



January 24, 2020

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Re: 218 South Lamar Boulevard Transportation Impact Analysis Update

Dear Mr. Good,

It has come to our attention that the proposed development at 218 South Lamar Boulevard (Project) has had changes to its development plan as compared to that assumed in the previously-approved TIA (January 2019). This memorandum summarizes those changes, analyzes differences as compared to the approved TIA, and determines if additional mitigation is required. As a point of reference, the previous TIA approval memo is attached to the end of this letter (**Attachment 1**).

### **Project Description**

In the approved January 2019 TIA, the Project was proposed to be a combination of office space (167,000 square feet) and high-turnover restaurant (13,000 square feet). The Project has now been proposed to consist of 189,881 square feet of office space and 5,000 square feet of high-turnover restaurant. As such, an updated trip generation estimate was deemed necessary in order to accurately assess future trips generated to the site.

In addition to the change in intensities of the land uses, the approved TIA analyzed a potential site plan that had two driveway accesses to the underground parking garage:

- A full access driveway on Toomey Road
- A right-in, right-out driveway on South Lamar Boulevard

The revised site plan includes a right-in, right-out driveway on South Lamar Boulevard, but it would serve commercial loading/unloading only. As such, all trips assigned to and from the Project have been shifted to the Toomey Road driveway.

### **Project Trip Generation (TIA)**

The ITE *Trip Generation Manual*, 10<sup>th</sup> Edition, was used for both the January 2019 TIA trip generation and the updated trip generation for the Project.

In the TIA, the Project was estimated to generate 3,181 net new daily external vehicle trips, with 294 occurring during the AM peak hour and 277 occurring during the PM peak hour. These values assumed a

15 percent discount for people walking, biking, and taking transit for the office land use, a 10 percent discount similarly for the restaurant use during the peak periods, no discount for internalization between the mix of uses, and no discount for existing trips on the site. **Table 1** summarizes the trip generation included in the TIA.

### Project Trip Generation (Update)

For the updated trip generation, the same codes and equations were used to determine the estimated trip generation. The revised Project is estimated to generate 2,685 net new daily external vehicle trips, with 246 trips occurring during the AM peak hour and 228 trips occurring during the PM peak hour.

**Table 2** summarizes the trip generation for the updated Project per the TIA methodology. The daily trip generation estimate decreased 15.6 percent, the AM peak hour trip generation estimate decreased 16.3 percent, and the PM peak hour trip generation estimate decreased 17.7 percent.

**TABLE 1: TRIP GENERATION SUMMARY (JANUARY 2019)**

Description	Land Use	ITE Code	Units	Daily	Weekday AM Peak			Weekday PM Peak		
				Total	In	Out	Total	In	Out	Total
Office	General Office Building	710 <sup>1</sup>	167 ksf	1,942	155	23	178	26	137	163
Services	High-Turnover Restaurant	932 <sup>2</sup>	13 ksf	1,239	64	52	116	71	43	114
<b>Total</b>				<b>3,181</b>	<b>219</b>	<b>75</b>	<b>294</b>	<b>97</b>	<b>180</b>	<b>277</b>

Notes:

1. General Office (Category 710)

Daily:  $T = 13.68 * X * 0.85$

AM:  $T = 1.25 * X * 0.85$ ; 87% in, 13% out

PM:  $T = 1.15 * X * 0.85$ ; 22% in, 78% out

Where T= number of vehicle trips, X = thousands of square feet (ksf)

2. High-Turnover (Sit-Down) Restaurant (Category 932)

Daily:  $T = 112.18 * X * 0.85$

AM:  $T = 9.94 * X * 0.90$ ; 55% in, 45% out

PM:  $T = 9.77 * X * 0.90$ ; 62% in, 38% out

Where T= number of vehicle trips, X = thousands of square feet (ksf)

Source: Wantman Group, Inc., 2020.

**TABLE 2: TRIP GENERATION SUMMARY (REVISED PROJECT)**

Description	Land Use	ITE Code	Units	Daily	Weekday AM Peak			Weekday PM Peak		
				Total	In	Out	Total	In	Out	Total
Office	General Office Building	710 <sup>1</sup>	189.881 ksf	2,208	176	26	202	41	145	186
Services	High-Turnover Restaurant	932 <sup>2</sup>	5 ksf	477	23	19	42	26	16	42
<b>Total</b>				<b>2,685</b>	<b>199</b>	<b>45</b>	<b>246</b>	<b>67</b>	<b>161</b>	<b>228</b>

Source: Wantman Group, Inc., 2020.

## Project Trip Assignment

**Attachment 2** shows the study area for the TIA. The locations shown in **Table 3** were assumed as the gateways for Project trips. The top section of Table 3 shows the assumed path for entering traffic for each gateway and whether there would be any change with the removal of the South Lamar Boulevard driveway. The bottom half of Table 3 shows the same information for exiting traffic.

**TABLE 3: TRIP DISTRIBUTION – PATH CHANGES**

Location	Distribution	Assumed Path to/from Project? <sup>1</sup>	Change for Project Traffic?
<b>Entering Traffic</b>			
Lamar Boulevard (north)	10%	SLB southbound to SLB driveway	Yes
South Lamar Boulevard (south)	11%	SLB northbound to Toomey and Toomey driveway	-
West 6 <sup>th</sup> Street	9%	SLB southbound to SLB driveway	Yes
West 5 <sup>th</sup> Street	15%	SLB southbound to SLB driveway	Yes
West Cesar Chavez Street (east)	16%	SLB southbound to SLB driveway	Yes
West Cesar Chavez Street (west)	19%	SLB southbound to SLB driveway	Yes
West Riverside Drive (east)	3%	SLB southbound to SLB driveway	Yes
Barton Springs Road (east)	9%	SLB northbound to Toomey and Toomey driveway	-
Barton Springs Road (west)	8%	Jessie Street to Toomey and Toomey driveway	-
<b>Exiting Traffic</b>			
Lamar Boulevard (north)	10%	Toomey driveway to Toomey and Northbound SLB	-
South Lamar Boulevard (south)	11%	SLB driveway to SLB southbound	Yes
West 6 <sup>th</sup> Street	9%	Toomey driveway to Toomey and Northbound SLB	-
West 5 <sup>th</sup> Street	15%	Toomey driveway to Toomey and Northbound SLB	-
West Cesar Chavez Street (east)	16%	Toomey driveway to Toomey and Northbound SLB	-
West Cesar Chavez Street (west)	19%	Toomey driveway to Toomey and Northbound SLB	-
West Riverside Drive (east)	3%	Toomey driveway to Toomey and Northbound SLB	-
Barton Springs Road (east)	9%	SLB driveway to SLB southbound	Yes
Barton Springs Road (west)	8%	SLB driveway to SLB southbound	Yes

Notes:

1. SLB = South Lamar Boulevard

Source: Wantman Group, Inc., 2020.

As shown in Table 3, the removal of the South Lamar Boulevard driveway for garage access affects vehicles entering the site from the north and exiting the site to the south.

All **vehicles entering the site coming from the south** were already assumed to make a northbound left-turn at Toomey Road, which they will continue to do.

**Vehicles exiting the site heading to the north** were already assumed to make an eastbound left-turn turn to South Lamar Boulevard from Toomey Road, which they will continue to do.

Inbound traffic coming from Barton Springs Road from the west was assumed to come via Jessie Street and is unaffected. Outbound traffic going to Barton Springs Road was assumed to leave via the South Lamar Boulevard driveway will be affected (roughly five to ten vehicles per peak hour).

