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DREAM TOWN DEVELOPMENT
TRAFFIC IMPACT ANALYSIS

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CE 664



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1. INTRODUCTION

HSL Developers is proposing the development of Dream Town, a multi-use site containing a restaurant and a mixed-use office/retail building. This section contains information on the purpose of the report and the study level of the proposed development.

1.1 PURPOSE

This report presents a Traffic Impact Analysis (TIA) for the proposed Dream Town development. This TIA was completed to fulfill requirements from Provo City and the Utah Department of Transportation (UDOT) for new development, and was done in accordance with UDOT guidelines to apply for an access permit (Utah Department of Transportation 2019). The TIA identifies current traffic patterns—including traffic volume counts—in the study area, and projects traffic volumes to opening day and five years after opening (2024 and 2029, respectively).

1.2 STUDY LEVEL

UDOT Administrative Rule R930-6-8(4) (Utah Department of Transportation 2019) sets forth general requirements for an access permit, including determining the application level. The proposed development will contain an 8,000 ft² high-turnover restaurant (Institute of Transportation Engineers (ITE) land use code 932) and a 32,000 ft² office/retail building, half of which (18,000 ft²) will be a general office location (ITE land use code 710), and the remaining half (18,000 ft²) will be a hardware store (ITE land use code 816). From the ITE Trip Generation Manual (Institute of Transportation Engineers 2021), these locations are expected to generate 1264 weekday trips and 166 PM peak trips (see Appendix A). These trip rates, along with the land use and respective development sizes, necessitate a level II application.

A Level II application requires the following:

- Analysis area includes intersection of site access drives with state highways and any signalized and un-signalized intersection within access category distance of property line
- Design years are opening day and five years after project completion
- Traffic is identified for weekday AM and PM peak, and special peak hour as necessary
 - **N.B. This analysis only includes PM peak traffic due to the scope of the assignment**
- Data collection includes:
 - Daily and turning movement counts
 - Site and adjacent roadway/intersection geometrics
 - Information on traffic control devices
 - Crash data
- Trip generation following the ITE Trip Generation Manual or other ITE procedures
- Trip distributions and assignment (existing, site, background, and future volumes in analysis area)
- Conflict and capacity analysis
- Traffic signal impacts
- Right-of-way identified, including no- and limited-access control lines
- Includes safe operational design needs and concerns with accompanying mitigation measures

2. PROPOSED DEVELOPMENT

This section describes the plans for the development, including site location, land use, zoning information, and the the site plan itself.

2.1 SITE DESCRIPTION

The proposed Dream Town development is located in southern Provo, in Utah. The site is located on the west side of University Avenue (US-189), between 1200 S and Towne Centre Drive. This location is just east of the Provo Towne Centre mall, which is a large retail and dining center and a large generator of trips. The location is also near (to the north of) the intersection of I-15 and University Avenue. Figure 2.1 shows a map of the site area. Four intersections are included in the analysis:

- 1200 S / Towne Centre Blvd. (stop-controlled)
- 1200 S / University Ave. (signalized)
- Towne Centre Dr. / Towne Centre Blvd. (signalized)
- Towne Centre Dr. / University Ave. (signalized)

2.2 LAND USE AND ZONING INFORMATION

The proposed Dream Town development has two development pads, with one pad containing a sit-down restaurant and the other pad containing a mixed-use office/retail location. The retail location is intended to be a hardware/paint store. Table 1 shows these land uses along with their ITE land use codes and respective square footage.

The site area is zoned as SC3, which is a Regional Shopping Center. The primary use of this land is for commercial and service uses to serve needs of people living in an entire region. It is located close to freeways & major arterials for easy access (Provo City Utah 2022a, chap. 14.20). Figure 2.2 provides a section of the Provo zoning map (Provo City Utah 2022b) with the site location marked.

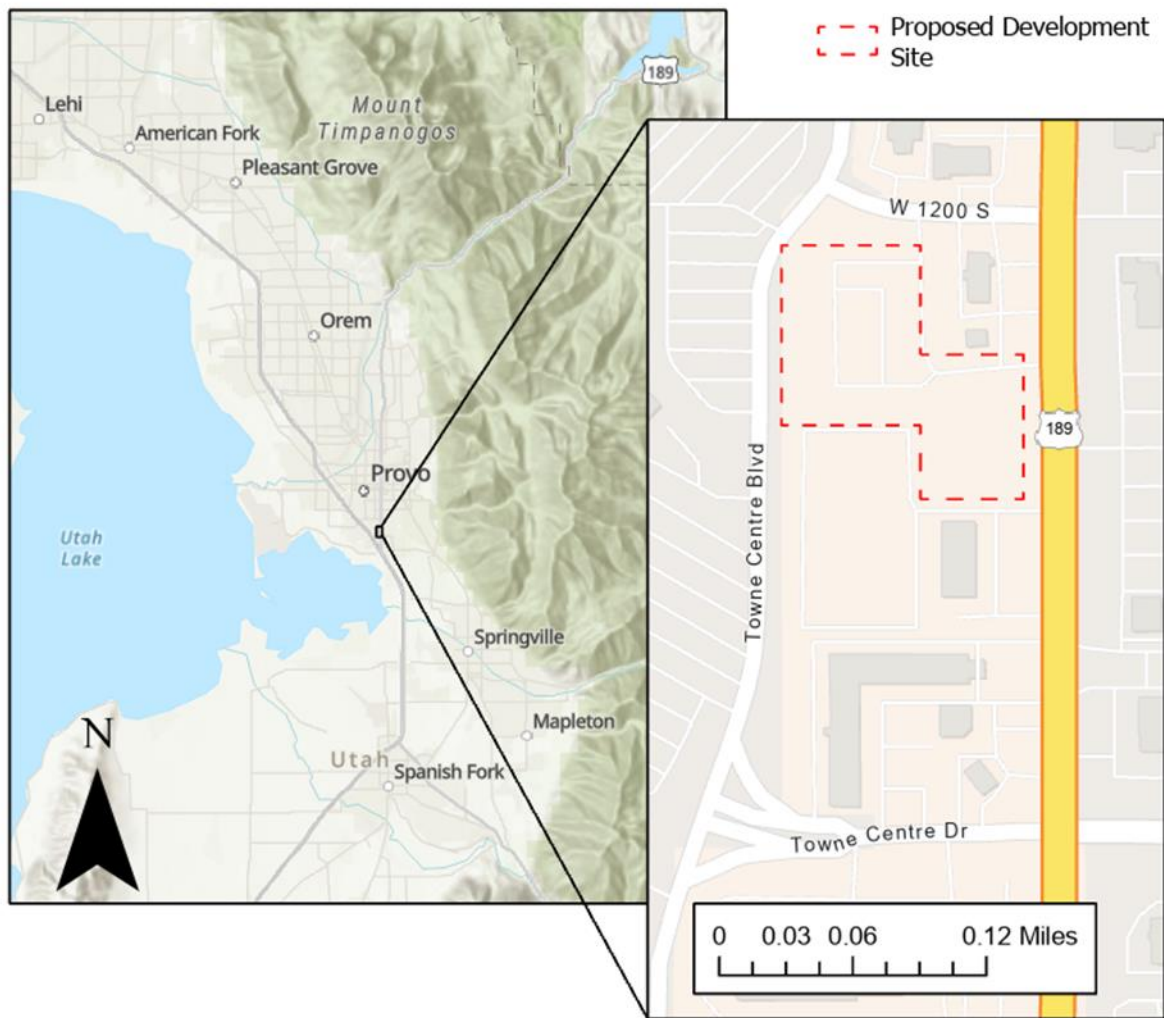


Figure 2.1: Map of the site location.

