APPENDIX H. TRAFFIC ANALYSIS

Plaistow Commuter Rail Extension Study Traffic Analysis

1 Introduction

As part of the Plaistow Commuter Rail Extension Study, each of the three alternative station sites were evaluated for traffic related impacts, including a detailed analysis of traffic flows and patterns. The traffic analysis generally concludes that no major impacts will be observed in traffic flow due to the addition of a new station and associated station parking.

2 Station-Related Traffic Impacts

Rail service in Plaistow is expected to generate additional trips in the vicinity of the station, particularly during peak ridership periods which revolves around typical commuting hours. For weekday operations, parking estimates are based on the Service Plan developed for this study (see Appendix C).

The ridership projections for Plaistow Station estimate that up to 258 boardings could occur at Plaistow Station by 2030. The near-term projection for year 1 of service is 170 passengers during a typical weekday. That number is expected to grow to 258 by 2030 to account for employment and population growth in the Plaistow region. A full explanation of anticipated ridership is found in the Ridership Forecasts and Market Assessment (Appendix C). To reflect potential a maximum passenger boarding scenario during a major event or times of increased demand, a 300 passenger ridership total was utilized for estimating traffic from the station.

Table 1.1 summarizes the distribution of riders during the morning peak (6:30-7:30 AM) and evening peak (boarding between 5:00-7:00 at North Station). The morning rush hour tends to be more concentrated and higher than in the evening due to work hours and travel patterns. Based on survey results provided by the Central Transportation Planning Staff, suburban commuter rail stations located at or near the ends of existing lines exhibited a passenger drop-off rate of approximately 11 percent.[1] It was also assumed that all trips to or from the Plaistow Station parking lot are related to passenger activities. Distribution of passengers per train was calculated using figures provided by the Massachusetts Bay Transportation Authority (MBTA) for typical north-side commuter rail boardings.

As shown in Table 1.1, the analysis reveals that a total of 100 vehicular trips are anticipated at Plaistow Station during the morning peak. This includes 90 total passengers with ten additional passengers expected to be dropped off and 80 expected to utilize park and ride facilities. This would account for 90

[1] MBTA Commuter Rail Survey, 1993

total passengers. Evening peak hour statistics would account for an additional 42 passengers using Plaistow Station during rush hour or an additional 46 vehicular trips. The remainder of riders are expected to use Plaistow Station during off-peak hours.

Table 1.1 Plaistow Station Anticipated Peak Hour Vehicular Trips

Trip Type	Weekday Morning Peak Hour Traffic			Weekday Evening Peak Hour Traffic		
	Enter	Exit	Total	Enter	Exit	Total
Drop-off/Pick-up Trips (vph)*	10	10	20	4	4	8
Parking Vehicular Trips (vph)	80	0	80	0	38	38
Total Trips (vph)	90	10	**100**	4	42	**46**

**Drop-off/Pick-up trips calculated at 11% of the total commuter rail passenger boarding*

Table 1.2 Nighttime Operations

Train Number	Departs Plaistow Station	Arrives North Station
200AM	4:55	6:14
202AM	5:28	6:50
204AM	6:00	7:25
206AM	6:36	7:48
226PM	10:10	11:28
Train Number	**Departs North Station**	**Arrives Plaistow Station**
225PM	10:35	11:51
227PM	12:10	1:25

3 Analysis of Alternative I

Section 1 identifies the traffic analysis conducted for Alternative I station site located at Westville Road in Plaistow, New Hampshire.

3.1 Roadway Physical Attributes

The proposed access and parking lot will be located at an existing NHDOT park-and-ride parking lot. Access for the parking lot is from Westville Road that connects to Plaistow Road (Route 125) with a signalized intersection. There is currently a left turn lane and a shared left/right turn lane at the Westville Road intersection with Plaistow Road. Westville road's north and southbound lanes both have a 5-foot-wide paved shoulder. The existing speed limit on Westville Road is posted at 30 mph and Plaistow Road is posted at 35 mph.

Based on the intended use, measurements, and field observations, the site distance is adequate looking north. Looking south, the sight distance is reduced by the corner on Westville Road. Currently the

southern entrance for the parking lot is a right turn only and the entrance on the conceptual study plans will need to be shifted to the north to improve the sight distance. The existing parking lot currently has two access points with an entrance in and out to the north and an exit to the south, this existing configuration should be maintained to provide adequate sight distance.