**Vehicles entering the site coming from the north** were assumed to make a southbound right-turn into the South Lamar Boulevard driveway; those vehicles will now have to continue south to Toomey Road, make a right turn and access the driveway on the north side of Toomey Road.

Similarly, **vehicles exiting the site heading to the south** were assumed to make an eastbound right-turn to South Lamar Boulevard; those vehicles will not have to use Toomey Road and head eastbound before making a right turn to South Lamar Boulevard.

As a result, the only study intersections shown in Attachment 2 that would be affected by this change are:

- (#7) South Lamar Boulevard / Toomey Road
- (#12) South Lamar Boulevard / Access Driveway
- (#13) Toomey Road / Access Driveway

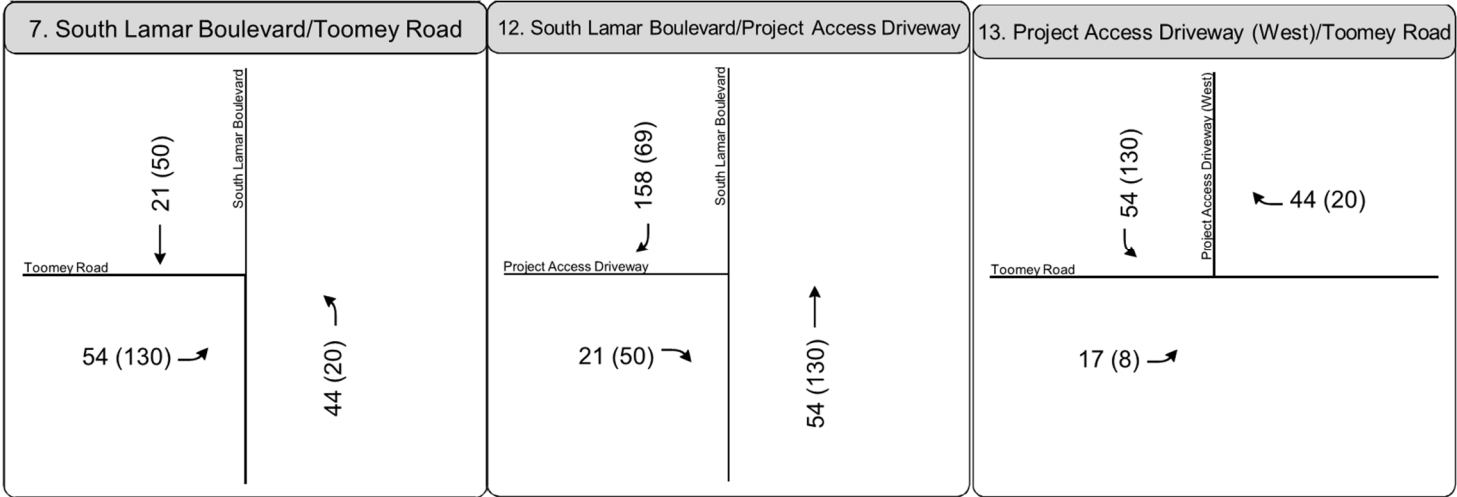
Intersection #12 no longer exists with the current proposal, but numbering will remain the same for consistency between documents. The following evaluates the updated trip generation, trip assignment, and anticipated traffic operations at these two locations with buildout of the Project.

### **Project Trip Assignment and Build Volumes**

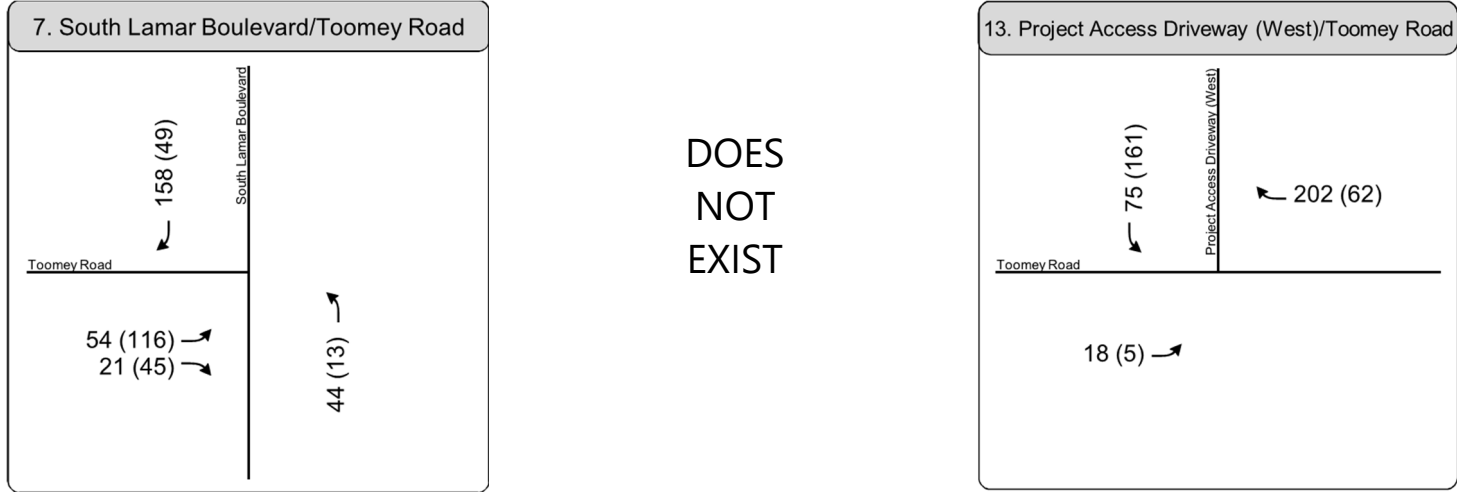
The volumes shown on the top of the following page (page 5) convey the trip assignment assumed for the study intersections mentioned above in the January 2019. Directly beneath that are the trip assignment volumes for the updated trip generation and assignment with the eliminated driveway.

On page 6, similarly conveyed, are the build volumes for the 2019 TIA and the updated analysis.

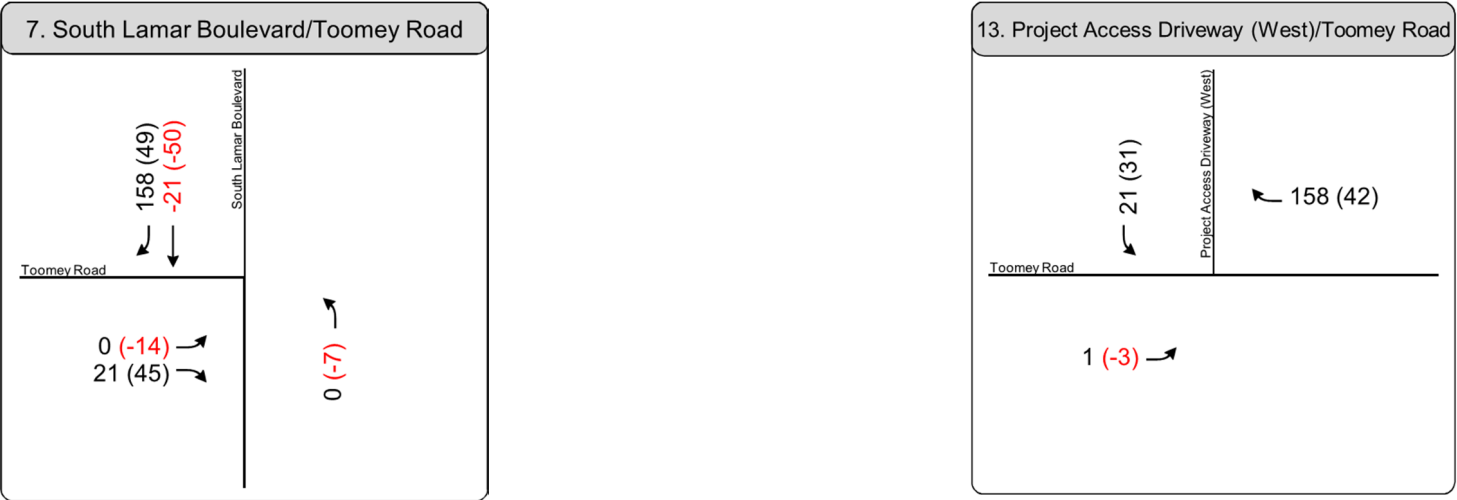
Project Trip Assignment (2019 Analysis)