Table 1: Proposed Land Use and Sizes

Development Pad	Proposed Land Use	ITE Land Use Code	Area (sqft)
A	Sit-Down Restaurant	932	8 000
B	General Office Building	710	18 000
B	Hardware/Paint Store	816	18 000

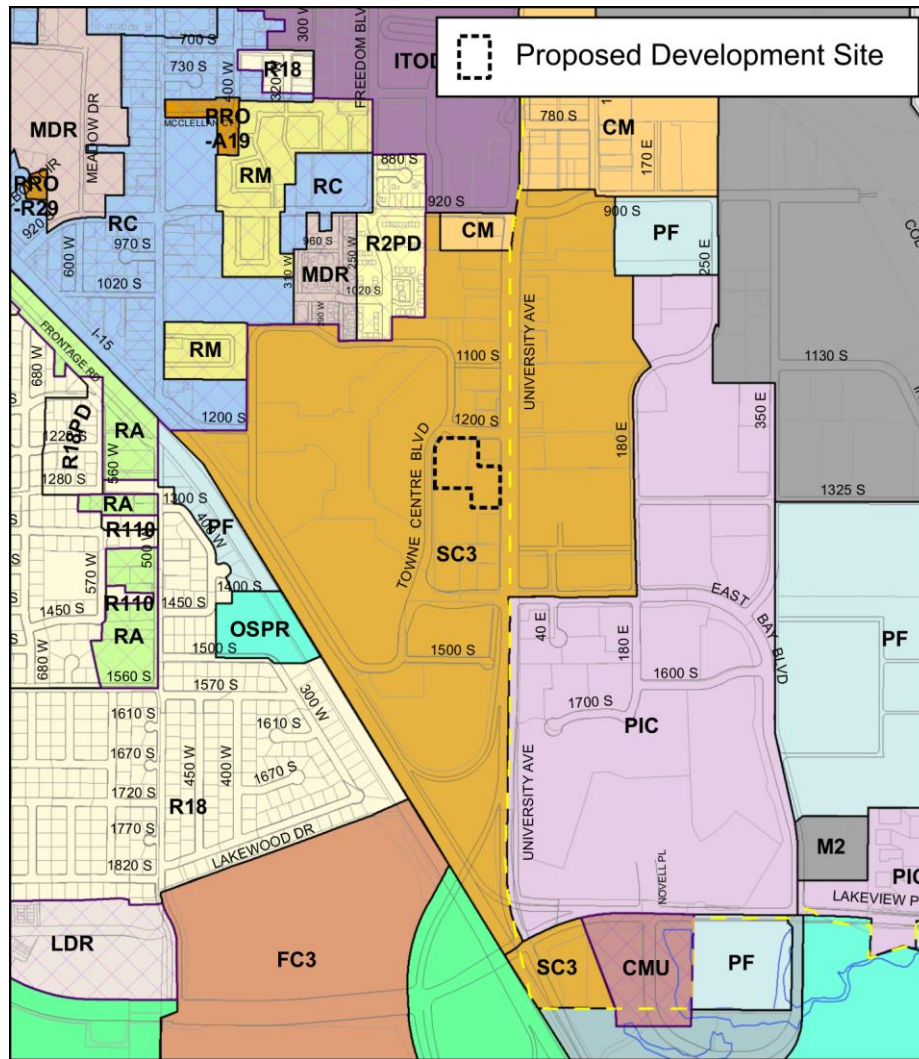


Figure 2.2: Provo zoning map, cropped to vicinity of the site.

2.3 SITE PLAN

Figure 2.3 shows a site plan for the proposed development. Note that Pad C is not included in this analysis, as it has already been developed. This site map is still preliminary, and will be updated in a future draft of this report.

Figure 2.3: Site plan for proposed Dream Town development.

3. STUDY AREA CONDITIONS

The study area for this analysis includes the streets adjacent to the site as well as their intersections. These streets are 1200 S on the north, University Ave. / US-189 on the east, Towne Centre Blvd. on the west, and Towne Centre Dr. on the south. Note that there is existing development between Dream Town and Towne Centre Dr. All of the intersections in the TIA are signalized with the exception of the Town Centre Blvd. / 1200 S intersection, which is stop-controlled. This is shown in Figure 3.1.

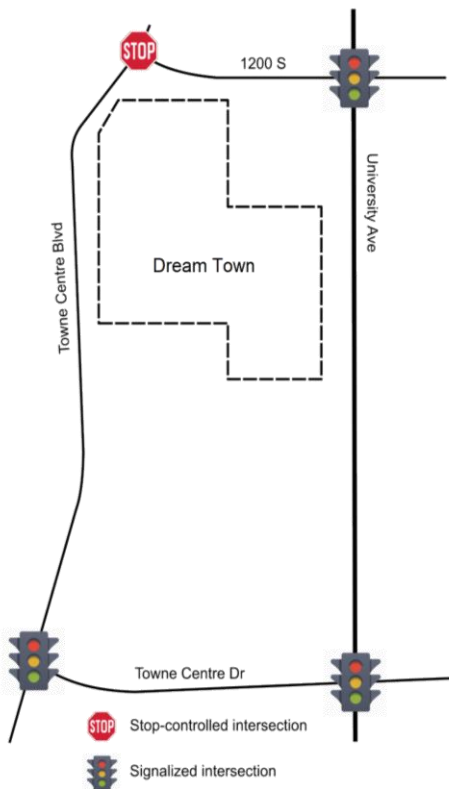


Figure 3.1: Map of basic intersection characteristics in TIA area.

3.1 STREET CONDITIONS

Detailed information on the streets in the study area is provided below. This information is summarized in Table 2.

Table 2: Summary of Adjacent Street Configuration

Road Name	Direction	NB/EB Lanes	SB/WB Lanes	Speed Limit (mph)	Median/TWLTL
1200 S	E/W	2	2	-	Median
University Ave / US-189	N/S	3	3	35	TWLTL
Towne Centre Blvd	N/S	1	2	25	TWLTL
Towne Centre Dr	E/W	2	2	30	Median

1200 South

1200 S is an east-west (E/W) local road which, at least in the vicinity of the study area, exists only to offer a connection between Towne Centre Blvd and University Ave. It runs about 350 feet along the north edge of the proposed Dream Town, and has 3 eastbound (EB) lanes and 2 westbound (WB) lanes. The two WB lanes offer a left- and right-turning movement, respectively (onto Towne Centre Blvd), and there is no through movement since 1200 S and Towne Centre Blvd form a T intersection. The three EB lanes offer a left, through, and right-turn movement, either onto University Avenue for the turning movements or into a parking lot for the through movement. There is no posted speed limit, and a raised median prevents left turns onto or off of this road.

University Avenue / US-189

University Ave is also designated as US-189, and is a major arterial running north-south (N/S) through Provo. University Ave connects with I-15 roughly 3000 feet south of the study area and has connections to many commercial developments on either side of the road. There are 3 through lanes in both directions in the study area, with 2 additional left- and 1 additional right-turn lanes/bays in both directions at the Towne Centre Dr intersection and 1 additional left- and right-turn lane/bay each in both directions at the 1200 S intersection.

The posted speed limit is 35 mph, and there is a Two-Way Left Turn Lane (TWLTL) on this road for the length of the study area. There is also an appreciable shoulder on the west side of the road, and there are sidewalks on both sides, though the sidewalk on the east is separated from the road by a grassy curb strip, and the sidewalk on the west is not.

Towne Centre Boulevard

Towne Centre Blvd is a local street that circumnavigates the Provo Towne Centre mall. Within the study area this road runs N/S, and has 1 northbound (NB) and 2 southbound (SB) through lanes. A TWLTL runs the length of this road, though it is broken up by a bus stop located in the center of the road near the southern end of Dream Town. The TWLTL becomes two SB left turn bays at the Towne Centre Dr intersection, and there is a NB free-flow right-turn bay at the same. This road has a posted speed limit of 25 mph.

