Memorandum

To: Matt Grush, PE – City of Albuquerque

From: Audra Gallegos, PE

CC: Cynthia Ramirez – Technology Leadership High School

Date: 1/22/2024

Re: Technology Leadership High School Neighborhood Impact Assessment

AUDRA V. GALLEGOS NEW MEXICO 23573 PROFESSIONAL ENGINEER 01.22.24

The Technology Leadership High School requested Wilson & Company, Inc., Engineers & Architects to perform a study to evaluate the school relocation from 10500 Research Road Southeast, Albuquerque, NM 87123 to 5000 Marble Avenue, Albuquerque, NM 87110. The Neighborhood Impact Assessment (NIA) criterion described in the *City of Albuquerque Development Process Manual (DPM),* under *Section 7-5(F)(2),* was used, which is a requirement for charter schools requesting access to City of Albuquerque streets. The following requirements must be provided under the DPM criterion:

Project Description

Technology Leadership High School is a public charter school that focuses on students in technology fields. It is expected to be relocated to 5000 Marble Avenue, Albuquerque, NM 87110, which currently has vacant office space and is expected to change to an educational land use (see Figure 1).

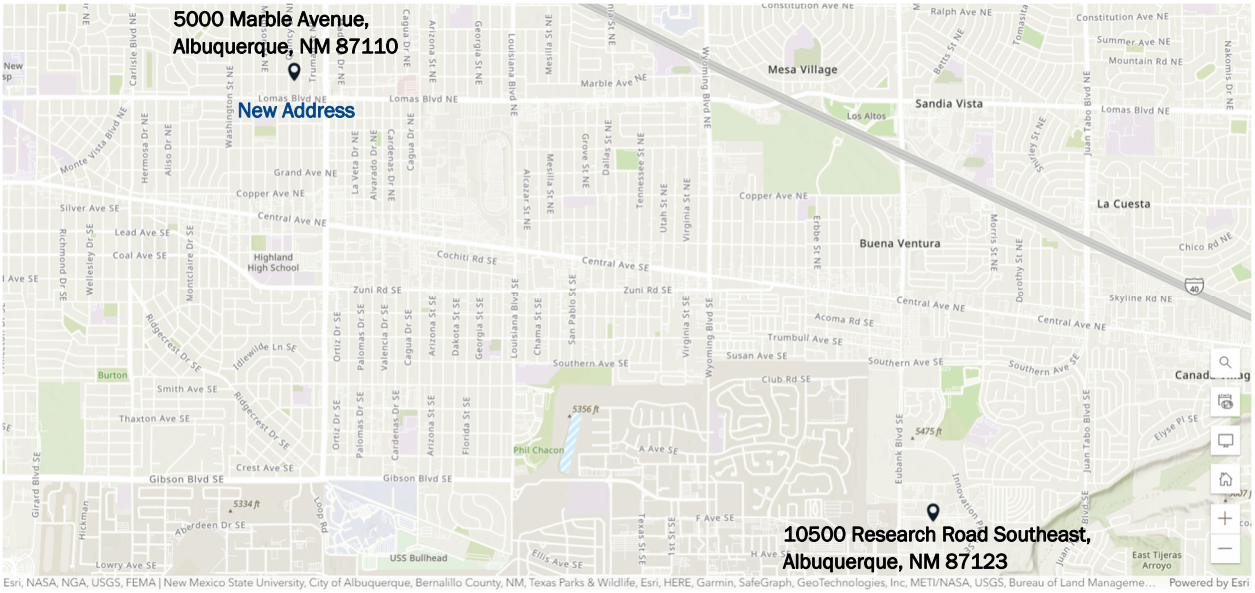


Figure 1: Technology Leadership High School New Location

The following information related to expected school attendance at the new location was provided by the Technology Leadership High School:

Total Attendance
- Up to 400 total students
- 2 buses for day program

AM Attendance (Day Program)
- 230 students 8:15 am – 3:15 pm
- 32 staff 7:45 am – 3:45 pm

PM Attendance (Evening Program)
- 110 students 4:00 pm – 8:30 pm
- 4 staff 4:00 pm – 9:00 pm

Virtual Attendance
- 69 students

Baseline Community Data

The baseline community data that identifies existing conditions with respect to adjacent land uses, traffic patterns, traffic turning movements and volumes, nearby multimodal transportation options, area pedestrian movements, and any other relevant information as determined at the time of scoping.

Adjacent land use – There are different land use categories around the new property address. Some categories include residential, commercial, and office (see Figure 2).

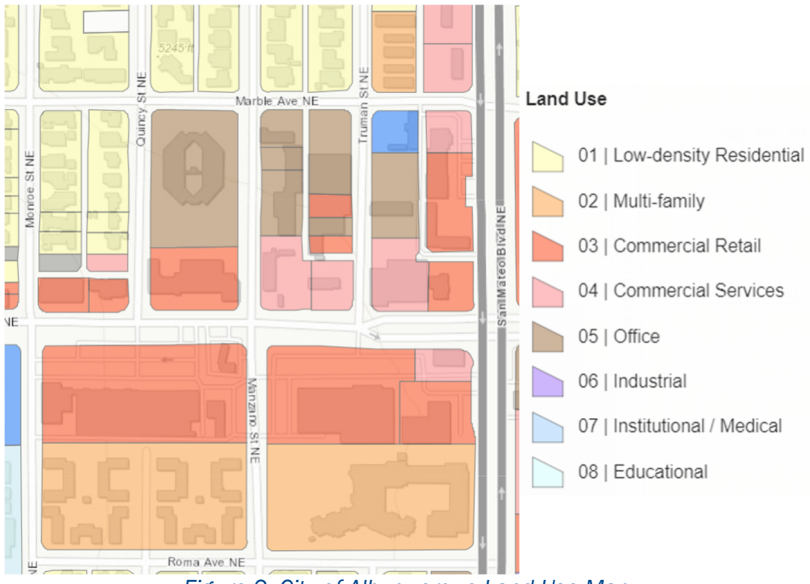


Figure 2: City of Albuquerque Land Use Map

Traffic volumes – Information related to traffic volumes was obtained from the Transportation Analysis and Querying Application (TAQA) a database maintained by the Mid-Region Council of Governments (MRCOG). The 2022 annual average weekly daily traffic (AAWDT) along Lomas Boulevard, between Washington Street and San Mateo Boulevard, is 21,900 vehicles per day (vpd).

Within the study area, the AAWDT along Washington Street is 5,800 vpd, Constitution Avenue has 4,700 vpd, and San Mateo Boulevard has 35,700 vpd.

Figure 3: Albuquerque 2022 Traffic Flow Map - AAWDT

Multimodal transportation – ABQRide has a bus route (Route 11) that runs along Lomas Boulevard at the southern part of the study area. ABQRide Route 11 provides bus stops for both eastbound and westbound movements at the intersections of Monroe Street and Truman Street, as shown in Figure 4.

