

Signal Warrant Evaluation 39th Street / Church Street

Zachary, Louisiana

January 10, 2023

PREPARED FOR:

The City of Zachary

PREPARED BY:



YOUR QUESTIONS ANSWERED QUICKLY

Why did you perform this study?

An evaluation was conducted for the 39th Street/ Church Street intersection in Zachary, Louisiana to determine if a traffic signal is warranted. The evaluation was initiated at the request of the City Council to address residents' concerns regarding heavy traffic, safety, and difficulty making a left turn, particularly during school start/end times for the adjacent Zachary High School. The intersection is located adjacent to the primary driveway for Zachary High School at 40th Street, and queues on Church Street were observed to extend through the 39th Street intersection intermittently during brief morning and afternoon periods of school arrival and departure.

What criteria was used to evaluate if a traffic signal is warranted?

The evaluation was conducted in accordance with the Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*, the national standard for determining if a signal is appropriate based on nine potentially applicable warrants.

- ▶ Warrant 1, Eight-Hour Vehicular Volume
- ▶ Warrant 2, Four-Hour Vehicular Volume
- ▶ Warrant 3, Peak Hour
- ▶ Warrant 4, Pedestrian Volume
- ▶ Warrant 5, School Crossing
- ▶ Warrant 6, Coordinated Signal System
- ▶ Warrant 7, Crash Experience
- ▶ Warrant 8, Roadway Network
- ▶ Warrant 9, Intersection Near a Grade Crossing

A signal may be justified if any one of the signal warrants are met. However, meeting a warrant alone does not indicate that a signal is required or recommended.

What are the findings and recommendations?

None of the warrants were met, indicating that a signal is not the appropriate control at this location. Additionally, the site characteristics with residential homes in all quadrants and residential driveways opposite 39th Street are not conducive to constructing a signal. The City could consider installing 'Do Not Block Intersection' signs and/or markings on Church Street at 39th Street to encourage traffic to keep the intersection clear.



INTRODUCTION

This report presents a traffic signal warrant evaluation conducted for the 39th Street/ Church Street (LA 64) intersection in Zachary, Louisiana. The intersection is currently side-street STOP control on 39th Street. This evaluation is performed for the City of Zachary as a response to Council request. Residents have expressed concerns regarding heavy traffic, safety, and difficulty making a left turn from 39th Street, particularly during school start/end times for the adjacent Zachary High School.

The following warrants were analyzed based on guidance in the Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*, the national standard for determining if a signal is appropriate based on nine potentially applicable warrants. A signal may be justified if any one of the signal warrants are met. However, meeting a warrant alone does not indicate that a signal is necessary or recommended.

- ▶ Warrant 1, Eight-Hour Vehicular Volume
- ▶ Warrant 2, Four-Hour Vehicular Volume
- ▶ Warrant 3, Peak Hour
- ▶ Warrant 4, Pedestrian Volume
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EXISTING INTERSECTION CONDITIONS

Existing Lane Configurations and Controls

Church Street (LA 64) is a four-lane, east-west roadway. The posted speed limit is 35 mph, and the intersection is in a 20-mph school zone for Zachary High School that is active from 6:00 AM – 8:00 AM, and 2:00 PM – 4:00 PM. The side street, 39th Street, is residential with a posted speed limit of 25 mph that forms a T-intersection with Church Street. Opposite 39th Street are two residential driveways. Church Street is classified as a Minor Urban Arterial with LADOTD, and 39th Street is a local roadway.

Exhibit 1 shows the intersection lane configurations and controls.



