

May 30, 2017

TO: Matt Trollinger, Manager, Village of Martinø Additions

FROM: Joseph Cutro, P.E., Traffic Engineering Consultant

SUBJECT: Summit Avenue ó Summary and Analysis of Traffic Counts

Iøve completed a summary and analysis of traffic volume and speed data collected on Summit Avenue earlier this month. Traffic was surveyed at two locations over a six-day period from Tuesday May 16 through Tuesday May 22. At each location, a portable roadside traffic recorder automatically collected information about the passage, direction, speed, and classification (by number of axles) of individual vehicles. At the completion of the survey period, the collected data were downloaded to a computer and then broken down in various ways using MetroCountø *Traffic Executive* software.

The ñnorthñ recorder location was at 7404 Summit Avenue, about 60ø inside the Village limit line. More specifically, the recorder was located 140ø north of the *eastern* leg of Thornapple Street, intentionally placed midway (250ø/240ø) between STOP signs at Leland Street and the *western* leg of Thornapple Street.

The ñsouthñ recorder was located at 7301 Summit Avenue, between the western leg of Thornapple Street (290ø to the north) and Taylor Street (350ø to the south). The intent here was to place the recorder roughly midway (140ø/120ø) between the two speed humps in the block. .

At the south location, one of the road tubes sending data to the recorder apparently worked itself loose after not quite two days of operation, rendering further data collected after that time (roughly 8:30 AM on Thursday the 18th) invalid. Nevertheless, 41 hours of data (a sample of 388 vehicles) should be sufficient to tell us about the character of traffic at this location.

From the data collected at the north location, we found that Average Daily Weekday Traffic (ADWT) in the block between Leland Street and the eastern leg of Thornapple is about 600 vehicles per day. Weekend volumes are somewhat lower, at about 450 vehicles per day. Directional flow favors southbound traffic on both weekdays and weekends, with about 58% of all traffic moving in that direction. On weekdays, that directionality becomes much more pronounced during the morning peak hour and up until about noon. During afternoon and evening hours, however, northbound and southbound traffic flows are just about equal.

Between Thornapple and Taylor, traffic volume drops to about 250 vehicles per weekday overall, due to an almost negligible northbound traffic stream. Since traffic cannot (legally) enter Summit with Taylor Street being one-way westbound, the only (legal) northbound traffic on this block of Summit is that originating from homes within the block itself. Fully 93% of traffic at the recorder location was moving southbound.

For both Summit Avenue locations, the weekday traffic peak hour is consistently from 8 to 9 AM. At the north location the peak hour volume of 60 is 10 % of the ADWT ó very typical for a residential street. At the south location, the peak hour volume of 30 is a somewhat higher proportion of the daily, another effect of the lack of northbound flow. There is of course, a secondary evening peak hour, but it shifts around in a range between 4 PM and 7 PM. Hourly volumes during the evening peak are 50 at the north location and 25 at the south.

On weekends, peak hours on Summit Avenue tend to fall in the middle of the day as is typical of residential streets. The highest weekend hourly volume recorded at the north location was 44 vehicles, occurring on Saturday between 10 and 11 AM.

The table below summarizes vehicle speed characteristics found on Summit Avenue over the survey period (s). The speed measures noted are the 50th percentile, or *median* speedó the middle value of the collected sample. This is close to, but not the same as the *average* (or mean) speed. A more important indicator for traffic engineers and enforcement officers is the 85th percentile speed. This is the speed exceeded by 15 percent of the vehicle sample, and is considered to be the best single-number representation of the prevailing speed of traffic. Ideally, speed limits are set at the 5 mph increment below the computed 85th percentile speed. The table also includes a 95th percentile speed and a maximum recorded speed to help define the extreme upper range of the speed distribution, along with a comparison of the vehicle sample with the existing speed limit (20 mph).

SUMMIT AVENUE TRAFFIC SPEED SUMMARY

	50 th %-ile (mph)	85 th %-ile (mph)	95 th %-ile (mph)	Max observed	% exceeding speed limit (20 mph)
North of Thornapple	18.0	21.6	23.7	32.6	29%
South of Thornapple	15.3	20.1	22.9	31.0	15%

While the highest prevailing speeds tend to occur midday (10 AM ó 2 PM), there appear to be no truly unusual hourly variations in the speed data. As might be expected, a few spikes and troughs were seen in the overnight hours, as much the product of tiny hourly sample volumes as they are of occasional late-night speeding incidents.

The classification data showed very few vehicles having more than 2 axles. For both Summit Avenue locations, vehicles or vehicle combinations of 3 axles or more constituted less than 1% of the traffic volume over the full survey period.

Between the Thornapples

At the April 20 Council meeting, at least one local resident expressed interest about traffic conditions in the short block of Summit separating the two legs of Thornapple Street. That interest helped spark the Council's request for my examination of traffic flow on Summit Avenue in the first place. As described above, however, my traffic recorders were placed in the blocks of Summit to the immediate north and south, and not within the segment of original interest. That's because automatic traffic counting equipment is poorly suited for recording traffic flow information in such a short block.

The problems here are twofold. Firstly, the centerline to centerline distance between the two legs of Thornapple is only 140'. That distance is not long enough to allow many vehicles to "straighten themselves out" to cross the road tubes squarely after making a turn. The result would be frequent double-counting of vehicles, enough to question the validity of any volume statistics derived from counts. The second issue is vehicle speeds. Both turning movements and the proximity of STOP signs at the western leg of Thornapple impede traffic flow in this segment to the point that any speed statistics would be meaningless, i.e., this is a terrible location at which to measure vehicle speeds. Indeed, there well may be numerous examples here of vehicles travelling too fast for conditions, but these cannot be detected by typical traffic recording equipment.

Without the benefit of a direct count, we can use data from nearby locations to extrapolate a reasonable estimate of traffic volume within the segment of Summit "between the Thornapples". Considering that the segment carries both north-south Summit traffic and east-west Thornapple traffic, volume must be higher here than for any of the legs feeding into it, either from Summit or Thornapple. I would estimate ADWT here to be about 800 vehicles per day. Speeds, on the other hand, will be lower than for nearby streets that flow more freely. I would estimate the 85th percentile speed within this short street segment to be about 15 mph at its midpoint.