28 Newark Pompton Tpk.
Riverdale, NJ 07457-1141
Tel: 973.616.9400
Fax: 973.616.9496
www.jda-inc.com

Accident Reconstruction
and
Traffic Engineering

November 18, 2022

Ms. Lori Camaya
Land Use Secretary
Pequannock Township Board of Adjustment
530 Newark-Pompton Turnpike
Pompton Plains, NJ 07444-1799

Re: **TRAFFIC IMPACT ASSESSMENT**
Proposed Gas Station Modification and Convenience Mart
403-411 Newark Pompton Turnpike
Block 3301, Lot 44
Pequannock Township, NJ
JDA No. 7471-22

Dear Ms. Camaya and Members of the Pequannock Township Board of Adjustment:

John Desch Associates, Inc., (*JDA* here-in) has completed its traffic impact analysis for the above referenced project. As part of our analysis we have reviewed the existing traffic conditions, site access, traffic generation projections and traffic impact(s) related to aspects of the proposed development. The project proposed by the Applicant, 403 Newark Pompton Turnpike LLC, is for the modification of an existing, 1-story masonry building at an existing gas station to accommodate a new convenience market. This letter documents the findings of our study.

Site Plans

Plans prepared by Darmofalski Engineering Associates, Inc., last modified October 13, 2022, were reviewed as part of our analysis. The project site is located at property #403-411 Newark Pompton Turnpike, in Pequannock Township, Morris County, New Jersey. This property is further identified as Block 3301, Lot 44. This site is located along the southwest corner at the intersection of Park Avenue & Newark Pompton Turnpike, and is approximately 1.5 miles north of NJ Route 23.

The Applicant is proposing to modify an existing, 1-story masonry building (*approx. 1,586 SF GFA*) which currently houses three (3) service bays on the existing gas station property located along the southwest corner at the intersection of Newark Pompton Turnpike (*CR-660*) & Park Avenue in Pequannock. Based upon the provided site plans, the Applicant is proposing to convert the three (3) service bays, maintaining the approximate 1,586 SF building footprint of the existing building, and constructing a convenience market in its place. The eight (8) fueling positions, three (3) access points, and amenities such as air compressors and vacuums are to remain as existing. Four (4) additional parking spaces and one (1) loading zone are proposed on site.

Based upon our discussions with the Site Engineer and the information provided on the site plan, it is our understanding that the existing concrete sidewalk along the perimeter of the building will be preserved and additional bollards will be installed along the east side of the building. These bollards will provide some protection to pedestrians in the walkway and the building itself from moving vehicles. STOP Bars, STOP Signs and directional arrows are proposed at all access points in order to help control ingress/egress and internal circulation. The existing sidewalk along the perimeter of the property, will continue to connect Newark Pompton Turnpike, Park Avenue and the surrounding neighborhood. It is our understanding that the proposed facility will not be a 24-hour operation.

The following are some images of the existing sidewalk and internal walkway on the site.

Sidewalk along Park Avenue, north side of site.

Sidewalk along Newark Pompton Turnpike, east side of site.

Concrete slab along service bay entrances. This may be saw cut or channelized with bollards to form a walkway.

Existing walkway and bollards along the northeast side of the service bays and office.

2022 Existing Conditions

Newark Pompton Turnpike (CR-660)

Per the available New Jersey Department of Transportation (*NJDOT*) Straight Line Diagram (*last inventoried May 2011*), Newark Pompton Turnpike is classified as an "Urban Minor Arterial" roadway under the jurisdiction of Morris County. Per the Straight Line Diagram, the posted speed limit is 35 mph. This asphalt roadway has a general north-south orientation. Newark Pompton Turnpike provides one (1) travel lane in each direction, and a minimum pavement width of 40 feet. At the STOP controlled intersection with Park Avenue, Newark Pompton Turnpike forms the northbound and southbound legs of a T-intersection and is considered the major approach.

Park Avenue

There is no New Jersey Department of Transportation (*NJDOT*) Straight Line Diagram available for Park Avenue. However, based upon the existing roadway characteristics and land uses along the roadway segment, it is our opinion that Park Avenue functions as a "Local Road". Per our field observations, the roadway has a posted speed limit of 25 MPH. This asphalt roadway has a general east-west orientation. Bi-directional travel is

permitted along the roadway segment, although opposing travel directions are not demarcated by center line pavement markings. The subject roadway segment provides for a minimum pavement width of approximately 30 feet. We did not observe any on-street parking prohibition signs near the project site. At its intersection with Newark Pompton Turnpike, Park Avenue serves as the minor approach and is governed by STOP Control.

