

Traffic Volume & Collision Report–Traffic Data Collection & Processing (Traffic Engineering Section)

INTRODUCTION

City of Scottsdale staff has prepared the *Traffic Volume & Collision Report* on a biannual basis since 1986. The purpose of the report is to provide traffic volume and collision information on arterial and collector roadway segments and major intersections within the city. The report is comprised of collision data and seasonally adjusted traffic volume data collected in the years covered by the report. Note that staff took care to omit potentially skewed traffic volume data due to travel restrictions imposed by the COVID-19 outbreak.

PURPOSE

The purpose of this document is to provide information regarding the process staff undergoes to collect and compile traffic volume information for the *Traffic Volume & Collision Report*.

DATA COLLECTION

Over the two years covered by the report, staff collects approach counts at signalized intersections in the City of Scottsdale. Currently, there are over 200 intersections included in the biannual data collection process. Staff collects data through pneumatic tubes, seen in **Figure 1**, which send a burst of air pressure along a rubber tube to a sensor when a vehicle's tires pass over the tube. The sensor reading is timestamped and recorded as a single count.



Figure 1: Pneumatic Tubes

Staff places pneumatic tubes at intersection approaches for approximately 48 hours. Additional consideration is given to when data collection occurs for each intersection to reduce seasonal influence between biannual reports.

Pneumatic tubes provide a quick installation and low-cost method to get physical counts of traffic, they may fail if the tube is cut or provide inaccurate traffic information when truck volumes are very high. Tubes are checked periodically to validate accuracy and staff reviews all data to determine if there are any anomalies that require data to be collected again.

DATA PROCESSING

Based on the timestamped sensor readings, each count is added to a 15-minute bin. An Average Daily Traffic (ADT) value is produced through the sum of the 15-minute bins over a 24-hour period. An example of data output can be seen in **Tables 3 and 4**.

The value reported in the *Traffic Volume & Collision Report* is an Average Annual Daily Traffic (AADT) value which represents an average 24-hour traffic volume over a full year. The AADT is calculated by adjusting the ADT based on monthly factors that reflect the difference in traffic volumes throughout the year.

Scottsdale uses the most recent monthly factors produced by the Maricopa Association of Governments (MAG) shown in **Table 1** in tandem with monthly factors that are calculated by Scottsdale staff for North Scottsdale shown in **Table 2**.

Table 1: MAG Traffic Variation Factor by Day and Month

MAG	
January	1.003
February	1.045
March	1.040
April	1.044
May	1.022
June	0.972
July	0.930
August	0.975
September	0.995
October	0.994
November	1.008
December	0.974

In 2020 and 2021, five (5) locations were used to collect monthly travel data for the derivation of North Scottsdale monthly factors: Cave Creek Road east of Tree Lined Trail, Pima Road south of Stagecoach Pass, Scottsdale Road north of Dove Valley Road, Dynamite Boulevard west of 93rd Street, and Thompson Peak Parkway at Desert Camp. The average ADT across all months at each location provides the AADT for that location. The monthly factor for a specific month is calculated by dividing that month's ADT by the AADT of that location. The monthly factors calculated at these five (5) locations are used to create the North Scottsdale monthly factors.

Table 2: North Scottsdale Factor by Month

2019 - 2020	
North Scottsdale	
January	1.049
February	1.086
March	1.109
April	1.131
May	1.053
June	0.868
July	0.852
August	0.822
September	0.953
October	1.083
November	1.034
December	1.160

North Scottsdale monthly factors are generally used at intersections north of Loop 101. MAG monthly factors are used in all other locations in the City. Typically, ADT values are adjusted down when collected late fall through spring and adjusted up during the summer month. However, Scottsdale does not collect data for the *Traffic Volume & Collision Report* during summer when volumes are low, and school is out of session.

When calculating the AADT of a segment, the bounding intersection approach counts are used. In the case of Thomas Road between 64th Street and 68th Street the AADT would be calculated by adding the AADT of the westbound approach at 64th Street and the AADT of the eastbound approach at 68th Street. The ADT counted in **Tables 3 and 4** is 13,172 vehicles per day (vpd) for the westbound approach at 64th Street and 13,401 vpd for the eastbound approach at 68th Street. The ADT is divided by the respective monthly factor to obtain AADT. In this case, the intersection counts were collected in South Scottsdale in the months of February and March for 64th Street and 68th Street, respectively. The appropriate monthly factors are 1.045 and 1.040 and are obtained from **Table 1**. The AADT calculated by applying the monthly factor at 64th Street is 12,604 and the AADT at 68th Street is calculated as 12,885. When added, these volumes equate to 25,489 and the resulting number is rounded up to 25,500 and reported in the *Traffic Volume & Collision Report*.

