

**TECHNICAL MEMORANDUM**

**TO:** Bradley Nelsen, NDDOT  
**FROM:** Kshitij Sharma, UGPTI/ATAC  
**Subject:** **Spot Speed Study – State Street in Bismarck**  
**Date:** October 12, 2021

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This memorandum documents the Spot Speed Study conducted on State Street in Bismarck.

**BACKGROUND**

NDDOT had requested ATAC to conduct a spot speed study at one location along State Street in Bismarck. The location is:

1. Site 1  
State St. between E Divide Ave & NDDOT access  
Sta 1251  
Posted Speed Limit 40

Only southbound data was requested.

**METHODOLOGY**

For the purpose of this spot speed study, Operating Speed Method, generally known as the 85<sup>th</sup> percentile speed method was used. The data was collected using a JAMAR Black CAT Radar Recorder. In addition to the 85<sup>th</sup> percentile speed, the following parameters were processed using TRAX Pro:

- Mean Speed  
Average speed of vehicles observed.
- Mode Speed  
Most frequently observed speed.
- Median Speed  
50<sup>th</sup> percentile speed.
- Pace  
Window of 10mph range encompassing highest number of observed vehicles.
- Vehicles in pace  
Percent of observed vehicles driving at speeds within pace.
- Over 40 mph  
Total percent of vehicles speeding.
- Over 45 mph  
Percent of vehicles speeding over 45 mph.

- Over 50 mph  
Percent of vehicles speeding over 50 mph.

Added benefit of using JAMAR Black CAT Radar Recorder devices are:

1. Reliable traffic volume data was collected at the same time.
2. Data statistics could be processed on a per-lane basis, up to two lanes.

Data was collected starting at 12:00 pm on September 8, 2021 and ending at 2:45 pm the same day. The JAMAR reports include frequency distribution charts showing the number of vehicles at each observed speed. Note that in the JAMAR reports, Direction 1 denotes the data for lanes 1 and 2 (lane 1 being closest to the curb) and Direction 2 denotes data for lane 3 (next to the median). The date collection site was approx. 1/4<sup>th</sup> mile from the NDDOT access road.

## RESULTS

As aforementioned, various parameters were calculated from speed observations. A summary of the results is presented in table 1. Most of the statistics for the lane 1 & 2 (combined) including the 85<sup>th</sup> percentile speed were found to be lower than those for lane 3. Mode speed in both cases was found to be 42 mph. A high percentage of vehicles were found to be traveling within the pace. The total number of vehicles speeding over the posted speed limit was found to be in excess of 50%, likely due to the roadway segment being on a downgrade. The percentage of vehicles speeding declines sharply for the '5-over' and '10-over' categories. However, a small number of vehicles were recorded going more than 20 to 30 mph over the speed limit and should be looked into further.

Table 1. Summary of spot speed study results for Site 1

Parameter	Site 1 (Sta 1251)		
	South Bound		
	September 8 <sup>th</sup> 12:00-2:45 PM		
	Lanes 1 & 2	Lane 3	Combined
Volume	1067	865	1,932
85th Percentile (mph)	45	47	46
Mean (mph)	41	43	42
Mode (mph)	42	42	42
Median (mph)	41	42	42
Pace (mph)	37-46	39-48	38-47
In pace (%)	78.0	81.6	78.2
Over 40mph (%)	54.5	72.5	62.5
Over 45mph (%)	13.3	22.9	17.6
Over 50mph (%)	2.2	3.4	2.7

Table 2. Speed statistics for lanes 1 & 2 (combined)

Direction 1														
Report for 9/8/2021 11:59:09 AM to 9/8/2021 2:41:30 PM														
<b>SPEED STATISTICS - 35 to 95+ by 5 MPH</b>														
Speed in MPH	1 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 - 70	71 - 75	76 - 80	81 - 85	86 - 90	91 - 95	96 - 999
Count	99	387	439	119	19	2	1	1	0	0	0	0	0	0
Percent	9.3	36.3	41.1	11.2	1.8	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Over Speed	35	40	45	50	55	60	65	70	75	80	85	90	95	999
Count	968	581	142	23	4	2	1	0	0	0	0	0	0	0
Percent	90.7	54.5	13.3	2.2	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percentile	5%	10%	15%	45%	50%	55%	85%	90%	95%					
Speed	35	36	37	40	41	42	45	47	48					
Average (Mean)	41													
Pace Speed	37-46													
Number in Pace	832													
Percent in Pace	78.0													