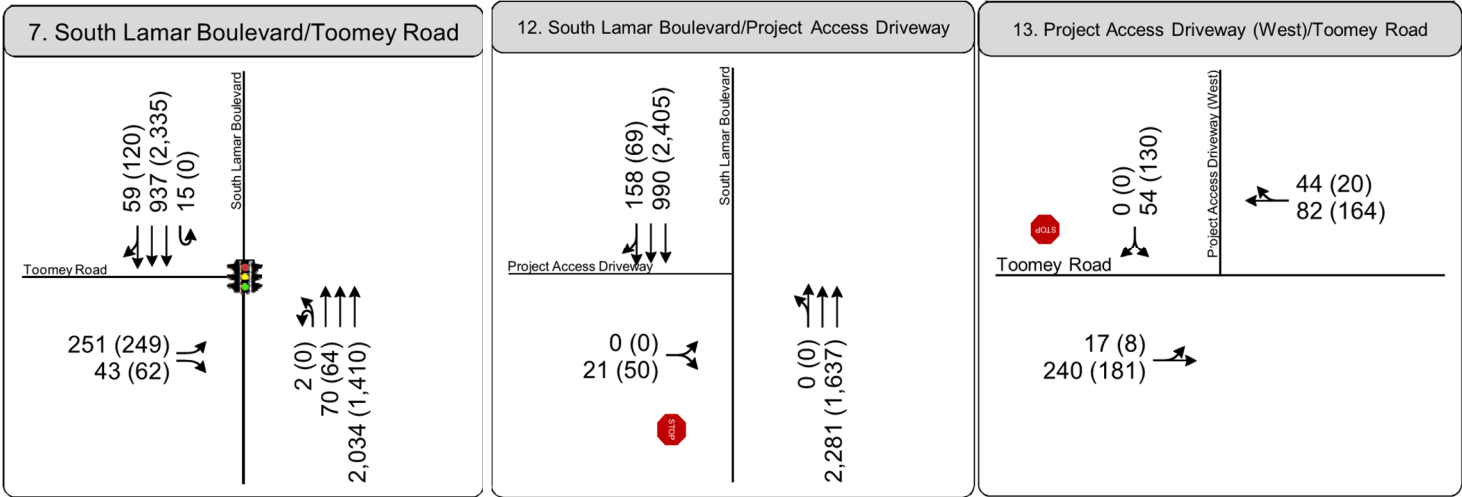
Project Trip Assignment (2020 Analysis)



Change (Black shows increase, Red shows decrease)



Build Conditions (2019 Analysis)



Build Conditions (2020 Analysis)



## Build Conditions Operations

**Table 4** shows the average vehicle delay, 95<sup>th</sup> percentile queue length, and volume-to-capacity (v/c) ratio for each movement and the overall intersection for both locations during the AM peak hour. **Table 5** shows the same information for the PM peak hour. As shown, there is minimal change as a result of the driveway elimination. The additional outbound vehicles are all right-turning vehicles at South Lamar Boulevard, which add minimal delay to the intersection.

Eastbound queues on Toomey Road specifically are expected to extend beyond Jessie Street. Mitigation options were evaluated for this intersection, which included:

- Signal timing adjustments for the (#7) South Lamar Boulevard / Toomey Road
- An additional eastbound left-turn lane on Toomey Road at South Lamar Boulevard
- The existing right-turn lane on Toomey Road could become a shared left-turn/right-turn lane

These improvements were not selected by ATD in order to prioritize vehicle progression along South Lamar Boulevard, as well as alternative modes (including transit stops and the off-street bicycle lanes). A conceptual design of the additional left-turn lane is included as **Attachment 3**. Synchro worksheets for both the 2019 and 2020 analyses are included as **Attachment 4**.

**TABLE 4: TRAFFIC OPERATIONS ANALYSIS AT AFFECTED INTERSECTIONS – AM PEAK HOUR**

Location / Movement	2019 Analysis				2020 Analysis			
	Delay	95 <sup>th</sup> Percentile Queue (feet)	V/C Ratio	LOS	Delay	95 <sup>th</sup> Percentile Queue (feet)	V/C Ratio	LOS
<b>(#7) South Lamar Boulevard / Toomey Road</b>								
Intersection	22.5	-	0.71	C	21.6	-	0.71	C
Eastbound Left-Turn	<b>68.5</b>	<b>421</b>	<b>0.81</b>	<b>E</b>	<b>68.5</b>	<b>421</b>	<b>0.81</b>	<b>E</b>
Eastbound Right-Turn	46.2	37	0.15	D	46.3	44	0.05	D
Northbound Left-Turn/U-Turn	4.3	9	0.13	A	4.6	9	0.14	A
Northbound Through	5.3	117	0.68	A	5.3	117	0.70	A
Southbound U-Turn	9.9	1	0.12	A	9.9	1	0.18	A
Southbound Through/Right-Turn	51.4	308	0.54	D	44.4	291	0.60	D
<b>(#13) Toomey Road / Access Driveway</b>								
Intersection	1.5	-	-	A	1.4	-	-	A
Eastbound Left-Turn/Through	0.8	1	0.02	A	1.2	2	0.03	A
Westbound Through/Right-Turn	0.0	-	0.16	A	0.0	-	0.53	A
Southbound Left-Turn/Right-Turn	12.6	9	0.10	B	18.6	21	0.22	C

Source: Wantman Group, Inc., 2020.

**TABLE 5: TRAFFIC OPERATIONS ANALYSIS AT AFFECTED INTERSECTIONS – PM PEAK HOUR**

Location / Movement	2019 Analysis				2020 Analysis			
	Delay	95 <sup>th</sup> Percentile Queue (feet)	V/C Ratio	LOS	Delay	95 <sup>th</sup> Percentile Queue (feet)	V/C Ratio	LOS
<b>(#7) South Lamar Boulevard / Toomey Road</b>								
Intersection	16.3	-	0.74	B	16.4	-	0.74	B
Eastbound Left-Turn	<b>72.4</b>	<b>317</b>	<b>0.80</b>	<b>E</b>	<b>73.2</b>	<b>304</b>	<b>0.79</b>	<b>E</b>
Eastbound Right-Turn	51.3	40	0.19	D	52.5	51	0.07	D
Northbound Left-Turn/U-Turn	21.9	51	0.17	C	20.3	39	0.15	C
Northbound Through	18.5	216	0.56	B	18.7	218	0.56	B
Southbound U-Turn	-	-	-	-	-	-	-	-
Southbound Through/Right-Turn	8.6	244	0.70	A	8.3	238	0.70	A
<b>(#13) Toomey Road / Access Driveway</b>								
Intersection	3.2	-	-	A	3.7	-	-	A
Eastbound Left-Turn/Through	0.4	0	0.01	A	0.3	0	0.00	A
Westbound Through/Right-Turn	0.0	-	0.12	A	0.0	-	0.14	A
Southbound Left-Turn/Right-Turn	12.8	22	0.22	B	13.5	28	0.28	B

Source: Wantman Group, Inc., 2020.



