DISPERSION OF HIGHWAY TRAFFIC VOLUME BY TIME PERIODS

Nine Stations in Michigan

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SYNOPSIS

The relative dispersion of highway traffic for the hours from 9 to 10 in the morning to 5 to 6 in the afternoon is much less than for the remaining hours of the day. This day period is also convenient for traffic counting, and the greater than average constancy of flow of traffic makes increased precision of estimate feasible. In resort areas and other areas of wide dispersion on week-end days, it may also be desirable to use only midweek days for estimation of traffic volume. Among the months, June, July, and August have the most nearly constant flow of traffic, but among the other months there is little choice for sampling periods.

This section of the analysis of the problem of estimating highway traffic volume includes the data at nine stations selected for the Highway Planning Survey of Michigan as representative of traffic in the Upper Peninsula and in the western part of the Lower Peninsula. The nine points include three near Humboldt in the Upper Peninsula and six in the western part of the Lower Peninsula, and they embrace some of the more widely dispersed populations of Michigan.

While the traffic population, or annual universe, of 8,784 hours at each of these points has a dispersion, or scatter, independent of other points, the locations were selected as characteristic of the several types of stations of the area. The dispersion by hours here set forth for time periods is an extension of similar studies of Hudson River crossings and State and local stations in Iowa presented to the Highway Research Board in previous years.[1]

The data consist of manual counts by hours for each point for a year ending on some date in January 1937 and including 366 days. The dispersion of the volume of traffic by hours is shown for the hours of the day, the days of the week, and the months of the year in nine tables of the standard deviation and nine of the coefficient of variation. The coefficient of variation has been charted as

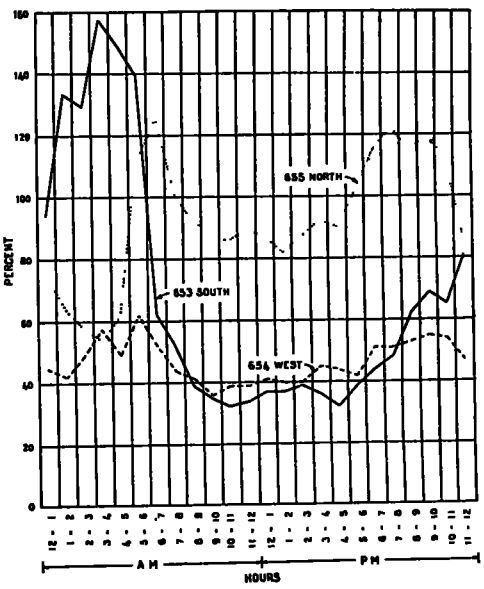

Figure 1. Coefficient of Variation of Highway Traffic Volume, by Hours, for Year 1936-37

indicating the relative dispersion in hourly volume of traffic among the subpopulations.

HOURS OF THE DAY

Figure 1 shows that during the day period from seven in the morning to five

[1] *Proceedings*, Highway Research Board, Vol. 14, 1934, pp. 399-410; Vol. 16, 1936, pp. 239-252; Vol. 17, 1937, pp. 413-419; Vol. 18, 1938, pp. 347-358.

in the afternoon the relative variation in total traffic volume among the hours of the day is smaller than for the remainder of the 24 hours. Samples could therefore be confined to the day period with a reduction in error of estimate. For the in the day period than during the remaining hours of the 24, as is shown for stations in the Lower Peninsula.

Figure 2 also manifests the general law of greater constancy during the day period from eight to six than during the

TABLE 1

STANDARD DEVIATION OF HIGHWAY TRAFFIC VOLUME, BY HOURS, FOR THE YEAR 1936-37[1], IN CHRONOLOGICAL ORDER

Hour	Michigan highway survey station numbers 650-655								
	650 East	650 South	650 West	651 North	651 East	652 South	653 South	654 West	655 North
	Number of vehicles								
a. m.									
12–1	13	8	9	6	6	20	5	27	78
1–2	11	7	7	5	5	20	5	17	54
2–3	6	4	5	4	6	13	2	14	40
3–4	4	2	3	3	4	11	2	13	32
4–5	3	2	4	3	3	10	2	11	34
5–6	5	3	4	6	4	15	2	18	78
6–7	10	6	7	12	10	27	4	24	120
7–8	13	6	10	17	12	36	7	30	123
8–9	16	7	13	21	16	46	6	40	149
9–10	21	9	18	21	19	60	7	37	173
10–11	28	11	24	24	20	66	7	47	196
11–12	28	11	25	25	20	65	7	48	218
p. m.									
12–1	27	10	24	23	18	57	7	48	201
1–2	30	12	25	23	20	57	8	51	193
2–3	40	15	36	26	21	64	9	57	238
3–4	40	15	36	26	20	70	9	68	265
4–5	39	14	36	28	23	70	9	85	297
5–6	41	15	37	30	25	72	11	72	326
6–7	40	15	34	24	19	62	11	74	334
7–8	44	17	36	26	19	67	11	69	329
8–9	43	16	37	25	20	64	11	62	269
9–10	34	13	29	20	16	50	10	54	231
10–11	24	10	19	21	19	37	7	41	177
11–12	16	8	12	10	9	27	7	28	100