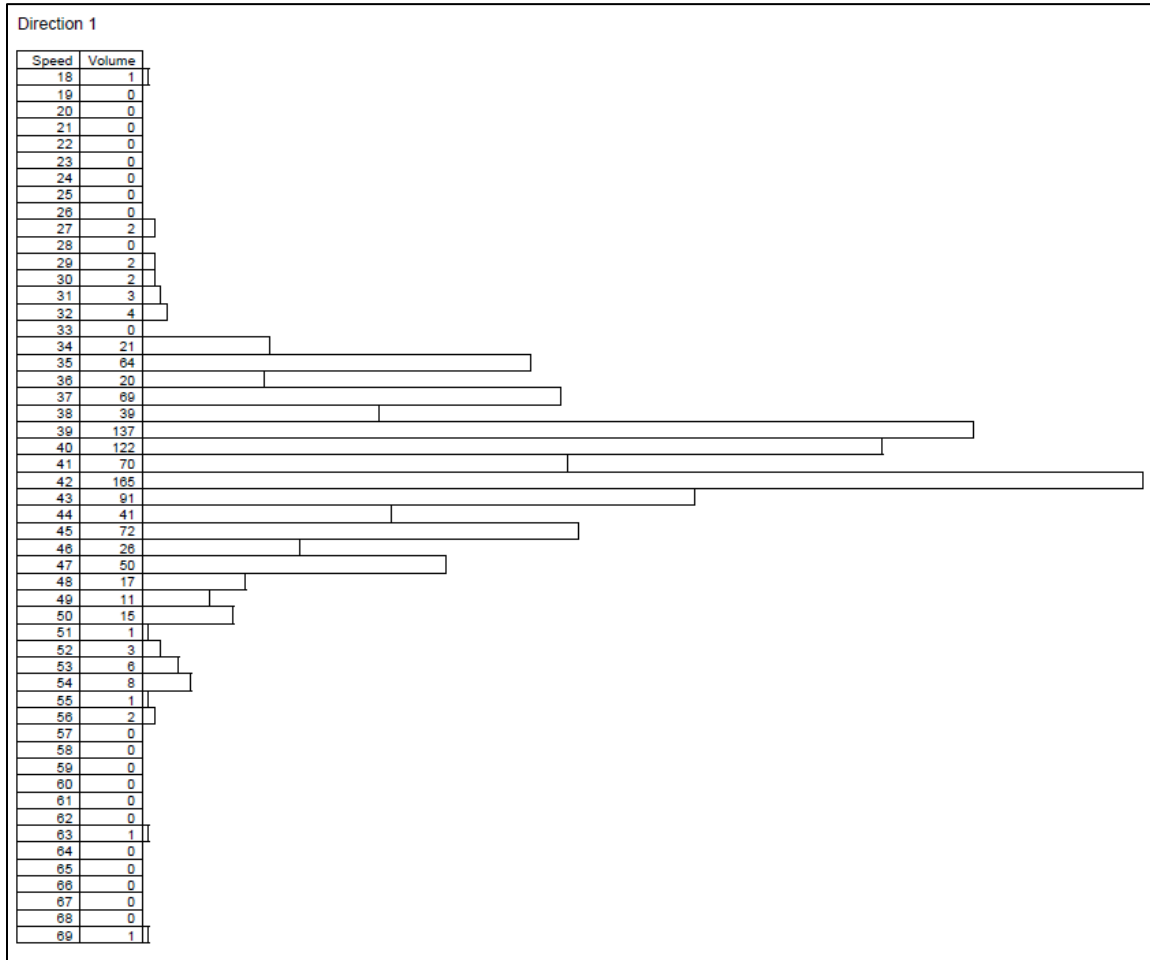


Figure 1. Frequency distribution and volume data for lane 1 & 2 (combined)