## **Conclusion**

The change in trip generation and the elimination of the South Lamar Boulevard driveway for access to the garage change turning movement volumes at the study locations and add traffic on Toomey Road between South Lamar Boulevard and the proposed access driveway. However, those changes do not significantly change the analysis previously provided, and no additional mitigation would be necessary. The change would also not entice anyone new to use Jessie Street, Sterzing Street, and/or Toomey Street west of the Project; there is sufficient capacity to accommodate those vehicles.

Per the previous analysis, the Project was responsible for posting fiscal towards eight improvements in the total amount of \$255,000, in addition to constructing improvements nearby; those mitigations are still applicable with this revised plan.

Respectfully submitted,

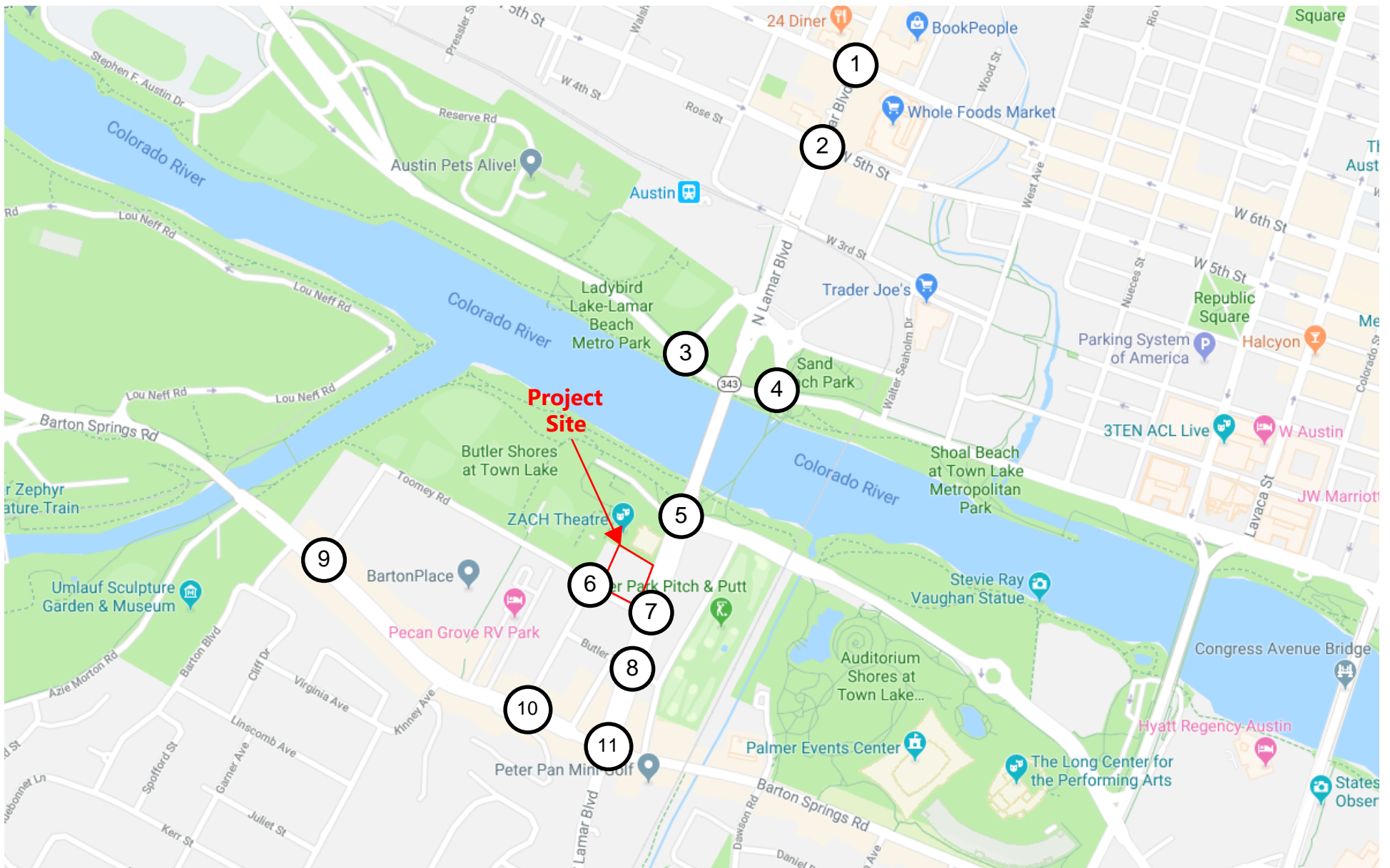
**WGI**



Dan Hennessey, PE, PTOE  
Director of Transportation Services, Texas

Attachment 1 – May 8, 2019 Approval Memo from ATD  
Attachment 2 – Study Intersection Map  
Attachment 3 – Conceptual Design (Eastbound Left-Turn Lane)  
Attachment 4 – Synchro Worksheets

Note: Attachment 1 is protected and cannot be included in the actual PDF attachment. It has been sent with this e-mail.