CONCLUSION

City of Scottsdale staff are continuously collecting traffic data and processing the data for the next iteration of the *Traffic Volume & Collision Report*. The thousands of intersection approach counts conducted over the past decades provide strong foundations for establishing traffic trends throughout the City. Staff collaborates for timely completion of the pneumatic tube counts and data processing in preparation for each iteration of the *Traffic Volume & Collision Report*.

Table 2: Example of Count Data – Thomas Road & 64th Street Westbound

	03-Feb-20		Tue		Wed		Thu	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00				192	29	205	23	
12:15				196	29	221	26	
12:30				194	11	219	14	
12:45				188	13	228	13	
01:00				219	11	169	13	
01:15				188	19	205	5	
01:30				207	6	189	9	
01:45				213	10	197	16	
02:00				181	3	220	7	
02:15				224	8	183	8	
02:30				213	10	214	15	
02:45				245	8	245	10	
03:00				214	4	217	12	
03:15				219	8	225	12	
03:30				226	7	216	3	
03:45				208	8	245	4	
04:00				238	13	246	6	
04:15				248	11	241	16	
04:30				265	15	246	19	
04:45				219	28	247	17	
05:00				274	27	269	21	
05:15				279	37	301	36	
05:30				263	53	264	53	
05:45				248	64	242	67	
06:00				219	68	236	65	
06:15				207	78	186	93	
06:30				200	137	228	130	
06:45				197	132	196	160	
07:00				154	208	195	200	
07:15				145	241	181	257	
07:30				137	273	164	278	
07:45				126	303	142	336	
08:00				120	277	124		
08:15				123	245	106		
08:30			222	104	241	124		
08:45			214	104	211	119		
09:00			207	102	207	88		
09:15			189	76	168	84		
09:30			154	94	163	97		
09:45			154	95	170	75		
10:00			176	86	191	79		
10:15			135	69	147	72		
10:30			171	55	167	86		
10:45			167	49	159	52		
11:00			175	47	170	36		
11:15			169	37	199	48		
11:30			184	27	194	23		
11:45			201	35	172	24		
Total	0	0	2518	7969	4953	8219	1944	0
Day Total	0		10487		13172		1944	

Table 4: Example of Count Data – Thomas Road & 68th Street Eastbound

	11-Mar-19		Tue		Wed	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00		241	22	233	31	253
12:15		255	22	237	17	269
12:30		214	13	224	18	229
12:45		199	9	224	11	
01:00		234	9	216	13	
01:15		222	12	210	11	
01:30		212	9	198	16	
01:45		216	11	210	11	
02:00		211	10	214	8	
02:15		196	8	190	9	
02:30		207	9	199	11	
02:45		274	4	215	3	
03:00		287	12	245	2	
03:15		231	9	253	7	
03:30		247	10	231	7	
03:45		244	9	238	15	
04:00		275	15	250	11	
04:15		269	13	296	13	
04:30		275	16	294	20	
04:45		300	42	284	36	
05:00		299	34	325	37	
05:15		318	45	343	42	
05:30		329	63	353	62	
05:45		319	72	315	76	
06:00		249	86	264	79	
06:15		215	74	245	83	
06:30		203	91	214	110	
06:45		194	159	198	146	
07:00		152	143	170	163	
07:15		142	169	144	148	
07:30		125	235	150	157	
07:45		120	257	131	255	
08:00		112	222	125	209	
08:15		92	205	123	235	
08:30		86	162	103	191	
08:45		86	200	88	206	
09:00		89	177	90	175	
09:15		67	148	101	161	
09:30		62	165	82	178	
09:45		59	197	71	204	
10:00	193	48	178	63	163	
10:15	206	54	181	48	195	
10:30	172	51	187	51	198	
10:45	194	39	207	43	192	
11:00	186	28	197	33	198	
11:15	203	26	177	30	210	
11:30	215	27	223	35	195	
11:45	232	24	252	32	242	
Total	0	0	0	0	951	8347
Day Total	10025		13401		5531	

Thomas Road: 56th Street to Scottsdale Road

The two-mile segment of Thomas Road from 56th Street to Scottsdale Road was reclassified to a Minor Arterial in the 2016 Transportation Master Plan Update. The existing cross section includes three (3) through lanes eastbound, two (2) through lanes westbound, separated by a center turn lane. The next step in the process breaks the corridor down into segments to document the justification for modifying the roadway.