Towne Centre Drive

Towne Centre Dr is an E/W road that runs between Towne Centre Blvd and University Ave, and becomes East Bay Blvd east of University Ave. There is a posted speed limit of 30 mph, and there is a raised median between Towne Centre Blvd and University Ave, though the median breaks about midway, allowing a WB left turn to access the development to the south. There are 2 left- and 1 right-turn bays at the University Ave intersection in both directions, and 2 left-turn lanes and a right-turn free-flow lane at the Towne Centre Blvd intersection.

Additional Information

There are several bus stops in the study area, as shown in Figure 3.2. Towne Centre Blvd is elevated relative to Dream Town, but there is a staircase next to the bus stop that allows for pedestrian access.

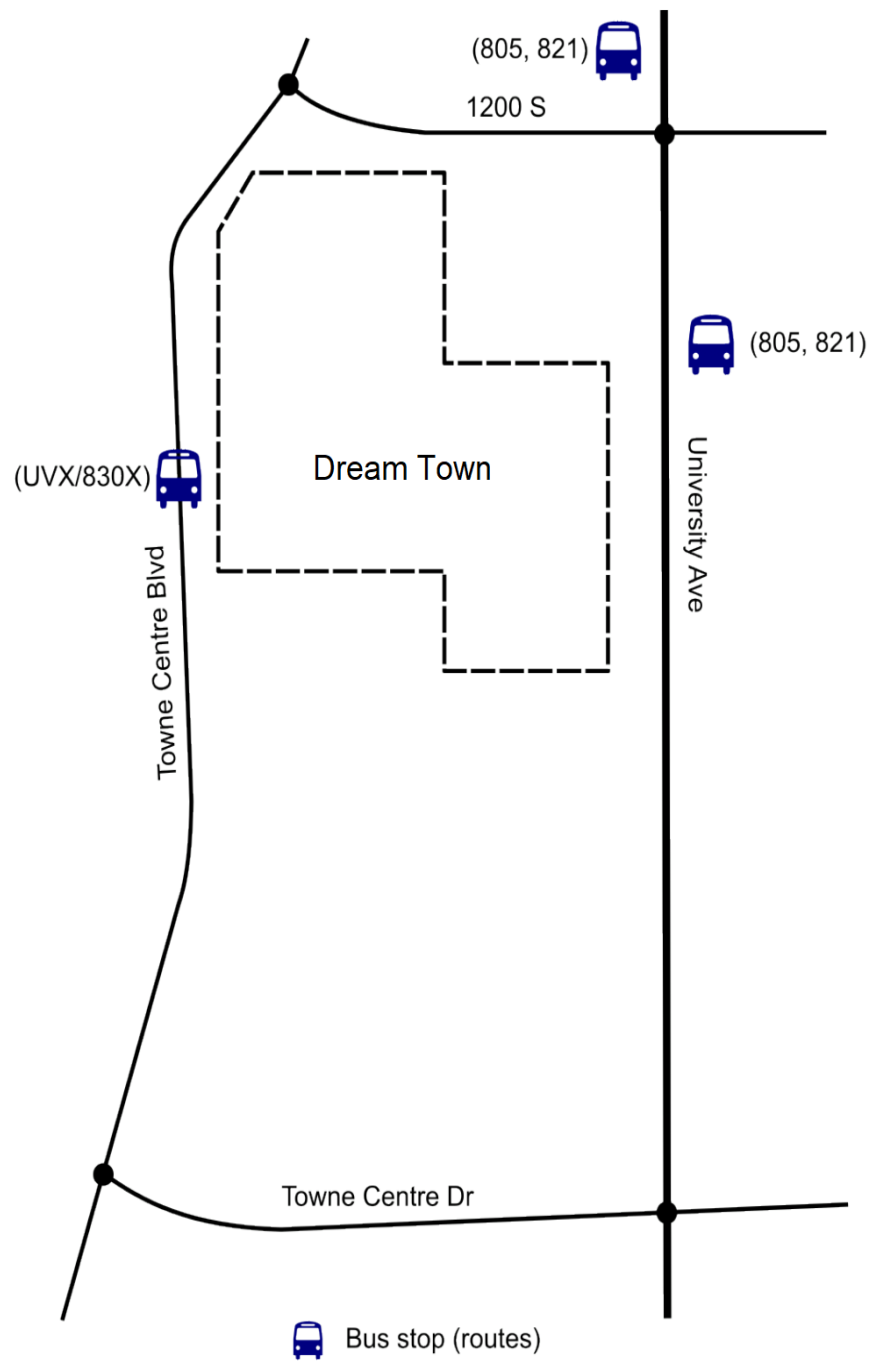


Figure 3.2: Map of bus stops on the studied streets.

3.2 ADJACENT LAND USES

As can be seen in Figure 2.2, much of the nearby land is in the same zoning category as Dream Town (SC3). This is borne out by the actual land use: there are several suburban commercial sites in this area. The most notable of these is the Provo Towne Centre mall to the east, but other locations include a Sam's Club, several fast-food and sit-down restaurants, and multiple small hotels and gas stations.

3.3 SITE ACCESSIBILITY

University Ave provides direct access to Dream Town from I-15, as well as from downtown Provo. This is the most major road with direct access to the site, but several other roads provide access as well. Towne Centre Blvd has connections to a neighborhood northwest of the site, and East Bay Blvd provides access to University Ave near the site from southeast Provo, and has a connection to Springville via Lakeview Pkwy and I-89.

4. ANALYSIS OF EXISTING CONDITIONS

4.1 PHYSICAL CHARACTERISTICS

The study area contains four intersections: 1200 S / Towne Centre Blvd, a 3-way stop-controlled intersection; 1200 S / University Ave, a 4-way signalized intersection; Towne Centre Dr / Towne Centre Blvd, a 3-way signalized intersection; and Towne Centre Dr / University Ave, a 4-way signalized intersection (see Figure 3.1).

Much of the information regarding lane striping and turning movements for these intersections is given in Table 2. It is additionally worth noting that the east leg of the 1200 S / University Ave intersection is a parking lot access, and the WB lane has a designated left-turn lane and a shared right/through lane. For reference, a lane configuration diagram of these intersections is provided in Figure 4.1.

4.2 TRAFFIC VOLUMES

Traffic turning volume counts were done at the Towne Centre Dr / University Ave and Towne Centre Dr / Towne Center Blvd intersections from 4:15–6:00 PM on January 24 (Tue) and 25 (Wed), 2023, respectively. Scheduling conflicts and limited personnel necessitated that the counts be performed for only two intersections and on different days. However, for the purposes of this report this is not a significant limitation, due to the limited scope of the assignment. The two days are considered similar enough, and volumes were estimated for the other two intersections.

From these counts and projections, 4:30–5:30 PM was determined to be the peak hour, with a peak hour factor (PHF) of 0.92. The volumes for this peak hour are presented in Figure 4.2.