3.2 Traffic Impacts: Impact to Adjacent Roadway Level of Service

Westville Road is a two-lane minor collector roadway that carries approximately 4,100 vehicles per day (vpd). During its peak hour, Westville Road sees approximately 450 vehicles per hour (vph), or an estimated 225 passenger cars per hour per lane (pcphpl). Given the anticipated maximum 100 additional trips during the morning peak hour from the commuter rail station, the roadway volume would increase to approximately 550 vph, or an estimated 275 pcphpl. This represents about a 25 percent increase in peak hour volume, which will likely be noticeable to local residents on the roadway, depending on the origin and destination points of the increased traffic. However, the future volume is still well below the 1,700 pcphpl capacity of a two-lane highway. Minimal increases in delay and decrease in the Westville Road's Level of Service (LOS) would be anticipated. Traffic signal timing adjustments at the intersection with Route 125 may be desired depending on origin and destination points of the generated traffic.

3.3 Summary

This site is well equipped for the addition of a commuter rail station from a traffic standpoint. The existing parking lot and entrances are already in place and the site will provide enough parking to provide for a new train station. Based on site observations, the existing park and ride facility seems underutilized and rarely contains a substantial amount of vehicles.

Westville Road is in good condition and has an adequate signalized intersection with Plaistow Road (Route 125). The double left and shared right turn lanes at the intersection will reduce the amount of vehicle queuing generated from any additional traffic and the traffic signal timing may need to be adjusted for the vehicles entering from Westville Road. The NHDOT traffic counts in 2010 on Plaistow Road (Route 125) show an average daily travel of 21,000 vehicles per day and based on the ridership projections there are no known negative impacts to traffic in the surrounding areas.

4 Analysis of Alternative II

Section 2 identifies the traffic analysis conducted for Alternative II station site located at Joanne Drive in Plaistow, New Hampshire.

4.1 Roadway Physical Attributes

Joanne Drive is a narrow two-lane dead end street connecting to Plaistow Road (Route 125). Route 125 has two lanes running north and south with turn lanes each direction for the intersection with Joanne Drive and East Road. The proposed station entrance would connect to the end of Joanne Drive and be

accessed by Plaistow Road. Joanne Drive is not currently posted with a speed limit and is assumed to be 25 mph. Plaistow Road is posted 35mph.

There is an existing signalized intersection with Route 125 and Joanne Drive that provides good sight distance looking north. Additionally, there is an existing signalized intersection with Route 125 and Joanne Drive that provides good sight distance looking south.

4.2 Traffic Impacts: Impact to Adjacent Roadway Level of Service

Joanne Drive is a dead-end local street that carries minimal traffic and intersects Route 125, a principal arterial that carries approximately 19,000 vpd adjacent to the project area. During its peak hour, Route 125 sees up to 1,900 vph, or an estimated 475 pcphpl. Given the anticipated 100 additional trips during the morning peak hour from the commuter rail station, the volume on Route 125 would increase to approximately 2,000 vph (est. 500 pcphpl). This represents only a 5 percent increase in peak hour volume and negligible increases in delay and decrease in the roadway's Level of Service (LOS) would be anticipated. While the percentage increase in peak hour traffic on Joanne Drive would be high, the 100 vph during the peak period is not expected to exceed capacity of this roadway. However, traffic signal timing adjustments at the intersection with NH 125 will likely be required.

4.3 Summary

Joanne Drive is in obvious disrepair with large pot holes and has limited roadway width but widens at the existing intersection and provides for good site distance in each direction. Joanne Drive will need to be reconstructed and improvements made to accommodate the additional traffic created from the proposed use. The intersection leg on the north side of the intersection allows vehicles travelling north to go around the existing light and make a right hand turn. Vehicles continuing straight onto East Road or making a left turn on Route 125 must use this existing signal. The timing at the signalized intersection of Joanne Drive with Route 125 will need to be adjusted to accommodate the new traffic generated from a proposed train station. Joanne Drive does not directly border or connect to any residential neighborhoods and an increase in traffic would not have any negative effects to the surrounding areas. NHDOT traffic counts in 2010 on Route 125 show an average daily travel of 21,000 vehicles per day.

5 Analysis of Alternative III

Section 3 identifies the traffic analysis conducted for Station Alternative III located at 144 Main Street in Plaistow, New Hampshire.

5.1 Roadway Physical Attributes

The proposed access location is an existing driveway located off Main Street (Route 121A). Main Street has a north and southbound lane with four to six-foot-wide paved shoulders and a sidewalk with curbing on the east side of Main Street. The existing speed limit on Main Street is posted at 30 mph.