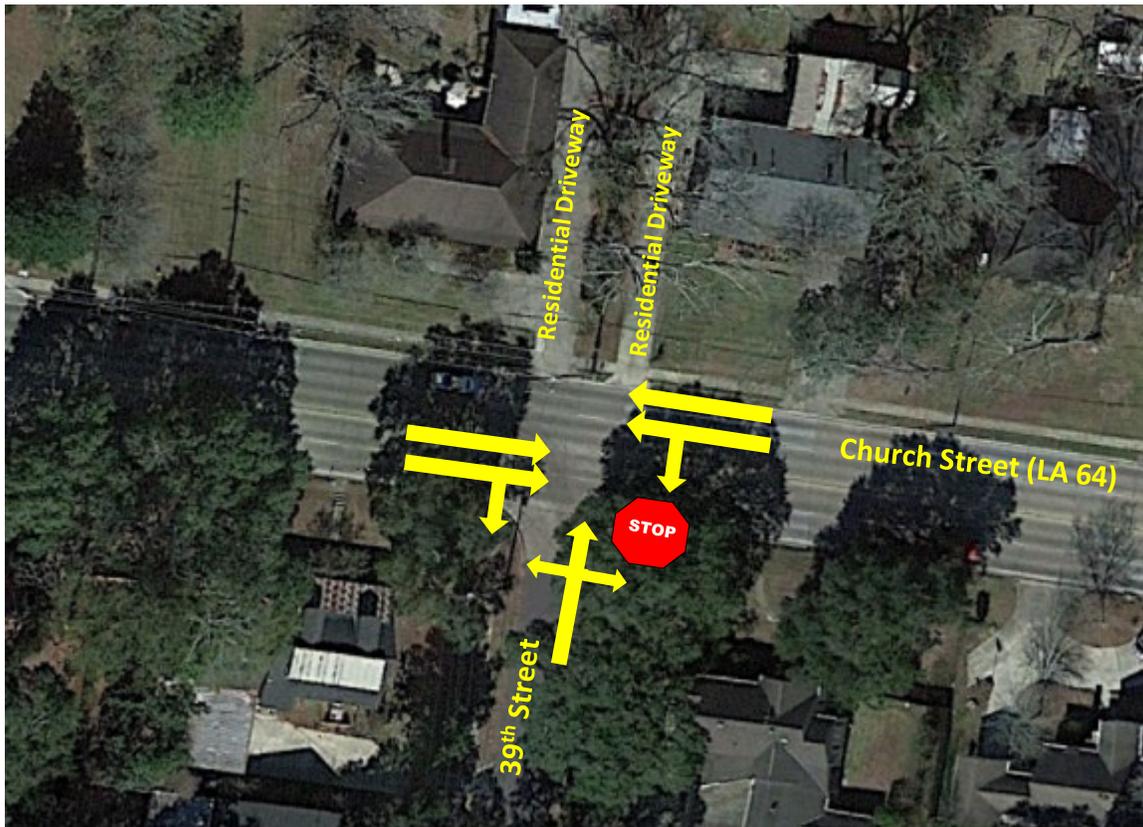


Exhibit 1: 39th Street/ Church Street
Existing Lane Configurations and Controls

Existing Operation

The intersection is adjacent to the primary access to Zachary High School at 40th Street, approximately 380 feet to the east. It is the interaction with this access during peak times of school start (approximately 6:40 AM) and release (approximately 2:12 PM) that has prompted this evaluation. *It is noted that the school times occur before the typical morning and afternoon commuter periods, a benefit to the intersections surrounding the school.*

The intersection was observed during these periods of school start and release. The morning and afternoon followed similar patterns - queues in the eastbound direction to enter the school form starting prior to school start and end. A crossing guard was stationed at Church / 40th Street directing traffic. During this time, a duration of approximately 20 minutes in the morning and afternoon, eastbound queues on Church Street did regularly extend past 39th Street. In addition, the school zone speed of 20 mph resulted in a slow, constant flow of vehicles. Gaps for vehicles turning from 39th Street were limited; however, Church Street traffic often stopped prior to 39th Street to keep the intersection clear. During the heaviest periods just before and after school, the longest observed queues on 39th Street were two vehicles. **Exhibit**



2 shows the 39th Street interaction with the primary Zachary High School access. The intersection was also observed during off peak times and found to operate with no noted issues.



Exhibit 2: 39th Street/ Church Street
Interaction with Zachary High School Access

Traffic Data

Twenty-four hour traffic volumes were collected in December 2022 with school in regular session. The peak hours were identified as 6:45-7:45 AM, 12:00-1:00 midday, and 4:30-5:30 PM. The data is in **Appendix A**.