Figure 4: ABQ Ride Route 11 and Bus Stops

The MRCOG Long Range Bikeway System shows a proposed bike route along Marble Avenue just north of the proposed High School property.

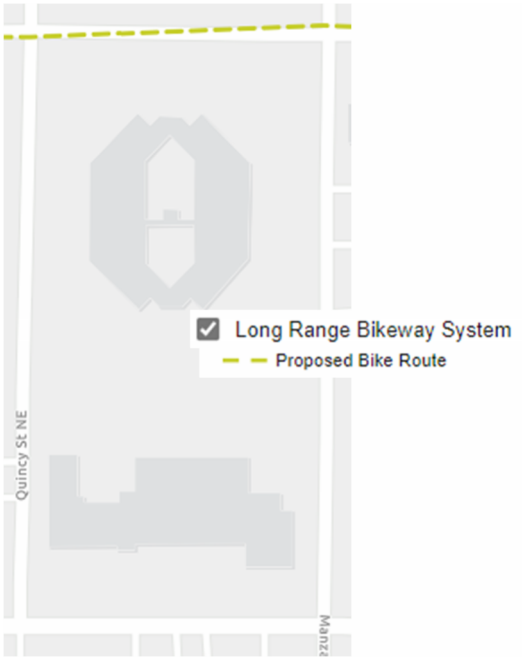


Figure 5: Long Range Bikeway System

Pedestrian movements – The Albuquerque Streetlight Density and Pedestrian Fatality map, provided by the New Mexico Community Data Collaborative, identifies the study area as a Class 2 west of Manzano Street and a Class 3 east of Manzano Street. In 2016, there was pedestrian fatal crash on Lomas Boulevard, between Manzano Street and Truman Street. The crash occurred during night-lighted conditions with the driver having alcohol involvement.

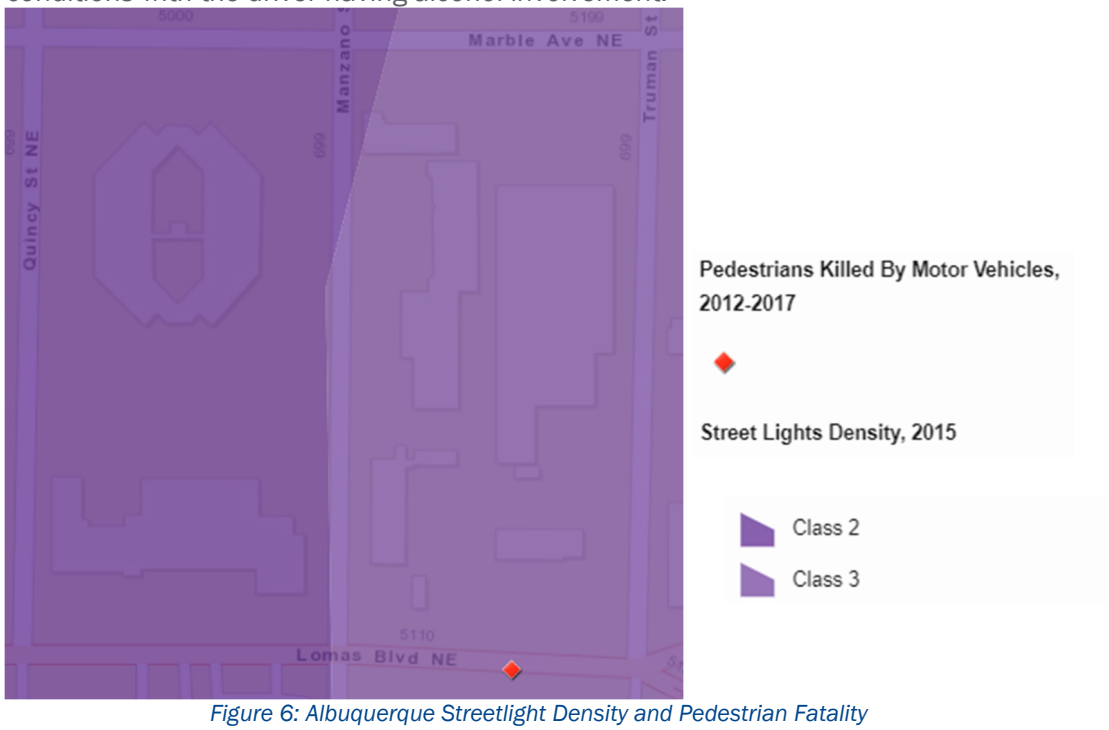


Figure 6: Albuquerque Streetlight Density and Pedestrian Fatality

Neighborhood Impacts

a. Impacts on pedestrian and bicycle circulation, and pedestrian and bicycle routes.

There is currently paved sidewalk provided around the property for pedestrian circulation with no direct impact. Currently, there are no bike lanes near the study area, but a bike route is proposed along Marble Avenue in the future with no direct impact.

b. Potential automobile and pedestrian conflict points.

Potential automobile conflict points are shown in Figure 7. There are three expected access points, one would be for vehicles entering and two for exiting.

c. Potential noise and air quality impacts resulting from stacking of idling vehicles or vehicle circulation.

It is expected that most of the impact of vehicles queueing to enter the parking lot or idling will occur inside the new school property, as well as the vehicle circulation with approximately 1,730 feet for queue storage within the property. Therefore, not impacting the adjacent properties and City streets.

d. Consistency with existing or planned transit routes and stops.

There are four bus stops along Lomas Boulevard located near the study area, two near the intersection of Monroe Street (one bus stop per traffic direction) and two near the intersection with Truman Street (one bus stop per traffic direction).