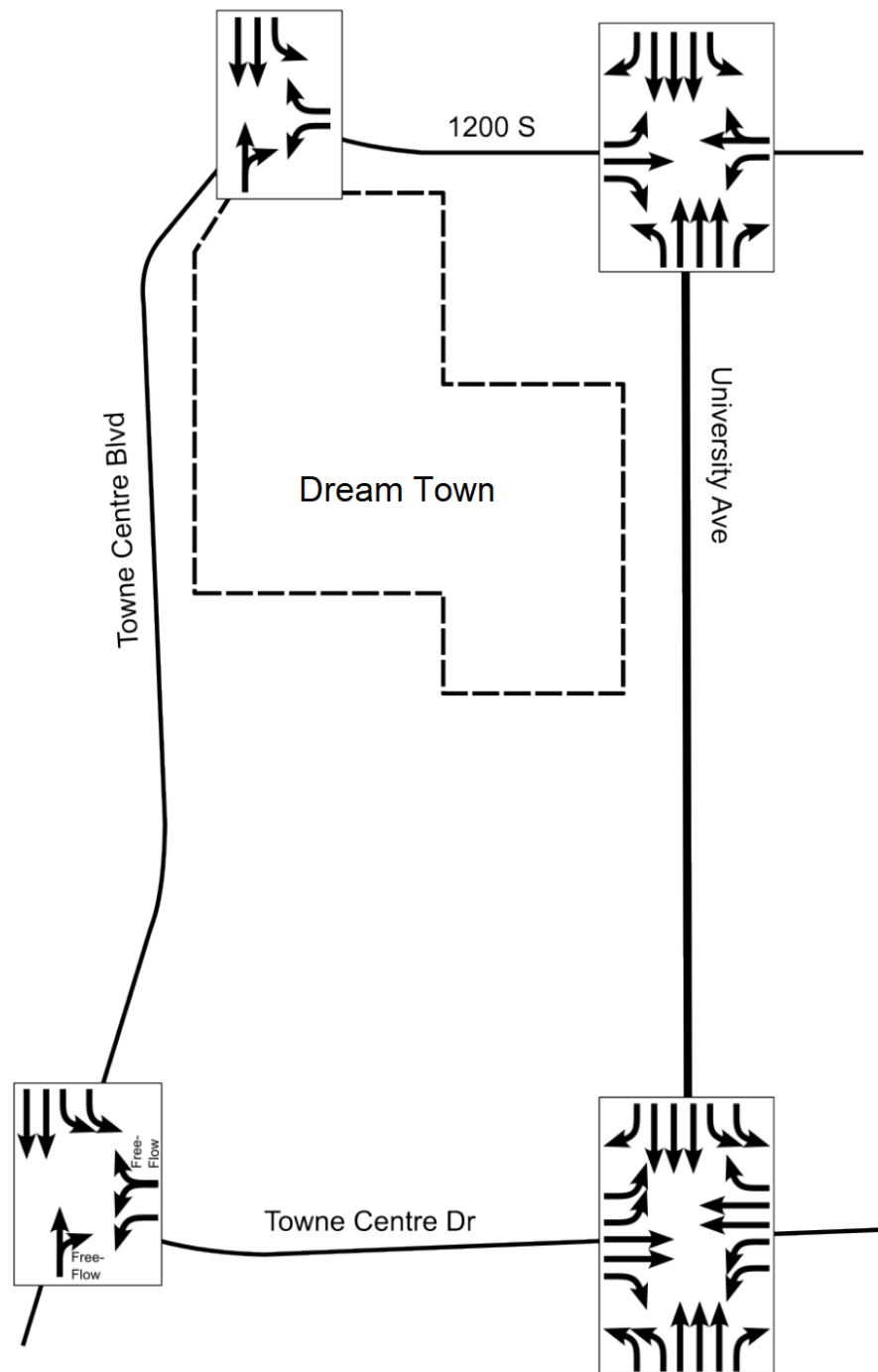


Figure 4.1: Intersection lane diagram of the study area.

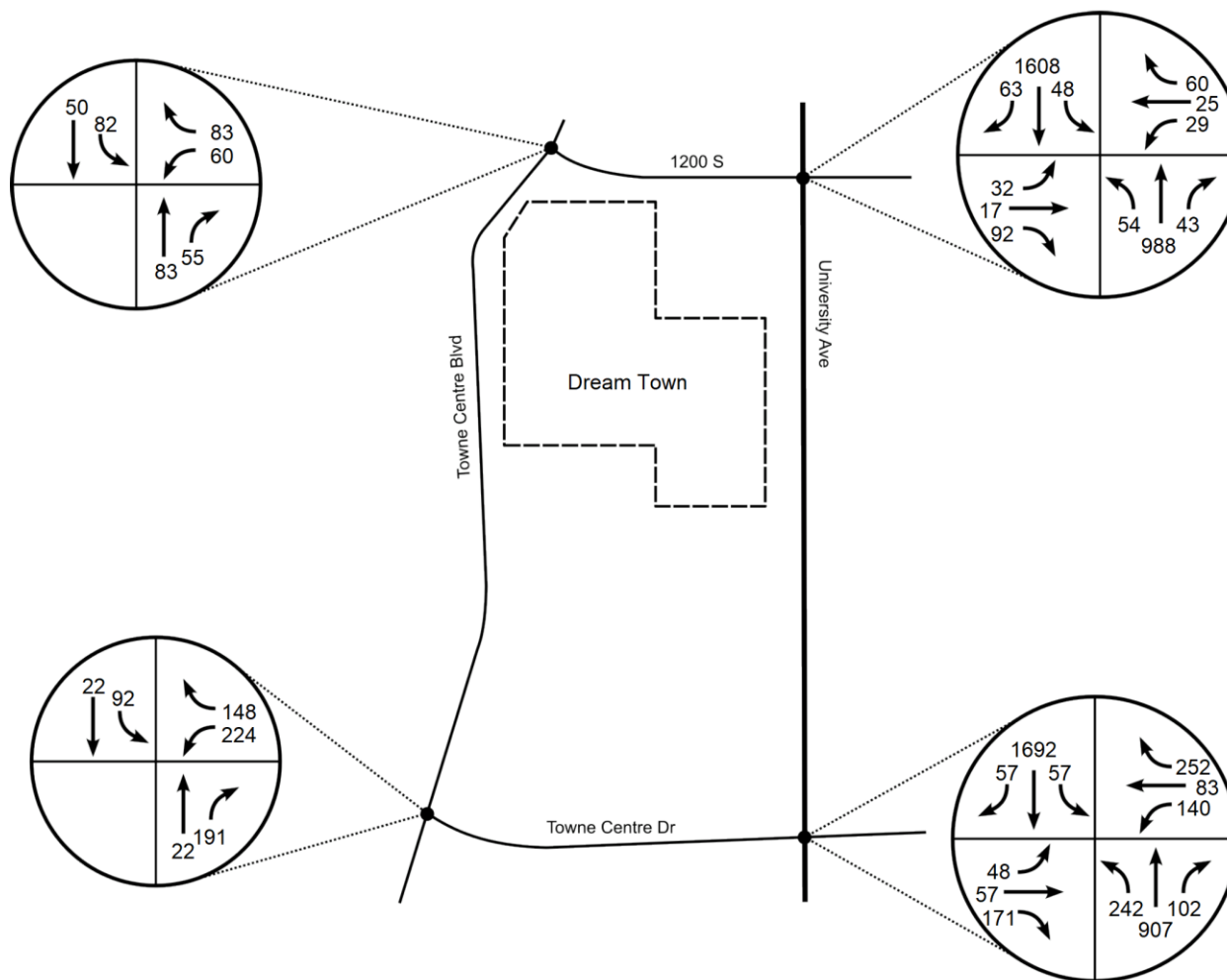


Figure 4.2: Peak hour turning volumes on the studied intersections.

4.3 LEVEL OF SERVICE

A level of service (LOS) measure was used to determine the traffic performance of each intersection (and each movement within each intersection). This LOS is a measurement of average control delay per vehicle, and bins the amount of delay into groups designated by the letters A–F. These designations differ between signalized and unsignalized intersections,

and are provided in the Highway Capacity Manual (HCM) (National Academies of Sciences, Engineering, and Medicine 2022). Tables 3 and 4 summarize these criteria. This analysis assumes a LOS of D or better represents acceptable conditions.