2022 Existing Traffic Volumes

In order to better understand the existing traffic conditions along the adjacent roadway network and intersection(s), our office researched historic traffic counts available from NJDOT's statewide traffic monitoring program. From this database we found a 48-hour bi-directional count conducted along Newark Pompton Turnpike, approximately 0.65 miles north of the site. The data collection was conducted along Newark Pompton Turnpike between the intersections of Wilrue Parkway and Center Street, on Tuesday, September 22, 2020, and Wednesday, September 23, 2020.

The report presents error codes in the data fields for the Wednesday count and only provides data for 2 hours of the day, from 11:00 a.m. to 1:00 p.m.. The Tuesday count provides a full 24 hours of data from 12:00 a.m. to 12:00 a.m., and indicates that Newark Pompton Turnpike experienced a total roadway volume of 10,656 vehicles on this date. The volume data provided on the available NJDOT Straight Line Diagram for Newark Pompton Turnpike indicates a traffic volume of 9,925 vehicles in 2017 at this location. The NJDOT count reports an Annual Average Daily Traffic (*AADT*) volume of 7,477 vehicles, noting that this volume figure is an estimate based on factors in use at the time the report was generated. Additionally, the Tuesday, September 22, 2020 count data indicates an AM Peak Hour for the roadway of 7:30 – 8:30 a.m. (*643 vehicles*), and a PM Peak Hour of 4:45 – 5:45 p.m. (*1,018 vehicles*). The traffic count printouts are attached in the Appendix and a summary is provided in the following **Table 1**.

Table 1
NJDOT Traffic Volumes – Tuesday, September 22, 2020, Newark Pompton Turnpike

EXISTING TRAFFIC VOLUMES		
Peak Period		2-Way Volume
AM	7:30 a.m. to 8:30 a.m.	643
MIDDAY	12:00 p.m. to 1:00 p.m.	921
PM	4:45 p.m. to 5:45 p.m.	1018

Trip Generation

The number of vehicular trips that may be expected to be generated by a proposed facility are typically based on data contained in the Institute of Transportation Engineers (ITE), *Trip Generation Manual, 11th Edition.* The data contained in this publication is derived from studies of trips generated by similar facilities throughout the country. It is our understanding that the proposed site will be occupied by an approximately ± 1,586 SF convenience market and provide for eight (8) vehicle fueling positions (*VFP*). In order to provide as conservative analysis as reasonable and provide a like comparison between the existing and proposed land uses, we elected to utilize the amount of fueling positions as the independent variable for our trip generation figures. We elected to generate our figures in this manner as the amount of fueling positions are to remain unchanged between the existing and proposed conditions and would thus serve as a control. Trip generation projections are shown in the **Table 2** below, providing a comparison between the existing and proposed conditions.

Table 2
ITE Trip Generation Figures – Existing Vs. Proposed Conditions

TRIP GENERATION COMPARISON				
PEAK HOUR PERIOD		LUC 944: Gasoline/ Service Station [ITE; 8 VFP, 3 Service Bays] (EXISTING)	LUC 945: Convenience Store/ Gas Station [ITE; 8 VFP, 1.6 KSF GFA] (PROPOSED)	Trip Difference (Δ)
AM	ENTER	41	64	23
	EXIT	41	64	23
	TOTAL	82	128	46
PM	ENTER	55	73	18
	EXIT	56	74	18
	TOTAL	111	147	36
SAT	ENTER	51	68	17
	EXIT	51	68	17
	TOTAL	102	136	34

We utilized Land Use Code (*LUC*) 944: Gasoline/Service Station to generate trip figures for the existing conditions, and for the proposed conditions we utilized LUC 945: Convenience Store/Gas Station. It is our opinion that these two land use codes most closely reflect both the facility currently in operation and that which is proposed. As stated above, since the amount of vehicle fueling positions would remain the same from the existing to the proposed conditions, we utilized vehicle fueling positions as the independent variable upon which we based our trip generations. The figures presented for the Weekday AM and PM Periods reflect the peak hour volumes for the adjacent street traffic. We utilized the figures for the peak of the adjacent street traffic for the Weekday Periods as this typically represents when peak traffic conditions occur on the roadway network or roadway users experience "rush hour". For the Saturday Period we utilized the peak of the generator by default, as it was the only reference point available for

comparison between the two land uses. We observe from the ITE Trip Generation Rates that both the existing and proposed land use would experience their largest peak periods during the Weekday PM Period.