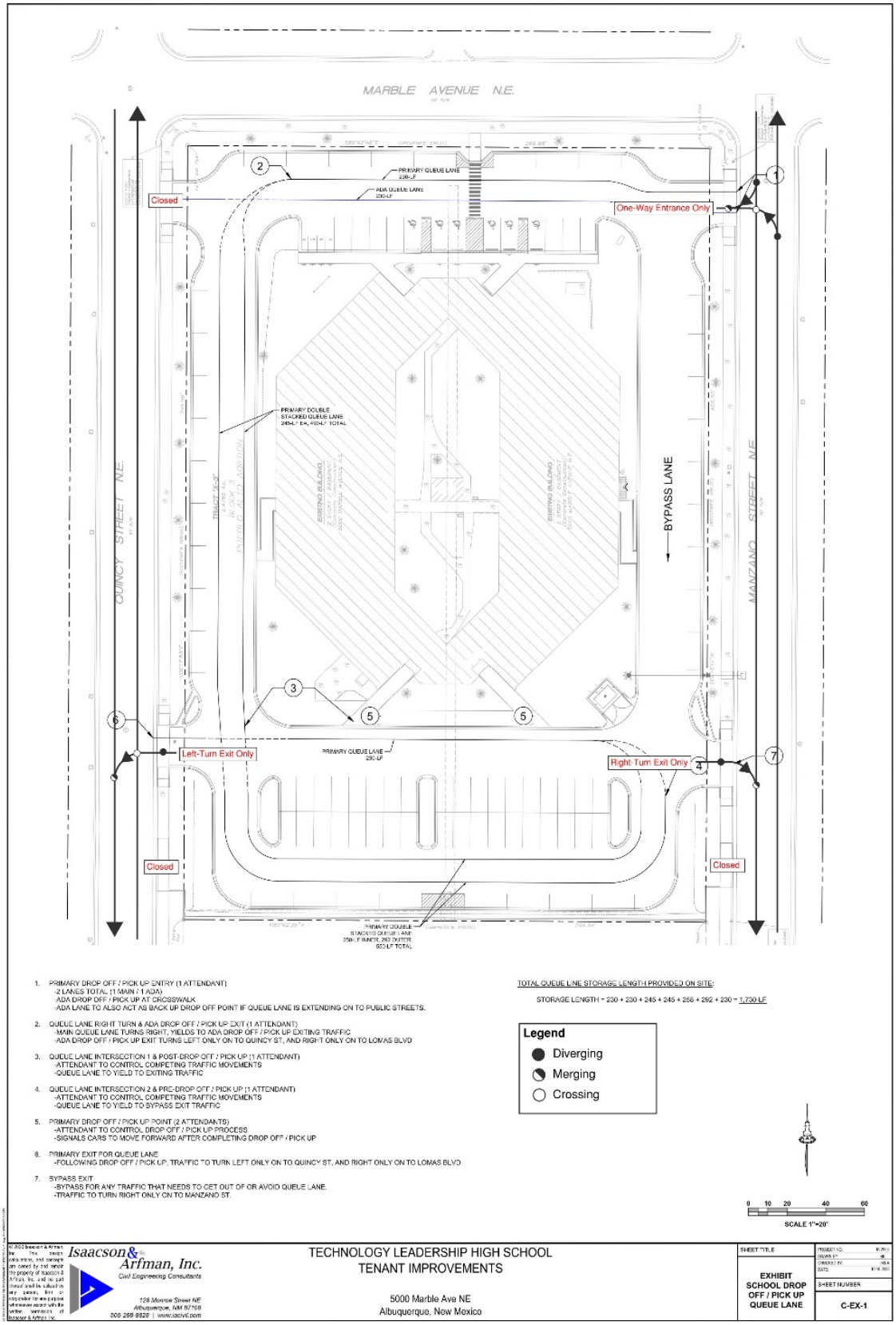


Figure 7: Conflict Points

Traffic Impacts

a. The impact that motorists arriving and departing from the school site will generate on traffic operations in the general vicinity.

Traffic patterns – Vehicles would enter the High School at the northeast access. They would come from the south, traveling north on Manzano Street and make a left turn into the parking lot. Vehicles would exit the High School at the southwest access. They will be directed to make a left turn on Quincy Street and then a right turn at Lomas Boulevard.

Traffic turning movements – The *Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition* was used to calculate estimated vehicle-trips for the High School. The number of employees for the day program were used to determine the AM Peak. A private high school with 32 employees is expected to generate approximately 138 trips during the AM Peak. For the PM Peak, the Technology Leadership High School anticipates four (4) employees during the evening program. The day program number of employees was not used since the day program ends outside of the roadway peak hour. This would estimate approximately 15 trips in the PM Peak. For the school PM Peak Hour expected trips, it was assumed to be the same vehicular distribution as the AM Peak Hour since the evening students will be going into school and vehicles will be dropping them instead of picking them up.

Since an office building was the previous land use for the site, office trips were calculated and then subtracted from the anticipated school trips. The estimated trip delta between the previous office building and the school is shown in Table 1. The two-story office building is approximately 48,000 sq. ft. It was expected to generate 89 trips during the AM Peak and 90 trips during the PM Peak.

Table 1: TLHS Trip Generation

Table 1: Technology Leadership High School Trip Generation																
Land Use	Unit	Size	Trip Generation Rates								Estimated Trip Generation					
			ITE Code	Daily Rate	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
					Rate	In	Out	Rate	In	Out	In	Out	Total	In	Out	Total
Private High School	Employee	32 AM 4 PM	534	15.2	4.3	65%	35%	2.49	65%	35%	90	48	138	10	5	15
Office	Sq. Ft.	48K	710	10.84	1.52	88%	12%	1.44	17%	83%	78	11	89	15	75	90
Change from previous Land Use											**12**	**37**	**49**	**-5**	**-70**	**-75**

Information provided in Table 1 was used to determine traffic operations at each access point. In order to collect typical traffic volumes along Manzano Street and Quincy Street, information was obtained from TAQA. To be conservative, it was observed that the vehicular traffic along Washington Street near the study area between Lomas Boulevard and Constitution Avenue was as follows:

- Southbound
  - AM Peak
    - 209 vehicles
  - PM Peak
    - 289 vehicles
- Northbound
  - AM Peak

        - 191 vehicles
    - PM Peak
        - 319 vehicles

These traffic volume assumptions were modeled for the traffic along Manzano Street and Quincy Street. For unsignalized intersections the traffic operations were calculated using the procedures and methodologies contained in the *Highway Capacity Manual* (HCM), 6th Edition; (Transportation Research Board, 2016) for weekday AM Peak and PM Peak Hour traffic operations.

For unsignalized (side-street stop-controlled) intersections, Synchro 11 was used. With this methodology, operations are defined by the average control delay per vehicle (measured in seconds) for each stop-controlled movement. The method incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. For side street stop-controlled intersections, LOS is reported for the approach with the highest average delay per vehicle. Table 2 summarizes the relationship between delay and LOS for unsignalized intersections.

Table 2: Unsignalized Intersection Delay and LOS Criteria

Level of Service	Delay per Vehicle (sec)	Definition
A	0 ≤ 10	Free-flow operations, minimal delay
B	> 10 ≤ 15	Stable flow, slight delays
C	> 15 ≤ 25	Stable flow, acceptable delay
D	> 25 ≤ 35	Approaching unstable flow, long delay
E	> 25 ≤ 50	Unstable flow, intolerable delay
F	> 50	Forced flow, congestion

The traffic operations for the access point are presented in Table 3. Both access points are expected to operate at acceptable traffic conditions.

Table 3: Access Level of Service

Control Type	Intersection	LOS/Delay [in seconds/vehicle] (Critical Movement)	
		AM Peak Hour	PM Peak Hour
TWSC	Entrance/Manzano St.	A / 2.5 (NB approach)	A / 0.3 (NB approach)
TWSC	Exit/Quincy Street	B / 11.8 (WB approach)	B / 13.5 (WB approach)

b. The site's total capacity for student enrollment and anticipated student enrollment.