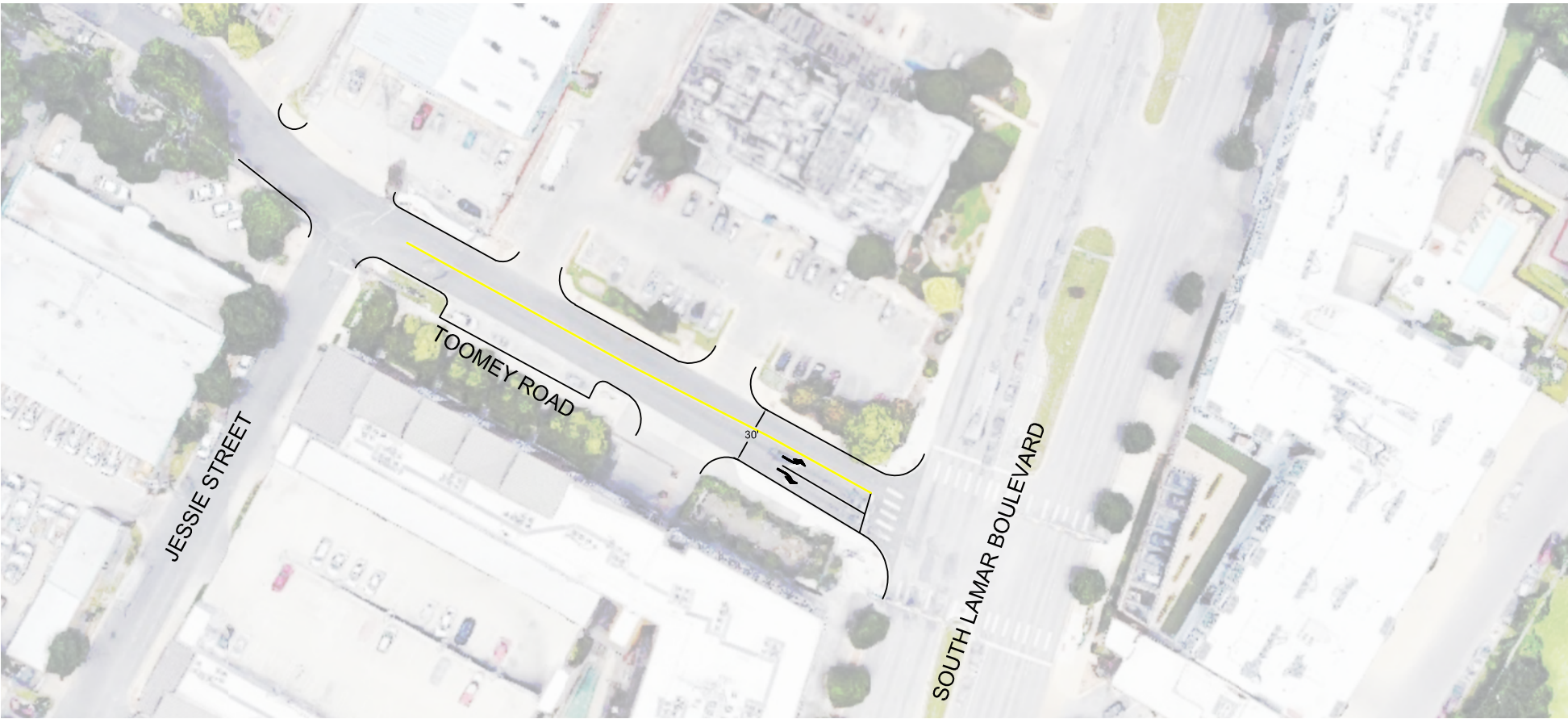


Key: (x) Study Intersection

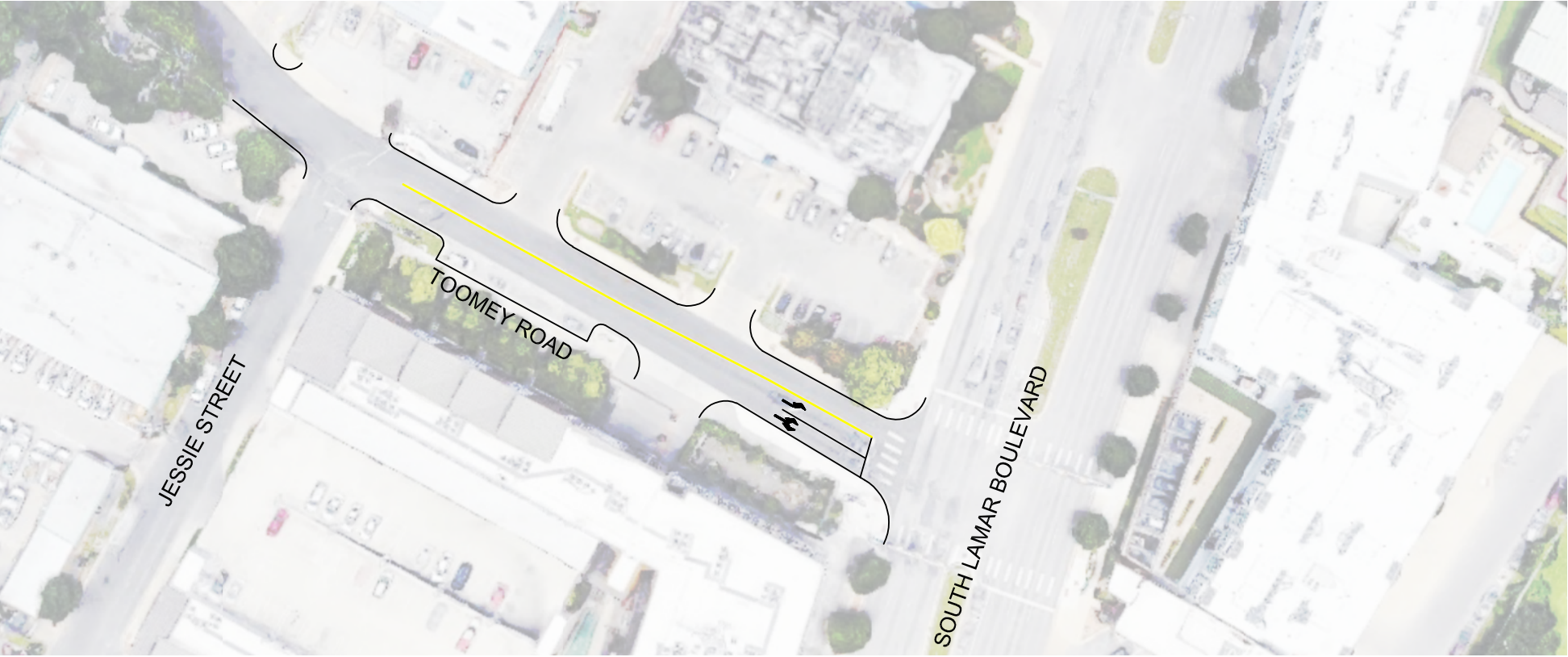
Attachment 2  
Study Area and Intersections