[1] The year extends from near the middle of January, 1936, to the date before that of 1937 and includes 366 days for each station leg because of leap year.

more widely dispersed hours of the 24, an hourly pattern composed of a larger number of hours can be used to convert the small sample from the more nearly constant period to a full day. It is significant that even the highly variable traffic of the Upper Peninsula shows the same tendency toward greater constancy remainder of the 24 hours. These three points are located in the northwest section of the Lower Peninsula and represent both sparse and rather dense volume of traffic in areas of both forest and farm. The afternoon scatter is less than that of the morning, while in Figure 3 the opposite is true. The explanation is that in

TABLE 2

STANDARD DEVIATION OF HIGHWAY TRAFFIC VOLUME, BY HOURS, FOR THE YEAR 1936-37, IN ASCENDING ORDER

Michigan highway survey station numbers 650-651

Hour	650 East	Hour	650 South	Hour	650 West	Hour	651 North	Hour	651 East
	Number of Vehicles								
4–5 a.	3	4–5 a.	2	3–4 a.	3	3–4 a.	3	4–5 a.	3
3–4 a.	4	3–4 a.	2	4–5 a.	4	4–5 a.	3	3–4 a.	4
5–6 a.	5	5–6 a.	3	5–6 a.	4	2–3 a.	4	5–6 a.	4
2–3 a.	6	2–3 a.	4	2–3 a.	5	1–2 a.	5	1–2 a.	5
6–7 a.	10	6–7 a.	6	1–2 a.	7	12–1 a.	6	12–1 a.	6
1–2 a.	11	7–8 a.	6	6–7 a.	7	5–6 a.	6	2–3 a.	6
7–8 a.	13	8–9 a.	7	12–1 a.	9	11–12 p.	10	11–12 p.	9
12–1 a.	13	1–2 a.	7	7–8 a.	10	6–7 a.	12	6–7 a.	10
11–12 p.	16	12–1 a.	8	11–12 p.	12	7–8 a.	17	7–8 a.	12
8–9 a.	16	11–12 p.	8	8–9 a.	13	9–10 p.	20	8–9 a.	16
9–10 a.	21	9–10 a.	9	9–10 a.	18	8–9 a.	21	9–10 p.	16
10–11 p.	24	12–1 p.	10	10–11 p.	19	9–10 a.	21	12–1 p.	18
12–1 p.	27	10–11 p.	10	10–11 a.	24	10–11 p.	21	9–10 a.	19
10–11 a.	28	10–11 a.	11	12–1 p.	24	12–1 p.	23	6–7 p.	19
11–12 a.	28	11–12 a.	11	11–12 a.	25	1–2 p.	23	7–8 p.	19
1–2 p.	30	1–2 p.	12	1–2 p.	25	10–11 a.	24	10–11 p.	19
9–10 p.	34	9–10 p.	13	9–10 p.	29	6–7 p.	24	10–11 a.	20
4–5 p.	39	4–5 p.	14	6–7 p.	34	11–12 a.	25	11–12 a.	20
2–3 p.	40	3–4 p.	15	2–3 p.	36	8–9 p.	25	1–2 p.	20
3–4 p.	40	6–7 p.	15	3–4 p.	36	2–3 p.	26	3–4 p.	20
6–7 p.	40	2–3 p.	15	4–5 p.	36	3–4 p.	26	8–9 p.	20
5–6 p.	41	5–6 p.	15	7–8 p.	36	7–8 p.	26	2–3 p.	21
8–9 p.	43	8–9 p.	16	5–6 p.	37	4–5 p.	28	4–5 p.	23
7–8 p.	44	7–8 p.	17	8–9 p.	37	5–6 p.	30	5–6 p.	25