Table 3: LOS Criteria for Signalized Intersection

Average Control Delay (sec/veh)	LOS Designation
≤ 10	A
10–20	B
20–35	C
35–55	D
55–80	E
> 80	F

Table 4: LOS Criteria for Unsignalized Intersection

Average Control Delay (sec/veh)	LOS Designation
≤ 10	A
10–15	B
15–25	C
25–35	D
35–50	E
< 50	F

The existing level of service was determined based on current traffic volumes Section 4.2 and signal timings (obtained from UDOT), using the Synchro software package (Trafficware 2019). Synchro performs a LOS analysis using these and other inputs, including roadway and lane configuration. Figure 4.3 shows the results of this analysis.

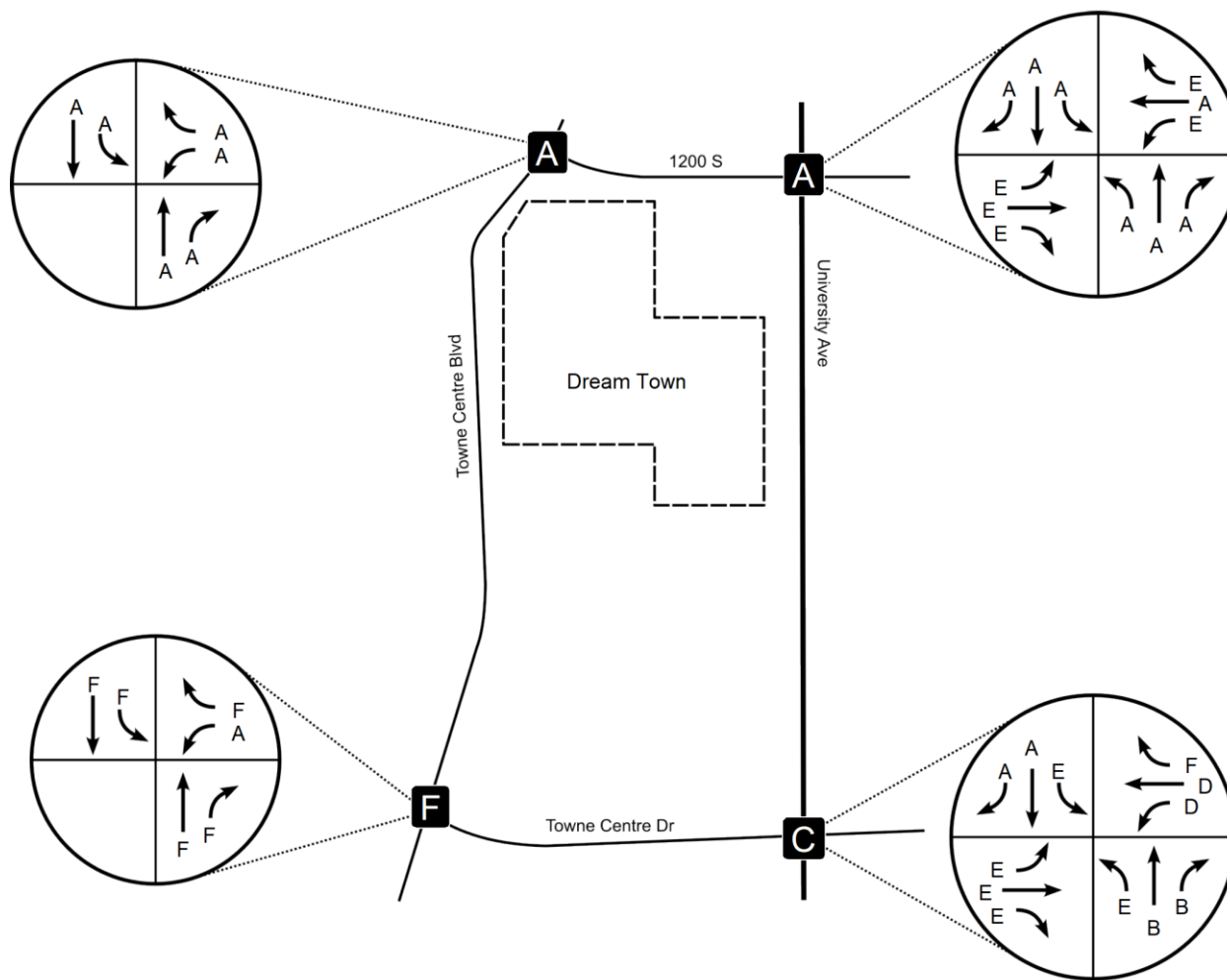


Figure 4.3: Results of existing Synchro LOS analysis for each movement and intersection studied.

4.4 TRANSPORTATION SAFETY

REFERENCES

Institute of Transportation Engineers. 2021. *Trip Generation Manual*. 11th ed. <https://itetripgen.org/>.

National Academies of Sciences, Engineering, and Medicine. 2022. *Highway Capacity Manual 7th Edition: A Guide for Multimodal Mobility Analysis*. Washington, D.C.: National Academies Press. <https://doi.org/10.17226/26432>.

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Trafficware. 2019. *Synchro*. Cubic Transportation Systems. <https://support.gridsmart.com/support/solutions/articles/69000541835-synchro-studio-11-user-guide>.

Utah Department of Transportation. 2019. "Administrative Rule R930-6 (Access Management)." https://drive.google.com/file/d/1a0YNDy9Z8bFxuE121lJP5XJNW0rw9Ft3/view?usp=embed_facebook.

APPENDIX A — ITE TRIP GENERATION REFERENCE

This appendix contains the ITE Trip Generation Manual references used for trip generation, including to determine the appropriate study level for this TIA. These are land use codes 710 (General Office Building), 816 (Hardware/Paint Store), and 932 (High-Turnover (Sit-Down) Restaurant), for both the daily trips and the PM peak trips.

General Office Building
(710)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 59

