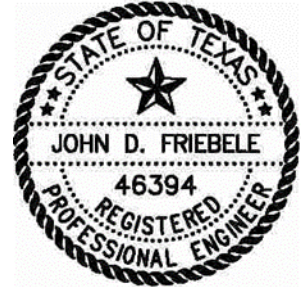




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LEE ENGINEERING



TECHNICAL MEMORANDUM

DATE: September 23, 2016
TO: Mr. Garry Ford, P.E., PTOE, City Engineer
City of New Braunfels, Texas
FROM: John Friebele, P.E., PTOE
Lee Engineering, LLC
SUBJECT: Task Order #6-D – All-way Stop Evaluation, Gruene Rd. & Gruene Lake Dr.
(Technical Memorandum 128.06-D)

SUBJECT

All-way stop evaluation for the intersection of Gruene Rd. and Gruene Lake Dr.

BACKGROUND

An all-way stop evaluation was performed for the intersection of Gruene Rd. and Gruene Lake Dr. The evaluation included an all-way stop warrant analysis along with the review of other characteristics of the intersection.

This intersection is located in the north-eastern part of the City east of the Loop 337/SH 46 and Hanz Dr. intersection. It is a four-legged intersection, with the east leg leading to Gruene Lake Village. Both streets have one approach lane. A site visit determined that the existing sight distance is acceptable for all approaches of the intersection and does not interfere drivers' ability to make a safe movement.

Crash information was obtained for this location, from the TxDOT Crash Records Information System (CRIS), for the 2-year period of January 1, 2013 through December 31, 2014. According to the data, there was two reported crashes at this intersection. One of the crashes that occurred is considered correctable, however five correctable crashes are required to meet the warrant criteria.

Traffic volumes were collected for this location over a 24-hour period on September 8, 2016. Based on the traffic volumes and roadway classifications, Gruene Rd. was selected as the "Major" street and Gruene Lake Dr. was selected as the "Minor" street. Total intersection volume is 6,582 vehicles per day (vpd) with Gruene Rd. having 5,514 daily approach vehicles (84% of total) and Gruene Lake Dr. having 1,068 vpd (16%). Hourly traffic volumes are modest with only one hour exceeding 300 approach vehicles on the major street (Gruene Rd.)

The all-way stop warrant analysis was conducted using recommendations made by the *Manual on Uniform Traffic Control Devices* (MUTCD) which include:

1. Review average volume for eight hours
 - a. Required volume for major street – 300 vehicles per hour
 - b. Required volume for minor street – 200 vehicles per hour
2. Review sight visibility at corners
3. Review number of correctable accidents within a 12-month period

CONCLUSION

The analysis concludes that none of the three warranting recommended criteria are met at the intersection.

ATTACHMENTS

1. All-way stop warrant analysis
2. 24-hr traffic volumes

TRAFFIC SIGNAL WARRANT STUDY
GRUENE RD and GRUENE LAKE DR
M. U. T. C. D. MULTIWAY STOP - WARRANT # C
Minimum Volume

REQUIRED AVERAGE VOLUME FOR 8 HOURS ON GRUENE RD	300
REQUIRED AVERAGE VOLUME FOR 8 HOURS ON GRUENE LAKE DR	200
REQUIRED PEAK HOUR DELAY ON GRUENE RD	30
REQUIRED PEAK HOUR DELAY ON GRUENE LAKE DR	Not Measured
NUMBER OF EIGHT-HOUR PERIODS SATISFIED:	0
WARRANT CRITERIA:	NOT SATISFIED

RANKING BY MAJOR STREET GRUENE RD HOURLY VOLUMES

HOURLY VOLUME				AVERAGE OF EIGHT HOURLY VOLUMES			
RANK	BEGIN TIME	MAJOR STREET	MINOR STREET	RANKED HOURS	MAJOR STREET	MINOR STREET	SATISFIED?
1	5:00 PM	489	85	1 to 8	407	78	NO
2	4:00 PM	447	114	2 to 9	385	79	NO
3	3:00 PM	439	69	3 to 10	369	74	NO
4	6:00 PM	424	93	4 to 11	350	73	NO
5	11:00 AM	396	88	5 to 12	329	67	NO
6	2:00 PM	368	63	6 to 13	307	63	NO
7	7:00 PM	357	42	7 to 14	287	56	NO
8	NOON	332	68	8 to 15	267	55	NO
9	1:00 PM	319	93	9 to 16	244	47	NO
10	10:00 AM	317	73	10 to 17	219	40	NO
11	9:00 AM	286	61	11 to 18	191	31	NO
12	8:00 PM	258	47	12 to 19	161	26	NO
13	8:00 AM	221	55	13 to 20	131	21	NO
14	10:00 PM	204	7	14 to 21	105	14	NO
15	9:00 PM	199	37	15 to 22	81	14	NO
16	11:00 PM	147	3	16 to 23	57	9	NO
17	7:00 AM	122	40	17 to 24	39	9	NO
18	MIDNITE	92	0				
19	6:00 AM	45	22				
20	1:00 AM	18	3				
21	5:00 AM	12	2				
22	2:00 AM	9	2				
23	3:00 AM	8	1				
24	4:00 AM	5	0				

1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day, and
2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour, but
3. If the 85th-percentile approach speed of the major-street vehicular traffic exceeds 65 km/h or exceeds 40 mph, the minimum vehicular volume warrants are 70% of the above values.

ANALYST: MRM





Average Daily Traffic Data

Project No. : 91-16
 Station No. : 100
 Counter No. : 7589

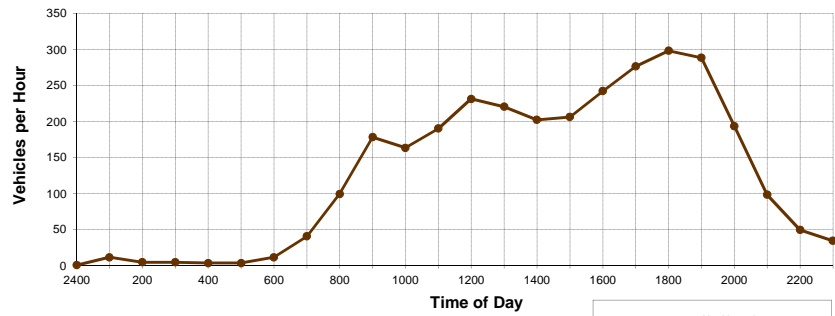
Day of Week: Thursday, September 08, 2016

Site: **Northbound
 Gruene Road**

Location: South of Gruene Lake Drive
 City/State: New Braunfels, Texas

Gruene Road and Gruene Lake Drive

Northbound Gruene Road



End Time	Northbound Gruene Road	
15	8	
30	0	
45	3	
100	0 11	
115	0	
130	1	
145	3	
200	0 4	
215	2	
230	0	
245	1	
300	1 4	
315	0	
330	1	
345	0	
400	2 3	
415	1	
430	0	
445	1	
500	1 3	
515	3	
530	0	
545	4	
600	4 11	
615	5	
630	14	
645	6	
700	15 40	
715	17	
730	25	
745	22	
800	35 99	
815	58	
830	44	
845	38	
900	38 178	
915	43	
930	35	
945	40	
1000	45 163	
1015	43	
1030	41	
1045	52	
1100	54 190	
1115	43	
1130	66	
1145	57	
1200	65 231	

End Time	Northbound Gruene Road	
1215	55	
1230	51	
1245	52	
1300	62 220	
1315	56	
1330	46	
1345	61	
1400	39 202	
1415	48	
1430	52	
1445	46	
1500	60 206	
1515	49	
1530	68	
1545	65	
1600	60 242	
1615	85	
1630	72	
1645	61	
1700	58 276	
1715	75	
1730	75	
1745	77	
1800	71 298	
1815	87	
1830	77	
1845	69	
1900	55 288	
1915	56	
1930	64	
1945	28	
2000	45 193	
2015	28	
2030	32	
2045	16	
2100	22 98	
2115	21	
2130	11	
2145	9	
2200	8 49	
2215	10	
2230	9	
2245	9	
2300	6 34	
2315	4	
2330	4	
2345	0	
2400	2 10	

Daily Traffic Data

Total ADT

3,053

3,053



Average Daily Traffic Data

Project No. : 91-16
 Station No. : 200
 Counter No. : 6343

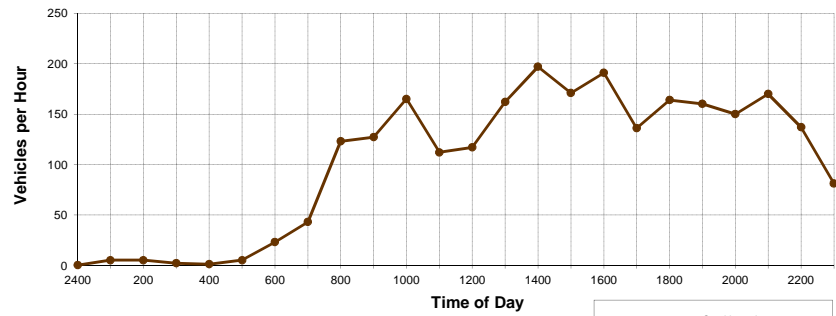
Day of Week: Thursday, September 08, 2016