Based upon these trip generation figures, we observe that the proposed land use will not generate 100 trips or greater as compared to the existing land use, during its greatest peak period. The impact of any development to the adjacent roadway network is typically dependent upon the number of site generated trips the development is anticipated to generate. Trip generation estimates for the development of the proposed project were made based on the ITE Trip Generation Reference. A "Significant increase in traffic" indicates an increase in vehicular volumes exceeding the previously anticipated two-way traffic generated by a lot. The State Highway Access Management Code (N.J.A.C. 16:47) defines a significant increase in traffic as an increase of 100 or more trips in any peak hour. As the proposed use would generate less than this 100-trip threshold, it would not be classified as a "significant increase in traffic."

To be conservative, we did not reduce the number of site generated trips to account for the pass-by trips that would be vehicles already on the road and only diverting their trip to a destination to get fuel or convenience store items. The NJDOT and ITE considers 50% of the trips associated with this type of use would already be on the road.

Sight Distance

The American Association of State Highway and Transportation Officials (AASHTO) provides designers, planners and engineers with guidelines for sight distance in order to help reduce conflicts and improve the efficiency and safety of traffic along roadways and through intersections. Stopping Sight Distance may be defined as the measure of distance provided along an approach, to an approaching driver, where the driver is provided an unobstructed view of the traffic conditions ahead. AASHTO further indicates that as long as the sight distance provided to a driver entering an intersection from the minor street approach is at least equal to the appropriate stopping sight distance for the major street approach, then drivers are considered to have sufficient sight distance to avoid or anticipate a collision. In some instances, it may be required for the vehicle on the major street approach to slow or stop in order to accommodate a vehicle entering the roadway.

AAHSTO guidelines indicate that for a design speed of 40 mph a minimum stopping sight distance of 305 feet is desirable. The Morris County Land Development Standards, Section 504: Driveways indicates within Table 500-3: Required Sight Distance that for an allowable speed of 35 MPH a sight distance of 425 feet would be required. The provided site plans indicate within the Sight Distance Exhibit on sheet 6 that the minimum distance of 425 feet would be provided for a stopped vehicle at the existing site driveways along Newark Pompton Turnpike.

Pedestrian Access

In order to better understand how the proposed facility would function, we examined similar facilities in the surrounding area. We found one facility which provided at least eight (8) fueling positions and approximately ± 1,500 square feet of convenience market on site. This facility is the Sunoco Gas station with convenience market located at 73 Hamburg Turnpike in Riverdale. This facility has access to/from Newark Pompton Turnpike, provides for three (3) access points and sits on the border of a residential neighborhood. There is sidewalk present along the site frontage which provides for pedestrian access to/from the public right-of-way and the site.

Internally, a sidewalk is provided along the perimeter of the building and at building entrances. Based upon our observations, the facility is typically frequented by patrons purchasing fuel, who leave their vehicles while fueling and access the convenience market to make quick purchases, such as lottery, Tobacco products and/or prepackaged food items. If a pedestrian wishes to access the site, they walk in from the sidewalk or the parking spaces provided, across the asphalt surface to the convenience market building. It is important to keep in mind that traffic on site typically travels at significantly reduced speeds (*as compared to the adjacent roadway*), there are minimal sight obstructions on site, and gas stations are typically well illuminated during nighttime hours due to their overhead canopies and surrounding light fixtures.

Parking Analysis

The following analysis is based on the parking demand rates provided by the Institute of Transportation Engineers: *Parking Generation Manual, 5TH Edition* for LUC: 960 Super Convenience Market with Gas Station. Within the current Parking Generation Manual, this land use most closely resembles the proposed land use. We do however note that a Super Convenience Market with Gas Station use is larger than a regular Convenience Market with Gas Station, as the former typically provides for a market space of at least 3,000 SF and at least ten (10) vehicle fueling positions. A Quick Check facility would fall within this category. To be conservative with our project, we used the Super Convenience Store/Gas Station rate. The findings for this type of land use are composed of twelve (12) different studies located throughout North America, with study dates ranging from 1990 to present date. A blend of urban and sub-urban sites were examined. In addition, we examined the available parking figures within the Pequannock Township Code within Chapter 360: Zoning, §360-53: Minimum required off-street parking spaces. The provided parking section does not give a specific designation or parking rate for convenience market with gas station uses, thus, we elected to utilize the rates provided for retail stores. **Table 3** below provides a summary of our parking calculations.