Note: Traffic volumes should be below 10,000 vehicles per lane on minor arterials. With 5 through lanes, capacity for 50,000 vehicles is possible without further widening. Existing volumes are less than 25,000 vpd throughout segment. Reduction to 4 through lanes would still operate under capacity.

Segment	Thomas Road 56th Street to 60th Street						
	2010	2012	2014	2016	2018	2020	Average
Volumes	25,800	23,600	22,400	23,000	25,900	23,800	24,083
Capacity	42,500						
Volume/Capacity	0.61	0.56	0.53	0.54	0.61	0.56	0.57
Collision Rate	0.64	0.93	1.47	1.05	1.14	1.24	1.08
Speed Limit	40 MPH						

Thomas Road and 56th Street Intersection	
Approach	2020 Volume
Northbound	2,300
Southbound	8,270
Eastbound	15,040
Westbound	13,760

Thomas Road and 60th Street Intersection	
Approach	2020 Volume
Northbound	660
Southbound	380
Eastbound	9,950
Westbound	9,630

Segment	Thomas Road 60th Street to 64th Street						
	2010	2012	2014	2016	2018	2020	Average
Volumes	26,300	24,300	23,600	23,800	24,700	21,500	24,033
Capacity	42,500						
Volume/Capacity Ratio	0.62	0.57	0.56	0.56	0.58	0.51	0.57
Collision Rate	0.63	2.25	0.46	0.90	1.20	1.12	1.09
Speed Limit	40 MPH						

Segment	Thomas Road 64th Street to 68th Street						
	2010	2012	2014	2016	2018	2020	Average
Volumes	28,900	26,600	24,900	25,900	26,000	25,400	26,283
Capacity	42,500						
Volume/Capacity Ratio	0.68	0.63	0.59	0.61	0.61	0.60	0.62
Collision Rate	2.09	1.24	1.10	2.22	1.79	1.51	1.66
Speed Limit	40 MPH						

Thomas Road and 68th Street Intersection	
Approach	2020 Volume
Northbound	4,920
Southbound	4,890
Eastbound	13,140
Westbound	13,590

Thomas Road and Scottsdale Road Intersection	
Approach	2020 Volume
Northbound	18,540
Southbound	19,400
Eastbound	12,570
Westbound	15,160

Segment	Thomas Road 68th Street to Scottsdale Road						
	2010	2012	2014	2016	2018	2020	Average
Volumes	30,800	26,900	25,900	27,600	24,300	25,600	26,850
Capacity	42,500						
Volume/Capacity Ratio	0.72	0.63	0.61	0.65	0.57	0.60	0.63
Collision Rate	4.98	5.30	4.23	4.57	3.38	2.78	4.21
Speed Limit	40 MPH						

Ancillary Data: Speed Study Documentation

More recent traffic counts were gathered from a speed study on Thomas Road that was conducted as a part of a separate effort to update speed limit studies throughout the city. A summary of that data collected in March of 2022 by a data collection contractor is shown below. The total traffic volumes are highlighted in bold for Thomas Road between 56th Street and Scottsdale Road.

It is important to note, that the eastbound direction, where the city is proposing to remove the third lane, has higher 85th percentile speeds than the westbound direction, highlighted below. In addition, the traffic volumes collected by the third-party contractor are slightly lower than those gathered by staff for the *2020 Traffic Volume & Collision Report* for the same corridor segments.

Street Name	From Street		Approach Volume		Total Volume	Average Speed (MPH)		85th Percentile Speed (MPH)		Date Collected
	From Street	To Street	EB	WB	EB+WB	EB	WB	EB	WB	
Thomas Road	56th Street	64th Street	10,227	9,666	19,893	40	40	45	44	3/23/2022
	64th Street	68th Street	11,259	12,369	23,628	49	40	54	44	3/23/2022
	68th Street	Scottsdale Road	12,348	12,342	24,690	38	31	43	36	3/9/2022
	Scottsdale Road	Miller Road	14,587	15,108	29,695	38	39	43	44	3/23/2022
	Miller Road	Hayden Road	13,756	12,743	26,499	39	37	43	44	3/9/2022
	Hayden Road	Granite Reef Road	12,479	13,365	25,844	45	41	49	45	3/9/2022
	Granite Reef Road	Pima Road	13,323	13,779	27,102	43	41	48	45	3/9/2022