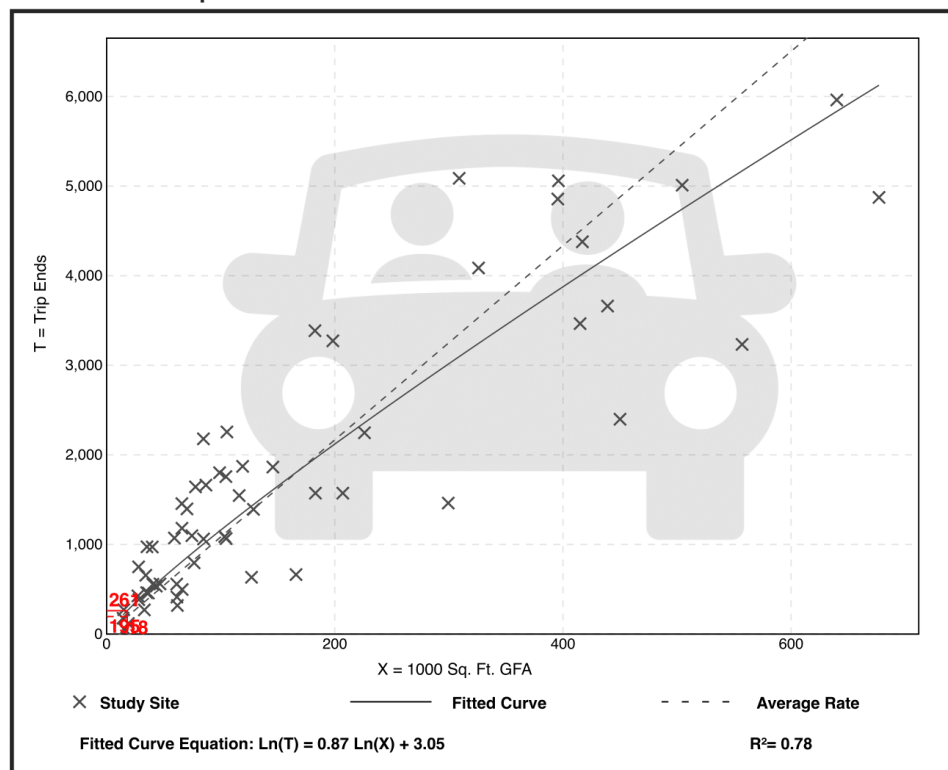
Avg. 1000 Sq. Ft. GFA: 163

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
10.84	3.27 - 27.56	4.76

Data Plot and Equation



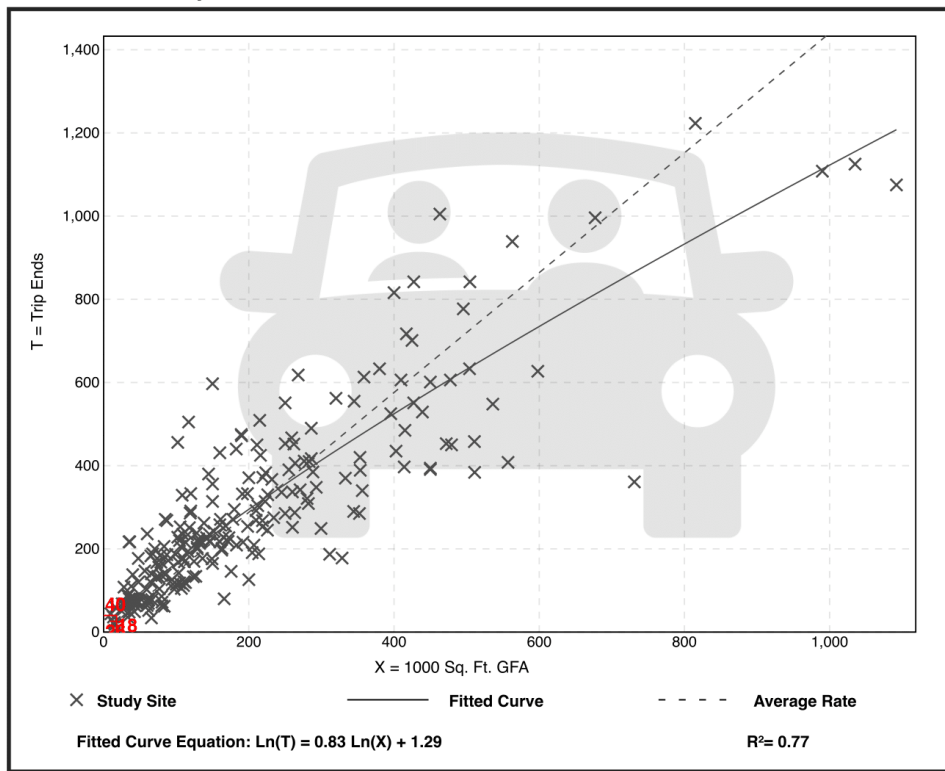
General Office Building (710)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 232
 Avg. 1000 Sq. Ft. GFA: 199
 Directional Distribution: 17% entering, 83% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.44	0.26 - 6.20	0.60

Data Plot and Equation



Trip Gen Manual, 11th Edition

• Institute of Transportation Engineers

Hardware/Paint Store (816)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 4

Avg. 1000 Sq. Ft. GFA: 11

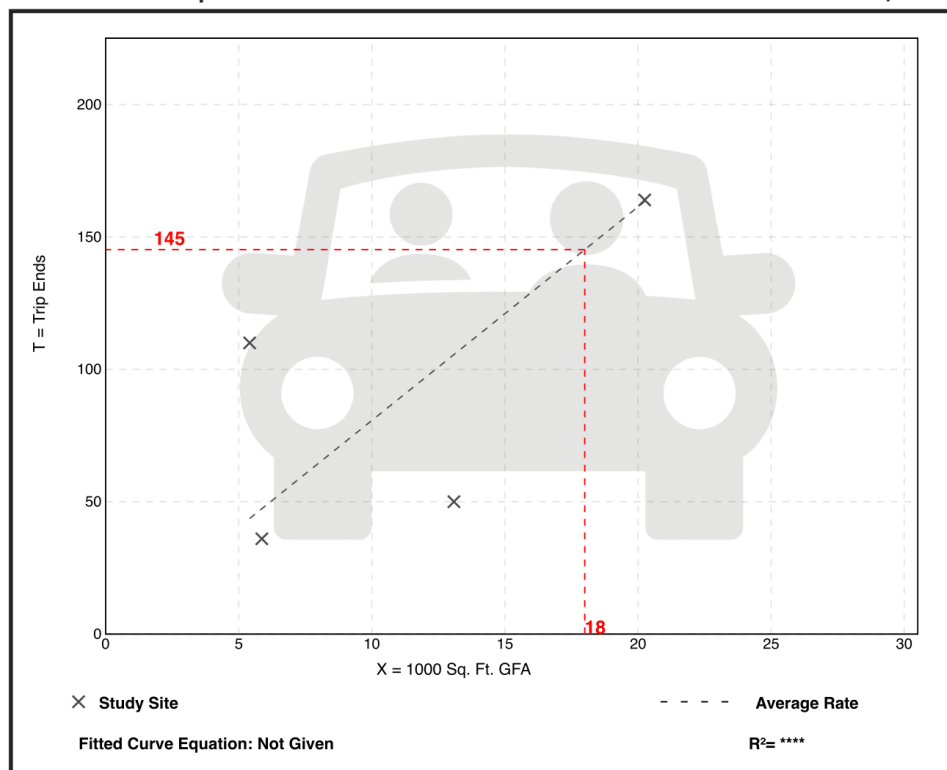
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
8.07	3.82 - 20.33	5.66

Data Plot and Equation

Caution – Small Sample Size



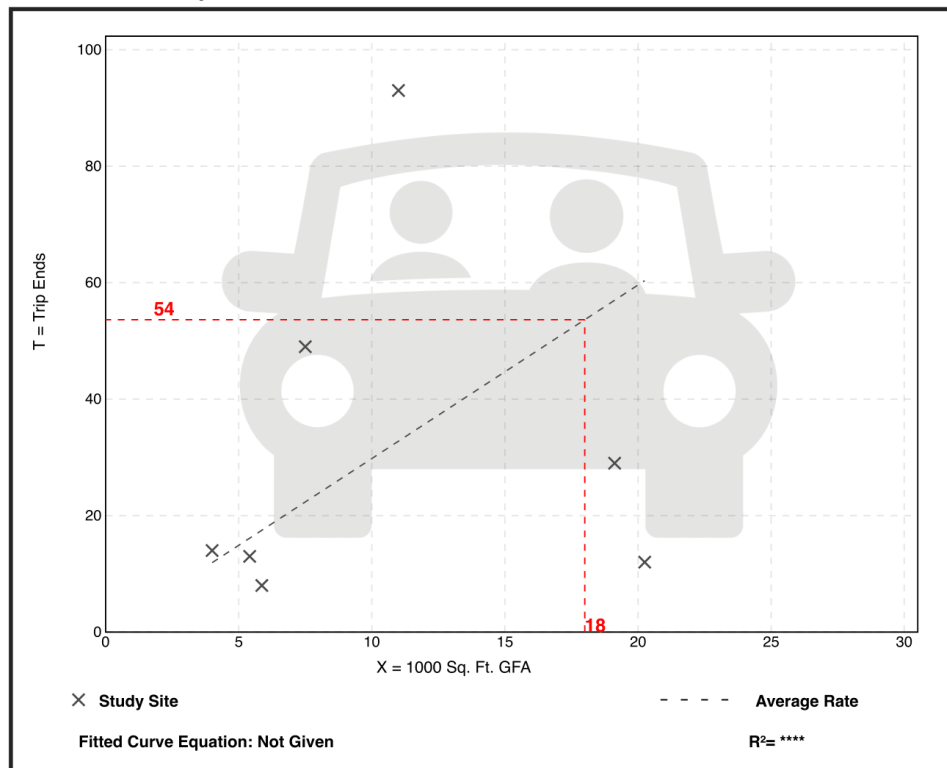
Hardware/Paint Store (816)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 7
 Avg. 1000 Sq. Ft. GFA: 10
 Directional Distribution: 46% entering, 54% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.98	0.59 - 8.45	3.09

