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via email only
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Wendy Smith
City Manager
The Hills
102 Trophy Drive
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RE: Village of The Hills Multi-Way Stop Warrant Analysis

Ms. Smith,

The following memorandum summarizes the results of multi-way stop warrant analysis at four intersections within the Village of The Hills. The four intersections evaluated for a multi-way stop include Lohmans Crossing Road and Wingreen Loop, The Hills Drive and Drifting Wind Run, The Hills Drive and Hightrail Way, and The Hills Drive and Cottondale Road.

Multi-way stop warrant analyses generally include the collection of certain traffic data to determine if the conditions of the intersection exceed a threshold that justifies increased traffic control devices or other improvements. Objective traffic data combined with engineering judgement factor into the analysis to determine whether warrant thresholds are met. In Texas, the warrants for a multi-way stop are outlined in the 2011 Texas Manual on Uniform Traffic Control Devices, Revision 2, effective October 9, 2014.

EXISTING CONDITIONS

The four intersections subject to this multi-way stop analysis were identified by The Hills, and the general conditions of each intersection are described below.

The intersection of Lohmans Crossing Road and Wingreen Loop provide the eastern entrance to The Hills gated community. Wingreen Loop approaches Lohmans Crossing Road from the west and creates a 3-way intersection where Wingreen Loop is a stop condition and Lohmans Crossing Road is a thru condition. Wingreen Loop near the intersection includes a gated entrance with a wide median that includes a staffed security building and landscaping.


Lohmans Crossing Road and Wingreen Loop

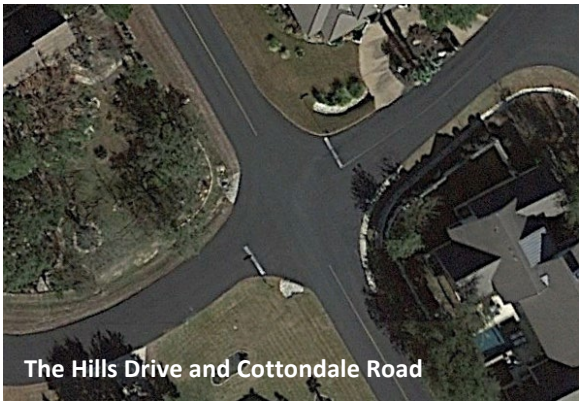
This gated entrance creates a non-standard 3-lane roadway with two wide lanes traveling west from the intersection (entering The Hills) and one wide lane traveling east towards the intersection (exiting The Hills). The width of the lane approaching the intersection, 25 feet, is wide enough to allow two lanes on Wingreen Loop at Lohmans Crossing Road, but the pavement is striped as a single lane. Lohmans Crossing Road is the major thru road at this intersection and includes 5 lanes: 2 lanes northbound, 2 lanes southbound, and a dedicated left turn lane to Wingreen Loop. The speed limit on Lohmans Crossing Road is 35 mph and the speed limit on Wingreen Loop is not identified, although vehicles are required to stop at the gated entrance.


The Hills Drive and Drifting Wind Run

The intersection of The Hills Drive and Drifting Wind Run is internal to The Hills and is a 4-way intersection with Drifting Wind Run and The Hills Park entrance approaching The Hills Drive from the west and east, respectively, with stop conditions. Both streets are 2 lane, one lane each way. Drifting Wind Run is a local residential street, and The Hills Drive is a residential collector street.


The Hills Drive and Hightrail Way

The intersection of The Hills Drive and Hightrail Way is internal to The Hills and is a 4-way intersection with Hightrail Way generally east and west and The Hills Drive generally north and south. Hightrail Way has a stop condition. Both streets are 2 lane, one lane each way. Hightrail Way is a local residential street, and The Hills Drive is a residential collector street.


The Hills Drive and Cottondale Road

The intersection of The Hills Drive and Cottondale Road is internal to The Hills and is a 4-way intersection with Cottondale Road generally east and west and The Hills Drive generally north and south. Cottondale Road has a stop condition. Both streets are 2 lane, one lane each way. Cottondale Road is a local residential street, and The Hills Drive is a residential collector street.

WARRANT CONDITIONS

As described by the Texas Manual on Uniform Traffic Control Devices, "multi-way stop control can be useful as a safety measure at intersections if certain traffic conditions exist. Safety concerns associated with multi-way stops include pedestrians, bicyclists, and all road users expecting other road users to stop. Multi-way stop control is used where the volume of traffic on the intersecting roads is approximately equal."

Section 2B.07 of the Texas Manual on Uniform Traffic Control Devices provides guidance for the location of multi-way stops in the form of warrant criteria to be considered in an engineering study. This guidance generally includes the following:

1. Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation.
2. Minimum intersection volumes:
    a. The vehicular volume entering the intersection from the major street approaches averages at least 300 vehicles per hour for any 8 hours of an average day.
    b. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches averages at least 200 units per hour for the same 8 hours.
    c. If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.

Crash data was not available at the time of this analysis and is not considered. If crash data becomes available at a future date, this analysis may be updated, and the results of the analysis may change. The streets analyzed in this study all have speed limits lower than 40 mph. As such, the last criterion does not apply.

DATA ANALYSIS

GRAM Traffic Counting, under contract with KSA, conducted vehicle and pedestrian traffic counts on March 29, 2022, at the four subject intersections. Per the warrant condition guidelines described previously, the data analysis begins with a review of vehicular volume entering the intersection from the major street approaches followed by a review of vehicular volume entering the intersection from the minor street approaches.

Both of these vehicular volume figures have minimum number of units to warrant a multi-way stop. Tables 1 – 4 summarize the 24-hour vehicle traffic counts from each major street and minor street approach at 1-hour intervals. The orange highlighted figures represent the eight hours with the highest vehicle counts per hour for the major street approaches, and the purple highlighted figures represent those same hours for the minor street approaches.

Table 1. 24-hour Vehicular Traffic Counts for Lohmans Crossing Road and Wingreen Loop

	Lohmans Crossing Road and Wingreen Loop							
	Station on Lohmans Crossing North of Wingreen Loop		Station on Lohmans Crossing South of Wingreen Loop		Combined Hour Totals for Southbound and Northbound Traffic		Station on Wingreen Loop West of Lohmans Crossing	
	Traffic headed South, toward intersection		Traffic headed North, toward intersection				Traffic Headed East, toward intersection	
	Hour Totals		Hour Totals		Hour Totals		Hour Totals	
Hour	A.M.	P.M.	A.M	P.M.	A.M	P.M.	A.M	P.M.
12:00 - 1:00	5	574	18	781	23	1355	1	163
1:00 - 2:00	8	583	6	799	14	1382	3	148
2:00 - 3:00	5	530	2	786	7	1316	2	197
3:00 - 4:00	8	633	7	736	15	1369	1	175
4:00 - 5:00	25	573	8	926	33	1499	7	161
5:00 - 6:00	80	589	35	903	115	1492	27	142
6:00 - 7:00	162	432	80	766	242	1198	60	116
7:00 - 8:00	564	248	362	611	926	859	208	73
8:00 - 9:00	710	170	479	366	1189	536	238	56
9:00 - 10:00	643	77	537	248	1180	325	165	26
10:00 - 11:00	589	41	549	137	1138	178	184	18
11:00 - 12:00	568	18	632	52	1200	70	202	5

The intersection of Lohmans Crossing Road and Wingreen Loop is by far the busiest of the four intersections studied, and this is clearly due to this intersection serving as a primary entrance to The Hills gated community. On average, 1,351 vehicles per hour enter the intersection from the major street approaches, Lohmans Crossing Road, over the eight busiest hours in the day. Over those same hours, an average of 163 vehicles per hour enter the intersection from the minor street approach, Wingreen Loop.

The major street approach volume far exceeded the minimum 300 vehicles per hour for a multi-stop warrant. However, the minor street approach volume is slightly below the minimum number of 200 vehicles per hour.

In the evaluation of the need for a multi-way stop, consideration should be given to the physical conditions of the intersection and any potential safety concerns. Vehicles on Wingreen Loop turning left on Lohmans Crossing Road must cross at least three conflicting thru lanes and a conflicting left-turn lane. The gate on Wingreen Loop is also likely to slow traffic on Lohmans Crossing Road turning into The Hills and thereby increasing the delay times for vehicles existing The Hills and turning onto Lohmans Crossing Road from Wingreen Loop. Based on these considerations and the vehicles per hour on the major approaches far exceeding the minimum threshold outlined previously, it is recommended that the intersection of Lohmans Crossing Road and Wingreen Loop become a 3-way stop with all approaches having a stop condition.

It is also understood that the intersection of Lohmans Crossing Road and Wingreen Loop will be expanded to a 4-way intersection as part of a future development project. Signalization of this 4-way intersection has already been recommended by the City of Lakeway as part of the development review and permitting process. The additional approach will increase the number of conflicting movements and increased traffic from the development will decrease the gaps available for safe turning movements in the partially stop-controlled intersection. Signalization will substantially improve the delay and safety of vehicles moving thru the intersection, and signal timing can also be modeled to meter thruput of certain movements to mitigate the queuing of vehicles at the entrance gate of The Hills. The previously recommended multi-way stop for this intersection is an appropriate interim condition prior to the implementation of the proposed signalization.

Table 2. 24-hour Vehicular Traffic Counts for The Hills Drive and Drifting Wind Run

	The Hills Dr and Drifting Wind Run							
	Station North of Drifting Wind Run		Station South of Drifting Wind Run		Combined Hour Totals for Southbound and Northbound Traffic		Stations on Drifting Wind Run East and West of The Hills	
	Traffic headed South, toward intersection		Traffic headed North, toward intersection				Traffic Headed East and West, toward the intersection	
	Hour Totals		Hour Totals		Hour Totals		Hour Totals	
Hour	A.M.	P.M.	A.M	P.M.	A.M	P.M.	A.M.	P.M.
12:00 - 1:00	0	38	2	43	2	81	0	53
1:00 - 2:00	0	35	0	47	0	82	1	50
2:00 - 3:00	0	32	0	31	0	63	0	32
3:00 - 4:00	0	45	2	36	2	81	1	44
4:00 - 5:00	0	50	5	45	5	95	2	59
5:00 - 6:00	2	62	11	52	13	114	6	45
6:00 - 7:00	6	41	13	21	19	62	8	36
7:00 - 8:00	25	24	37	20	62	44	29	29
8:00 - 9:00	27	29	44	20	71	49	57	25
9:00 - 10:00	39	8	47	2	86	10	41	3
10:00 - 11:00	31	9	33	5	64	14	32	9
11:00 - 12:00	34	0	48	1	82	1	42	1

The intersection of The Hills Drive and Drifting Wind Run is internal to The Hills and adjacent to The Hills Park. On average, 86 vehicles per hour enter the intersection from the major street approaches, The Hills Drive, over the eight busiest hours in the day. Over those same hours, an average of 48 vehicles per hour enter the intersection from the minor street approaches, Drifting Wind Run and the park entrance. Pedestrians and cyclists must be a consideration in a multi-way stop analysis and especially at this intersection being near a park. However, negligible volumes of pedestrian and cyclists crossing the intersection were recorded.

Both the major street and minor street approach volumes far below the minimum thresholds of 300 vehicles per hour and 200 vehicles per hour, respectively. Therefore, this intersection does not meet the warrants for a multi-way stop.

Table 3. 24-hour Vehicular Traffic Counts for The Hills Drive and Hightrail Way

	The Hills Dr and Hightrail Way							
	Station North of Hightrail Way		Station South of Hightrail Way		Combined Hour Totals for Southbound and Northbound Traffic		Stations on Hightrail Way East and West of The Hills	
	Traffic headed South, toward intersection		Traffic headed North, toward intersection				Traffic Headed East and West, toward the intersection	
	Hour Totals		Hour Totals		Hour Totals		Hour Totals	
Hour	A.M.	P.M.	A.M	P.M.	A.M	P.M.	A.M.	P.M.
12:00 - 1:00	2	87	0	79	2	166	0	8
1:00 - 2:00	2	105	1	80	3	185	0	3
2:00 - 3:00	0	97	0	89	0	186	1	6
3:00 - 4:00	2	100	1	82	3	182	2	2
4:00 - 5:00	2	107	1	68	3	175	0	3
5:00 - 6:00	5	114	9	80	14	194	0	4
6:00 - 7:00	9	81	19	51	28	132	2	4
7:00 - 8:00	34	78	76	35	110	113	3	1
8:00 - 9:00	63	42	96	23	159	65	3	0
9:00 - 10:00	94	26	81	12	175	38	4	2
10:00 - 11:00	86	26	68	10	154	36	3	0
11:00 - 12:00	94	7	89	2	183	9	8	0

The intersection of The Hills Drive and Hightrail Way is internal to The Hills. On average, 180 vehicles per hour enter the intersection from the major street approaches, The Hills Drive, over the eight busiest hours in the day. Over those same hours, an average of 4 vehicles per hour enter the intersection from the minor street approaches, Hightrail Way. This intersection includes a walking trail crossing; however, negligible volumes of pedestrian and cyclists crossing the intersection were recorded.

Both the major street and minor street approach volumes far below the minimum thresholds of 300 vehicles per hour and 200 vehicles per hour, respectively. Therefore, this intersection does not meet the warrants for a multi-way stop.

Table 4. 24-hour Vehicular Traffic Counts for The Hills Drive and Cottondale Road

	The Hills Drive and Cottondale Road							
	Station on The Hills North of Cottondale Rd		Station on The Hills South of Cottondale Rd		Combined Hour Totals for Southbound and Northbound Traffic		Stations on Cottondale Road East and West of The Hills	
	Traffic headed South, toward intersection		Traffic headed North, toward intersection				Traffic Headed East and West, toward the intersection	
	Hour Totals		Hour Totals		Hour Totals		Hour Totals	
Hour	A.M.	P.M.	A.M	P.M.	A.M	P.M.	A.M.	P.M.
12:00 - 1:00	2	52	0	103	2	155	0	62
1:00 - 2:00	1	64	1	83	2	147	0	52
2:00 - 3:00	0	43	1	105	1	148	2	64
3:00 - 4:00	1	40	1	95	2	135	2	82
4:00 - 5:00	1	68	2	85	3	153	1	71
5:00 - 6:00	2	58	11	84	13	142	3	75
6:00 - 7:00	3	34	29	59	32	93	7	64
7:00 - 8:00	27	33	100	32	127	65	27	67
8:00 - 9:00	32	15	120	25	152	40	46	31
9:00 - 10:00	63	6	108	13	171	19	46	28
10:00 - 11:00	63	8	86	11	149	19	49	21
11:00 - 12:00	58	3	116	2	174	5	51	2

The intersection of The Hills Drive and Cottondale Road is internal to The Hills. On average, 156 vehicles per hour enter the intersection from the major street approaches, The Hills Drive, over the eight busiest hours in the day. Over those same hours, an average of 55 vehicles per hour enter the intersection from the minor street approaches, Cottondale Road.

Both the major street and minor street approach volumes far below the minimum thresholds of 300 vehicles per hour and 200 vehicles per hour, respectively. Therefore, this intersection does not meet the warrants for a multi-way stop.

CONCLUSION

Of the four intersections evaluated in this analysis, Lohmans Crossing Road and Wingreen Loop is recommended for a multi-way stop due to the major street approach vehicular volume far exceeding the warrant threshold and the unique physical conditions of the intersection located at the gated entrance to The Hills. The other three intersections evaluated in this analysis – The Hills Drive and Drifting Wind Run, The Hills Drive and Hightrail Way, and The Hills Drive and Cottondale Road – fall below the minimum warrants and are not recommended for a multi-way stop.

It is important to note that traffic volumes and safety considerations can change over time and, therefore, change the results of this analysis. If crash data becomes available, traffic volumes increase, or other safety considerations change, it is recommended that this evaluation be updated with the latest available data.

Please don't hesitate to contact me at 512.342.6868 or gcox@ksaeng.com if you have any questions or require any further information regarding this analysis and recommendations.

Sincerely,
KSA

Grayson M. Cox, P.E.
Project Manager