TABLE 3
STANDARD DEVIATION OF HIGHWAY TRAFFIC VOLUME, BY HOURS, FOR THE YEAR 1936-37, IN ASCENDING ORDER

Michigan highway survey station numbers 652-655							
Hour	652 South	Hour	653 South	Hour	654 West	Hour	655 North
	Number of vehicles						
4–5 a.	10	2–3 a.	2	4–5 a.	11	3–4 a.	32
3–4 a.	11	3–4 a.	2	3–4 a.	13	4–5 a.	34
2–3 a.	13	4–5 a.	2	2–3 a.	14	2–3 a.	40
5–6 a.	15	5–6 a.	2	1–2 a.	17	1–2 a.	54
12–1 a.	20	6–7 a.	4	5–6 a.	18	12–1 a.	78
1–2 a.	20	12–1 a.	5	6–7 a.	24	5–6 a.	78
6–7 a.	27	1–2 a.	5	12–1 a.	27	11–12 p.	100
11–12 p.	27	8–9 a.	6	11–12 p.	28	6–7 a.	120
7–8 a.	36	7–8 a.	7	7–8 a.	30	7–8 a.	123
10–11 p.	37	9–10 a.	7	9–10 a.	37	8–9 a.	149
8–9 a.	46	10–11 a.	7	8–9 a.	40	9–10 a.	173
9–10 p.	50	11–12 a.	7	10–11 p.	41	10–11 p.	177
12–1 p.	57	12–1 p.	7	10–11 a.	47	1–2 p.	193
1–2 p.	57	10–11 p.	7	11–12 a.	48	10–11 a.	196
9–10 a.	60	11–12 p.	7	12–1 p.	48	12–1 p.	201
6–7 p.	62	1–2 p.	8	1–2 p.	51	11–12 a.	218
2–3 p.	64	2–3 p.	9	9–10 p.	54	9–10 p.	231
8–9 p.	64	3–4 p.	9	2–3 p.	57	2–3 p.	238
11–12 a.	65	4–5 p.	9	8–9 p.	62	3–4 p.	265
10–11 a.	66	9–10 p.	10	3–4 p.	68	8–9 p.	269
7–8 p.	67	5–6 p.	11	7–8 p.	69	4–5 p.	297
3–4 p.	70	6–7 p.	11	5–6 p.	72	5–6 p.	326
4–5 p.	70	7–8 p.	11	6–7 p.	74	7–8 p.	329
5–6 p.	72	8–9 p.	11	4–5 p.	85	6–7 p.	334

TABLE 4

COEFFICIENT OF VARIATION OF HIGHWAY TRAFFIC VOLUME, BY HOURS, FOR THE YEAR 1936-37, IN CHRONOLOGICAL ORDER

Hour	Michigan highway survey station numbers 650-655								
	650 East	650 South	650 West	651 North	651 East	652 South	653 South	654 West	655 North
	Percent that standard deviation is of mean for each hour								
a. m.									
12–1	83.33	91.09	85.77	88.85	81.04	72.25	94.25	45.31	74.08
1–2	98.18	111.09	104.09	111.41	100.73	87.66	133.17	42.13	63.72
2–3	96.48	100.07	106.26	122.14	134.56	84.63	129.23	48.60	57 54
3–4	93.94	97.15	108.11	139.28	123.27	88.25	157.06	57.32	53.69
4–5	63.56	78.07	92.92	145.98	108.66	89 59	148.03	48.91	61.59
5–6	53.50	46.68	68.70	116.45	99.01	84 53	139.41	61.90	111.88
6–7	46.15	45.30	56.03	74.77	69.03	63.51	62.36	51.87	125.15
7–8	44.79	52.14	45.97	53.12	58.52	57.37	52.39	43.74	100.56
8–9	45.08	43.39	46.29	58.55	58.91	58.12	39.05	40.79	91 64
9–10	44.48	42.37	51.63	49.45	55.26	59.85	35.23	35.51	88.89
10–11	50.41	42.70	59.13	50.65	53.16	57.55	32.48	39.36	86.36
11–12	53.84	46.18	60.85	49.71	53.53	54.30	34.35	38.79	89.10
p. m.									
12–1	54.18	43.28	63 11	47.35	50.00	48.60	36.59	41.06	86.76
1–2	49.85	43 66	55 51	48.55	48.57	47.38	37.32	39.92	81.75
2–3	59.36	53 07	69.30	51.28	49 94	47.02	38.80	40 01	87.03
3–4	56.54	46.77	63.14	49.65	48.95	49.54	36.13	45.19	91.58
4–5	50.40	44.11	60.08	40.33	45.00	45 22	32 37	43.51	89.89
5–6	58.65	44.98	70.65	43.58	49.22	48.21	38.55	42.06	102.33
6–7	62.37	48.50	70.70	48.40	48.13	52.09	44.00	51.14	114.70
7–8	75.35	66.10	78 14	57.49	59.13	58.66	48.32	51.47	122.42
8–9	90.44	74.76	96.57	65.78	71.32	65.18	61.89	52.96	115.34
9–10	91.07	72.68	100.50	73.08	75.85	65.55	68.62	54.86	119.34
10–11	85.22	72.46	93.50	105.77	107.91	65.12	64.95	54.47	112.84
11–12	76.39	73.76	81.96	93 76	87.54	67.07	80.81	46 82	84.98