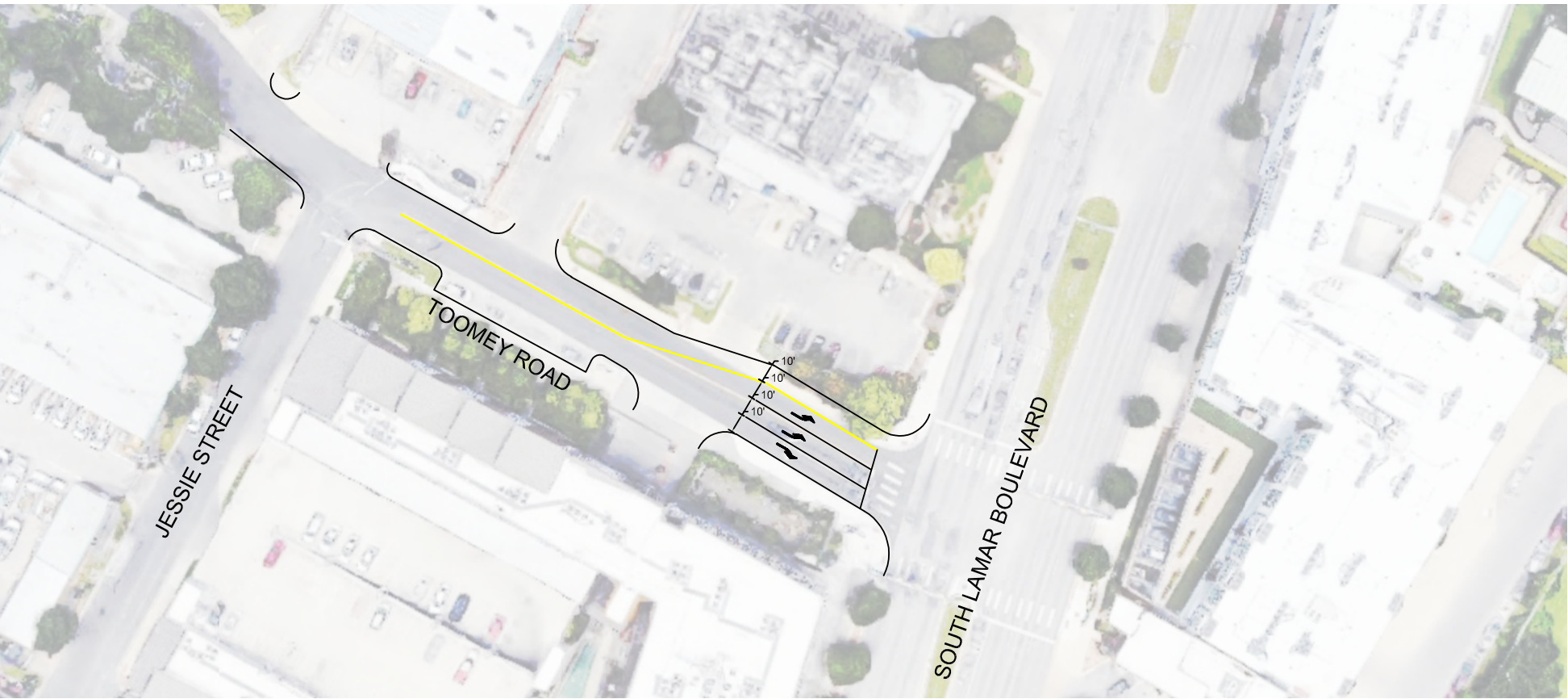
Existing



Re-striping for shared left-/right-turn lane



Additional Left-Turn Lane





## Queues

Build AM

## 7: South Lamar Boulevard &amp; Toomey Road

Build Conditions AM Peak



Lane Group	EBL	EBR	NBL	NBT	SBU	SBT
Lane Group Flow (vph)	254	43	82	2311	15	996
v/c Ratio	0.81	0.15	0.13	0.68	0.12	0.54
Control Delay	74.6	15.9	2.5	4.6	4.9	51.3
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	74.6	15.9	2.5	4.7	4.9	51.3
Queue Length 50th (ft)	215	0	9	101	4	296
Queue Length 95th (ft)	#421	37	m9	117	m1	308
Internal Link Dist (ft)	86			221		189
Turn Bay Length (ft)	75		60		75	
Base Capacity (vph)	312	287	650	3500	124	3183
Starvation Cap Reductn	0	0	0	228	0	0
Spillback Cap Reductn	0	0	0	277	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.15	0.13	0.72	0.12	0.31

## Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

# HCM Signalized Intersection Capacity Analysis

## 7: South Lamar Boulevard & Toomey Road

Build AM  
Build Conditions AM Peak



Movement	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	251	43	2	70	2034	15	937	59
Future Volume (vph)	251	43	2	70	2034	15	937	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	0.91	1.00	0.91	
Frpb, ped/bikes	1.00	0.97		1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	0.85		1.00	1.00	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1781	1440		1704	5136	1805	4932	
Flt Permitted	0.95	1.00		0.18	1.00	0.04	1.00	
Satd. Flow (perm)	1781	1440		329	5136	83	4932	
Peak-hour factor, PHF	0.99	0.99	0.88	0.88	0.88	1.00	1.00	1.00
Adj. Flow (vph)	254	43	2	80	2311	15	937	59
RTOR Reduction (vph)	0	35	0	0	0	0	9	0
Lane Group Flow (vph)	254	8	0	82	2311	15	987	0
Confl. Peds. (#/hr)	2	6						9
Confl. Bikes (#/hr)		5						3
Heavy Vehicles (%)	1%	9%	2%	6%	1%	0%	4%	2%
Turn Type	Perm	Perm	custom	custom	NA	custom	NA	
Protected Phases			5	5	2	1	6	
Permitted Phases	4	4	1 2	1 2		5 6		
Actuated Green, G (s)	23.7	23.7		93.5	86.5	93.5	47.0	
Effective Green, g (s)	23.7	23.7		93.5	86.5	93.5	47.0	
Actuated g/C Ratio	0.18	0.18		0.69	0.64	0.69	0.35	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	312	252		650	3290	82	1717	
v/s Ratio Prot				0.04	c0.45	0.00	c0.20	
v/s Ratio Perm	c0.14	0.01		0.05		0.12		
v/c Ratio	0.81	0.03		0.13	0.70	0.18	0.57	
Uniform Delay, d1	53.5	46.1		15.4	15.8	14.0	35.9	
Progression Factor	1.00	1.00		0.27	0.27	0.63	1.40	
Incremental Delay, d2	14.9	0.0		0.1	1.0	1.0	1.3	
Delay (s)	68.5	46.2		4.3	5.3	9.9	51.4	
Level of Service	E	D		A	A	A	D	
Approach Delay (s)	65.2				5.2		50.8	
Approach LOS	E				A		D	

### Intersection Summary




HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Unsignalized Intersection Capacity Analysis

## 13: Toomey Road & Project Access Driveway (West)

Build AM  
Build Conditions AM Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	17	240	82	44	54	0
Future Volume (Veh/h)	17	240	82	44	54	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.92	0.92	0.25	1.00	1.00
Hourly flow rate (vph)	23	261	89	176	54	0
Pedestrians					7	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)			287			
pX, platoon unblocked						
vC, conflicting volume	272				491	184
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	272				491	184
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				90	100
cM capacity (veh/h)	1294				527	858
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	284	265	54			
Volume Left	23	0	54			
Volume Right	0	176	0			
cSH	1294	1700	527			
Volume to Capacity	0.02	0.16	0.10			
Queue Length 95th (ft)	1	0	9			
Control Delay (s)	0.8	0.0	12.6			
Lane LOS	A		B			
Approach Delay (s)	0.8	0.0	12.6			
Approach LOS			B			
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			35.4%	ICU Level of Service		A
Analysis Period (min)			15			

## Queues

## 7: South Lamar Boulevard &amp; Toomey Road

Build PM

No Build PM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	249	62	67	1469	2557
v/c Ratio	0.80	0.19	0.17	0.56	0.70
Control Delay	77.4	11.6	15.9	20.2	9.3
Queue Delay	0.0	0.0	0.0	0.1	0.7
Total Delay	77.4	11.6	15.9	20.2	9.9
Queue Length 50th (ft)	236	0	19	276	265
Queue Length 95th (ft)	317	40	m51	m216	m244
Internal Link Dist (ft)	86			221	189
Turn Bay Length (ft)	75		60		
Base Capacity (vph)	471	467	403	2988	3641
Starvation Cap Reductn	0	0	0	0	635
Spillback Cap Reductn	0	1	0	299	131
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.53	0.13	0.17	0.55	0.85

## Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

# HCM Signalized Intersection Capacity Analysis

## 7: South Lamar Boulevard & Toomey Road

Build PM  
No Build PM Peak



Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	249	62	64	1410	0	2335	120
Future Volume (vph)	249	62	64	1410	0	2335	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		5.0	
Lane Util. Factor	1.00	1.00	1.00	0.91		0.91	
Frpb, ped/bikes	1.00	0.98	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85	1.00	1.00		0.99	
Flt Protected	0.95	1.00	0.95	1.00		1.00	
Satd. Flow (prot)	1767	1577	1805	5085		5031	
Flt Permitted	0.95	1.00	0.05	1.00		1.00	
Satd. Flow (perm)	1767	1577	100	5085		5031	
Peak-hour factor, PHF	1.00	1.00	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	249	62	67	1469	0	2432	125
RTOR Reduction (vph)	0	51	0	0	0	2	0
Lane Group Flow (vph)	249	11	67	1469	0	2555	0
Confl. Peds. (#/hr)	1	3					11
Confl. Bikes (#/hr)		5					40
Heavy Vehicles (%)	2%	0%	0%	2%	0%	2%	0%
Turn Type	Perm	Perm	custom	NA	custom	NA	
Protected Phases			5!	2!	1!	6!	
Permitted Phases	4	4	1 2		5 6		
Actuated Green, G (s)	26.5	26.5	103.5	75.9		108.5	
Effective Green, g (s)	26.5	26.5	103.5	75.9		108.5	
Actuated g/C Ratio	0.18	0.18	0.69	0.51		0.72	
Clearance Time (s)	5.0	5.0	5.0	5.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	312	278	382	2573		3639	
v/s Ratio Prot			0.03	0.29		c0.51	
v/s Ratio Perm	c0.14	0.01	0.09				
v/c Ratio	0.80	0.04	0.18	0.57		0.70	
Uniform Delay, d1	59.2	51.2	35.4	25.7		11.7	
Progression Factor	1.00	1.00	0.61	0.69		0.73	
Incremental Delay, d2	13.3	0.1	0.2	0.7		0.1	
Delay (s)	72.4	51.3	21.9	18.5		8.6	
Level of Service	E	D	C	B		A	
Approach Delay (s)	68.2			18.7		8.6	
Approach LOS	E			B		A	

### Intersection Summary

HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group






# HCM Unsignalized Intersection Capacity Analysis

## 13: Toomey Road & Project Access Driveway (West)

Build PM  
No Build PM Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	181	164	20	130	0
Future Volume (Veh/h)	8	181	164	20	130	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.92	0.92	0.92	1.00	1.00
Hourly flow rate (vph)	9	197	178	22	130	0
Pedestrians					7	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)			287			
pX, platoon unblocked						
vC, conflicting volume	207				411	196
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	207				411	196
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				78	100
cM capacity (veh/h)	1367				593	845
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	206	200	130			
Volume Left	9	0	130			
Volume Right	0	22	0			
cSH	1367	1700	593			
Volume to Capacity	0.01	0.12	0.22			
Queue Length 95th (ft)	0	0	21			
Control Delay (s)	0.4	0.0	12.8			
Lane LOS	A		B			
Approach Delay (s)	0.4	0.0	12.8			
Approach LOS			B			
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			29.9%	ICU Level of Service	A	
Analysis Period (min)			15			

## Queues

Build AM

## 7: South Lamar Boulevard &amp; Toomey Road

Build Conditions AM Peak



Lane Group	EBL	EBR	NBL	NBT	SBU	SBT
Lane Group Flow (vph)	254	65	82	2311	15	1132
v/c Ratio	0.81	0.21	0.14	0.68	0.12	0.58
Control Delay	74.6	13.7	2.7	4.6	5.0	41.1
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	74.6	13.7	2.7	4.7	5.0	41.1
Queue Length 50th (ft)	215	0	9	101	4	289
Queue Length 95th (ft)	#421	44	m9	117	m2	291
Internal Link Dist (ft)	86			221		189
Turn Bay Length (ft)	75		60		75	
Base Capacity (vph)	312	305	588	3500	124	3127
Starvation Cap Reductn	0	0	0	228	0	0
Spillback Cap Reductn	0	0	0	277	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.21	0.14	0.72	0.12	0.36

## Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

# HCM Signalized Intersection Capacity Analysis

## 7: South Lamar Boulevard & Toomey Road

Build AM  
Build Conditions AM Peak






Movement	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	251	64	2	70	2034	15	916	216
Future Volume (vph)	251	64	2	70	2034	15	916	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	0.91	1.00	0.91	
Frpb, ped/bikes	1.00	0.97		1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	0.85		1.00	1.00	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1781	1440		1704	5136	1805	4809	
Flt Permitted	0.95	1.00		0.15	1.00	0.04	1.00	
Satd. Flow (perm)	1781	1440		274	5136	83	4809	
Peak-hour factor, PHF	0.99	0.99	0.88	0.88	0.88	1.00	1.00	1.00
Adj. Flow (vph)	254	65	2	80	2311	15	916	216
RTOR Reduction (vph)	0	54	0	0	0	0	51	0
Lane Group Flow (vph)	254	11	0	82	2311	15	1081	0
Confl. Peds. (#/hr)	2	6						9
Confl. Bikes (#/hr)		5						3
Heavy Vehicles (%)	1%	9%	2%	6%	1%	0%	4%	2%
Turn Type	Perm	Perm	custom	custom	NA	custom	NA	
Protected Phases			5	5	2	1	6	
Permitted Phases	4	4	1 2	1 2		5 6		
Actuated Green, G (s)	23.7	23.7		93.5	86.5	93.5	50.8	
Effective Green, g (s)	23.7	23.7		93.5	86.5	93.5	50.8	
Actuated g/C Ratio	0.18	0.18		0.69	0.64	0.69	0.38	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	312	252		589	3290	82	1809	
v/s Ratio Prot				0.04	c0.45	0.00	c0.22	
v/s Ratio Perm	c0.14	0.01		0.06		0.12		
v/c Ratio	0.81	0.05		0.14	0.70	0.18	0.60	
Uniform Delay, d1	53.5	46.2		17.4	15.8	14.0	33.9	
Progression Factor	1.00	1.00		0.26	0.27	0.63	1.27	
Incremental Delay, d2	14.9	0.1		0.1	1.0	1.0	1.4	
Delay (s)	68.5	46.3		4.6	5.3	9.9	44.4	
Level of Service	E	D		A	A	A	D	
Approach Delay (s)	63.9				5.2		43.9	
Approach LOS	E				A		D	
<b>Intersection Summary</b>								
HCM 2000 Control Delay			21.6		HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio			0.71					
Actuated Cycle Length (s)			135.0		Sum of lost time (s)		19.0	
Intersection Capacity Utilization			69.9%		ICU Level of Service		C	
Analysis Period (min)			15					
c Critical Lane Group								

# HCM Unsignalized Intersection Capacity Analysis 13: Toomey Road & Project Access Driveway (West)

Build AM  
Build Conditions AM Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	18	240	82	202	75	0
Future Volume (Veh/h)	18	240	82	202	75	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.92	0.92	0.25	1.00	1.00
Hourly flow rate (vph)	24	261	89	808	75	0
Pedestrians					7	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)			287			
pX, platoon unblocked						
vC, conflicting volume	904				809	500
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	904				809	500
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				78	100
cM capacity (veh/h)	756				339	571
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	285	897	75			
Volume Left	24	0	75			
Volume Right	0	808	0			
cSH	756	1700	339			
Volume to Capacity	0.03	0.53	0.22			
Queue Length 95th (ft)	2	0	21			
Control Delay (s)	1.2	0.0	18.6			
Lane LOS	A		C			
Approach Delay (s)	1.2	0.0	18.6			
Approach LOS			C			
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			38.3%	ICU Level of Service		A
Analysis Period (min)			15			

## Queues

## 7: South Lamar Boulevard &amp; Toomey Road

Build PM

No Build PM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	235	107	59	1469	2556
v/c Ratio	0.79	0.30	0.15	0.56	0.70
Control Delay	77.9	10.5	14.3	20.4	8.9
Queue Delay	0.0	0.0	0.0	0.1	0.6
Total Delay	77.9	10.5	14.3	20.4	9.5
Queue Length 50th (ft)	224	0	14	282	258
Queue Length 95th (ft)	304	51	m39	m218	m238
Internal Link Dist (ft)	86			221	189
Turn Bay Length (ft)	75		60		
Base Capacity (vph)	471	500	408	2995	3666
Starvation Cap Reductn	0	0	0	0	638
Spillback Cap Reductn	0	2	0	304	133
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.50	0.21	0.14	0.55	0.84

## Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

# HCM Signalized Intersection Capacity Analysis

## 7: South Lamar Boulevard & Toomey Road

Build PM  
No Build PM Peak



Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	235	107	57	1410	0	2285	169
Future Volume (vph)	235	107	57	1410	0	2285	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		5.0	
Lane Util. Factor	1.00	1.00	1.00	0.91		0.91	
Frpb, ped/bikes	1.00	0.98	1.00	1.00		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85	1.00	1.00		0.99	
Flt Protected	0.95	1.00	0.95	1.00		1.00	
Satd. Flow (prot)	1766	1577	1805	5085		5009	
Flt Permitted	0.95	1.00	0.05	1.00		1.00	
Satd. Flow (perm)	1766	1577	99	5085		5009	
Peak-hour factor, PHF	1.00	1.00	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	235	107	59	1469	0	2380	176
RTOR Reduction (vph)	0	89	0	0	0	3	0
Lane Group Flow (vph)	235	18	59	1469	0	2553	0
Confl. Peds. (#/hr)	1	3					11
Confl. Bikes (#/hr)		5					40
Heavy Vehicles (%)	2%	0%	0%	2%	0%	2%	0%
Turn Type	Perm	Perm	custom	NA	custom	NA	
Protected Phases			5!	2!	1!	6!	
Permitted Phases	4	4	1 2		5 6		
Actuated Green, G (s)	25.3	25.3	104.7	76.7		109.7	
Effective Green, g (s)	25.3	25.3	104.7	76.7		109.7	
Actuated g/C Ratio	0.17	0.17	0.70	0.51		0.73	
Clearance Time (s)	5.0	5.0	5.0	5.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	297	265	387	2600		3663	
v/s Ratio Prot			0.03	0.29		c0.51	
v/s Ratio Perm	c0.13	0.01	0.08				
v/c Ratio	0.79	0.07	0.15	0.56		0.70	
Uniform Delay, d1	59.8	52.4	33.4	25.2		11.0	
Progression Factor	1.00	1.00	0.60	0.71		0.74	
Incremental Delay, d2	13.4	0.1	0.1	0.7		0.1	
Delay (s)	73.2	52.5	20.3	18.7		8.3	
Level of Service	E	D	C	B		A	
Approach Delay (s)	66.7			18.7		8.3	
Approach LOS	E			B		A	

### Intersection Summary

HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.




c Critical Lane Group

# HCM Unsignalized Intersection Capacity Analysis

## 13: Toomey Road & Project Access Driveway (West)

Build PM  
No Build PM Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	181	164	62	161	0
Future Volume (Veh/h)	5	181	164	62	161	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.92	0.92	0.92	1.00	1.00
Hourly flow rate (vph)	6	197	178	67	161	0
Pedestrians					7	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)			287			
pX, platoon unblocked						
vC, conflicting volume	252				428	218
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	252				428	218
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				72	100
cM capacity (veh/h)	1316				581	821
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	203	245	161			
Volume Left	6	0	161			
Volume Right	0	67	0			
cSH	1316	1700	581			
Volume to Capacity	0.00	0.14	0.28			
Queue Length 95th (ft)	0	0	28			
Control Delay (s)	0.3	0.0	13.5			
Lane LOS	A		B			
Approach Delay (s)	0.3	0.0	13.5			
Approach LOS			B			
Intersection Summary						
Average Delay			3.7			
Intersection Capacity Utilization		29.1%		ICU Level of Service		A
Analysis Period (min)		15				



December 16, 2019

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Re: 218 South Lamar Boulevard Trip Generation Update

Dear Mr. Good,

It has come to our attention that the proposed development at 218 South Lamar Boulevard (Project) has changed intensities of land uses as compared to the previously-approved TIA. To determine if any additional mitigation might be required, Wantman Group, Inc. (WGI) has completed an updated trip generation estimate for the Project. The purpose of this letter is to provide an update on estimated trips generated based on the proposed change in land use per the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10<sup>th</sup> Edition.

### **Project Description**

In the approved January 2019 TIA, the Project was proposed to be a combination of office space (167,000 square feet) and high-turnover restaurant (13,000 square feet). The Project has now been proposed to consist of 189,881 square feet of office space and 5,000 square feet of high-turnover restaurant. As such, an updated trip generation estimate was deemed necessary in order to accurately assess future trips generated to the site.

### **Project Trip Generation (TIA)**

The ITE *Trip Generation Manual*, 10<sup>th</sup> Edition, was used for both the January 2019 TIA trip generation and the updated trip generation for the Project.

In the TIA, the Project was estimated to generate 3,181 net new daily external vehicle trips, with 294 occurring during the AM peak hour and 277 occurring during the PM peak hour. These values assumed a 15 percent discount for people walking, biking, and taking transit, no discount for internalization between the mix of uses, and no discount for existing trips on the site. **Table 1** summarizes the trip generation included in the TIA. As a result of this trip generation, the Project was responsible for posting fiscal towards eight improvements in the total amount of \$255,000.

### **Project Trip Generation (Update)**

For the updated trip generation, the same codes and equations were used to determine the estimated trip generation. The revised Project is estimated to generate 2,685 net new daily external vehicle trips, with 246



trips occurring during the AM peak hour and 228 trips occurring during the PM peak hour.

**Table 2** summarizes the trip generation for the updated Project per the TIA methodology. The daily trip generation estimate decreased 15.6 percent, the AM peak hour trip generation estimate decreased 16.3 percent, and the PM peak hour trip generation estimate decreased 17.7 percent. As a point of reference, the previous TIA approval memo is attached to the end of this letter (**Attachment 1**).

**TABLE 1: TRIP GENERATION SUMMARY (JANUARY 2019)**

Description	Land Use	ITE Code	Units	Daily	Weekday AM Peak			Weekday PM Peak		
				Total	In	Out	Total	In	Out	Total
Office	General Office Building	710 <sup>1</sup>	167 ksf	1,942	155	23	178	26	137	163
Services	High-Turnover Restaurant	932	13 ksf	1,239	64	52	116	71	43	114
Total				3,181	219	75	294	97	180	277

Notes:

- General Office (Category 710)  
 Daily:  $T = 13.68 * X * 0.85$   
 AM:  $T = 1.25 * X * 0.85$ ; 87% in, 13% out  
 PM:  $T = 1.15 * X * 0.85$ ; 22% in, 78% out  
 Where T= number of vehicle trips, X = thousands of square feet (ksf)
- High-Turnover (Sit-Down) Restaurant (Category 932)  
 Daily:  $T = 112.18 * X * 0.85$   
 AM:  $T = 9.94 * X * 0.85$ ; 55% in, 45% out  
 PM:  $T = 9.77 * X * 0.85$ ; 62% in, 38% out  
 Where T= number of vehicle trips, X = thousands of square feet (ksf)

Source: Wantman Group, Inc., 2019.

**TABLE 2: TRIP GENERATION SUMMARY (REVISED PROJECT)**

Description	Land Use	ITE Code	Units	Daily	Weekday AM Peak			Weekday PM Peak		
				Total	In	Out	Total	In	Out	Total
Office	General Office Building	710 <sup>1</sup>	189,881 ksf	2,208	176	26	202	41	145	186
Services	High-Turnover Restaurant	932	5 ksf	477	23	19	42	26	16	42
Total				2,685	199	45	246	67	161	228

Source: Wantman Group, Inc., 2019.

Respectfully submitted,  
**WGI**



Dan Hennessey, PE, PTOE  
 Director of Transportation Services, Texas

Attachment 1 – May 8, 2019 Approval Memo from ATD