Table 3
Parking Generation Figures

PARKING GENERATION COMPARISON		
Parking Rates	**LUC 944: Gasoline/ Service Station**	**LUC 960: Super Convenience Store/Gas Station**
EXISTING	8	-
ITE	-	13 (avg.)
§360-53	12 (service station)	8 (retail store)
PROPOSED	-	12

Based upon the parking figures above, we note that the existing use experiences a deficit in parking of approximately four (4) spaces, as eight (8) are provided and the Township Code requires twelve (12) due to the service bays on site. Based upon the parking demand rates for a Super Convenience Market with Gas Station from ITE, the site would require thirteen (13) spaces. The general retail store rates within the Township Code indicate that the site would require eight (8) spaces. The site plans indicate that the Applicant proposes to provide for twelve (12) spaces, exceeding the Township's minimum off-street parking requirements. It should also be noted that the eight (8) fueling positions may be counted as additional parking, as patrons to the site frequently access the market while they are waiting for their vehicles to be fueled.

Conclusions

Based on the foregoing analysis, it is the professional opinion of John Desch Associates, Inc., to a reasonable degree of engineering certainty, that the introduction of traffic generated by the proposed project will not create a significant increase in traffic along Newark Pompton Turnpike or at the STOP Controlled intersection of Newark Pompton Turnpike & Park Avenue. Access to the site would be provided via three (3) existing site driveways, which provide ample geometry for the vehicles expected to access the site, as well as suitable sight distance. Pedestrians will be provided safe access to/from the site via existing sidewalks along the site frontage and will be able to safely access the proposed convenience market. Ample parking will be provided onsite for patrons of the facility.

We will be available to testify before the Board regarding our analysis and report.