Data Plot and Equation



High-Turnover (Sit-Down) Restaurant (932)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 50

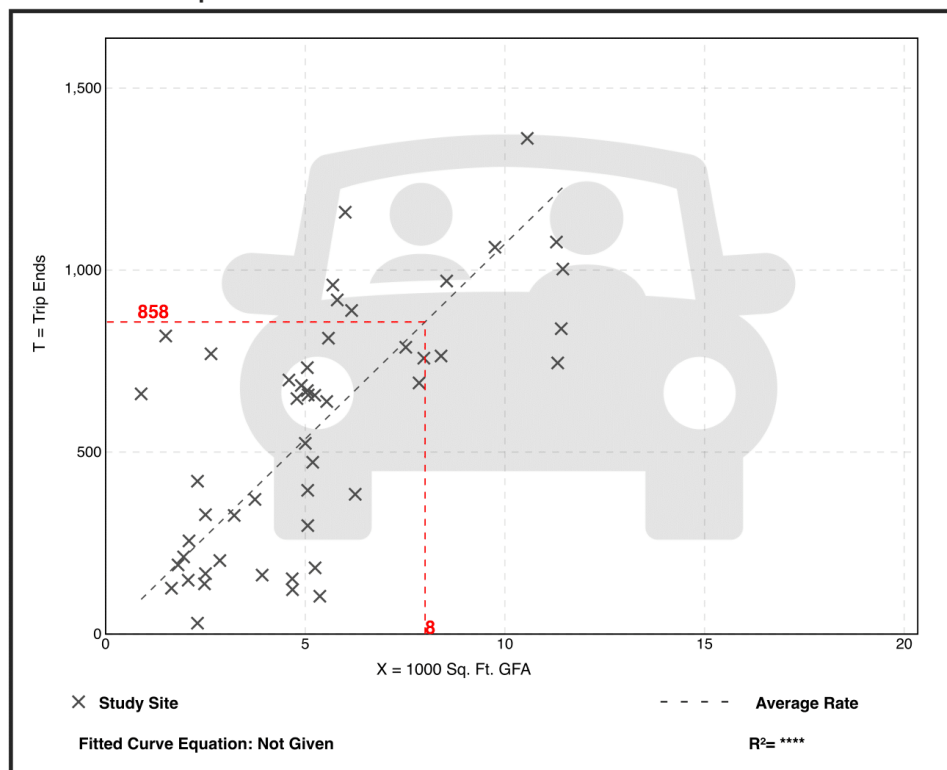
Avg. 1000 Sq. Ft. GFA: 5

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
107.20	13.04 - 742.41	66.72

Data Plot and Equation



Trip Gen Manual, 11th Edition

• Institute of Transportation Engineers

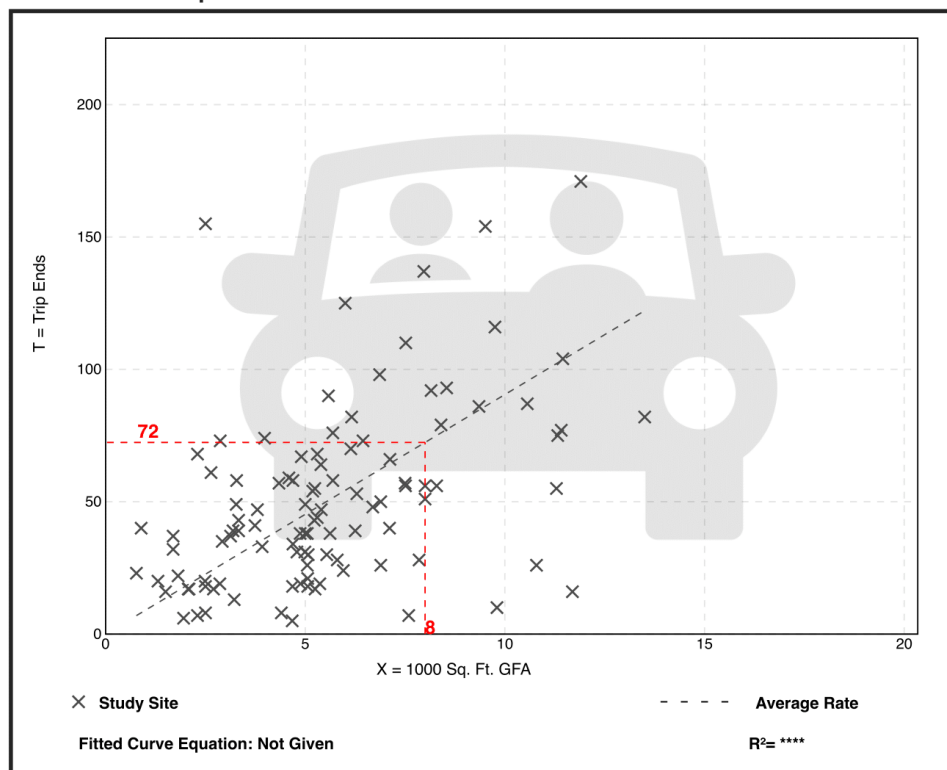
High-Turnover (Sit-Down) Restaurant (932)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 104
 Avg. 1000 Sq. Ft. GFA: 6
 Directional Distribution: 61% entering, 39% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA






Average Rate	Range of Rates	Standard Deviation
9.05	0.92 - 62.00	6.18

Data Plot and Equation



APPENDIX B — SYNCHRO LOS ANALYSIS (EXISTING)

This appendix contains the results of the Synchro LOS analysis for the existing road volumes, signal timings, and lane configurations. The analysis of the all-way-stop-controlled (AWSC) 1200 S / Towne Centre Blvd intersection is given first, followed by the analysis for the remaining (signalized) intersections.

Intersection						
Intersection Delay, s/veh	8.6					
Intersection LOS	A					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	60	83	83	55	82	50
Future Vol, veh/h	60	83	83	55	82	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	65	90	90	60	89	54
Number of Lanes	1	1	1	0	1	2
Approach	WB	NB		SB		
Opposing Approach		SB		NB		
Opposing Lanes	0	3		1		
Conflicting Approach Left	NB			WB		
Conflicting Lanes Left	1	0		2		
Conflicting Approach Right	SB	WB				
Conflicting Lanes Right	3	2		0		
HCM Control Delay	8.5	9		8.4		
HCM LOS	A	A		A		
Lane	NBLn1	WBLn1	WBLn2	SBLn1	SBLn2	SBLn3
Vol Left, %	0%	100%	0%	100%	0%	0%
Vol Thru, %	60%	0%	0%	0%	100%	100%
Vol Right, %	40%	0%	100%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	138	60	83	82	25	25
LT Vol	0	60	0	82	0	0
Through Vol	83	0	0	0	25	25
RT Vol	55	0	83	0	0	0
Lane Flow Rate	150	65	90	89	27	27
Geometry Grp	8	8	8	7	7	7
Degree of Util (X)	0.208	0.105	0.116	0.138	0.038	0.025
Departure Headway (Hd)	4.986	5.818	4.615	5.569	5.066	3.324
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	720	616	776	644	707	1074
Service Time	2.719	3.553	2.35	3.298	2.795	1.052
HCM Lane V/C Ratio	0.208	0.106	0.116	0.138	0.038	0.025
HCM Control Delay	9	9.2	8	9.2	8	6.1
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.8	0.4	0.4	0.5	0.1	0.1