SIGNAL WARRANT EVALUATION

The Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices* (MUTCD) includes nine different traffic signal warrants to investigate the need for a traffic control signal. Meeting any one of the warrants can be considered adequate justification for a traffic signal installation.

Warrant 1, Eight-Hour Vehicular Volume

Criteria

According to the MUTCD, “the need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:

- (a) The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or
- (b) The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

^a Basic minimum hourly volume

^b Used for combination of Conditions A and B after adequate trial of other remedial measures

^c May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

^d May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Source: MUTCD 2009



Evaluation

The 15-minute volumes were input and evaluated in a spreadsheet-based signal warrant program, based on the number of lanes and the speed limit. The warrant is presented in **Exhibit 3**.

MUTCD WARRANT 1, EIGHT-HOUR VEHICULAR VOLUME									
Number of Lanes for Moving Traffic on Each Approach									Print Page
Major Street:		2 or More Lanes							
Minor Street:		1 Lane							
Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?									No
Combination of Conditions A and B Necessary?*									No
<small>*Only applicable for Warrant 1 if after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems. See Section 4C.02 of the 2009 MUTCD for application.</small>									
Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or More	1	600	480	420	336	150	120	105	84
2 or More	2 or More	600	480	420	336	200	160	140	112
1	2 or More	500	400	350	280	200	160	140	112
Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or More	1	900	720	630	504	75	60	53	42
2 or More	2 or More	900	720	630	504	100	80	70	56
1	2 or More	750	600	525	420	100	80	70	56
Condition A Evaluation									
Number of Unique Hours Met:		0		Condition A Satisfied?				No	
Condition B Evaluation									
Number of Unique Hours Met:		2		Condition B Satisfied?				No	

Exhibit 3: Warrant 1: 8-Hour Summary Warrant

Warrant 1 Met?

No. Eight hours of Condition A or B are required for the warrant to be met; zero hours were met for Condition A and two hours were met for Condition B.



Warrant 2, Four-Hour Vehicular Volume

Criteria

According to the MUTCD, “the need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in **Figure 4C-1** for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.”

Evaluation

The 15-minute volumes were input and evaluated in a spreadsheet-based signal warrant program, based on the number of lanes and the speed limit. The warrant data is presented in **Exhibit 4**.