TABLE 7

STANDARD DEVIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY DAY OF WEEK, IN CHRONOLOGICAL ORDER

Michigan highway survey station numbers 650-655

Day	650 East	650 South	650 West	651 North	651 East	652 South	653 South	654 West	655 North
	Number of vehicles								
Sunday	54	20	47	32	23	86	15	102	350
Monday	29	12	23	27	20	63	10	61	242
Tuesday	26	11	21	24	19	52	10	58	100
Wednesday	29	12	24	27	21	54	10	54	98
Thursday	28	12	23	26	19	57	10	61	98
Friday	30	13	24	29	24	66	11	64	172
Saturday	37	16	30	32	25	77	12	63	251

TABLE 8

STANDARD DEVIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY DAY OF WEEK, IN ASCENDING ORDER

Michigan highway survey station numbers 650-651

Day	650 East	Day	650 South	Day	650 West	Day	651 North	Day	651 East
	Number of vehicles								
Tuesday	26	Tuesday	11	Tuesday	21	Tuesday	24	Tuesday	19
Thursday	28	Monday	12	Monday	23	Thursday	26	Thursday	19
Monday	29	Wednesday	12	Thursday	23	Monday	27	Monday	20
Wednesday	29	Thursday	12	Wednesday	24	Wednesday	27	Wednesday	21
Friday	30	Friday	13	Friday	24	Friday	29	Sunday	23
Saturday	37	Saturday	16	Saturday	30	Saturday	32	Friday	24
Sunday	54	Sunday	20	Sunday	47	Sunday	32	Saturday	25

TABLE 9

STANDARD DEVIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY DAY OF WEEK, IN ASCENDING ORDER

Michigan highway survey station numbers 652-655

Day	652 South	Day	653 South	Day	654 West	Day	655 North
	Number of vehicles						
Tuesday	52	Monday	10	Wednesday	54	Wednesday	98
Wednesday	54	Tuesday	10	Tuesday	58	Thursday	98
Thursday	57	Wednesday	10	Monday	61	Tuesday	100
Monday	63	Thursday	10	Thursday	61	Friday	172
Friday	66	Friday	11	Saturday	63	Monday	242
Saturday	77	Saturday	12	Friday	64	Saturday	251
Sunday	86	Sunday	15	Sunday	102	Sunday	350

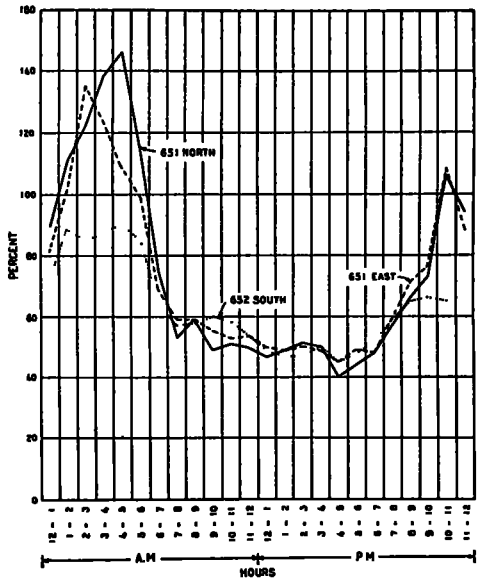

Figure 2. Coefficient of Variation of Highway Traffic Volume, by Hours, for Year 1936-37

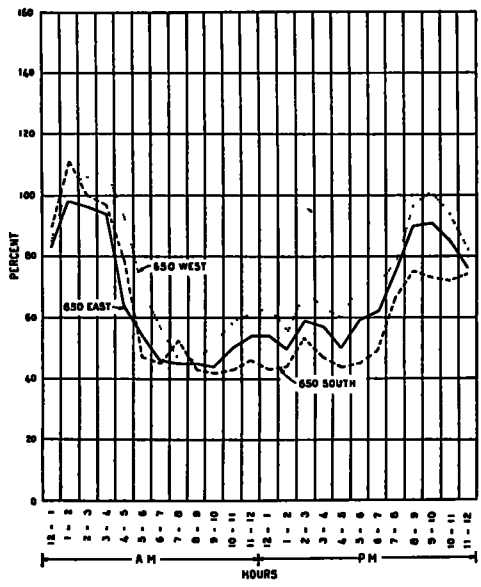

Figure 3. Coefficient of Variation of Highway Traffic Volume, by Hours, for Year 1936-37