It is anticipated that current school enrollment would remain the constant with approximately 314 students and about 34 staff employees. Representing a total of close to 350 persons and it is expected to grow to approximately 400 persons for next year. The analysis for the site was based on the 400 total students, this includes the day and evening program as well as virtual students.

c. Need for a student drop off and pick-up queuing lane.

It is expected that the vehicles entering the High School would have approximately 1,730 feet for vehicle queue lane storage inside the property with a drop off and pick up area as shown in Figure 8. The vehicular traffic would enter through the northeast access, Keynote #1. Drivers will exit at the southwest access point Keynote #6.

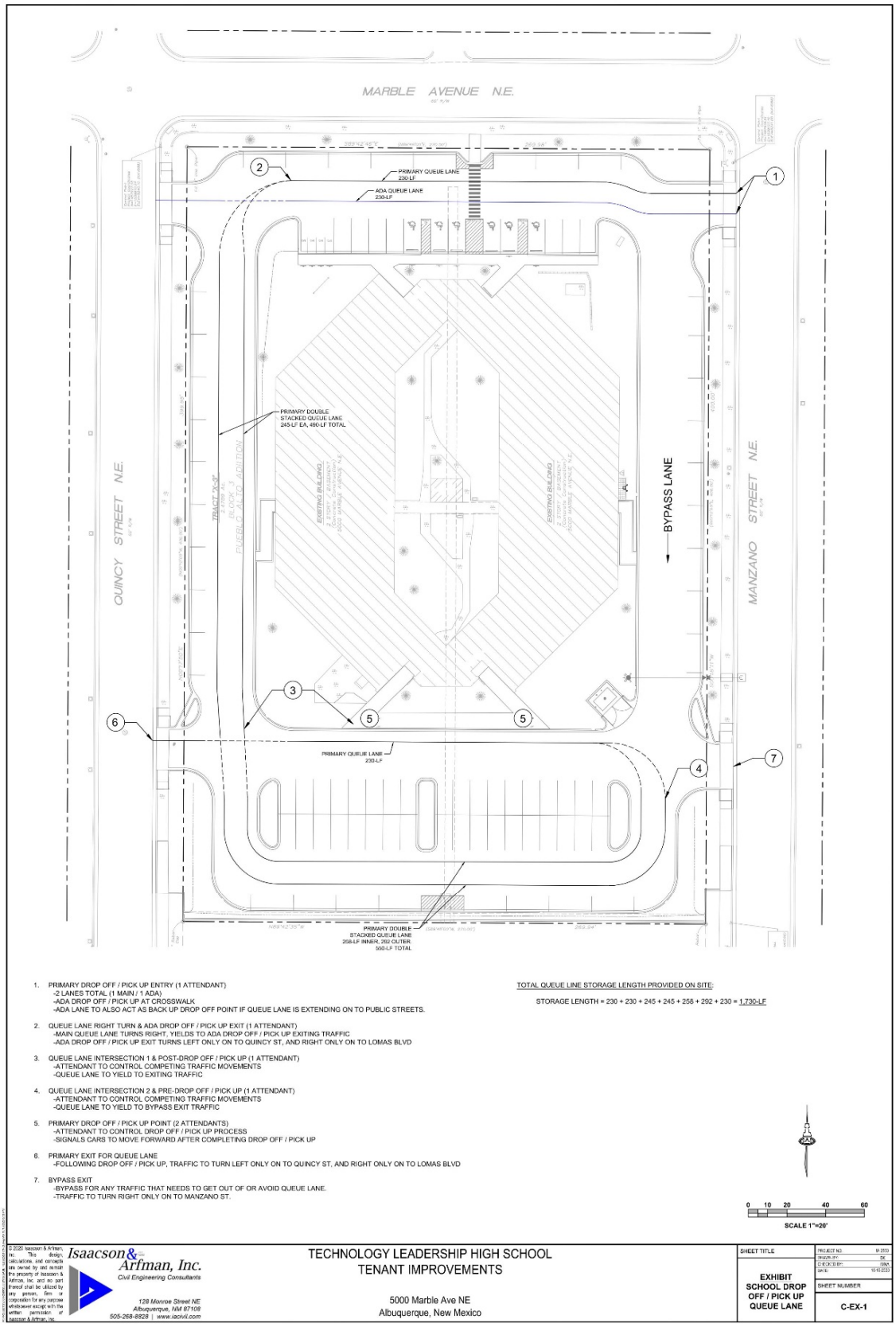


Figure 8: Queue Lane Storage

9. An evaluation of reasonable alternatives, if any, and their anticipated effectiveness in mitigating potential impacts. The NIA shall include a justification by the applicant for the selection of a particular alternative or why no other reasonable alternatives existed.

There are no additional alternatives since the vehicle queue is expected to occur inside the school property. According to the City of Albuquerque *Development Process Manual*, the recommended driveway width for each access point at the school should be 12-ft to 20-ft for a one-way drive and it should be 22-ft to 24-ft for a two-lane drive.

TABLE 7.4.47 **Driveway Widths for Arterial, Collector, and Local Streets**

Entrance	Arterial & Collector	Local Streets
One-way Drive	20 ft. – 25 ft.	12 ft. – 20 ft.
Two-lane Drive	22 ft. – 30 ft.	22 ft. – 24 ft.
Three-lane Drive	24 ft. – 35 ft.	22 ft. – 30 ft.
Larger Vehicles (WB-40 or larger)	Max 50 ft.	Max 30 ft.

It is also recommended that no signs or landscaping over 3-ft be located within the sight triangles of each access point.

Attachments

ITE Trip Generation Rates

Private High School
(534)