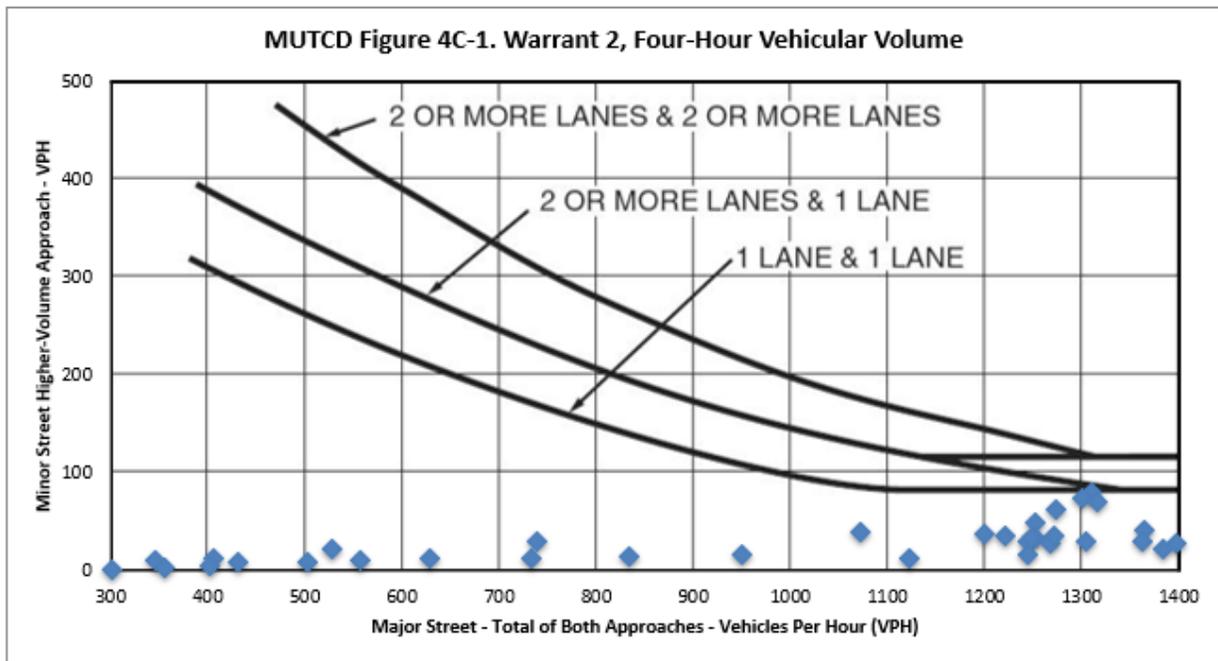


Exhibit 4: Warrant 2: 4-Hour Summary Warrant

Warrant 2 Met?

No. Four hours are required to meet the warrant, one hour met. The minimum side street (39th Street) volume for this warrant is 81 vehicles per hour; this was achieved for one hour, from 7:00 – 8:00 AM.



Warrant 3, Peak Hour

Criteria/ Evaluation

This warrant applies to direct access to facilities that attract/discharge a large number of vehicles in a short period of time but is not intended for schools. Also, 39th Street is not the access to the school. The warrant is not applicable and therefore is not met.

Warrant 4, Pedestrian Volume

Criteria

According to the MUTCD, “The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.” The warrant also states that “The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic.”

Evaluation

No pedestrians were observed crossing at 39th Street / Church Street; pedestrians were observed crossing at the adjacent intersection, approximately 380 feet to the east at 40th Street / Church Street. This intersection has marked pedestrian crosswalks, pedestrian crossing signage, and was observed to have a crossing guard during the periods of school arrival and dismissal.

Warrant 4 Met?

No. This warrant is not met since pedestrians do not routinely cross at this intersection.



Crossing Guard during School Arrival at 40th Street

Warrant 5, School Crossing

Criteria

According to the MUTCD, this warrant is intended for “application where the fact that schoolchildren cross the major street is the principal reason to consider installing a traffic control signal.”

Evaluation

The requests to evaluate a signal were not related to school children crossing. The criteria are similar to Warrant #4, based primarily on pedestrian volumes. Students were not observed to cross this intersection



during school arrival or departure periods. Students cross at the adjacent 40th Street / Church Street intersection, which is marked and signed for pedestrians and has a crossing guard.

Warrant 5 Met?

No. This warrant is not met since students do not routinely cross at this intersection.

Warrant 6, Coordinated Signal System

Criteria/ Evaluation

This warrant is intended for intersections where a signal is needed to maintain proper platooning of vehicles in coordination with an adjacent signal. The warrant is not applicable and therefore is not met.

Warrant 7, Crash Experience

Criteria

According to the MUTCD, “the need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:

- (a) Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and
- (b) Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and
- (c) For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.”

Evaluation

There are three (3) components of this warrant, all of which must be met.

Component (a) - No trials of alternatives have been documented. A crossing guard was implemented at the adjacent intersection (40th Street) to assist during school start and end periods.



Component (b) – Crash data is typically only made available for LADOTD projects; therefore, detailed crash data was not provided. Local knowledge of the study intersection does not indicate that a significant crash history susceptible to correction by a signal has occurred.

Component (c) - The volumes were input and evaluated in a spreadsheet-based signal warrant program. The volume warrant criteria was not met.

Warrant 7 Met?

No. None of the three components are confirmed to be met; all are required to for the warrant to be met.

Warrant 8, Roadway Network

Criteria

According to the MUTCD, this warrant is intended for intersections to “encourage concentration and organization of traffic flow on a roadway network.” This warrant is meant for situations in which projected traffic volumes from planned developments will increase existing traffic volumes to thresholds meeting the criteria for Warrants 1, 2 and 3.

Evaluation

The side street volumes were generally half or less what would be required to warrant a signal. No known developments or planned projects are expected which would increase traffic volumes on 39th Street to meet signal warrants in the foreseeable future.

Warrant 8 Met?

No. Traffic volumes in the foreseeable future are not expected to increase to meet warrants.