TABLE 10

COEFFICIENT OF VARIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY DAY OF WEEK, IN CHRONOLOGICAL ORDER

Day	Michigan highway survey station numbers 650-655								
	650 East	650 South	650 West	651 North	651 East	652 South	653 South	654 West	655 North
	Percent that standard deviation is of mean of each hour of day								
Sunday	95.30	80.24	104.42	94.85	88.55	85.27	77.01	81.04	110.73
Monday	81.33	68.81	86.26	84.66	82.24	84.40	72.78	69.42	135.52
Tuesday	82.99	75.73	88.04	83.25	83.20	77.41	75.94	68.65	76.74
Wednesday	85.61	74.87	93.08	85.42	87.33	77.62	75.58	63.29	74.60
Thursday	81.32	71.99	86 76	85.10	81.21	77.62	73.57	67.32	72.68
Friday	80.14	72.62	84.96	87.67	90.18	80.00	75.46	67.31	99.65
Saturday	83.37	79.68	90 84	83 51	81.56	77.37	70.48	61.73	109.48

the resort area of the Upper Peninsula the dispersion increases after 10 in the morning. The night peaks of dispersion are not so pronounced at 652 South as at the other two points on Figure 2, and the explanation is that this State highway station near Cadillac has a more nearly constant night flow than the points on the routes of smaller volume.

While station 653 South and 654 West show something of the usual night peaks of dispersion, that of 655 North shows a valley from 12 midnight to five in the morning. Nevertheless the level plane from nine to five in the day period standing between two peaks, as shown on Figure 1, is clearly marked for 655 North. This station is located between Chicago

and the Lake Michigan resort area in Michigan and also on the route of fruit and vegetable movement, and both of these types of traffic occur in widely varying volume. This station should represent the most extreme variation from the normal law of constancy of dispersion during the day period; and yet it shows markedly the day plane (from 9 a.m. to 5 p.m.), with a much wider coefficient of variation, however, than have the other eight stations. This curve (655 North) seems to indicate that the tendency toward small dispersion during the day period is very general if not universal. It shows that the relative dispersion is materially less from nine in the morning to five in the afternoon.

DAYS OF THE WEEK

The dispersion of the hours by days of the week is roughly 80 percent of the mean, while that of the hours between nine in the morning and five in the afternoon for all days of the week is roughly only 50 percent. This contrast is due to the inclusion of the widely dispersed hours in the 24 hours in the former case. The other striking feature of the dispersion by days of the week is that the

TABLE 11

COEFFICIENT OF VARIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY DAY OF WEEK, IN ASCENDING ORDER

Day	Michigan highway survey station numbers 650-651								
	650 East	Day	650 South	Day	650 West	Day	651 North	Day	651 East
	Percent that standard deviation is of mean of each day of week								
Friday	80.14	Monday	68.81	Friday	84.96	Tuesday	83.25	Thursday	81.21
Thursday	81.32	Thursday	71.99	Monday	86.26	Saturday	83.51	Saturday	81.56
Monday	81.33	Friday	72.62	Thursday	86.76	Monday	84.66	Monday	82.24
Tuesday	82.99	Wednesday	74.87	Tuesday	88.04	Thursday	85.10	Tuesday	83.20
Saturday	83.37	Tuesday	75.73	Saturday	90.84	Wednesday	85.42	Wednesday	87.33
Wednesday	85.61	Saturday	79.68	Wednesday	93.08	Friday	87.67	Sunday	88.55
Sunday	95.30	Sunday	80.24	Sunday	104.42	Sunday	94.85	Friday	90.18

TABLE 12

COEFFICIENT OF VARIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY DAY OF WEEK, IN ASCENDING ORDER

Day	Michigan highway survey station numbers 652-655						
	652 South	Day	653 South	Day	654 West	Day	655 North
	Percent that standard deviation is of mean of each day of week						
Saturday	77.37	Saturday	70.48	Saturday	61.73	Thursday	72.68
Tuesday	77.41	Monday	72.78	Wednesday	63.29	Wednesday	74.60
Wednesday	77.62	Thursday	73.57	Friday	67.31	Tuesday	76.74
Thursday	77.62	Friday	75.46	Thursday	67.32	Friday	99.65
Friday	80.00	Wednesday	75.58	Tuesday	68.65	Saturday	109.48
Monday	84.40	Tuesday	75.94	Monday	69.42	Sunday	110.73
Sunday	85.27	Sunday	77.01	Sunday	81.04	Monday	135.52