Based on the intended use, measurements, and field observations the site distance is adequate looking northwardly. There are some minor tree limbs that will need to be cut back for an improved line of site. Looking south, the existing sign for 144-146 Main Street businesses currently blocks the view and line of site of approaching vehicles. The location of the sign will need to be relocated for an improved and adequate sight lines condition.

5.2 Traffic Impacts: Impact to Adjacent Roadway Level of Service

Route 121A (Main Street) is a two-lane minor arterial roadway which carries approx. 6,600 vpd. During its peak hour, Main Street sees approximately 725 vph, or an estimated 365 pcphpl. Given the anticipated 100 additional trips during the morning peak hour from the commuter rail station, the roadway volume would increase to approximately 825 vph, or an estimated 413 pcphpl. Although this represents about a 15 percent increase in peak hour volume, the future volume is still well below the 1,700 pcphpl capacity of a two-lane highway. Minimal increases in delay and decrease in the roadway's Level of Service (LOS) would be anticipated.

5.3 Signal Warrant Analysis

A conceptual traffic signal warrant analysis was prepared utilizing available traffic data. This data consists of the peak hour trip generation volumes calculated earlier in this document for the Commuter Rail Station and 24-hour Automatic Traffic Recorder (ATR) volumes available from NHDOT that were collected south of Duston Avenue on Route 121A (Main Street) in June of 2012. This count location is within one-quarter mile from the project site. As multiple hours of traffic data are generally required for a warrant analysis, the generated peak hour volumes were mimicked over a period of four hours during the AM and PM. This is considered to be quite conservative, but was necessary to provide sufficient data points for the analysis

The Federal Highway Administration's Manual on Uniform Traffic Control Devices (2009 Edition) utilizes nine warrant analyses to determine if a traffic signal is justified at a particular location. For an intersection to justify a traffic signal installation based on traffic volumes, the NHDOT generally prefers that it meets the 8-hour or 4-hour Vehicular Volume warrants. For this study, the 8-hour, 4-hour, Peak Hour warrant were analyzed. As the intersection geometry on each approach of the access road to the Alternative III station with Main Street has not been determined at this point, a conservative assumption that there would only be one traffic lane on each approach of the intersection was utilized. Additionally as Plaistow is a community with a population of less than 10,000, this factor was utilized when reviewing signal warrants.

Even utilizing the conservative volume and geometry noted above, the traffic on the Alternative III station access road and Main Street do not meet the volume requirements during any hour when reviewing the 8-hour, 4-hour, or Peak Hour criteria (see appendix for warrant analysis data). Based on the currently available data, a traffic signal is <u>not warranted</u> for the intersection of the Alternative III station access road and Main Street.

5.4 Summary

By utilizing the existing road for the proposed access it will alleviate the creation of a new connection with Main Street. The existing access road structure appears to be in good condition and has adequate width to support the proposed traffic from the train station. The existing entrance is located approximately 60 feet from the existing tracks crossing Main Street and this condition will need to be evaluated in greater detail if this site is chosen for development.

Warrant 1: Eight-hour Vehicular Volume
3:

Intersection Information:

Major Street	NH 121A (Main St)
Major Direction	NB/SB
Minor Direction	EB

Warrant 1 Met? **No**

Details:

Condition A or B Met?	**No**	0 Hours met (8 required)
Condition A and B Met?	**No**	0 Hours met (8 required)

Hour		Condition A		Condition B			Condition A		Condition B		70% Standard Met? Cond. A OR Cond. B		56% Standard Met? Cond. A AND Cond. B	
	Major Street Vehicles (total of both approaches)	Volume >= 70% column (350)?	Volume >= 56% column (280)?	Volume >= 70% column (525)?	Volume >= 56% column (420)?	High-volume Minor Approach Vehicles	Volume >= 70% column (105)?	Volume >= 56% column (84)?	Volume >= 70% column (53)?	Volume >= 56% column (42)?	Condition A 70% Column	Condition B 70% Column	Condition A 56% Column	Condition B 56% Column
06:00 to 07:00	462	Yes	Yes	No	Yes	10	No	No	No	No	No	No	No	No
06:15 to 07:15	493	Yes	Yes	No	Yes	10	No	No	No	No	No	No	No	No

Warrant 1: Eight-hour Vehicular Volume

3:

06:30 to 07:30	524	Yes	Yes	No	Yes	10	No	No	No	No	No	No	No	No
06:45 to 07:45	555	Yes	Yes	Yes	Yes	10	No	No	No	No	No	No	No	No
07:00 to 08:00	586	Yes	Yes	Yes	Yes	10	No	No	No	No	No	No	No	No
07:15 to 08:15	577	Yes	Yes	Yes	Yes	10	No	No	No	No	No	No	No	No
07:30 to 08:30	568	Yes	Yes	Yes	Yes	10	No	No	No	No	No	No	No	No
07:45 to 08:45	559	Yes	Yes	Yes	Yes	10	No	No	No	No	No	No	No	No
08:00 to 09:00	550	Yes	Yes	Yes	Yes	10	No	No	No	No	No	No	No	No
08:15 to 09:15	532	Yes	Yes	Yes	Yes	10	No	No	No	No	No	No	No	No
08:30 to 09:30	514	Yes	Yes	No	Yes	10	No	No	No	No	No	No	No	No
08:45 to 09:45	496	Yes	Yes	No	Yes	10	No	No	No	No	No	No	No	No
09:00 to 10:00	478	Yes	Yes	No	Yes	10	No	No	No	No	No	No	No	No
09:15 to 10:15	480	Yes	Yes	No	Yes	7	No	No	No	No	No	No	No	No
09:30 to 10:30	482	Yes	Yes	No	Yes	5	No	No	No	No	No	No	No	No
09:45 to 10:45	484	Yes	Yes	No	Yes	2	No	No	No	No	No	No	No	No
10:00 to 11:00	484	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No
10:15 to 11:15	484	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No
10:30 to 11:30	484	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No

Warrant 1: Eight-hour Vehicular Volume

3:

10:45 to 11:45	484	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No
11:00 to 12:00	484	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No
11:15 to 12:15	501	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No
11:30 to 12:30	518	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No
11:45 to 12:45	535	Yes	Yes	Yes	Yes	0	No	No	No	No	No	No	No	No
12:00 to 13:00	552	Yes	Yes	Yes	Yes	0	No	No	No	No	No	No	No	No
12:15 to 13:15	532	Yes	Yes	Yes	Yes	0	No	No	No	No	No	No	No	No
12:30 to 13:30	512	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No
12:45 to 13:45	492	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No
13:00 to 14:00	472	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No
13:15 to 14:15	496	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No
13:30 to 14:30	520	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No
13:45 to 14:45	544	Yes	Yes	Yes	Yes	0	No	No	No	No	No	No	No	No
14:00 to 15:00	568	Yes	Yes	Yes	Yes	0	No	No	No	No	No	No	No	No
14:15 to 15:15	601	Yes	Yes	Yes	Yes	11	No	No	No	No	No	No	No	No
14:30 to 15:30	632	Yes	Yes	Yes	Yes	21	No	No	No	No	No	No	No	No
14:45 to 15:45	665	Yes	Yes	Yes	Yes	32	No	No	No	No	No	No	No	No

Warrant 1: Eight-hour Vehicular Volume

3:

15:00 to 16:00	696	Yes	Yes	Yes	Yes	42	No	No	No	Yes	No	No	No	Yes
15:15 to 16:15	721	Yes	Yes	Yes	Yes	42	No	No	No	Yes	No	No	No	Yes
15:30 to 16:30	746	Yes	Yes	Yes	Yes	42	No	No	No	Yes	No	No	No	Yes
15:45 to 16:45	771	Yes	Yes	Yes	Yes	42	No	No	No	Yes	No	No	No	Yes
16:00 to 17:00	796	Yes	Yes	Yes	Yes	42	No	No	No	Yes	No	No	No	Yes
16:15 to 17:15	765	Yes	Yes	Yes	Yes	42	No	No	No	Yes	No	No	No	Yes
16:30 to 17:30	734	Yes	Yes	Yes	Yes	42	No	No	No	Yes	No	No	No	Yes
16:45 to 17:45	703	Yes	Yes	Yes	Yes	42	No	No	No	Yes	No	No	No	Yes
17:00 to 18:00	672	Yes	Yes	Yes	Yes	42	No	No	No	Yes	No	No	No	Yes
17:15 to 18:15	613	Yes	Yes	Yes	Yes	42	No	No	No	Yes	No	No	No	Yes
17:30 to 18:30	554	Yes	Yes	Yes	Yes	42	No	No	No	Yes	No	No	No	Yes
17:45 to 18:45	495	Yes	Yes	No	Yes	42	No	No	No	Yes	No	No	No	Yes
18:00 to 19:00	436	Yes	Yes	No	Yes	42	No	No	No	Yes	No	No	No	Yes
18:15 to 19:15	431	Yes	Yes	No	Yes	31	No	No	No	No	No	No	No	No
18:30 to 19:30	428	Yes	Yes	No	Yes	21	No	No	No	No	No	No	No	No
18:45 to 19:45	423	Yes	Yes	No	Yes	10	No	No	No	No	No	No	No	No
19:00 to 20:00	420	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No