Table 3. Speed statistics for lane 3

Direction 2															
Report for 9/8/2021 11:59:09 AM to 9/8/2021 2:41:30 PM															
<b>SPEED STATISTICS - 35 to 95+ by 5 MPH</b>															
Speed in MPH	1 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 - 70	71 - 75	76 - 80	81 - 85	86 - 90	91 - 95	96 - 999	
Count	18	220	429	169	23	5	0	0	1	0	0	0	0	0	
Percent	2.1	25.4	49.6	19.5	2.7	0.6	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	
Over Speed	35	40	45	50	55	60	65	70	75	80	85	90	95	999	
Count	847	627	198	29	6	1	1	1	0	0	0	0	0	0	
Percent	97.9	72.5	22.9	3.4	0.7	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
Percentile	5%	10%	15%	45%	50%	55%	85%	90%	95%						
Speed	37	39	39	42	42	43	47	48	50						
Average 43 (Mean)															
Pace Speed 39-48															
Number in 706															
Pace															
Percent in 81.6															
Pace															

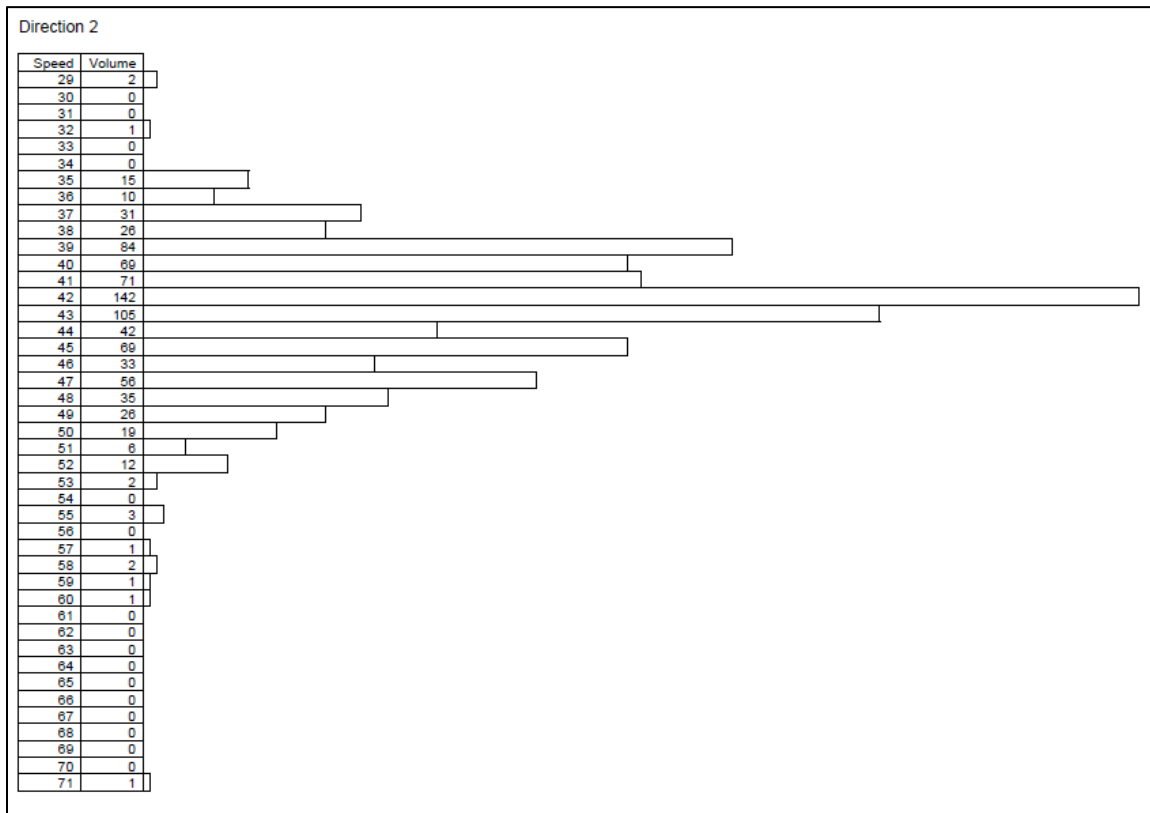


Figure 2. Frequency distribution and volume data for lane 3

Table 4. Speed statistics for all three lanes

COMBINED - Direction 1, Direction 2  
 Report for 9/8/2021 11:59:09 AM to 9/8/2021 2:41:30 PM

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**SPEED STATISTICS - 35 to 95+ by 5 MPH**

Speed in MPH	1 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 - 70	71 - 75	76 - 80	81 - 85	86 - 90	91 - 95	96 - 999
Count	117	607	868	288	42	7	1	1	1	0	0	0	0	0
Percent	6.1	31.4	44.9	14.9	2.2	0.4	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0

