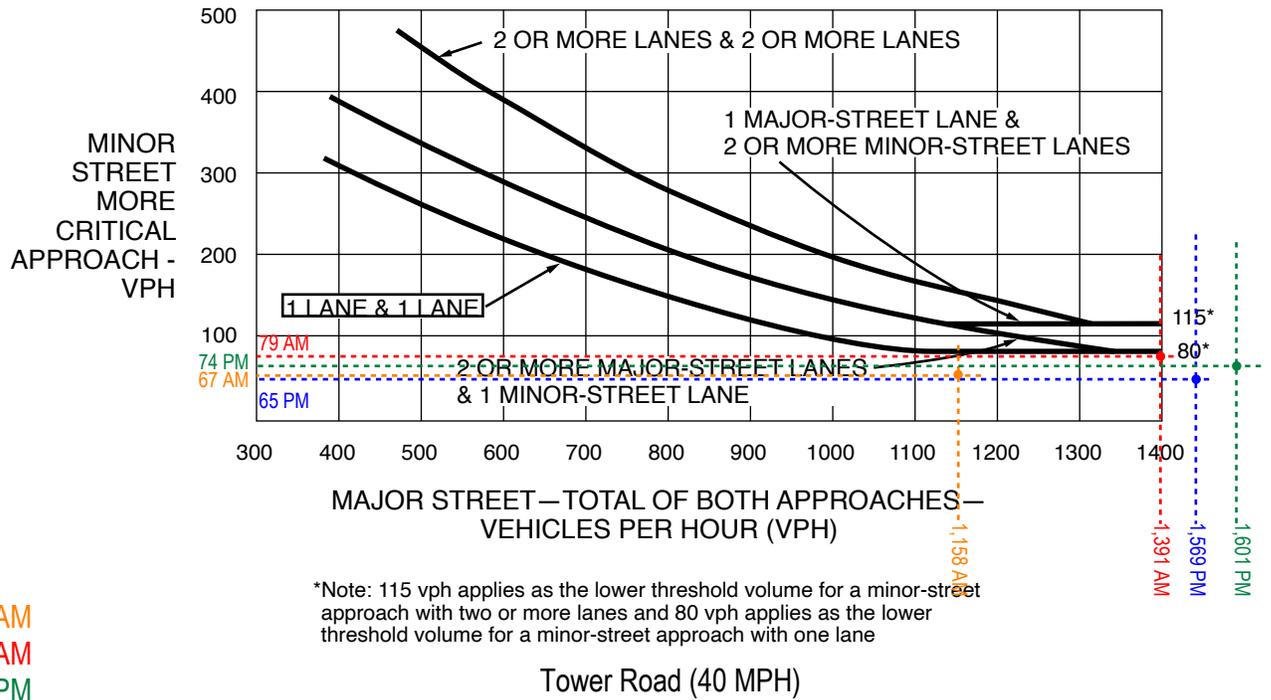


Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

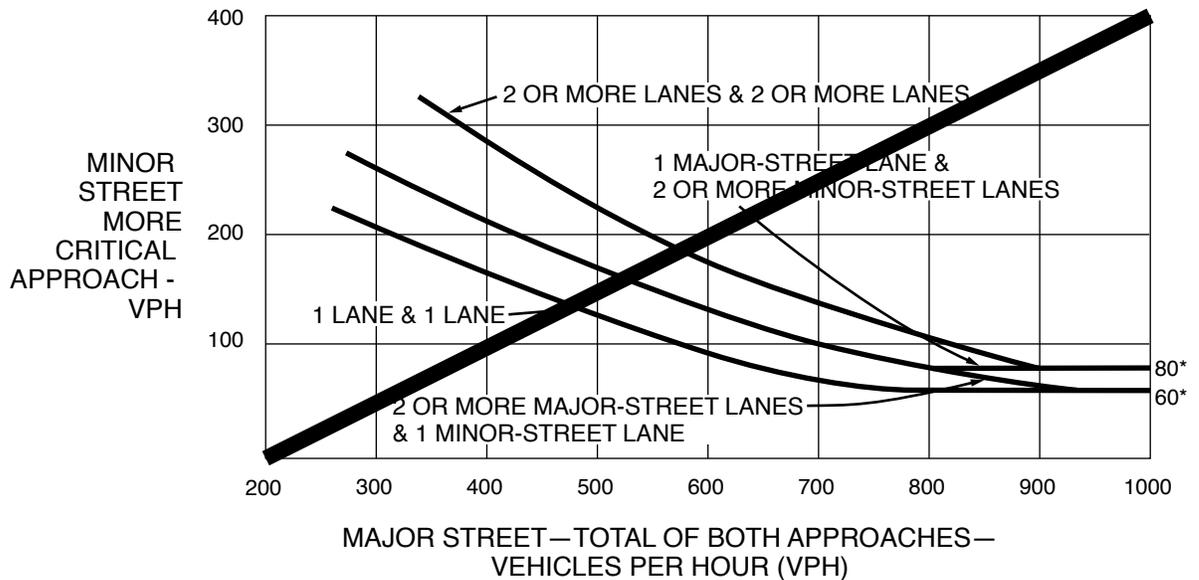
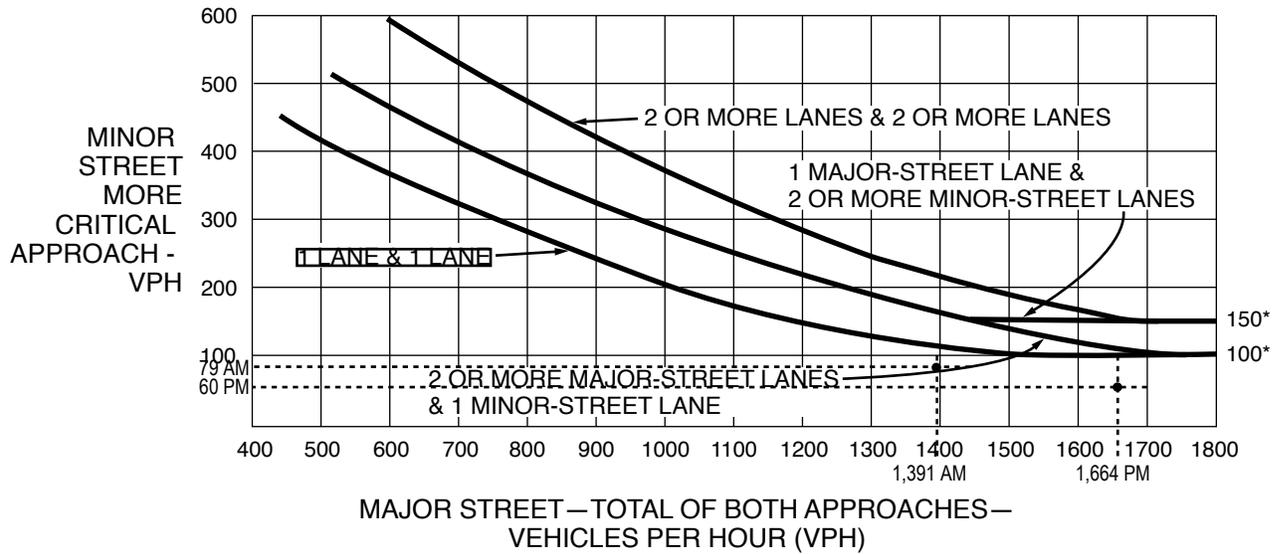


Figure 4C-3. Warrant 3, Peak Hour