Warrant 1: Eight-hour Vehicular Volume

3:

19:15 to 20:15	315	No	Yes	No	No	0	No	No	No	No	No	No	No	No
19:30 to 20:30	210	No	No	No	No	0	No	No	No	No	No	No	No	No
19:45 to 20:45	105	No	No	No	No	0	No	No	No	No	No	No	No	No

Warrant 2: Four-hour Vehicular Volume

3:

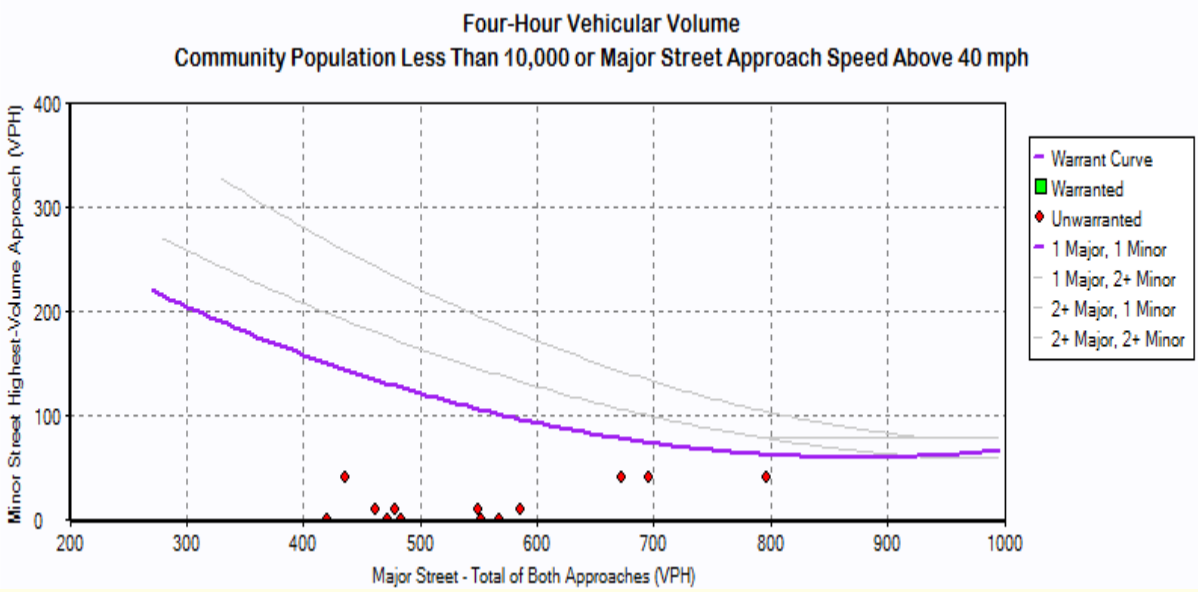
Intersection Information

	Major Street	Minor Street
Street Name	NH 121A (Main St)	Commuter Rail Drive
Direction	NB/SB	EB
Number of Lanes	1	1
Approach Speed	30	30

Warrant 2 Met? **No**

Details:

Notes:	0 Hours met (4 required)
Low Population?	**Yes**



Warrant 2: Four-hour Vehicular Volume

3:

Hourly Volumes

Hour	Major Street Total of both Approaches (vph)	Minor Street Highest Volume Approach (vph)
00:00:00 - 01:00:00	0.00	0.00
01:00:00 - 02:00:00	0.00	0.00
02:00:00 - 03:00:00	0.00	0.00
03:00:00 - 04:00:00	0.00	0.00
04:00:00 - 05:00:00	0.00	0.00
05:00:00 - 06:00:00	0.00	0.00
06:00:00 - 07:00:00	462.00	10.00
07:00:00 - 08:00:00	586.00	10.00
08:00:00 - 09:00:00	550.00	10.00
09:00:00 - 10:00:00	478.00	10.00
10:00:00 - 11:00:00	484.00	0.00
11:00:00 - 12:00:00	484.00	0.00
12:00:00 - 13:00:00	552.00	0.00
13:00:00 - 14:00:00	472.00	0.00
14:00:00 - 15:00:00	568.00	0.00
15:00:00 - 16:00:00	696.00	42.00
16:00:00 - 17:00:00	796.00	42.00
17:00:00 - 18:00:00	672.00	42.00
18:00:00 - 19:00:00	436.00	42.00
19:00:00 - 20:00:00	420.00	0.00
20:00:00 - 21:00:00	0.00	0.00
21:00:00 - 22:00:00	0.00	0.00
22:00:00 - 23:00:00	0.00	0.00
23:00:00 - 00:00:00	0.00	0.00

Warrant 2: Four-hour Vehicular Volume

3:

Warranted Hours		
Hour	Major Street Total of Both Approaches (VPH)	Minor Street Highest Volume Approah (VPH)

Note: Only data of hours warranted is represented in the above table.

Warrant 3: Peak Hour

3:

Intersection Information:

	Major Street	Minor Street
Street Name	NH 121A (Main St)	Commuter Rail Drive
Direction	NB/SB	EB
Number of Lanes	1	1
Approach Speed	30	30

Warrant 3 Met? **No**

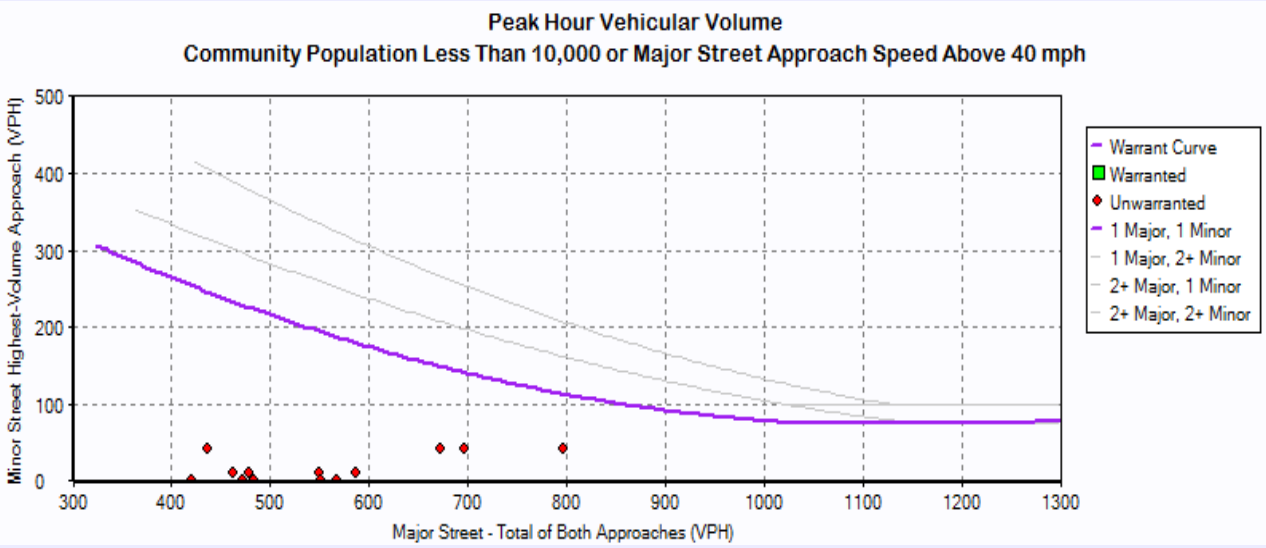
Details:

Low Population?	Yes
Condition A Met?	No
Notes:	0 Hours met (1 required)
Minor Approach Time Delay Condition	Not Met
Minor Approach Volume Condition	Not Met
Total Entering Intersection Volume Condition	Not Met
Condition B Met?	No
Notes:	0 Hours met (1 required)

Warrant 3: Peak Hour

3:

Warrant 3



Note: Please turn over for volume information.

Warrant 3: Peak Hour

3:

Warranted / Unwarranted

Hour	Major Street Total of both approaches (VPH)	Minor Street Highest volume approach (VPH)
6:00	462	10
7:00	586	10
8:00	550	10
9:00	478	10
10:00	484	0
11:00	484	0
12:00	552	0
13:00	472	0
14:00	568	0
15:00	696	42
16:00	796	42
17:00	672	42
18:00	436	42
19:00	420	0