Vehicle Trip Ends vs: Employees
On a: Weekday

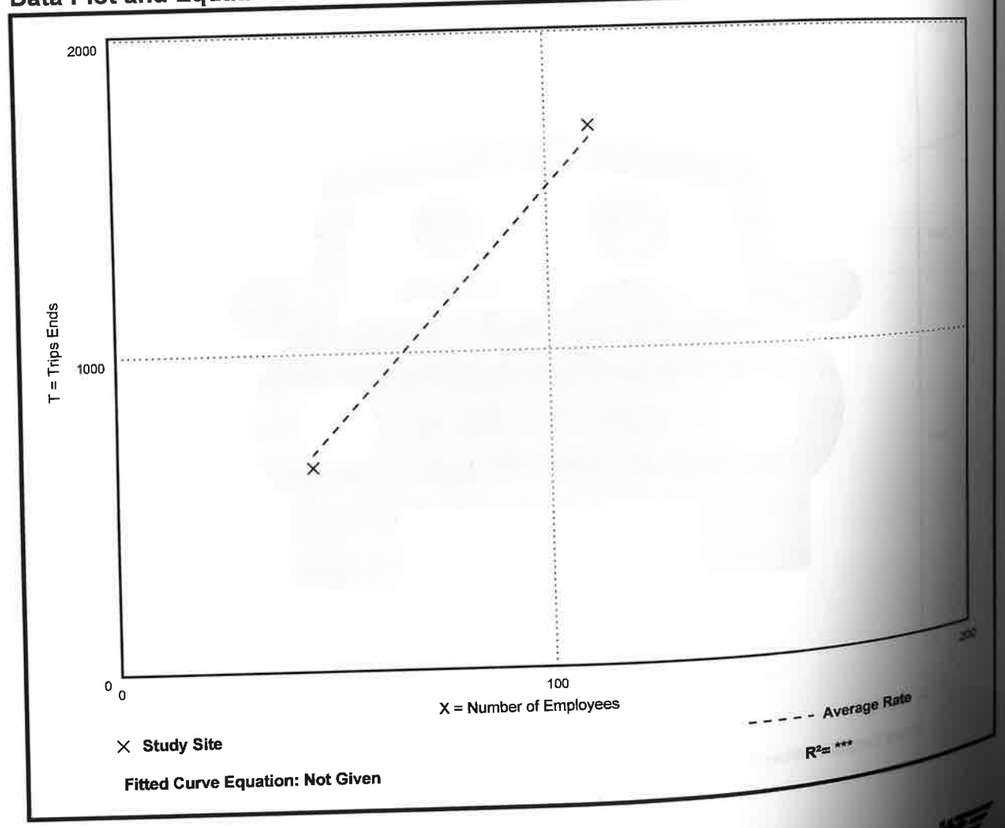
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. Num. of Employees: 78
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
15.12	14.27 - 15.46	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

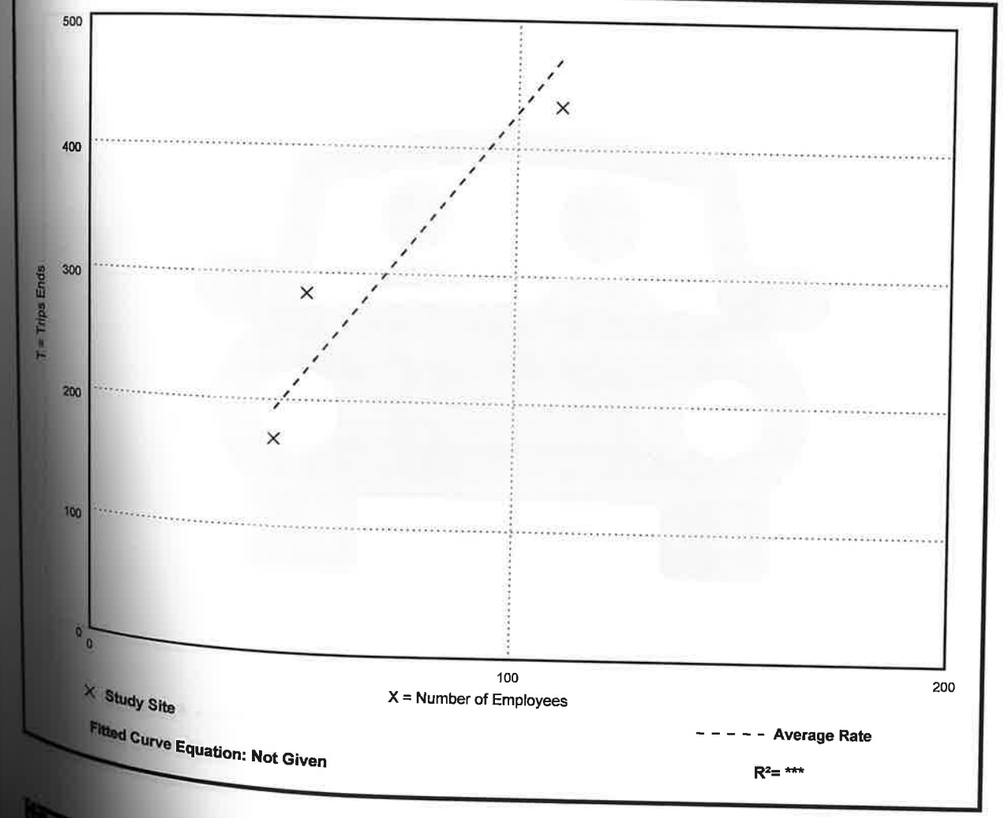
Private High School
(534)

Vehicle Trip Ends vs: Employees
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 3
Avg. Num. of Employees: 69
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
4.28	3.76 - 5.46	0.84

Data Plot and Equation



Fitted Curve Equation: Not Given

Private High School
(534)

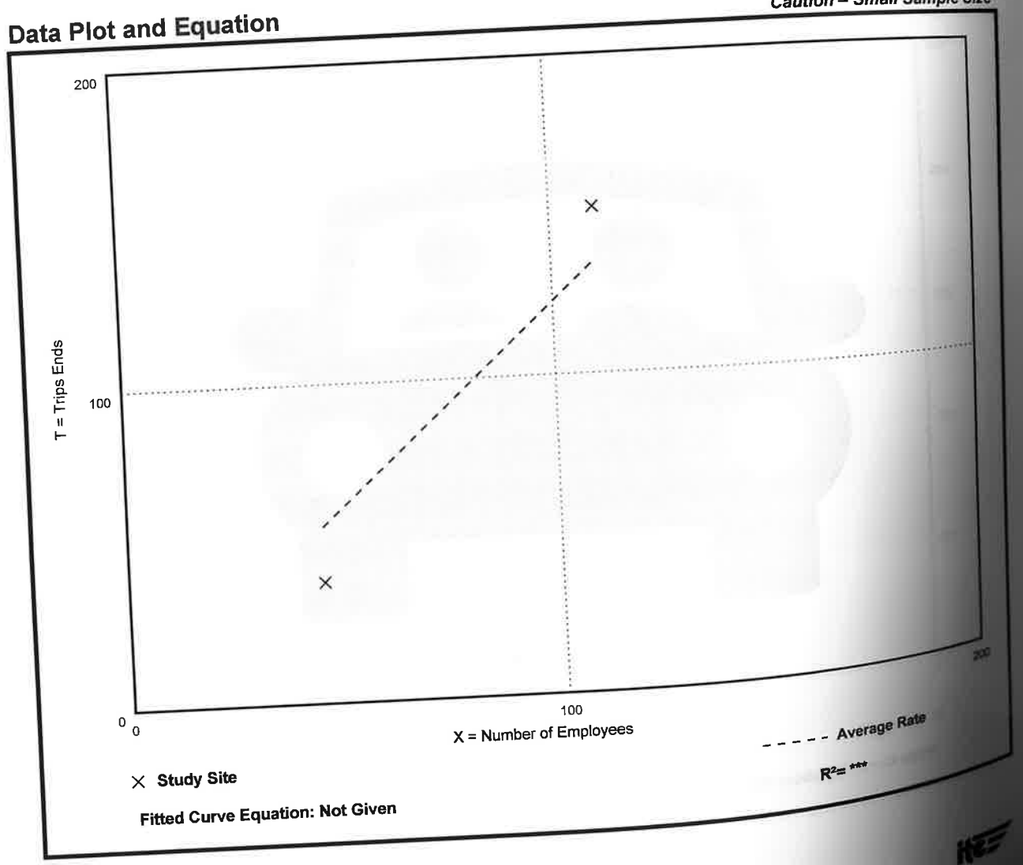
Vehicle Trip Ends vs: Employees
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. Num. of Employees: 78
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
1.23	0.84 - 1.38	***