Very truly yours,

John A. Desch, P.E.
NJPE #25885

STATE OF NEW JERSEY
JOHN A. DESCH
No.
2588500
LICENSED
PROFESSIONAL ENGINEER

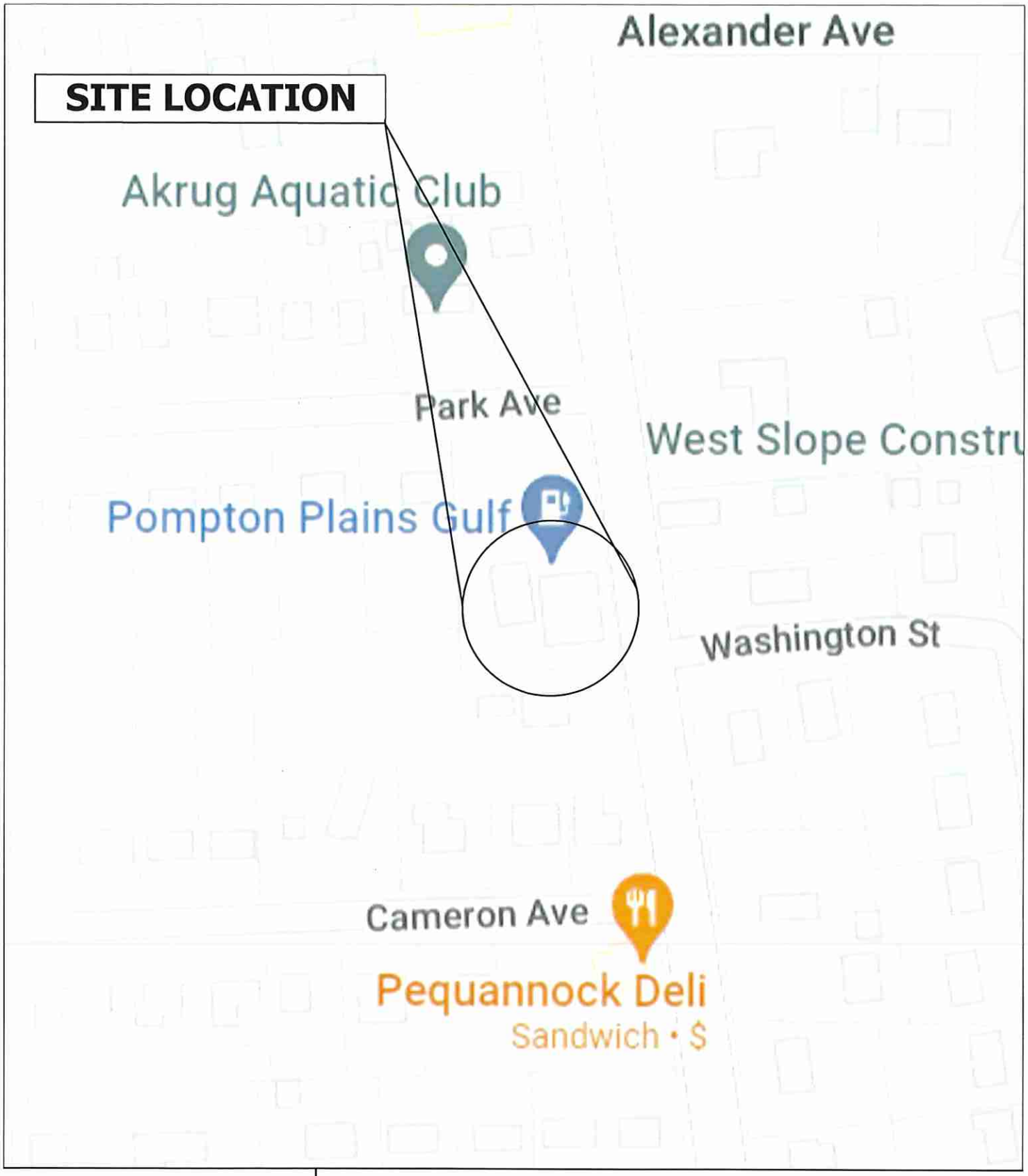
Gary K. Anderson, P.E.
NJPE #45110

STATE OF NEW JERSEY
GARY K. ANDERSON
No.
4511000
LICENSED
PROFESSIONAL ENGINEER

JAD/GKA/JDR/sh

Attachments: Site Location Map
Aerial Image
NJDOT Traffic Count Printouts
NJDOT Straight Line Diagrams
ITE Trip & Parking Generation References
Morris County Land Development Standards
Pequannock Township Code
Curriculum Vitae of Report Authors

cc: Thomas A. Boorady, P.E.
Roy Kesenci
Tony Kalejian
Lindsay Janel



JDA

JOHN DESCH ASSOCIATES, INC.
ACCIDENT RECONSTRUCTION AND
TRAFFIC ENGINEERING

SITE LOCATION MAP

STREET LOCATION	MAP SCALE
403-411 NEWARK POMPTON TURNPIKE	"NTS"
TOWN AND STATE	JDA No.
PEQUANNOCK, NEW JERSEY	7471-22

JOHN DESCH ASSOCIATES, INC.
ACCIDENT RECONSTRUCTION AND
TRAFFIC ENGINEERING

AERIAL IMAGE

STREET LOCATION	MAP SCALE
403-411 NEWARK POMPTON TURNPIKE	"NTS"
TOWN AND STATE	JDA No.
PEQUANNOCK, NEW JERSEY	7471-22

New Jersey DOT

Most Recent 48 Hour Count for Year for 1/1/2020 - 12/31/2020
Criteria: Type = I-SECTION, Is Perm Station = 0, From 1/1/2020 To 12/31/2020

Location ID: 111467

County: Morris

Location: CO 660 Newark Pompton Turnpike Bet Wilrue Parkway and Center Street

Tuesday, September 22, 2020

Time	NB Hourly	SB Hourly	2-WAY Hourly
0:00-1:00	19	11	30
1:00-2:00	2	7	9
2:00-3:00	5	6	11
3:00-4:00	6	4	10
4:00-5:00	9	17	26
5:00-6:00	32	36	68
6:00-7:00	131	119	250
7:00-8:00	291	198	489
8:00-9:00	318	318	636
9:00-10:00	288	291	579
10:00-11:00	272	334	606
11:00-12:00	335	395	730
12:00-13:00	408	513	921
13:00-14:00	350	408	758
14:00-15:00	401	397	798
15:00-16:00	421	538	959
16:00-17:00	381	568	949
17:00-18:00	433	577	1,010
18:00-19:00	295	369	664
19:00-20:00	198	270	468
20:00-21:00	149	173	322
21:00-22:00	104	105	209
22:00-23:00	52	51	103
23:00-24:00	24	27	51

Count Total	4,924	5,732	10,656
AM Peak	07:45-08:45 339	08:00-09:00 318	07:30-08:30 643
Mid Peak	12:15-13:15 415	12:00-13:00 513	12:00-13:00 921
PM Peak	17:00-18:00 433	16:30-17:30 615	16:45-17:45 1,018

Wednesday, September 23, 2020

Time	NB Hourly	SB Hourly	2-WAY Hourly
#Error			
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#Error			
11:00-12:00	98	98	196
12:00-13:00	272	332	604
#Error			
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Count Total	370	430	800
Peak	-	-	-
Mid Peak	11:45-12:45 370	11:45-12:45 430	11:45-12:45 800
Peak	-	-	-