Warrant 9, Intersection Near a Grade Crossing

Criteria/ Evaluation

This warrant is intended for intersections where the proximity of a railroad crossing is the principal reason for consideration. The warrant is not applicable and therefore is not met.



RECOMMENDATIONS

No warrants were met to justify installing a signal at 39th Street / Church Street. The side-street STOP control on 39th Street is the appropriate control for this intersection. Additionally, the location is not ideal to construct a signal. Residences exist in all quadrants, and two residential driveways are located opposite 39th Street.



Residential Driveways Opposite 39th Street



Residences on 39th Street / Church Street

The primary concern from the public is that it is difficult to exit 39th Street during school arrival and departure periods. It is noted that these periods occur prior to 6:40 AM until around 2:45 PM; off set from typical peak commuter periods. The City could consider installing 'Do Not Block Intersection' signs and/or markings on Church Street at 39th Street to encourage traffic to keep the intersection clear when eastbound queues on Church Street from the school access extend past 39th Street.



Appendix A

Count Data



Southern Traffic Services, Inc. Vehicle Counts

39th St South of Church St NB

Datasets:

Site: [WY488MZG] MetroCount Factory Test Setup
Attribute:
Direction: 1 - North bound, A trigger first. Lane: 0
Survey Duration: 19:26 Sunday, December 11, 2022 => 10:00 Thursday, December 15, 2022,
Zone:
File: WY488MZG 0 2022-12-15 1001.EC0 (Plus)
Identifier: WY488MZG MC5900-X13 (c)MetroCount 09Nov16
Algorithm: Factory default axle (v5.05)
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: 0:00 Tuesday, December 13, 2022 => 0:00 Wednesday, December 14, 2022 (1.04167)
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range: 6 - 99 mph.
Direction: North (bound), P = North, Lane = 0-16
Separation: Headway > 0 sec, Span 0 - 328.084 ft
Name: Default Profile
Scheme: Vehicle classification (Scheme F3)
Units: Non metric (ft, mi, ft/s, mph, lb, ton)
In profile: Vehicles = 584

Tuesday, December 13, 2022 - Total=584, 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
2	1	1	1	4	12	39	81	29	38	23	16	23	21	43	72	44	54	39	13	14	6	5	3
0	1	0	0	1	2	3	13	3	8	7	4	8	6	13	31	5	21	6	2	5	2	0	1
2	0	0	0	0	3	13	6	9	11	8	1	3	7	9	22	11	9	9	4	3	2	0	1
0	0	1	1	2	5	12	24	13	8	5	6	5	5	8	11	16	10	18	4	2	1	3	1
0	0	0	0	1	2	11	38	4	11	3	5	7	3	13	8	12	14	6	3	4	1	2	0

AM Peak 0700 - 0800 (81), AM PHF=0.53 PM Peak 1445 - 1545 (77), PM PHF=0.62

Southern Traffic Services, Inc. Vehicle Counts

39th St South of Church St **SB**

Datasets:

Site: [WY488MZG] MetroCount Factory Test Setup
Attribute:
Direction: 1 - North bound, A trigger first. **Lane:** 0
Survey Duration: 19:26 Sunday, December 11, 2022 => 10:00 Thursday, December 15, 2022,
Zone:
File: WY488MZG 0 2022-12-15 1001.EC0 (Plus)
Identifier: WY488MZG MC5900-X13 (c)MetroCount 09Nov16
Algorithm: Factory default axle (v5.05)
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: 0:00 Tuesday, December 13, 2022 => 0:00 Wednesday, December 14, 2022 (1.04167)
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range: 6 - 99 mph.
Direction: South (bound), P = North, Lane = 0-16
Separation: Headway > 0 sec, Span 0 - 328.084 ft
Name: Default Profile
Scheme: Vehicle classification (Scheme F3)
Units: Non metric (ft, mi, ft/s, mph, lb, ton)
In profile: Vehicles = 754

Tuesday, December 13, 2022 - Total=754, 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
2	0	1	1	1	5	31	153	26	23	34	24	37	33	50	72	70	76	39	34	23	10	8	1	
0	0	0	0	0	0	3	25	8	9	12	10	9	8	12	26	22	19	11	13	2	5	2	1	0
2	0	0	1	0	1	4	36	3	6	9	5	8	10	14	16	12	21	6	9	8	0	3	0	1
0	0	0	0	0	1	8	55	6	4	6	3	7	8	12	15	19	19	9	7	7	2	1	0	0
0	0	1	0	1	3	16	37	9	4	7	6	13	7	12	15	17	17	13	5	6	3	2	0	1