Site: **Southbound
Gruene Road**

Location: North of Gruene Lake Drive
 City/State: New Braunfels, Texas

Gruene Road and Gruene Lake Drive

Southbound Gruene Road



End Time	Southbound Gruene Road	
15	3	
30	2	
45	0	
100	0	5
115	2	
130	2	
145	1	
200	0	5
215	0	
230	0	
245	1	
300	1	2
315	1	
330	0	
345	0	
400	0	1
415	1	
430	1	
445	1	
500	2	5
515	1	
530	4	
545	2	
600	16	23
615	8	
630	7	
645	9	
700	19	43
715	19	
730	25	
745	43	
800	36	123
815	42	
830	34	
845	24	
900	27	127
915	24	
930	42	
945	47	
1000	52	165
1015	23	
1030	34	
1045	29	
1100	26	112
1115	22	
1130	28	
1145	37	
1200	30	117

End Time	Southbound Gruene Road	
1215	35	
1230	36	
1245	43	
1300	48	162
1315	48	
1330	55	
1345	41	
1400	53	197
1415	55	
1430	29	
1445	47	
1500	40	171
1515	64	
1530	37	
1545	43	
1600	47	191
1615	30	
1630	42	
1645	40	
1700	24	136
1715	39	
1730	46	
1745	43	
1800	36	164
1815	28	
1830	43	
1845	47	
1900	42	160
1915	46	
1930	28	
1945	48	
2000	28	150
2015	38	
2030	56	
2045	43	
2100	33	170
2115	52	
2130	41	
2145	25	
2200	19	137
2215	35	
2230	17	
2245	19	
2300	10	81
2315	6	
2330	4	
2345	1	
2400	3	14

Daily Traffic Data

Total ADT

2,461

2,461



Average Daily Traffic Data

Project No. : 91-16
 Station No. : 300
 Counter No. : 4788

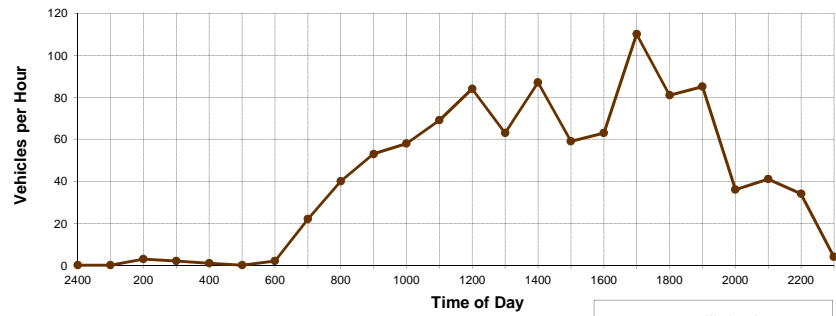
Day of Week: Thursday, September 08, 2016

Site: **Westbound**
Gruene Lake Drive

Location: East of Gruene Road
 City/State: New Braunfels, Texas

Gruene Road and Gruene Lake Drive

Westbound Gruene Lake Drive



End Time	Westbound Gruene Lake Drive	
15	0	
30	0	
45	0	
100	0 0	
115	0	
130	0	
145	3	
200	0 3	
215	2	
230	0	
245	0	
300	0 2	
315	0	
330	1	
345	0	
400	0 1	
415	0	
430	0	
445	0	
500	0 0	
515	0	
530	0	
545	0	
600	2 2	
615	4	
630	4	
645	7	
700	7 22	
715	4	
730	12	
745	12	
800	12 40	
815	12	
830	15	
845	10	
900	16 53	
915	14	
930	20	
945	12	
1000	12 58	
1015	16	
1030	24	
1045	13	
1100	16 69	
1115	25	
1130	19	
1145	21	
1200	19 84	

End Time	Westbound Gruene Lake Drive	
1215	18	
1230	20	
1245	7	
1300	18 63	
1315	31	
1330	28	
1345	15	
1400	13 87	
1415	12	
1430	19	
1445	13	
1500	15 59	
1515	13	
1530	20	
1545	13	
1600	17 63	
1615	26	
1630	32	
1645	35	
1700	17 110	
1715	23	
1730	15	
1745	25	
1800	18 81	
1815	22	
1830	17	
1845	24	
1900	22 85	
1915	14	
1930	9	
1945	10	
2000	3 36	
2015	5	
2030	14	
2045	14	
2100	8 41	
2115	14	
2130	8	
2145	7	
2200	5 34	
2215	2	
2230	0	
2245	0	
2300	2 4	
2315	0	
2330	0	
2345	1	
2400	0 1	

Daily Traffic Data

Total ADT

998

998