TABLE 13

STANDARD DEVIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY MONTH, IN CHRONOLOGICAL ORDER

Month	Michigan highway survey station numbers 650-655								
	650 East	650 South	650 West	651 North	651 East	652 South	653 South	654 West	655 North
	Number of vehicles								
January....	16	8	12	16	11	32	10	51	42
February...	15	8	11	11	9	27	9	33	26
March.....	16	9	11	16	12	35	12	53	65
April.....	21	10	16	21	15	45	12	52	81
May.....	31	14	25	26	19	74	12	67	223
June.....	36	14	31	24	19	58	10	60	166
July.....	53	20	46	34	27	78	11	74	335
August.....	48	18	40	32	24	91	12	98	307
September..	38	16	31	33	27	83	12	79	328
October.....	29	14	22	29	24	56	12	65	129
November..	22	11	18	35	27	55	11	63	78
December...	20	10	16	24	15	43	10	58	59

TABLE 14

STANDARD DEVIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY MONTH, IN ASCENDING ORDER

Month	Michigan highway survey station numbers 650-651								
	650 East	Month	650 South	Month	650 West	Month	651 North	Month	651 East
	Number of vehicles								
February...	15	January...	8	February..	11	February..	11	February..	9
January....	16	February..	8	March.....	11	January...	16	January...	11
March.....	16	March.....	9	January...	12	March.....	16	March.....	12
December...	20	April.....	10	April.....	16	April.....	21	April.....	15
April.....	21	December..	10	December..	16	June.....	24	December..	15
November..	22	November.	11	November.	18	December..	24	May.....	19
October....	29	May.....	14	October...	22	May.....	26	June.....	19
May.....	31	June.....	14	May.....	25	October...	29	August....	24
June.....	36	October...	14	June.....	31	August....	32	October...	24
September..	38	September.	16	September.	31	September.	33	July.....	27
August.....	48	August....	18	August....	40	July.....	34	September.	27
July.....	53	July.....	20	July.....	46	November.	35	November.	27

TABLE 15

STANDARD DEVIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY MONTH, IN ASCENDING ORDER

Michigan highway survey station numbers 652-655

Month	652 South	Month	653 South	Month	654 West	Month	655 North
	Number of vehicles						
February	27	February	9	February	33	February	26
January	32	January	10	January	51	January	42
March	35	June	10	April	52	December	59
April	45	December	10	March	53	March	65
December	43	July	11	December	58	November	78
November	55	November	11	June	60	April	81
October	56	March	12	November	63	May	223
June	58	April	12	October	65	October	129
May	74	May	12	May	67	June	166
July	78	August	12	July	74	August	307
September	83	September	12	September	79	September	328
August	91	October	12	August	98	July	335

TABLE 16

COEFFICIENT OF VARIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY MONTH, IN CHRONOLOGICAL ORDER

Michigan highway survey station numbers 650-655

Month	650 East	650 South	650 West	651 North	651 East	652 South	653 South	654 West	655 North
	Percent that standard deviation is of mean of each hour of day								
January	73.30	72.33	77.18	88.13	87.18	76.06	86.90	75.54	66.99
February	78.24	78.81	82.14	93.54	89.00	87.71	97.08	66.58	52.97
March	70.74	71.31	73.70	83.54	73.67	71.91	76.81	68.06	66.42
April	76.23	71.02	82.60	79.75	75.14	69.26	75.07	64.23	69.55
May	79.23	72.79	86.15	75.45	74.06	82.44	74.25	68.75	109.28
June	74.72	65.86	83.31	71.52	70.02	62.94	69.18	57.70	77.63
July	74.77	75.09	80.11	71.33	68.25	63.49	67.34	59.70	88.09
August	68.26	64.81	71.69	69.36	67.53	65.10	69.00	65.45	77.11
September	74.12	66.89	80.52	78.63	80.21	72.88	72.46	68.28	113.75
October	74.62	70.15	77.88	75.79	73.33	66.13	74.39	65.07	74.87
November	66.83	65.01	70.76	82.23	81.25	67.67	75.84	67.29	61.50
December	68.97	68.93	72.74	87.85	77.15	72.04	75.39	66.44	60.47

TABLE 17

COEFFICIENT OF VARIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY MONTH, IN ASCENDING ORDER

Michigan highway survey station numbers 650-651									
Month	650 East	Month	650 South	Month	650 West	Month	651 North	Month	651 East
	Percent that standard deviation is of mean of each hour of day, by months								
November..	66.83	August...	64.81	November.	70.76	August...	69.36	August...	67.53
August.....	68.26	November.	65.01	August...	71.69	July.....	71.33	July.....	68.25
December...	68.97	June.....	65.86	December.	72.74	June.....	71.52	June.....	70.02
March.....	70.74	September	66.89	March....	73.70	May.....	75.45	October...	73.33
January....	73.30	December.	68.93	January...	77.18	October...	75.79	March....	73.67
September..	74.12	October...	70.15	October...	77.88	September	78.63	May.....	74.06
October....	74.62	April.....	71.02	July.....	80.11	April.....	79.75	April.....	75.14
June.....	74.72	March....	71.31	September	80.52	November	82.23	December.	77.15
July.....	74.77	January...	72.33	February..	82.14	March....	83.54	September	80.21
April.....	76.23	May.....	72.79	April.....	82.60	December.	87.85	November.	81.25
February...	78.24	July.....	75.09	June.....	83.31	January...	88.13	January...	87.18
May.....	79.23	February..	78.81	May.....	86.15	February..	93.54	February..	89.00