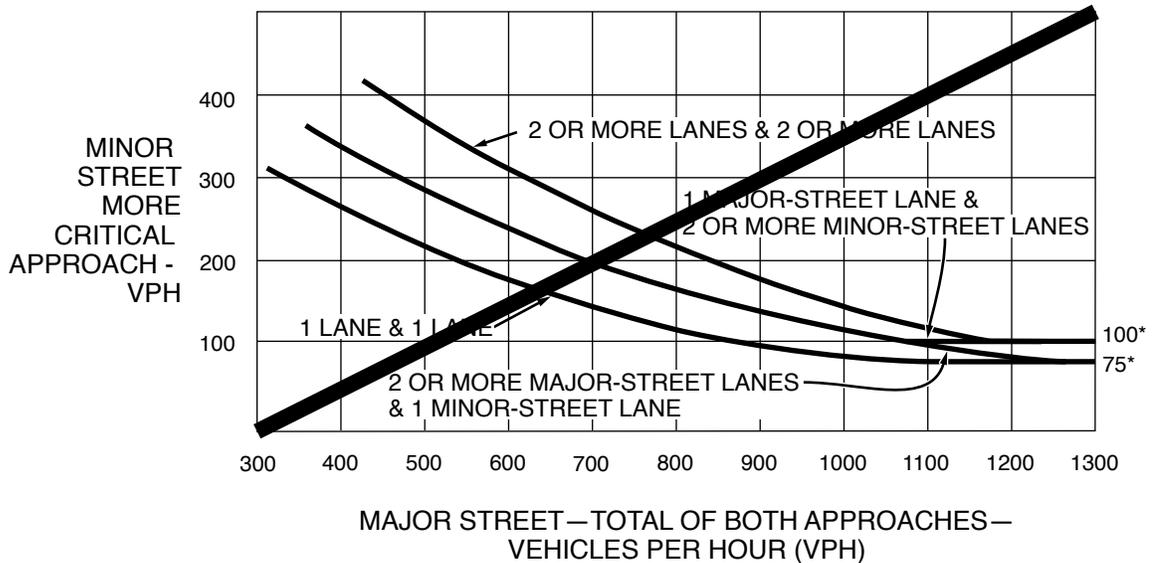
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane

Note: No right turn reduction applied.

Tower Road (40 MPH)

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane