Traffic Impact Study – 3rd REVISION

Villas on Singleton

Z167-404

Dallas, Texas
Greenleaf Ventures, LLC

3 April 2018

TRAFFIC IMPACT GROUP, LLC
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Villas on Singleton - Dallas - Greenleaf Ventures, LLC

Project Number 17-TX09101-1

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Texas.

4/3/2018

Scott P. Israelson, P.E., PTOE
License No. 116712

Executive Summary

Villas on Singleton is a proposed residential development in Dallas, Texas. This REVISED study is due to a slight change in the proposed number of units.

The proposed development will consist of 160 single-family units and 73 multi-family units. The development had previously also included 100,000 square feet of mini-warehouse storage but the owner has since withdrawn this request.

The site is on the north side of Singleton Boulevard, east of North Westmoreland Road. The property will have full access to Singleton Boulevard, and Pointer Drive will be used as an emergency-only access. A median break with eastbound left-turn lane is proposed as part of the development.

The *ITE Trip Generation Manual 9th Edition* was used to estimate the projected trips by the development. The City of Dallas requires a Traffic Impact Study for developments that generate 1,000 trips per day.

North Westmoreland Road & Singleton Boulevard

Analysis of existing conditions shows that the intersection experiences Level of Service (LOS) C overall in both peak hours.

Analysis of Full Build 2019 conditions shows that the intersection is expected to remain operating at LOS C overall in both peak hours. No improvements are recommended.

Singleton Boulevard & Project Access

The development access is projected to function at LOS B in the AM peak hour and LOS C in the PM peak hour in the Full Build 2019 scenario. Analysis of projected volumes shows that the volumes do not meet thresholds for a westbound right-turn lane. Evaluation of Intersection Sight Distance (ISD) show that there are no obstructions to sightlines for the proposed access.

Based on City of Dallas review comments, it is **recommended** to provide 27 feet width for internal streets for the development.

According to the City of Dallas *Pavement Design Manual*, the proposed access would not meet median opening spacing standards. Since the access is expected to function acceptably during both peak hours and there are no ISD concerns, it is **recommended** to seek a waiver of median opening spacing for the proposed access.

The following summarize recommendations for the development.

- Provide 27-foot wide internal streets,
- Provide sidewalk along internal streets,
- Seek a waiver of median opening spacing for the proposed access.

Table of Contents

I. Introduction

Villas on Singleton is a proposed residential development in Dallas, Texas. The 18.25-acre parcel is located on the north side of Singleton Boulevard, east of North Westmoreland Road. The development is proposed to consist of single-family housing.

A Traffic Impact Study dated 11/16/17 was approved by the City of Dallas.

This 3rd REVISED Traffic Impact Study is needed due to a slight adjustment in the number of proposed units. The site is now proposed to consist of 160 single-family lots and 73 multi-family lots.

The site will have full access to the south on Singleton Boulevard. A median break with accompanying eastbound left-turn lane is proposed as part of the property access. Pointer Drive will also be used as an emergency-only access.

The study area included the following intersections:

- North Westmoreland Road & Singleton Boulevard
- Singleton Boulevard & Project Access

The study analyzed the following scenarios:

- 2017 Existing Conditions
- Full Build 2019 Conditions

The AM peak hour and PM peak hour were analyzed.

Figure 1 shows the most recent site plan. **Figure 2** shows the project vicinity map.

Site Plan

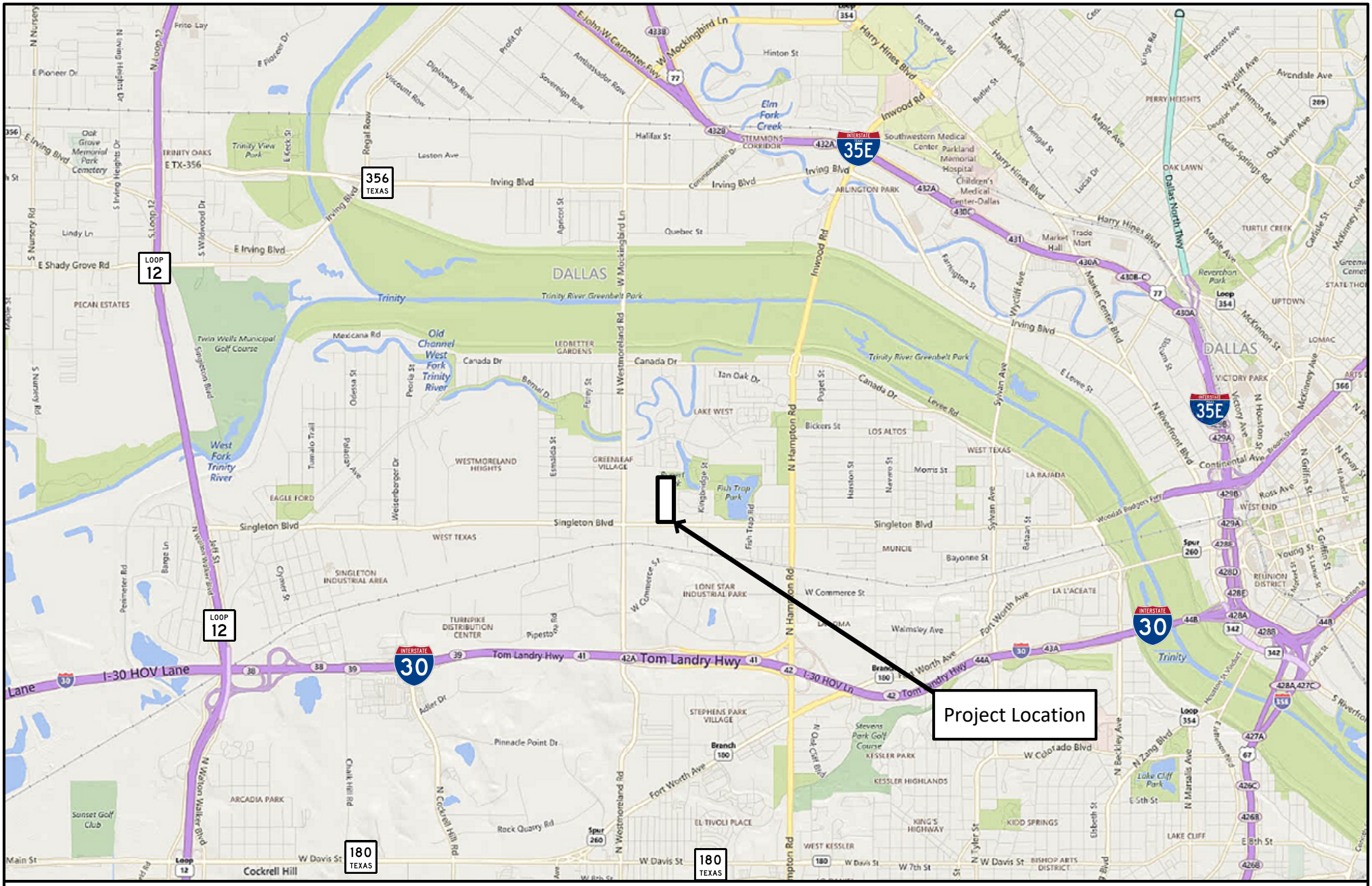
Project No: 17-TX09102-1

Figure 1

Date: 3 April 2018

Villas on Singleton – Dallas – Greenleaf Ventures, LLC

TRAFFIC IMPACT GROUP, LLC



Vicinity Map

Figure 2

Villas on Singleton – Dallas – Greenleaf Ventures, LLC

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II. Existing Conditions

A. EXISTING ROADWAY CONDITIONS

Table 2.1 presents a summary of the existing roadway conditions in the study area. **Figure 3** shows the roadways in the study area.

Table 2.1 - Existing Roadways				
Street Name	Functional Class	Typical Section	Posted Speed	AADT
North Westmoreland Road	Principal Arterial	Six-lane divided	35 mph	23,951 (2014)
Singleton Boulevard	Principal Arterial	Six-lane divided	35 mph	16,066 to 18,504 (2014)

B. EXISTING INTERSECTION GEOMETRY

The intersection of North Westmoreland Road & Singleton Boulevard is signalized with protected-permitted "Dallas" phasing for all left turns. All four approaches to the intersection consist of a left turn lane, two through lanes, and a shared through-right lane. Pedestrian crossings are marked and signalized on all four legs of the intersection.

The property will have full access to Singleton Boulevard. Its location is proposed to be approximately 200 feet east of Pointer Drive. A median break with accompanying eastbound left-turn lane is proposed as part of this access.

The geometric configuration of all intersections in the study area is shown in **Figure 3**.

C. TRAFFIC VOLUMES

Traffic data collection for study area intersections was collected on March 1, 2017. **Figure 4** displays existing traffic volumes. These volumes can be found in the Appendix.

Current Average Annual Daily Traffic (AADT) volumes were retrieved from the TxDOT Planning office website. The most recent volumes acquired were from 2014.

Study Area Roadways and Intersections

Figure 3

Villas on Singleton – Dallas – Greenleaf Ventures, LLC

Project No: 17-TX09102-1

Date: 16 March 2017

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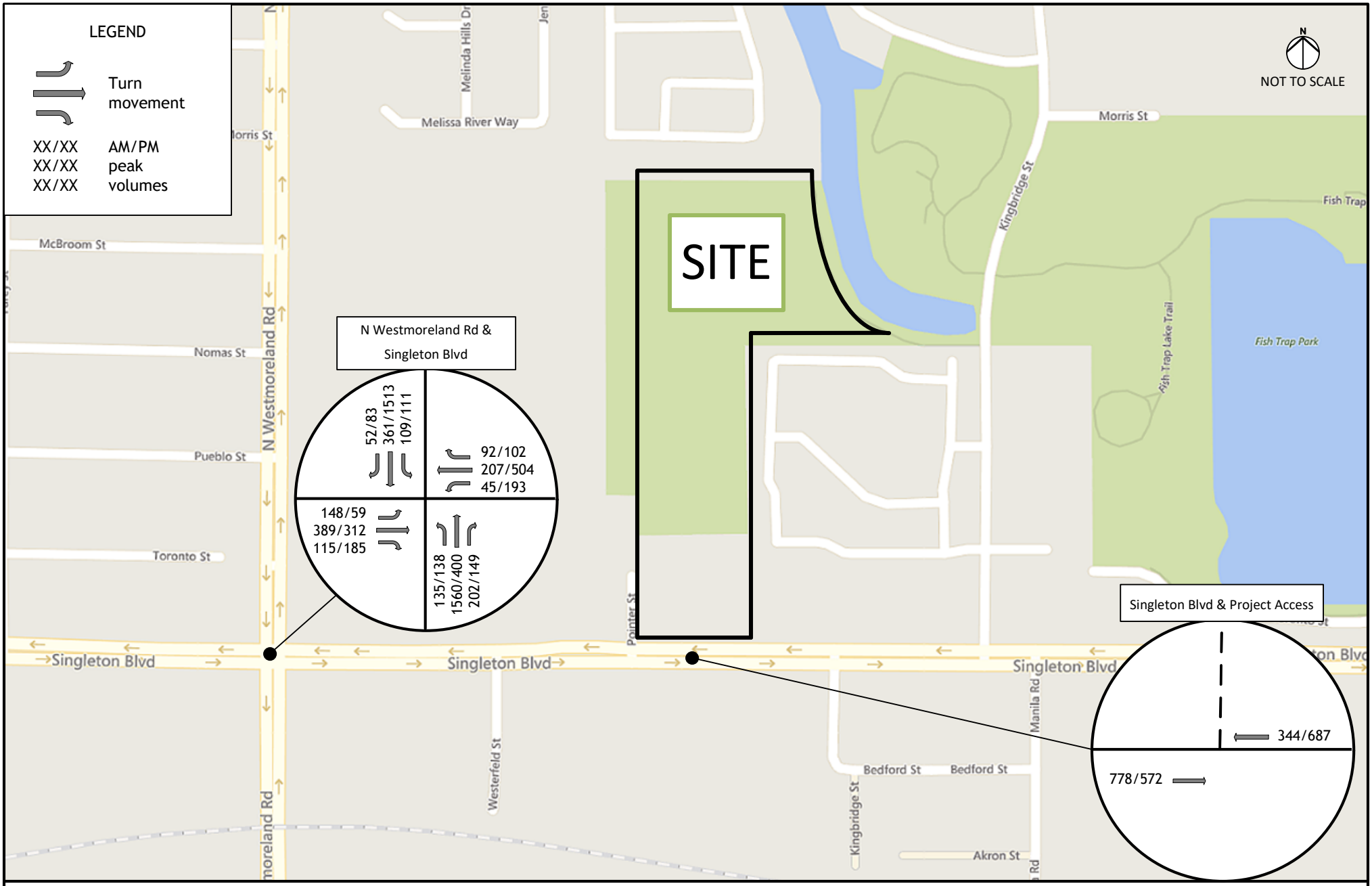

Existing Traffic Volumes

Figure 4

Villas on Singleton – Dallas – Greenleaf Ventures, LLC

Project No: 17-TX09102-1

Date: 16 March 2017

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III. Methodology

A. BASE ASSUMPTIONS

Intersection capacity analysis was conducted using Synchro v10.0. Trip generation was calculated using the 9th edition of the Institute of Traffic Engineers (ITE) *Trip Generation Manual*. Right-turn lanes were examined using the City of Dallas *Parking Driveways Handbook*.

B. BACKGROUND GROWTH

Existing turning movement volumes were increased by 1% per year to estimate background growth for Full Build 2019 turning movement volumes.

C. TRIP GENERATION

The development is proposed to consist of 160 single-family units and 73 multi-family units.

The *ITE Trip Generation Manual 9th Edition* was used to estimate the projected trips by this development.

Table 3.1 shows a summary of the land uses and sizes used for trip generation estimates.

Table 3.1 - ITE Trip Generation

Average Weekday Driveway Volumes					AM Peak Hour		PM Peak Hour	
Land Use	ITE Code	Size		Daily Trips	Enter	Exit	Enter	Exit
Single Family Housing	210	160	Dwelling Units	1618	31	91	101	59
Residential Condominium/Townhouse	230	73	Dwelling Units	489	7	33	31	15
Average Weekday Driveway Volumes					**38**	**124**	**132**	**74**

D. TRIP DISTRIBUTION

Trips for this proposed development were assigned to the surrounding roadway network based on engineering judgment. Trip distribution for this project is as follows:

- To/from the north: 10%
- To/from the south: 40%
- To/from the east: 40%
- To/from the west: 10%

The projected site trips are shown in **Figure 5**. Full Build 2019 volumes are shown in **Figure 6**.

Site Trips

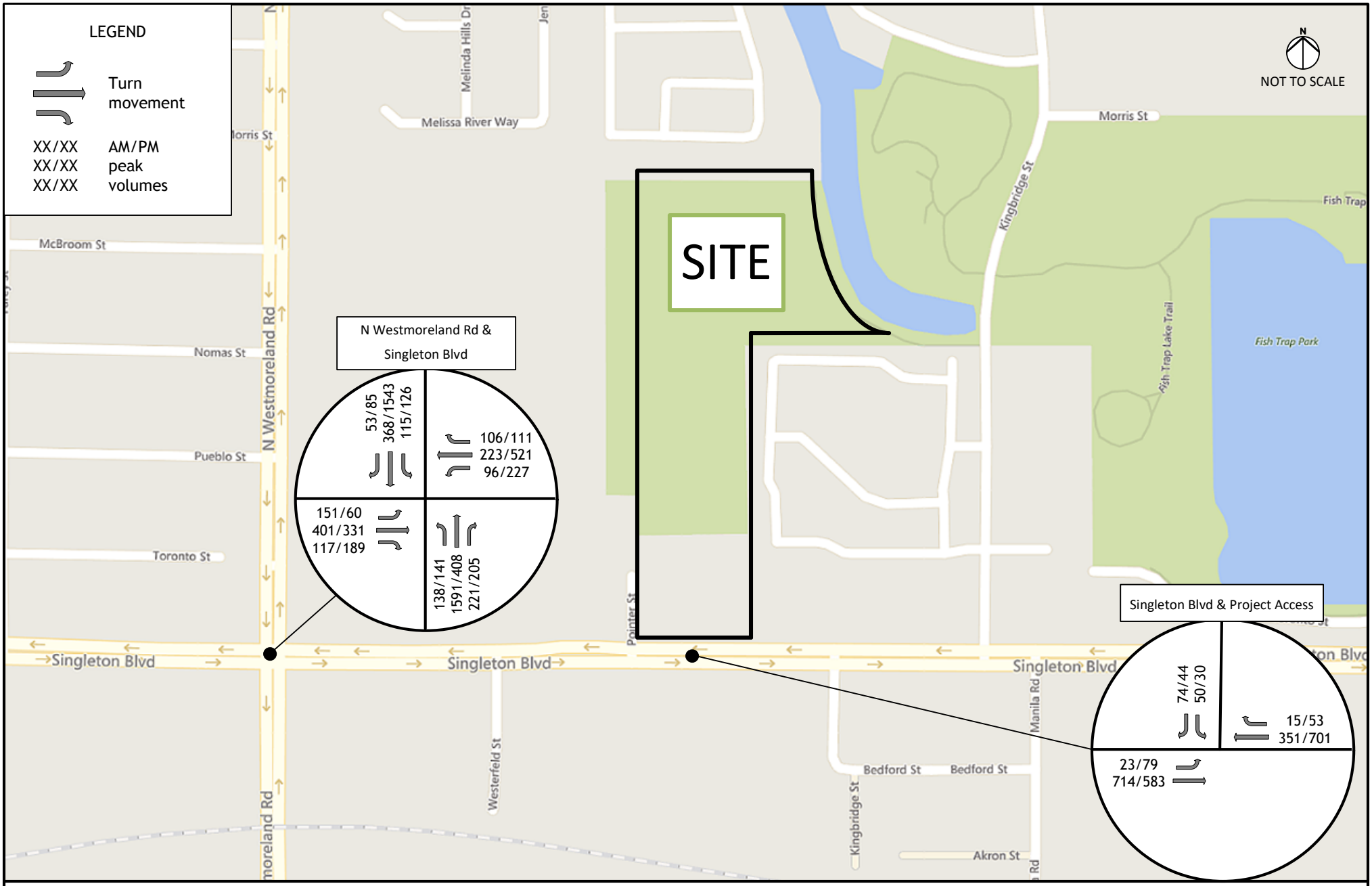
Figure 5

Villas on Singleton – Dallas – Greenleaf Ventures, LLC

Project No: 17-TX09102-1

Date: 3 April 2018

TRAFFIC IMPACT GROUP, LLC



Full Build 2019 Volumes

Figure 6

Villas on Singleton – Dallas – Greenleaf Ventures, LLC

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IV. Capacity Analysis

The Transportation Research Board's Highway Capacity Manual (HCM) utilizes a term "level of service" (LOS) to measure how traffic operates in intersections. There are currently six levels of service ranging from A to F. Level of Service "A" represents the best conditions and Level of Service "F" represents the worst. Synchro software was used to determine the level of service for intersections in the study area. All worksheet reports from the analyses can be found in the Appendix.

Table 4.1 shows the control delay per vehicle associated with LOS A through F for signalized and unsignalized intersections.

Table 4.1 - Highway Capacity Manual Levels of Service and Control Delay

Signalized Intersection		Unsignalized Intersection	
Level of Service	**Control Delay per Vehicle (sec)**	**Level of Service**	**Control Delay per Vehicle (sec)**
A	≤ 10	A	≤ 10
B	> 10 and ≤ 20	B	> 10 and ≤ 15
C	> 20 and ≤ 35	C	> 15 and ≤ 25
D	> 35 and ≤ 55	D	> 25 and ≤ 35
E	> 55 and ≤ 80	E	> 35 and ≤ 50
F	> 80	F	> 50

A. NORTH WESTMORELAND ROAD & SINGLETON BOULEVARD

The intersection of North Westmoreland Road & Singleton Boulevard is signalized with protected-permitted "Dallas" phasing for all left turns. All four approaches to the intersection consist of a left turn lane, two through lanes, and a shared through-right lane. Pedestrian crossings are marked and signalized on all four legs of the intersection.

Table 4.2 shows the current LOS, control delay, and 95th percentile queue length for existing 2017 conditions.

Table 4.2 - Intersection LOS, delay, and queue by movement - 2017 Existing

Intersection	Approach	Movement	AM			PM		
			LOS	delay	queue	LOS	delay	queue
North Westmoreland Rd & Singleton Blvd	EB	LT	D	36.8	126'	C	27.3	56'
		TH	C	33.9	150'	D	36.3	118'
		RT						
	WB	LT	C	26.8	47'	D	40.1	158'
		TH	C	292.0	72'	D	36.0	163'
		RT						
	NB	LT	B	10.5	62'	C	29.4	109'
		TH	C	23.4	398'	B	13.3	86'
		RT						
	SB	LT	C	25.0	78'	B	11.4	56'
		TH	B	14.2	70'	C	30.5	385'
		RT						
	OVERALL		C (24.5)			C (29.5)		

Table 4.3 shows the expected LOS, control delay, and 95th percentile queue length for Full Build 2019 conditions.

Table 4.3 - Intersection LOS, delay, and queue by movement - 2019 Full Build								
Intersection	Approach	Movement	AM			PM		
			LOS	delay	queue	LOS	delay	queue
North Westmoreland Rd & Singleton Blvd	EB	LT	D	38.2	129'	C	27.7	56'
		TH	D	38.8	158'	D	39.8	136'
		RT						
	WB	LT	C	33.7	87'	D	51.5	214'
		TH	C	29.9	78'	D	36.5	170'
		RT						
	NB	LT	B	10.6	63'	C	29.8	110'
		TH	C	27.5	416'	B	13.3	91'
		RT						
	SB	LT	C	25.6	85'	B	12.3	63'
		TH	B	14.2	71'	C	31.7	401'
		RT						
	OVERALL		C (27.7)			C (31.1)		

For the Full Build 2019 scenario, the intersection is expected to continue to function acceptably.

North Westmoreland Road & Singleton Boulevard - looking north

B. SINGLETON BOULEVARD & PROJECT ACCESS

Access to the property will be via a driveway to Singleton Boulevard. Table 4.6 shows the expected LOS, control delay, and 95th percentile queue length for Full Build 2019 conditions.

Table 4.4 - Intersection LOS, delay, and queue by movement - 2019 Full Build

Intersection	Approach	Movement	AM			PM		
			LOS	delay	queue	LOS	delay	queue
Singleton Blvd & Project Access	EB	LT	A	9.8	-	B	13.9	18'
		TH	Free					
	WB	TH	Free					
		RT						
	SB	LT	B	13.8	25'	C	20.5	28'
		RT						

For the Full Build 2019 scenario, vehicles exiting the development would experience LOS B in the AM peak hour, and LOS C in the PM peak hour. The eastbound left-turn movement is projected to see LOS B in the PM peak hour.

The City of Dallas *Parking Driveways Handbook* provides guidelines for deceleration lanes on City roadways. According to the *Handbook*, a deceleration lane should be considered on arterials operating at speeds greater than 35 mph or the average inbound right-turn volume into the driveway is expected to exceed 120 vehicles in the peak hour.

Analysis shows that the expected number of right-turning vehicles is projected to be 54 vehicles in the PM peak hour. This is less than the threshold for a right-turn lane.

Singleton Boulevard & Project Access - looking east

The City of Dallas *Paving Design Manual* provides guidelines for the spacing of median openings. According to the *Manual*, "median openings should occur no closer than 300 feet from any other median opening." The proposed median opening for the Project Access would be approximately 200 feet from the median opening at Pointer Drive.

The City of Dallas requested an Intersection Sight Distance (ISD) analysis for this access since the median opening spacing is less than standard. The City of Dallas *Pavement Design Manual* provides the standards for ISD based on design speed and street section type.

Singleton Avenue has a posted speed limit of 35 mph and is a four-lane roadway. According to the Manual, the ISD for a M4 roadway is 180 feet minimum for the left side and 225 feet minimum for the right side. The stopping sight distance minimum is 225 feet.

The photo on the previous page looking east and the photo below show that there are no sight obstructions in the area that prevent ISD.

Singleton Avenue & Pointer Drive - looking west

Based on capacity analysis and ISD analysis, it is **recommended** to seek a waiver of the minimum median opening for the proposed project access.

C. SINGLETON BOULEVARD ROADWAY SEGMENT ANALYSIS

The HCM uses travel speed to determine the level of service for roadway segments. Roadway characteristics that define level of service include the peak hourly volumes, number of through lanes, number of access points or driveways, and posted speed limit. HCM 2010 methodology was used to determine LOS for the study area roadway segments. All worksheet reports from the analyses can be found in the Appendix.