Station AADT * **7,477**

**** The AADT Estimate is based on factors in use on the date the report was generated***

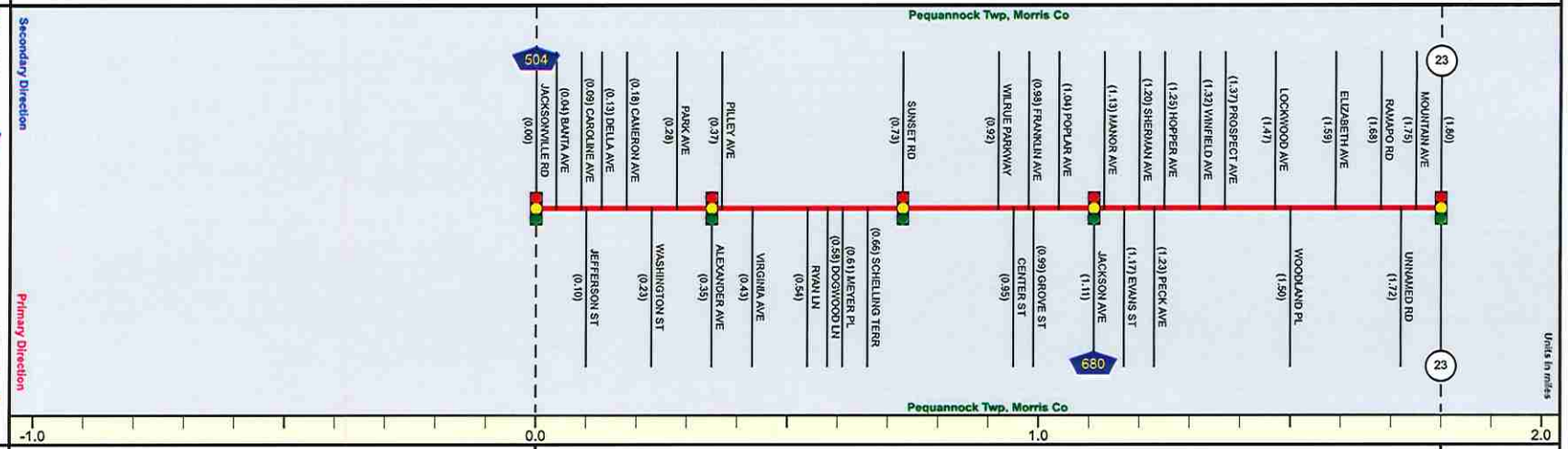
Peak Hour Starts Between

Period	Begin	End
AM	6:00	9:00
MID	9:15	14:45
PM	15:00	18:00

MORRIS COUNTY 660 (South to North)

Mile Posts: 0.000 - 1.800

Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	



Street Name		Newark Pompton Turnpike
Jurisdiction		County
Functional Class		Urban Minor Arterial
Federal Aid - NHS Sy		STP
Control Section	Begin Morris County 660 MP=0.00	
Speed Limit		35
Number of Lanes		2
Med. Type		None
Med. Width		
Pavement		40
Shoulder		
Traffic Volume		9,925 (2017) / 8,247 (2019)
Traffic Sta. ID		111467 / 161424
Structure No.		
Enlarged Views		End Morris County 660 MP=1.80

Page Created: June, 2020

SRI = 14000660__

Date last inventoried: May 2011

Land Use: 944
Gasoline/Service Station

Description

This land use includes gasoline/service stations where the primary business is the fueling of motor vehicles. The sites included generally have a small building (less than 2,000 gross square feet) that houses a cashier and limited space for motor vehicle maintenance supplies and general convenience products. A gasoline/service station may also have facilities for servicing and repairing motor vehicles. The gasoline/service station may also have a car wash. Convenience store/gas station (Land Use 945) and truck stop (Land Use 950) are related uses.

Additional Data

The independent variable—vehicle fueling positions—is defined as the maximum number of vehicles that can be fueled simultaneously. The sites in this land use include both self-pump and attendant-pumped fueling positions and both pre-pay and post-pay operations.

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 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Florida, Kentucky, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, Ontario (CAN), Oregon, South Dakota, Texas, and Washington.

Specialized Land Use Data

A 2006 study provided data on four private fuel facilities in Florida (source 721). These facilities provide self-fuel service for any motorist with a pre-established membership account. The site is not open to the general public. The trip generation characteristics of these sites differ from sites included in this land use; therefore, trip generation information for these sites is excluded from the data plots. The four sites have an average of nine vehicle fueling positions, with an average of 12 vehicle trips during the weekday, AM peak hour of adjacent traffic and 7 vehicle trips during the weekday, PM peak hour of adjacent street traffic.

Source Numbers

221, 274, 278, 288, 340, 350, 351, 355, 359, 366, 440, 583, 617, 618, 631, 721, 867, 882, 883, 888, 954, 977

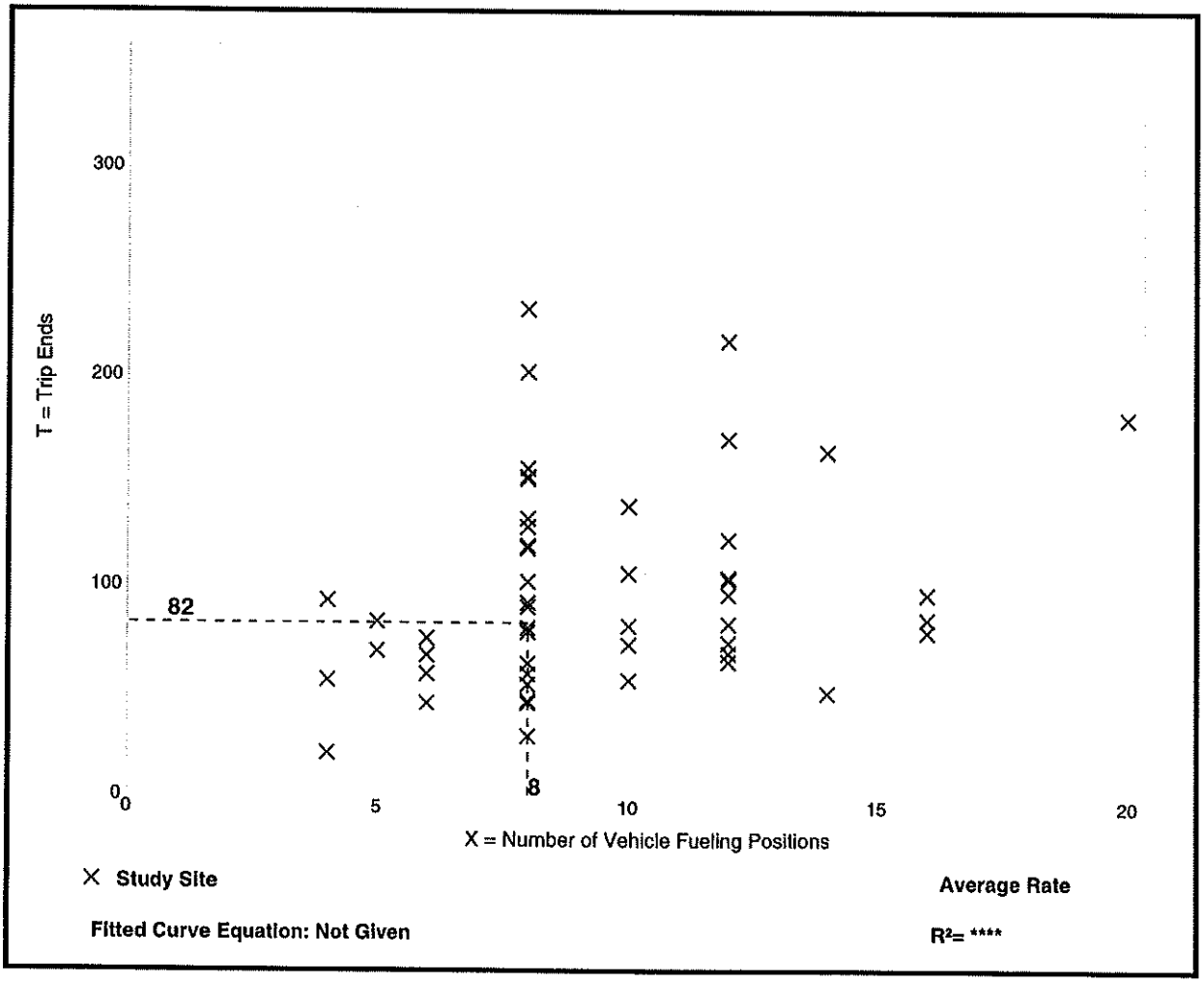
Gasoline/Service Station
(944)