Educational Use Only

HCM 6th Signalized Intersection Summary
6: University Ave & 1200 S

02/02/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱		↰↱		↰	↑↑↑	↱	↰	↑↑↑	↱
Traffic Volume (veh/h)	32	17	92	60	25	29	54	988	43	48	1608	63
Future Volume (veh/h)	32	17	92	60	25	29	54	988	43	48	1608	63
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	35	18	100	65	27	32	59	1074	47	52	1748	68
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	143	121	128	54	69	270	3936	1222	487	3931	1220
Arrive On Green	0.08	0.08	0.08	0.08	0.08	0.08	0.06	1.00	1.00	0.03	0.77	0.77
Sat Flow, veh/h	1344	1870	1585	1074	710	903	1781	5106	1585	1781	5106	1585
Grp Volume(v), veh/h	35	18	100	69	0	55	59	1074	47	52	1748	68
Grp Sat Flow(s),veh/h/ln	1344	1870	1585	1147	0	1540	1781	1702	1585	1781	1702	1585
Q Serve(g_s), s	3.8	1.3	9.3	7.9	0.0	5.1	1.0	0.0	0.0	0.9	18.0	1.5
Cycle Q Clear(g_c), s	8.9	1.3	9.3	9.2	0.0	5.1	1.0	0.0	0.0	0.9	18.0	1.5
Prop In Lane	1.00		1.00	0.94		0.59	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	143	121	134	0	118	270	3936	1222	487	3931	1220
V/C Ratio(X)	0.33	0.13	0.83	0.52	0.00	0.46	0.22	0.27	0.04	0.11	0.44	0.06
Avail Cap(c_a), veh/h	244	337	285	269	0	277	340	3936	1222	560	3931	1220
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00
Uniform Delay (d), s/veh	70.6	64.6	68.3	68.9	0.0	66.3	4.3	0.0	0.0	3.1	6.0	4.2
Incr Delay (d2), s/veh	0.7	0.1	5.3	1.1	0.0	1.1	0.1	0.2	0.1	0.0	0.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.7	4.0	2.7	0.0	2.1	0.3	0.1	0.0	0.3	5.9	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.3	64.8	73.6	70.1	0.0	67.4	4.5	0.2	0.1	3.1	6.4	4.2
LnGrp LOS	E	E	E	E	A	E	A	A	A	A	A	A
Approach Vol, veh/h	153			124			1180			1868		
Approach Delay, s/veh	72.0			68.9			0.4			6.2		
Approach LOS	E			E			A			A		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.9	121.6		19.5	9.1	121.5		19.5				
Change Period (Y+Rc), s	4.5	6.0		8.0	4.5	6.0		8.0				
Max Green Setting (Gmax), s	10.5	94.0		27.0	10.5	94.0		27.0				
Max Q Clear Time (g_c+I1), s	2.9	2.0		11.3	3.0	20.0		11.2				
Green Ext Time (p_c), s	0.0	3.6		0.1	0.0	7.4		0.2				
Intersection Summary												
HCM 6th Ctrl Delay	9.5											
HCM 6th LOS	A											

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Scenario 1 11:17 am 01/31/2023 Baseline

Synchro 11 Classroom Report
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HCM 6th Signalized Intersection Summary
5: Towne Centre Blvd & Towne Centre Dr

























02/02/2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	←←	→	→	→	←←	→→
Traffic Volume (veh/h)	224	148	22	191	92	22
Future Volume (veh/h)	224	148	22	191	92	22
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	243	0	24	0	100	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	2227		8		15	16
Arrive On Green	0.64	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	3456	1585	1122	1585	3456	3647
Grp Volume(v), veh/h	243	0	24	0	100	24
Grp Sat Flow(s),veh/h/ln	1728	1585	1870	1585	1728	1777
Q Serve(g_s), s	0.6	0.0	0.1	0.0	0.1	0.1
Cycle Q Clear(g_c), s	0.6	0.0	0.1	0.0	0.1	0.1
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	2227		8		15	16
V/C Ratio(X)	0.11		2.89		6.51	1.52
Avail Cap(c_a), veh/h	2227		1372		768	4185
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	1.5	0.0	11.3	0.0	11.3	11.2
Incr Delay (d2), s/veh	0.1	0.0	875.0	0.0	2491.0	258.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	2.1	0.0	5.3	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	1.6	0.0	886.2	0.0	2502.2	269.3
LnGrp LOS	A		F		F	F
Approach Vol, veh/h	243		24		124	
Approach Delay, s/veh	1.6		886.2		2070.0	
Approach LOS	A		F		F	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	0.0	0.0			0.0	22.5
Change Period (Y+Rc), s	5.0	6.0			6.0	8.0
Max Green Setting (Gmax), s	5.0	16.5			26.5	14.5
Max Q Clear Time (g_c+I1), s	0.0	0.0			0.0	0.0
Green Ext Time (p_c), s	0.0	0.0			0.0	0.0
Intersection Summary						
HCM 6th Ctrl Delay			711.9			
HCM 6th LOS			F			
Notes						
Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.						

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HCM 6th Signalized Intersection Summary
3: University Ave & Towne Centre Dr

02/02/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	57	171	252	83	140	242	907	102	57	1692	57
Future Volume (veh/h)	48	57	171	252	83	140	242	907	102	57	1692	57
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	52	62	186	274	90	152	263	986	111	62	1839	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	87	465	207	317	702	313	307	3075	955	99	2768	859
Arrive On Green	0.03	0.13	0.13	0.09	0.20	0.20	0.09	0.60	0.60	0.06	1.00	1.00
Sat Flow, veh/h	3456	3554	1585	3456	3554	1585	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	52	62	186	274	90	152	263	986	111	62	1839	62
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1585	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	2.2	2.3	17.3	11.7	3.1	12.8	11.3	14.3	4.5	2.6	0.0	0.0
Cycle Q Clear(g_c), s	2.2	2.3	17.3	11.7	3.1	12.8	11.3	14.3	4.5	2.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	87	465	207	317	702	313	307	3075	955	99	2768	859
V/C Ratio(X)	0.60	0.13	0.90	0.86	0.13	0.49	0.86	0.32	0.12	0.63	0.66	0.07
Avail Cap(c_a), veh/h	346	877	391	346	877	391	415	3075	955	415	2768	859
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	72.4	57.7	64.2	67.2	49.6	53.4	67.4	14.7	12.8	69.9	0.0	0.0
Incr Delay (d2), s/veh	2.4	0.0	5.4	17.4	0.0	0.4	10.0	0.3	0.2	2.2	1.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	1.1	7.4	6.0	1.4	5.2	5.4	5.6	1.7	1.2	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.8	57.7	69.6	84.6	49.6	53.9	77.4	15.0	13.0	72.1	1.2	0.1
LnGrp LOS	E	E	E	F	D	D	E	B	B	E	A	A
Approach Vol, veh/h	300			516			1360			1963		
Approach Delay, s/veh	68.0			69.5			26.9			3.4		
Approach LOS	E			E			C			A		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.3	96.3	18.8	25.6	18.3	87.3	8.8	35.6				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	18.0	58.0	15.0	37.0	18.0	58.0	15.0	37.0				
Max Q Clear Time (g_c+I1), s	4.6	16.3	13.7	19.3	13.3	2.0	4.2	14.8				
Green Ext Time (p_c), s	0.0	3.7	0.0	0.3	0.1	9.3	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay	24.0											
HCM 6th LOS	C											

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