Table 4.5 shows the LOS for roadway segments as described by the percentage of base flow speed.

Table 4.5 - HCM Levels of Service - Average Travel Speed as a percentage of Free Flow Speed

Level of Service	Percentage
A	> 85%
B	>67% and ≤85%
C	> 50% and ≤67%
D	>40% and ≤50%
E	>30% and ≤40%
F	≤ 30%

Table 4.6 summarizes the overall LOS or worst movement LOS for existing conditions, and the Full Build 2018 scenario.

Table 4.6 - Overall Roadway Segment LOS & Travel Speed percentage

Intersection	Existing		2018 Full Build	
	AM	PM	AM	PM
Singleton Avenue east of Westmoreland Rd	A (95%)	A (95%)	A (95%)	A (95%)

D. PEDESTRIAN AND BICYCLE ANALYSIS

Sidewalk is present along both sides of Singleton Avenue in the study area.

It is **recommended** to provide sidewalk along internal streets to provide non-vehicular connectivity to the sidewalk along Singleton Avenue.

V. Summary and Conclusion

This study serves as a revised analysis of the traffic impacts from the Villas on Singleton development in Dallas, Texas.

The proposed development is expected to generate 1,850 external trips daily.

Based on City of Dallas review comments, it is **recommended** to provide internal street widths of 27 feet for the development. It is also **recommended** to provide sidewalk along internal streets to provide connectivity to the sidewalk along Singleton Avenue.

North Westmoreland Road & Singleton Boulevard

Analysis of existing conditions shows that the intersection experiences LOS C overall in both peak hours.

Analysis of Full Build 2019 conditions shows that the intersection is expected to remain operating at LOS C overall in both peak hours. No improvements are recommended.

Singleton Boulevard & Project Access

The development access is projected to function acceptably for both peak hours in the Full Build 2019 scenario. Analysis of projected volumes show that the volumes do not meet the threshold for a right-turn lane.

An evaluation of ISD shows that there are no sightline obstructions at the proposed access.

According to the City of Dallas *Pavement Design Manual*, the proposed access would not meet median opening spacing standards. Since the access is expected to function acceptably during both peak hours and there are no ISD concerns, it is **recommended** to seek a waiver of median opening spacing for the proposed access.

The following summarize recommendations for the development.

- Provide 27-foot wide internal streets,
- Provide sidewalk along internal streets,
- Seek a waiver of median opening spacing for the proposed access.

Appendix

Background Information

Traffic Volumes

Trip Generation

Capacity Analysis

Turn Lane Warrants

Traffic Volumes

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: WESTMORELAND RD @ SINGLETON BLVD
Site Code:
Start Date: 03/01/2017

Turning Movement Data

Start Time	WESTMORELAND RD Southbound					SINGLETON BLVD Westbound					WESTMORELAND RD Northbound					SINGLETON BLVD Eastbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:00 AM	12	73	11	0	96	5	36	28	0	69	32	376	41	0	449	32	84	10	0	126	740
7:15 AM	16	74	15	0	105	5	39	23	0	67	32	426	48	0	506	30	92	24	0	146	824
7:30 AM	30	96	9	0	135	11	56	22	0	89	26	355	42	0	423	54	123	28	1	206	853
7:45 AM	35	93	15	0	143	11	60	22	0	93	42	426	71	0	539	35	78	24	0	137	912
Hourly Total	93	336	50	0	479	32	191	95	0	318	132	1583	202	0	1917	151	377	86	1	615	3329
8:00 AM	28	98	13	0	139	18	52	25	0	95	35	353	41	0	429	27	96	39	1	163	826
8:15 AM	27	85	11	0	123	18	51	16	0	85	27	369	42	0	438	26	93	14	1	134	780
8:30 AM	23	97	5	0	125	20	72	22	0	114	22	298	37	0	357	26	82	24	0	132	728
8:45 AM	36	85	10	0	131	14	53	21	0	88	22	265	54	0	341	27	68	22	0	117	677
Hourly Total	114	365	39	0	518	70	228	84	0	382	106	1285	174	0	1565	106	339	99	2	546	3011
9:00 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
4:00 PM	39	255	24	0	318	30	97	17	1	145	35	112	36	0	183	18	81	39	0	138	784
4:15 PM	39	340	18	0	397	51	116	19	0	186	29	108	36	0	173	14	65	37	0	116	872
4:30 PM	35	366	22	0	423	40	106	23	0	169	36	121	35	0	192	19	77	49	1	146	930
4:45 PM	31	392	29	0	452	51	148	34	0	233	38	105	31	0	174	18	68	54	0	140	999
Hourly Total	144	1353	93	0	1590	172	467	93	1	733	138	446	138	0	722	69	291	179	1	540	3585
5:00 PM	20	329	20	0	369	49	124	26	0	199	41	108	41	0	190	18	77	47	0	142	900
5:15 PM	34	394	21	0	449	39	99	22	0	160	23	97	40	0	160	10	80	36	0	126	895
5:30 PM	26	398	13	0	437	54	133	20	0	207	36	90	37	0	163	13	87	48	0	148	955
5:45 PM	27	366	28	0	421	52	121	30	0	203	21	99	25	0	145	11	74	40	0	125	894
Hourly Total	107	1487	82	0	1676	194	477	98	0	769	121	394	143	0	658	52	318	171	0	541	3644
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	458	3541	264	0	4263	469	1363	370	1	2203	497	3708	657	0	4862	378	1325	535	4	2242	13570
Approach %	10.7	83.1	6.2	0.0	-	21.3	61.9	16.8	0.0	-	10.2	76.3	13.5	0.0	-	16.9	59.1	23.9	0.2	-	-
Total %	3.4	26.1	1.9	0.0	31.4	3.5	10.0	2.7	0.0	16.2	3.7	27.3	4.8	0.0	35.8	2.8	9.8	3.9	0.0	16.5	-
Lights	423	3434	199	0	4056	456	1288	336	1	2081	430	3569	632	0	4631	328	1236	461	4	2029	12797
% Lights	92.4	97.0	75.4	-	95.1	97.2	94.5	90.8	100.0	94.5	86.5	96.3	96.2	-	95.2	86.8	93.3	86.2	100.0	90.5	94.3
Mediums	29	81	23	0	133	7	41	26	0	74	22	82	13	0	117	25	53	27	0	105	429
% Mediums	6.3	2.3	8.7	-	3.1	1.5	3.0	7.0	0.0	3.4	4.4	2.2	2.0	-	2.4	6.6	4.0	5.0	0.0	4.7	3.2
Articulated Trucks	6	26	42	0	74	6	34	8	0	48	45	57	12	0	114	25	36	47	0	108	344
% Articulated Trucks	1.3	0.7	15.9	-	1.7	1.3	2.5	2.2	0.0	2.2	9.1	1.5	1.8	-	2.3	6.6	2.7	8.8	0.0	4.8	2.5

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: WESTMORELAND RD @ SINGLETON BLVD
Site Code:
Start Date: 03/01/2017

Turning Movement Peak Hour Data (7:15 AM)

Start Time	WESTMORELAND RD Southbound					SINGLETON BLVD Westbound					WESTMORELAND RD Northbound					SINGLETON BLVD Eastbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:15 AM	16	74	15	0	105	5	39	23	0	67	32	426	48	0	506	30	92	24	0	146	824
7:30 AM	30	96	9	0	135	11	56	22	0	89	26	355	42	0	423	54	123	28	1	206	853
7:45 AM	35	93	15	0	143	11	60	22	0	93	42	426	71	0	539	35	78	24	0	137	912
8:00 AM	28	98	13	0	139	18	52	25	0	95	35	353	41	0	429	27	96	39	1	163	826
Total	109	361	52	0	522	45	207	92	0	344	135	1560	202	0	1897	146	389	115	2	652	3415
Approach %	20.9	69.2	10.0	0.0	-	13.1	60.2	26.7	0.0	-	7.1	82.2	10.6	0.0	-	22.4	59.7	17.6	0.3	-	-
Total %	3.2	10.6	1.5	0.0	15.3	1.3	6.1	2.7	0.0	10.1	4.0	45.7	5.9	0.0	55.5	4.3	11.4	3.4	0.1	19.1	-
PHF	0.779	0.921	0.867	0.000	0.913	0.625	0.863	0.920	0.000	0.905	0.804	0.915	0.711	0.000	0.880	0.676	0.791	0.737	0.500	0.791	0.936
Lights	98	344	43	0	485	42	201	84	0	327	111	1512	197	0	1820	132	352	88	2	574	3206
% Lights	89.9	95.3	82.7	-	92.9	93.3	97.1	91.3	-	95.1	82.2	96.9	97.5	-	95.9	90.4	90.5	76.5	100.0	88.0	93.9
Mediums	8	12	7	0	27	2	3	6	0	11	9	32	1	0	42	6	23	6	0	35	115
% Mediums	7.3	3.3	13.5	-	5.2	4.4	1.4	6.5	-	3.2	6.7	2.1	0.5	-	2.2	4.1	5.9	5.2	0.0	5.4	3.4
Articulated Trucks	3	5	2	0	10	1	3	2	0	6	15	16	4	0	35	8	14	21	0	43	94
% Articulated Trucks	2.8	1.4	3.8	-	1.9	2.2	1.4	2.2	-	1.7	11.1	1.0	2.0	-	1.8	5.5	3.6	18.3	0.0	6.6	2.8

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

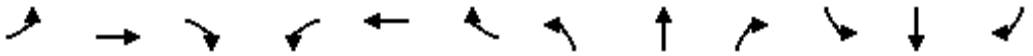
Count Name: WESTMORELAND RD @ SINGLETON BLVD
Site Code:
Start Date: 03/01/2017

Turning Movement Peak Hour Data (4:45 PM)

Start Time	WESTMORELAND RD Southbound					SINGLETON BLVD Westbound					WESTMORELAND RD Northbound					SINGLETON BLVD Eastbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
4:45 PM	31	392	29	0	452	51	148	34	0	233	38	105	31	0	174	18	68	54	0	140	999
5:00 PM	20	329	20	0	369	49	124	26	0	199	41	108	41	0	190	18	77	47	0	142	900
5:15 PM	34	394	21	0	449	39	99	22	0	160	23	97	40	0	160	10	80	36	0	126	895
5:30 PM	26	398	13	0	437	54	133	20	0	207	36	90	37	0	163	13	87	48	0	148	955
Total	111	1513	83	0	1707	193	504	102	0	799	138	400	149	0	687	59	312	185	0	556	3749
Approach %	6.5	88.6	4.9	0.0	-	24.2	63.1	12.8	0.0	-	20.1	58.2	21.7	0.0	-	10.6	56.1	33.3	0.0	-	-
Total %	3.0	40.4	2.2	0.0	45.5	5.1	13.4	2.7	0.0	21.3	3.7	10.7	4.0	0.0	18.3	1.6	8.3	4.9	0.0	14.8	-
PHF	0.816	0.950	0.716	0.000	0.944	0.894	0.851	0.750	0.000	0.857	0.841	0.926	0.909	0.000	0.904	0.819	0.897	0.856	0.000	0.939	0.938
Lights	104	1478	54	0	1636	191	484	101	0	776	121	384	145	0	650	48	305	172	0	525	3587
% Lights	93.7	97.7	65.1	-	95.8	99.0	96.0	99.0	-	97.1	87.7	96.0	97.3	-	94.6	81.4	97.8	93.0	-	94.4	95.7
Mediums	5	28	7	0	40	1	13	1	0	15	6	9	3	0	18	5	3	6	0	14	87
% Mediums	4.5	1.9	8.4	-	2.3	0.5	2.6	1.0	-	1.9	4.3	2.3	2.0	-	2.6	8.5	1.0	3.2	-	2.5	2.3
Articulated Trucks	2	7	22	0	31	1	7	0	0	8	11	7	1	0	19	6	4	7	0	17	75
% Articulated Trucks	1.8	0.5	26.5	-	1.8	0.5	1.4	0.0	-	1.0	8.0	1.8	0.7	-	2.8	10.2	1.3	3.8	-	3.1	2.0