TABLE 18

COEFFICIENT OF VARIATION OF HIGHWAY TRAFFIC VOLUME, FOR HOURS, FOR THE YEAR 1936-37, BY MONTH, IN ASCENDING ORDER

Michigan highway survey station numbers 652-655							
Month	652 South	Month	653 South	Month	654 West	Month	655 North
	Percent that standard deviation is of mean of each hour of day, by months						
June.....	62.94	July.....	67.34	June.....	57.70	February....	77.63
July.....	63.49	August.....	69.00	July.....	59.70	December...	60.47
August.....	65.10	June.....	69.18	April.....	64.23	November...	61.50
October.....	66.13	September....	72.46	October.....	65.07	March.....	66.42
November.....	67.67	May.....	74.25	August.....	65.45	January.....	66.99
April.....	69.26	October.....	74.39	December....	66.44	April.....	69.55
March.....	71.91	April.....	75.07	February.....	66.58	October.....	74.87
December.....	72.04	December....	75.39	November....	67.29	August.....	77.11
September.....	72.88	November....	75.84	March.....	68.06	July.....	88.09
January.....	76.06	March.....	76.81	September....	68.28	May.....	109.28
May.....	82.44	January.....	86.90	May.....	68.75	September...	113.75
February.....	87.71	February.....	97.08	January.....	75.54	June.....	165.70

scatter for the six weekdays is almost uniform and that that for Sunday is only moderately greater. The scatter for Sunday (as for each of the other days), however, is measured from its own mean. If it were measured from the mean of all

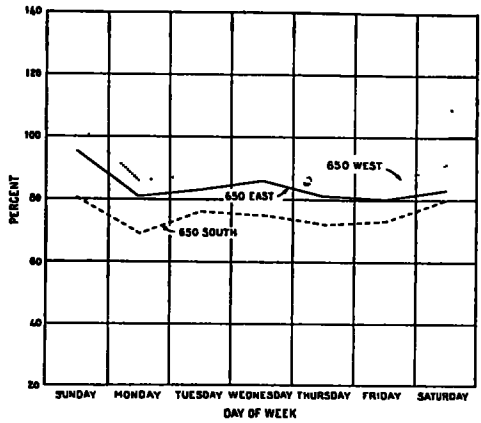

Figure 4. Coefficient of Variation of Highway Traffic Volume, by Days of Week, for Year 1936-37.

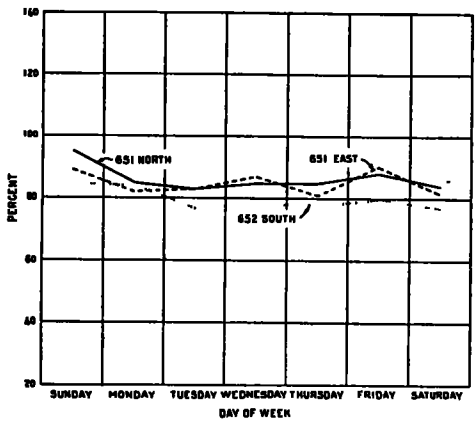

Figure 5. Coefficient of Variation of Highway Traffic Volume, by Days of Week, for Year 1936-37.

hours, the dispersion would be slightly greater for Sunday than shown. It is clear that for eight of the stations the gain in precision of estimate due to the elimination of Saturday is very small, and that due to the elimination of Sunday is moderate. The variation is important, however, for station 655 North, not only for Sunday and Saturday but also for Monday and Friday, two other days affected by the week-end scatter (Figs. 5-6). This tendency toward increased relative scatter for Friday to Monday in summer and week-end resort areas indicates that it may be desirable to separate the week-end days from the three midweek days for resort areas (Fig. 6, curve 655 North). For the other eight stations, however, the increased dispersion for Saturday and Sunday is not so great (Figs. 4-6).