Over Speed	35	40	45	50	55	60	65	70	75	80	85	90	95	999
Count	1815	1208	340	52	10	3	2	1	0	0	0	0	0	0
Percent	93.9	62.5	17.6	2.7	0.5	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

Percentile	5%	10%	15%	45%	50%	55%	85%	90%	95%
Speed	35	37	38	42	42	42	46	47	49

Average 42  
 (Mean)

Pace Speed 38-47  
 Number in 1510  
 Pace  
 Percent in 78.2  
 Pace

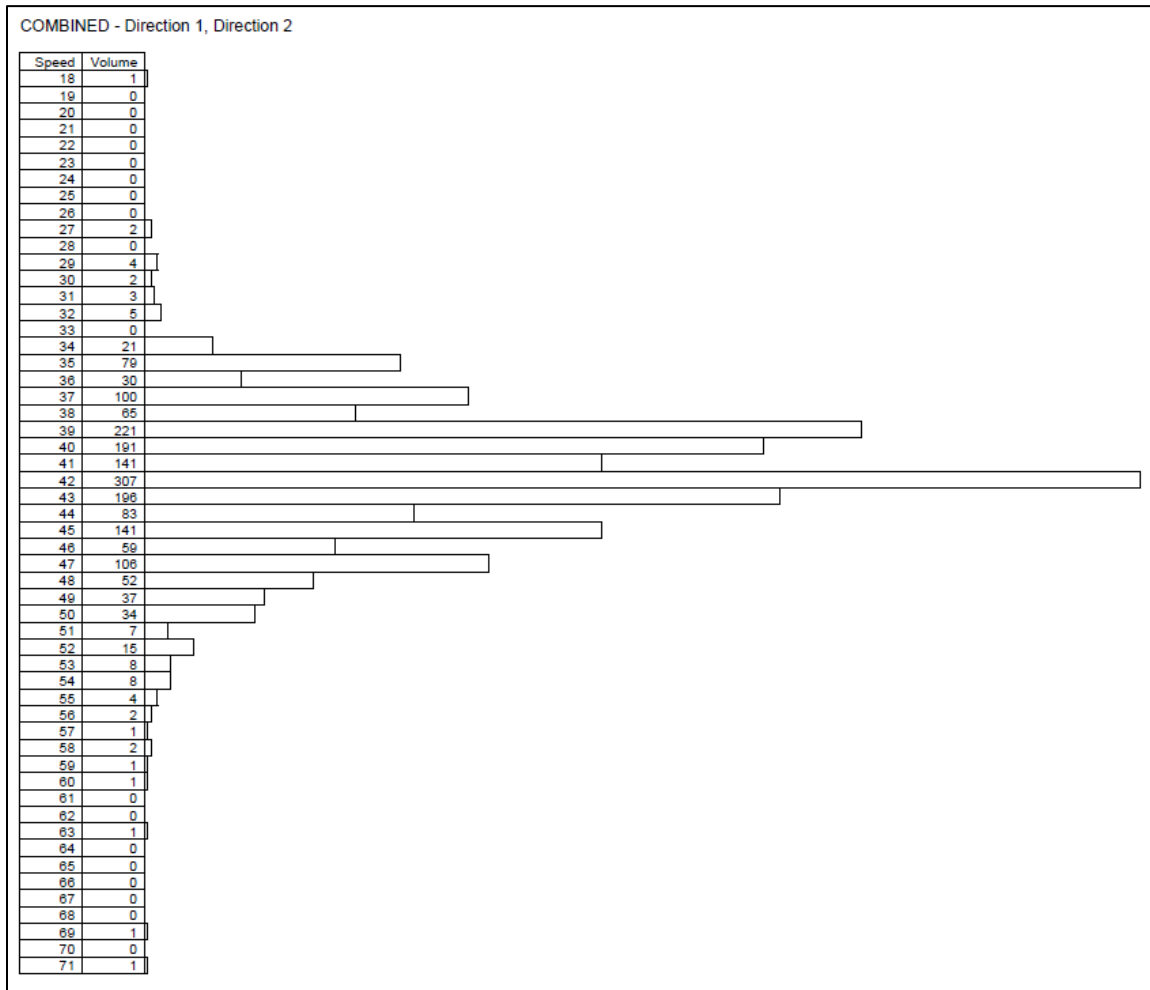


Figure 3. Frequency distribution and volume data for all three lanes