Capacity Analysis

N Westmoreland Road & Singleton Boulevard



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	148	389	115	45	207	92	135	1560	202	109	361	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	200		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.966			0.954			0.983			0.981	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	4436	0	1687	4720	0	1530	4950	0	1641	4778	0
Flt Permitted	0.551			0.355			0.488			0.094		
Satd. Flow (perm)	952	4436	0	630	4720	0	786	4950	0	162	4778	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		69			98			33			37	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		710			1503			681			699	
Travel Time (s)		13.8			29.3			13.3			13.6	
Adj. Flow (vph)	157	414	122	48	220	98	144	1660	215	116	384	55
Lane Group Flow (vph)	157	536	0	48	318	0	144	1875	0	116	439	0
Turn Type	D.P+P	NA		D.P+P	NA		D.P+P	NA		D.P+P	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	8			4			6			2		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	
Minimum Split (s)	13.0	16.0		13.0	16.0		13.0	26.0		13.0	26.0	
Total Split (s)	15.0	18.0		13.0	16.0		13.0	46.0		13.0	46.0	
Total Split (%)	16.7%	20.0%		14.4%	17.8%		14.4%	51.1%		14.4%	51.1%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	3.0	2.0		3.0	2.0		3.0	2.0		3.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes				Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effct Green (s)	18.7	17.0		21.1	10.0		47.0	42.6		48.2	40.0	
Actuated g/C Ratio	0.21	0.19		0.24	0.11		0.52	0.47		0.54	0.45	
v/c Ratio	0.59	0.60		0.21	0.52		0.31	0.79		0.57	0.20	
Control Delay	36.8	33.9		26.8	29.2		10.5	23.4		25.0	14.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	36.8	33.9		26.8	29.2		10.5	23.4		25.0	14.2	
LOS	D	C		C	C		B	C		C	B	
Approach Delay		34.5			28.9			22.5			16.4	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	71	95		20	43		34	331		27	49	
Queue Length 95th (ft)	126	#150		47	72		62	398		#78	70	
Internal Link Dist (ft)		630			1423			601			619	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	270	894		231	613		469	2369		202	2150	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.58	0.60		0.21	0.52		0.31	0.79		0.57	0.20	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 89.7			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 24.5		Intersection LOS: C	
Intersection Capacity Utilization 77.2%		ICU Level of Service D	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

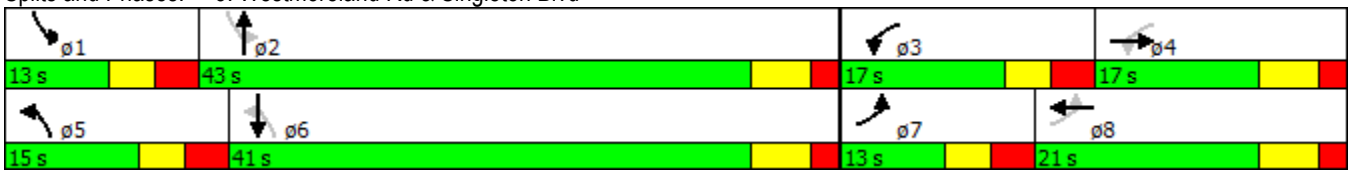
Splits and Phases: 3: Westmoreland Rd & Singleton Blvd

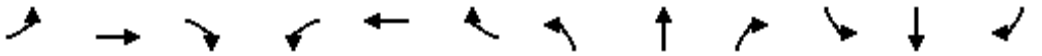
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	312	185	193	504	102	138	400	149	111	1513	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	200		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.944			0.975			0.959			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	4714	0	1787	4887	0	1612	4796	0	1703	4966	0
Flt Permitted	0.275			0.331			0.110			0.410		
Satd. Flow (perm)	439	4714	0	623	4887	0	187	4796	0	735	4966	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		136			41			127			11	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		710			1503			681			699	
Travel Time (s)		13.8			29.3			13.3			13.6	
Adj. Flow (vph)	63	332	197	205	536	109	147	426	159	118	1610	88
Lane Group Flow (vph)	63	529	0	205	645	0	147	585	0	118	1698	0
Turn Type	D.P+P	NA		D.P+P	NA		D.P+P	NA		D.P+P	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	8			4			6			2		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	
Minimum Split (s)	13.0	16.0		13.0	16.0		13.0	26.0		13.0	26.0	
Total Split (s)	13.0	17.0		17.0	21.0		15.0	43.0		13.0	41.0	
Total Split (%)	14.4%	18.9%		18.9%	23.3%		16.7%	47.8%		14.4%	45.6%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	3.0	2.0		3.0	2.0		3.0	2.0		3.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes				Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effct Green (s)	22.6	10.8		21.4	17.1		43.6	39.3		44.9	35.2	
Actuated g/C Ratio	0.25	0.12		0.24	0.19		0.49	0.44		0.50	0.40	
v/c Ratio	0.32	0.77		0.71	0.66		0.65	0.27		0.26	0.86	
Control Delay	27.3	36.3		40.1	36.0		29.4	13.3		11.4	30.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.3	36.3		40.1	36.0		29.4	13.3		11.4	30.5	
LOS	C	D		D	D		C	B		B	C	
Approach Delay		35.4			37.0			16.5			29.3	
Approach LOS		D			D			B			C	
Queue Length 50th (ft)	26	79		90	121		38	60		30	319	
Queue Length 95th (ft)	56	118		#158	163		#109	86		56	385	
Internal Link Dist (ft)		630			1423			601			619	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	196	702		296	970		236	2191		446	1967	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.32	0.75		0.69	0.66		0.62	0.27		0.26	0.86	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 89			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 29.5		Intersection LOS: C	
Intersection Capacity Utilization 79.6%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Westmoreland Rd & Singleton Blvd