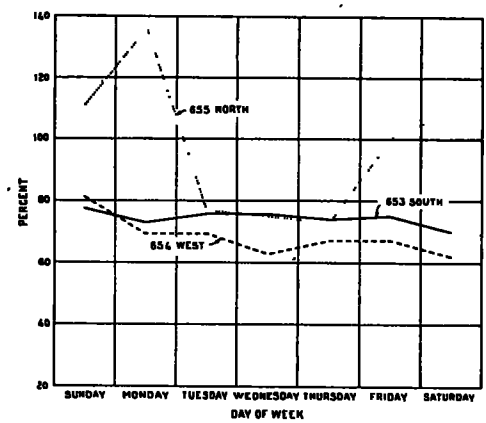

Figure 6. Coefficient of Variation of Highway Traffic Volume, by Days of Week, for Year 1936-37.

DISPERSION BY MONTHS

While the volume of traffic varies greatly between the winter and the summer months, the relative dispersion does not vary greatly. This is shown clearly in Figures 7-9 with the single exception of station 655 North. Even for this resort area, the irregularity is confined to the holiday months of May (Memorial Day) and September (Labor Day).

The relative constancy of dispersion for the months indicates that estimates for the annual mean can be made with fair precision provided an adequate

sample be taken from the constant day period and a proper pattern for the month is available for converting the monthly estimate to the annual monthly

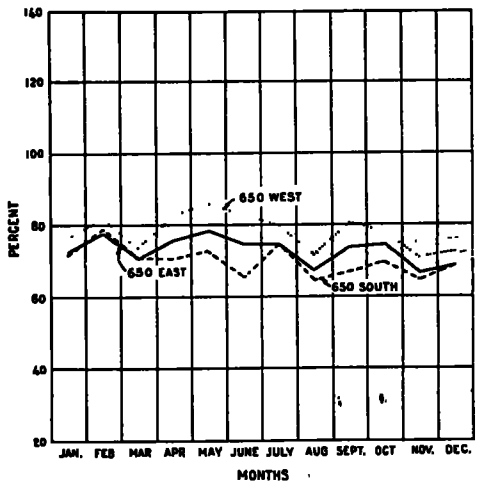

Figure 7. Coefficient of Variation of Highway Traffic Volume, by Months, for Year 1936-37

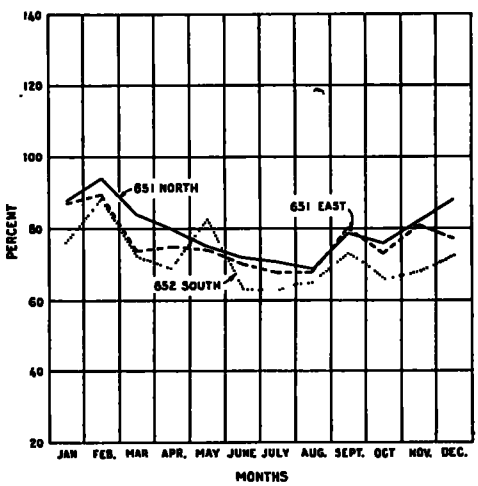

Figure 8. Coefficient of Variation of Highway Traffic Volume, by Months, for Year 1936-37

mean. An extension of this tendency is evident from the finding in the paper submitted to this Board a year ago; namely, that if the hours of the day be separated by months, the dispersion is limited to the function of scatter of the month.

Although the months of June, July, and August show smaller relative dispersion in hourly volume of traffic than the other months for the nine stations in Figures 7-9, it is clear that, in general, all the months may be used for estimating the traffic volume. The winter months show a tendency toward wide dispersion, and May and September reflect the influence of holidays in increas-

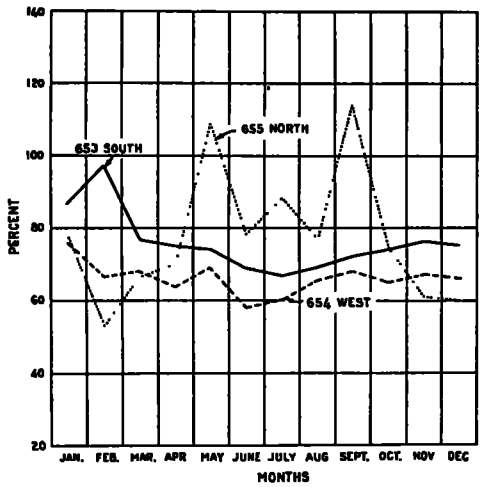

Figure 9. Coefficient of Variation of Highway Traffic Volume, by Months for Year 1936-37

ing dispersion. The departures for most stations, however, are not great enough to eliminate even these months from the sampling periods (Figs. 7-9). For station 655 North the dispersion is large for May and September, and for all months from May to September, inclusive, due to the summer vacation and week-end resort traffic. May and September would be the worst months for estimating the traffic at this point, and June and August the most dependable months. It would probably be advisable to include one month from each of the seasons among those of smallest dispersion for estimating traffic on this exceptional route.