AM Peak 0700 - 0800 (153), AM PHF=0.70 PM Peak 1630 - 1730 (76), PM PHF=0.90

Southern Traffic Services, Inc. Event Counts

Church St EB Approach to 39th St

Datasets:

Site: [XF61D3YS] MetroCount Factory Test Setup
Attribute:
Input A: 1 - North bound, A trigger first. - Lane= 0, Added to totals. (/2.000)
Input B: 0 - Unused or unknown. - Lane= 0, Excluded from totals.
Survey Duration: 15:46 Monday, November 28, 2022 => 10:04 Thursday, December 15, 2022,
Zone:
File: XF61D3YS 0 2022-12-15 1005.EC0 (Plus)
Identifier: XF61D3YS MC5900-X13 (c)MetroCount 09Nov16
Algorithm: Event Count (v5.05)
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: 0:00 Tuesday, December 13, 2022 => 0:00 Wednesday, December 14, 2022 (1.04167)
Separation: GapX > 0 sec
Name: Default Profile
Scheme: Count events divided by setup divisor
Units: Non metric (ft, mi, ft/s, mph, lb, ton)
In profile: Events = 11492

Tuesday, December 13, 2022=11492, 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
19	11	16	19	51	160	633	709	717	641	728	779	768	721	717	941	1009	1058	691	516	265	177	106	46	
4	5	1	1	9	23	58	148	181	161	169	207	199	176	172	201	229	271	187	183	82	50	30	18	8
8	2	6	7	7	29	98	171	168	162	180	199	180	176	201	245	237	283	167	127	73	49	32	14	7
5	1	4	8	18	42	211	186	172	156	187	181	178	180	174	234	263	268	176	110	68	34	23	7	7
2	3	5	3	18	66	266	205	197	163	192	193	212	189	170	262	281	237	162	98	42	45	22	7	4

AM Peak 0630 - 0730 (795), AM PHF=0.75 PM Peak 1645 - 1745 (1102), PM PHF=0.97

Southern Traffic Services, Inc. Event Counts

Church St WB Approach to 39th St

Datasets:

Site: [XK40TFEA] MetroCount Factory Test Setup
Attribute:
Input A: 1 - North bound, A trigger first. - Lane= 0, Added to totals. (/2.000)
Input B: 0 - Unused or unknown. - Lane= 0, Excluded from totals.
Survey Duration: 19:26 Sunday, December 11, 2022 => 10:06 Thursday, December 15, 2022,
Zone:
File: XK40TFEA 0 2022-12-15 1006.EC0 (Plus)
Identifier: XK40TFEA MC5900-X13 (c)MetroCount 09Nov16
Algorithm: Event Count (v5.05)
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: 0:00 Tuesday, December 13, 2022 => 0:00 Wednesday, December 14, 2022 (1.04167)
Separation: GapX > 0 sec
Name: Default Profile
Scheme: Count events divided by setup divisor
Units: Non metric (ft, mi, ft/s, mph, lb, ton)
In profile: Events = 11381

Tuesday, December 13, 2022=11381, 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
22	14	10	24	69	185	438	601	548	557	655	739	845	684	793	879	1172	1037	761	604	363	224	112	52	
11	3	2	9	7	42	68	159	131	135	149	192	198	176	173	210	300	271	201	183	112	73	46	20	8
4	5	5	4	10	38	91	130	118	144	152	176	256	189	233	215	283	273	191	161	97	65	29	13	7
4	6	1	1	26	51	92	156	142	131	156	180	187	174	190	231	301	280	194	142	84	48	18	9	8
3	0	2	10	26	55	188	156	159	148	198	191	204	145	197	223	288	214	176	119	71	38	19	10	11

AM Peak 1145 - 1245 (832), AM PHF=0.81 PM Peak 1600 - 1700 (1172), PM PHF=0.97