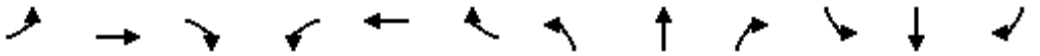


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	151	401	117	96	223	106	138	1591	221	115	368	53
Future Volume (vph)	151	401	117	96	223	106	138	1591	221	115	368	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	200		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.966			0.952			0.982			0.981	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	4437	0	1687	4706	0	1530	4945	0	1641	4778	0
Flt Permitted	0.528			0.324			0.484			0.100		
Satd. Flow (perm)	912	4437	0	575	4706	0	779	4945	0	173	4778	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		67			108			36			37	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		710			1503			681			699	
Travel Time (s)		13.8			29.3			13.3			13.6	
Adj. Flow (vph)	161	427	124	102	237	113	147	1693	235	122	391	56
Lane Group Flow (vph)	161	551	0	102	350	0	147	1928	0	122	447	0
Turn Type	D.P+P	NA		D.P+P	NA		D.P+P	NA		D.P+P	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	8			4			6			2		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	
Minimum Split (s)	13.0	16.0		13.0	16.0		13.0	26.0		13.0	26.0	
Total Split (s)	15.0	18.0		13.0	16.0		13.0	46.0		13.0	46.0	
Total Split (%)	16.7%	20.0%		14.4%	17.8%		14.4%	51.1%		14.4%	51.1%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	3.0	2.0		3.0	2.0		3.0	2.0		3.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes				Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effct Green (s)	18.8	14.4		20.0	10.0		47.0	40.0		47.0	40.0	
Actuated g/C Ratio	0.21	0.16		0.22	0.11		0.52	0.45		0.52	0.45	
v/c Ratio	0.62	0.72		0.48	0.57		0.32	0.87		0.60	0.21	
Control Delay	38.0	38.8		33.5	29.9		10.6	27.4		25.6	14.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	38.0	38.8		33.5	29.9		10.6	27.4		25.6	14.2	
LOS	D	D		C	C		B	C		C	B	
Approach Delay		38.6			30.7			26.2			16.7	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	73	100		44	47		35	346		28	50	
Queue Length 95th (ft)	129	#158		86	78		63	416		#85	71	
Internal Link Dist (ft)		630			1423			601			619	
Turn Bay Length (ft)	200			200			200			200		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	266	767		214	619		466	2223		205	2150	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.61	0.72		0.48	0.57		0.32	0.87		0.60	0.21	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 89.8			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 27.6		Intersection LOS: C	
Intersection Capacity Utilization 78.7%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Westmoreland Rd & Singleton Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	331	189	227	521	111	141	408	205	126	1543	85
Future Volume (vph)	60	331	189	227	521	111	141	408	205	126	1543	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	200		0	200		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.945			0.974			0.950			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	4721	0	1787	4883	0	1612	4753	0	1703	4966	0
Flt Permitted	0.260			0.331			0.113			0.369		
Satd. Flow (perm)	415	4721	0	623	4883	0	192	4753	0	661	4966	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		131			44			172			11	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		710			1503			681			699	
Travel Time (s)		13.8			29.3			13.3			13.6	
Adj. Flow (vph)	64	352	201	241	554	118	150	434	218	134	1641	90
Lane Group Flow (vph)	64	553	0	241	672	0	150	652	0	134	1731	0
Turn Type	D.P+P	NA		D.P+P	NA		D.P+P	NA		D.P+P	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	8			4			6			2		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	
Minimum Split (s)	13.0	16.0		13.0	16.0		13.0	26.0		13.0	26.0	
Total Split (s)	13.0	17.0		17.0	21.0		15.0	43.0		13.0	41.0	
Total Split (%)	14.4%	18.9%		18.9%	23.3%		16.7%	47.8%		14.4%	45.6%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	3.0	2.0		3.0	2.0		3.0	2.0		3.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes				Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effct Green (s)	22.9	10.8		21.7	17.4		44.0	37.0		44.0	35.5	
Actuated g/C Ratio	0.26	0.12		0.24	0.19		0.49	0.41		0.49	0.40	
v/c Ratio	0.33	0.81		0.83	0.69		0.66	0.32		0.33	0.88	
Control Delay	27.7	39.7		50.3	36.6		29.8	13.3		12.3	31.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.7	39.7		50.3	36.6		29.8	13.3		12.3	31.6	
LOS	C	D		D	D		C	B		B	C	
Approach Delay		38.5			40.2			16.4			30.2	
Approach LOS		D			D			B			C	
Queue Length 50th (ft)	26	86		108	127		39	64		34	328	
Queue Length 95th (ft)	56	#136		#210	169		#110	91		63	#401	
Internal Link Dist (ft)		630			1423			601			619	
Turn Bay Length (ft)	200			200			200			200		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	192	694		293	980		237	2060		405	1971	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.33	0.80		0.82	0.69		0.63	0.32		0.33	0.88	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 89.7			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 31.0		Intersection LOS: C	
Intersection Capacity Utilization 82.7%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Westmoreland Rd & Singleton Blvd

Singleton Boulevard & Project Access

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	714	351	15	50	74
Future Vol, veh/h	23	714	351	15	50	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	10	3	0	0	0
Mvmt Flow	24	760	373	16	53	79

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	389	0	-	0	733	195
Stage 1	-	-	-	-	381	-
Stage 2	-	-	-	-	352	-
Critical Hdwy	5.3	-	-	-	5.7	7.1
Critical Hdwy Stg 1	-	-	-	-	6.6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	3.1	-	-	-	3.8	3.9
Pot Cap-1 Maneuver	771	-	-	-	426	697
Stage 1	-	-	-	-	572	-
Stage 2	-	-	-	-	631	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	771	-	-	-	413	697
Mov Cap-2 Maneuver	-	-	-	-	413	-
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	631	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	13.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	771	-	-	-	546
HCM Lane V/C Ratio	0.032	-	-	-	0.242
HCM Control Delay (s)	9.8	-	-	-	13.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.9

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	79	583	701	53	30	44
Future Vol, veh/h	79	583	701	53	30	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	2	4	0	0	0
Mvmt Flow	84	620	746	56	32	47

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	802	0	-	0	1190	401
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	416	-
Critical Hdwy	5.3	-	-	-	5.7	7.1
Critical Hdwy Stg 1	-	-	-	-	6.6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	3.1	-	-	-	3.8	3.9
Pot Cap-1 Maneuver	494	-	-	-	253	516
Stage 1	-	-	-	-	335	-
Stage 2	-	-	-	-	585	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	494	-	-	-	210	516
Mov Cap-2 Maneuver	-	-	-	-	210	-
Stage 1	-	-	-	-	278	-
Stage 2	-	-	-	-	585	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	19.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	494	-	-	-	324
HCM Lane V/C Ratio	0.17	-	-	-	0.243
HCM Control Delay (s)	13.8	-	-	-	19.6
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	0.9

Turn Lane Warrants

Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway

Variable	Value
Major-road speed, mph:	35
Major-road volume (one direction), veh/h:	549
Right-turn volume, veh/h:	56

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	348
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.