Caution – Small Sample Size

Data Plot and Equation



Fitted Curve Equation: Not Given

Private High School
(534)

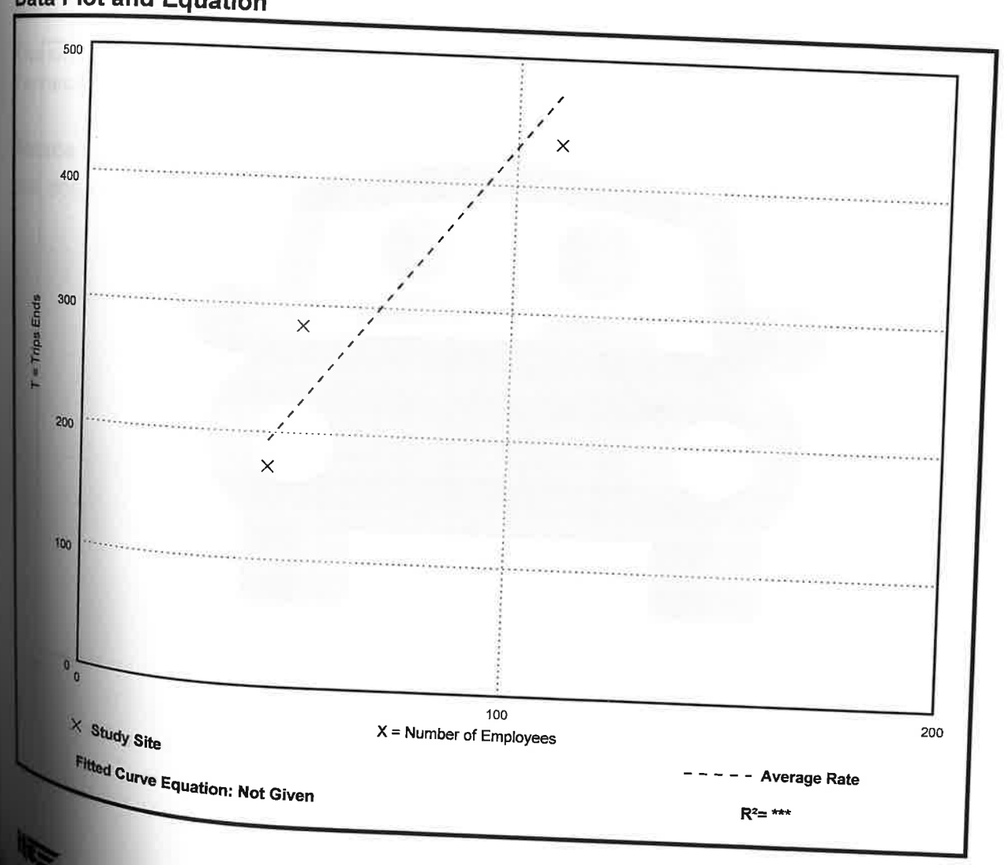
Vehicle Trip Ends vs: Employees
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 3
Avg. Num. of Employees: 69
Directional Distribution: 65% entering, 35% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
4.30	3.84 - 5.46	0.83

Data Plot and Equation



Fitted Curve Equation: Not Given

Private High School
(534)

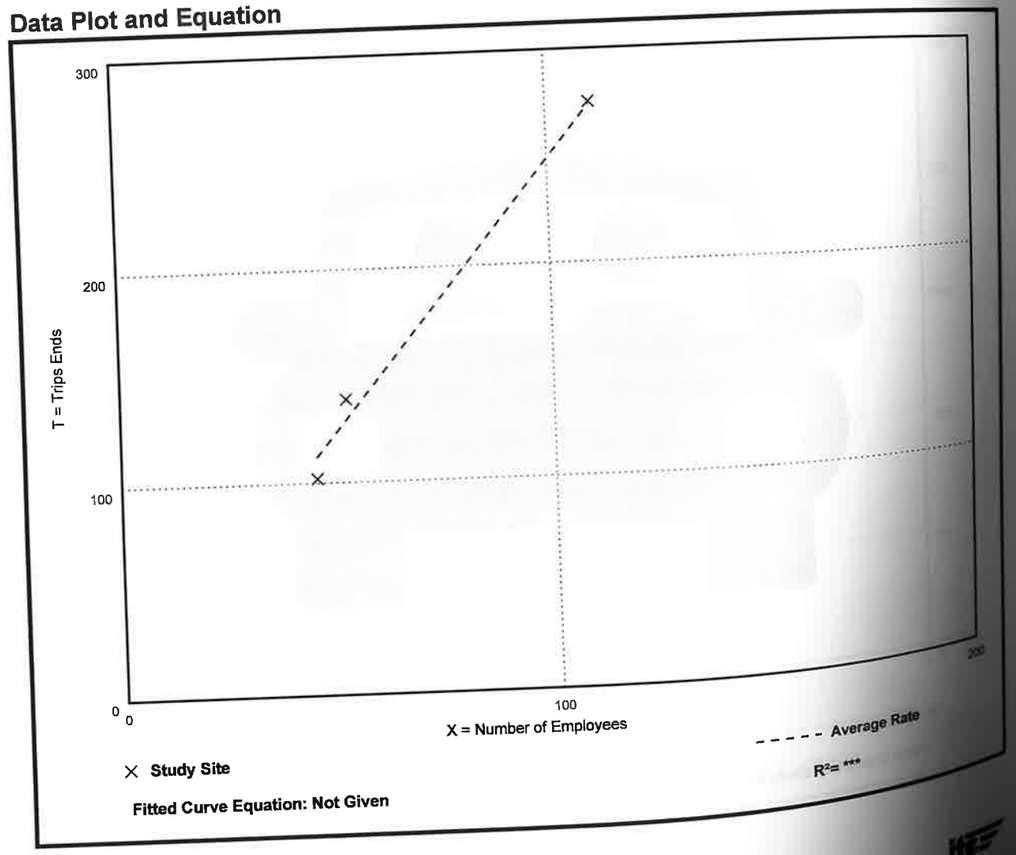
Vehicle Trip Ends vs: Employees
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 3
Avg. Num. of Employees: 69
Directional Distribution: 34% entering, 66% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
2.49	2.27 - 2.67	0.17

Data Plot and Equation



Fitted Curve Equation: Not Given

Land Use: 536
Charter Elementary School

Description

A charter elementary school is an elementary school that is publicly funded and privately managed. The school serves students attending kindergarten through the fifth, sixth, or eighth grade. The school may also offer extended care and day care. Elementary school (Land Use 520), middle school/junior high school (Land Use 522), private school (K-8) (Land Use 530), private school (K-12) (Land Use 532), and charter school (K-12) (Land Use 538) are related uses.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 2010s in Arizona, Florida, Minnesota, Nevada, New Jersey, Tennessee, Texas, and Utah.

Source Numbers

866, 905, 906, 953, 954, 1029, 1039, 1051, 1055

The average numbers of person trips per vehicle trip at the 18 dense multi-use urban sites at which both person trip and vehicle trip data were collected are as follows:

- 1.5 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 1.5 during Weekday, AM Peak Hour of Generator
- 1.5 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 1.5 during Weekday, PM Peak Hour of Generator

The average numbers of person trips per vehicle trip at the 23 general urban/suburban sites at which both person trip and vehicle trip data were collected are as follows:

- 1.3 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 1.3 during Weekday, AM Peak Hour of Generator
- 1.3 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 1.4 during Weekday, PM Peak Hour of Generator

The sites were surveyed in the 1980s, the 1990s, the 2000s, the 2010s, and the 2020s in Alberta (CAN), California, Colorado, Connecticut, Georgia, Illinois, Indiana, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Missouri, Montana, New Hampshire, New Jersey, New York, Ontario (CAN)Pennsylvania, Texas, Utah, Virginia, and Washington.

Source Numbers

161, 175, 183, 184, 185, 207, 212, 217, 247, 253, 257, 260, 262, 273, 279, 297, 298, 300, 301, 302, 303, 304, 321, 322, 323, 324, 327, 404, 407, 408, 419, 423, 562, 734, 850, 859, 862, 867, 869, 883, 884, 890, 891, 904, 940, 944, 946, 964, 965, 972, 1009, 1030, 1058, 1061

General Office Building
(710)

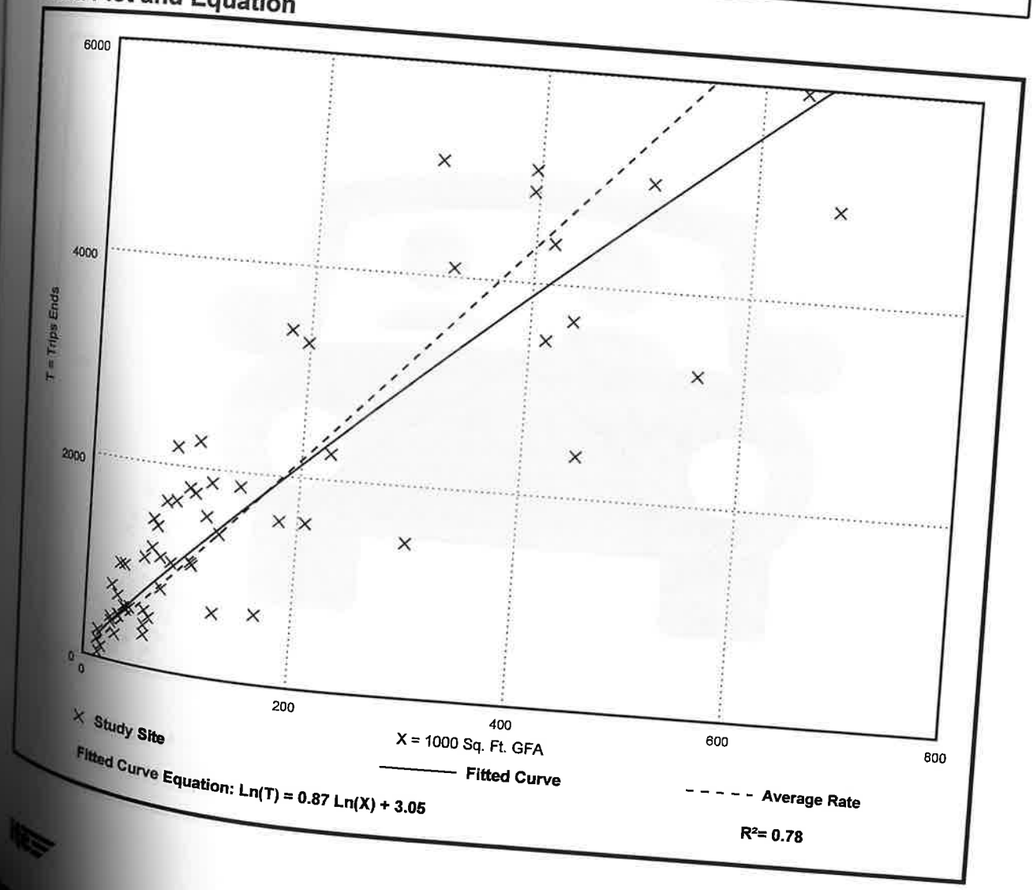
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

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



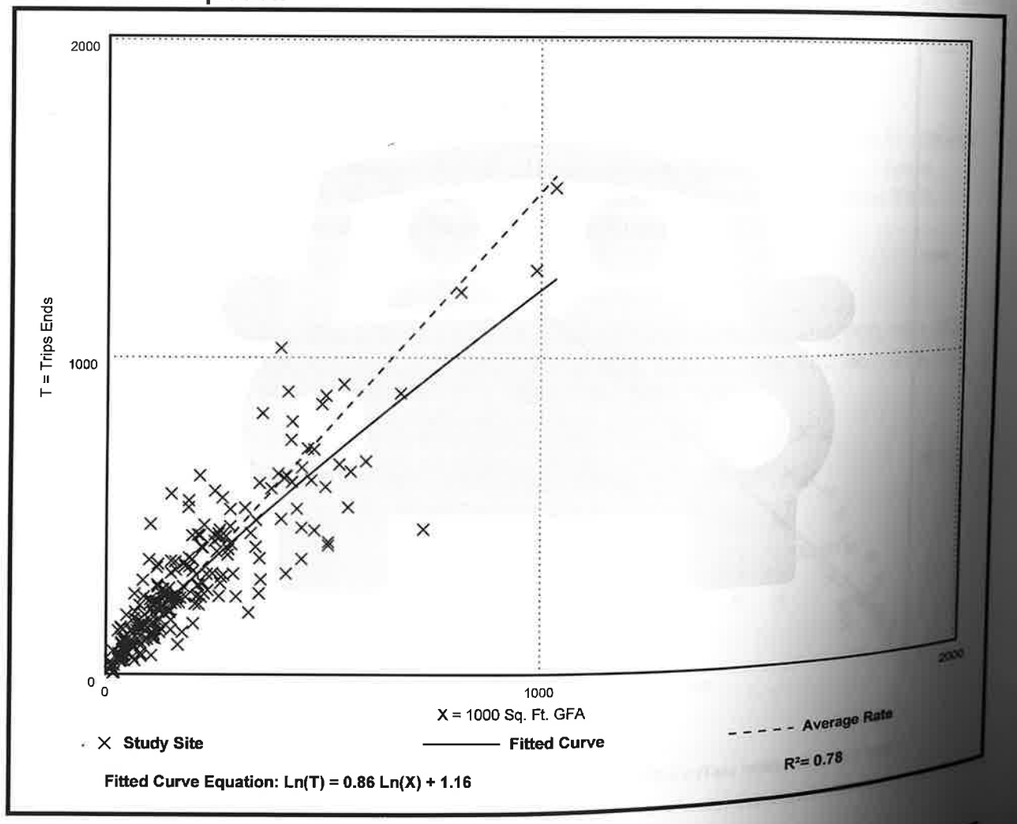
General Office Building
(710)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 221
Avg. 1000 Sq. Ft. GFA: 201
Directional Distribution: 88% entering, 12% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.52	0.32 - 4.93	0.58

Data Plot and Equation



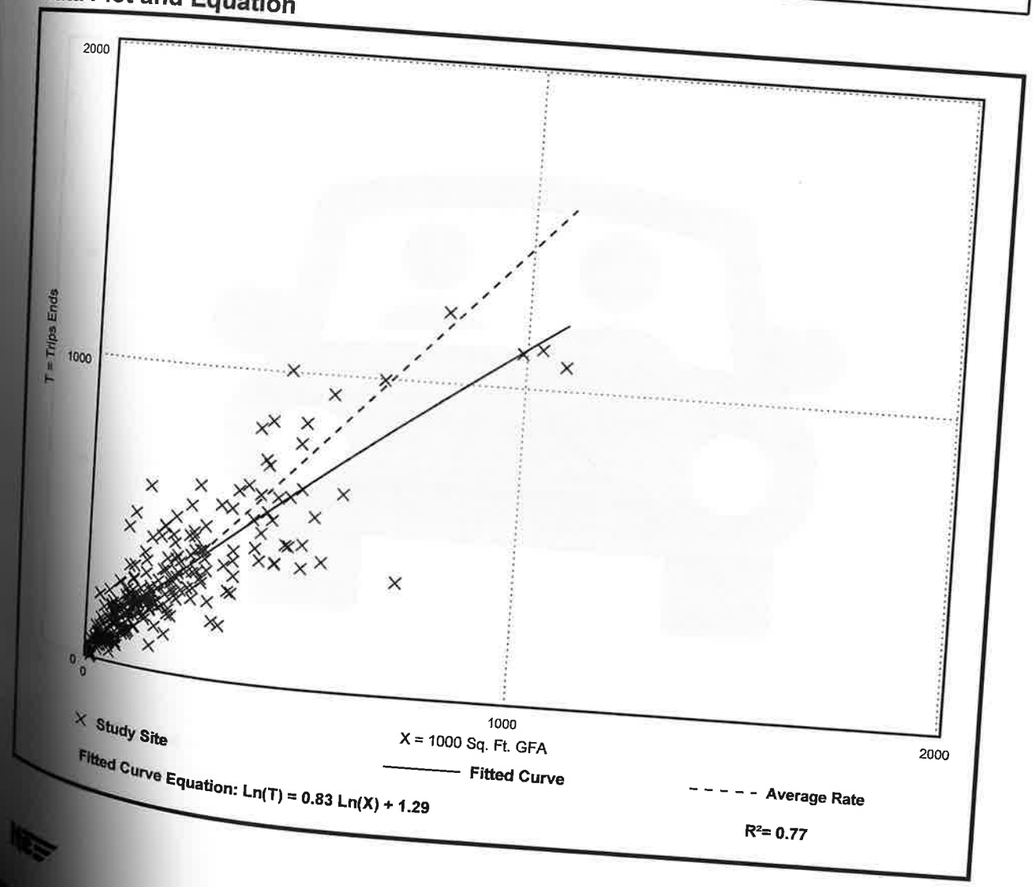
General Office Building
(710)

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

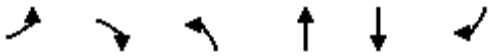
Vehicle Trip Generation per 1000 Sq. Ft. GFA

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

Data Plot and Equation



Traffic Operation Results



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	72	191	209	18
Future Volume (Veh/h)	0	0	72	191	209	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	78	208	227	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	601	237	247			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	601	237	247			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	94			
cM capacity (veh/h)	436	802	1319			

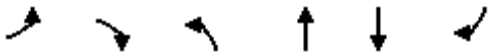
Direction, Lane #	NB 1	SB 1
Volume Total	286	247
Volume Left	78	0
Volume Right	0	20
cSH	1319	1700
Volume to Capacity	0.06	0.15
Queue Length 95th (ft)	5	0
Control Delay (s)	2.5	0.0
Lane LOS	A	
Approach Delay (s)	2.5	0.0
Approach LOS		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	48	0	191	0	0	209
Future Volume (Veh/h)	48	0	191	0	0	209
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	0	208	0	0	227
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	435	208			208	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	435	208			208	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	100			100	
cM capacity (veh/h)	578	832			1363	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	52	208	227
Volume Left	52	0	0
Volume Right	0	0	0
cSH	578	1700	1700
Volume to Capacity	0.09	0.12	0.13
Queue Length 95th (ft)	7	0	0
Control Delay (s)	11.8	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.8	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	8	319	289	2
Future Volume (Veh/h)	0	0	8	319	289	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	9	347	314	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	680	315	316			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	680	315	316			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	414	725	1244			

Direction, Lane #	NB 1	SB 1
Volume Total	356	316
Volume Left	9	0
Volume Right	0	2
cSH	1244	1700
Volume to Capacity	0.01	0.19
Queue Length 95th (ft)	1	0
Control Delay (s)	0.3	0.0
Lane LOS	A	
Approach Delay (s)	0.3	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	0	319	0	0	289
Future Volume (Veh/h)	5	0	319	0	0	289
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	347	0	0	314
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	661	347			347	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	661	347			347	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	427	696			1212	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	347	314
Volume Left	5	0	0
Volume Right	0	0	0
cSH	427	1700	1700
Volume to Capacity	0.01	0.20	0.18
Queue Length 95th (ft)	1	0	0
Control Delay (s)	13.5	0.0	0.0
Lane LOS	B		
Approach Delay (s)	13.5	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	26.8%	ICU Level of Service	A
Analysis Period (min)	15		