Vehicle Trip Ends vs:	**Vehicle Fueling Positions**
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:	53
Avg. Num. of Vehicle Fueling Positions:	9
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
10.28	3.50 - 29.00	5.36

Data Plot and Equation



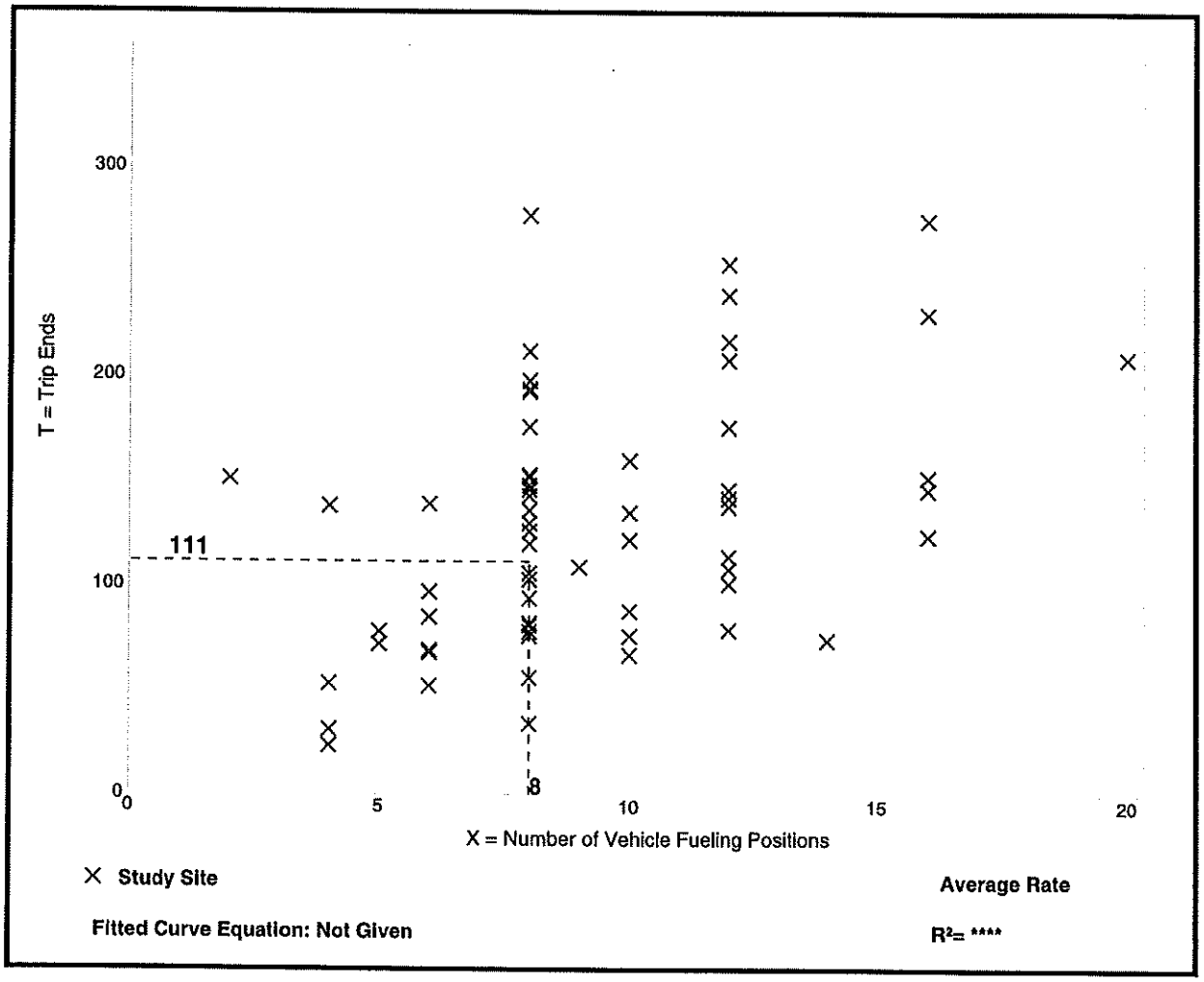
Gasoline/Service Station
(944)

Vehicle Trip Ends vs: **Vehicle Fueling Positions**
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: 65
Avg. Num. of Vehicle Fueling Positions: 9
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
13.91	4.25 - 75.50	6.93

Data Plot and Equation



Gasoline/Service Station
(944)

Vehicle Trip Ends vs: **Vehicle Fueling Positions**
On a: **Saturday, Peak Hour of Generator**

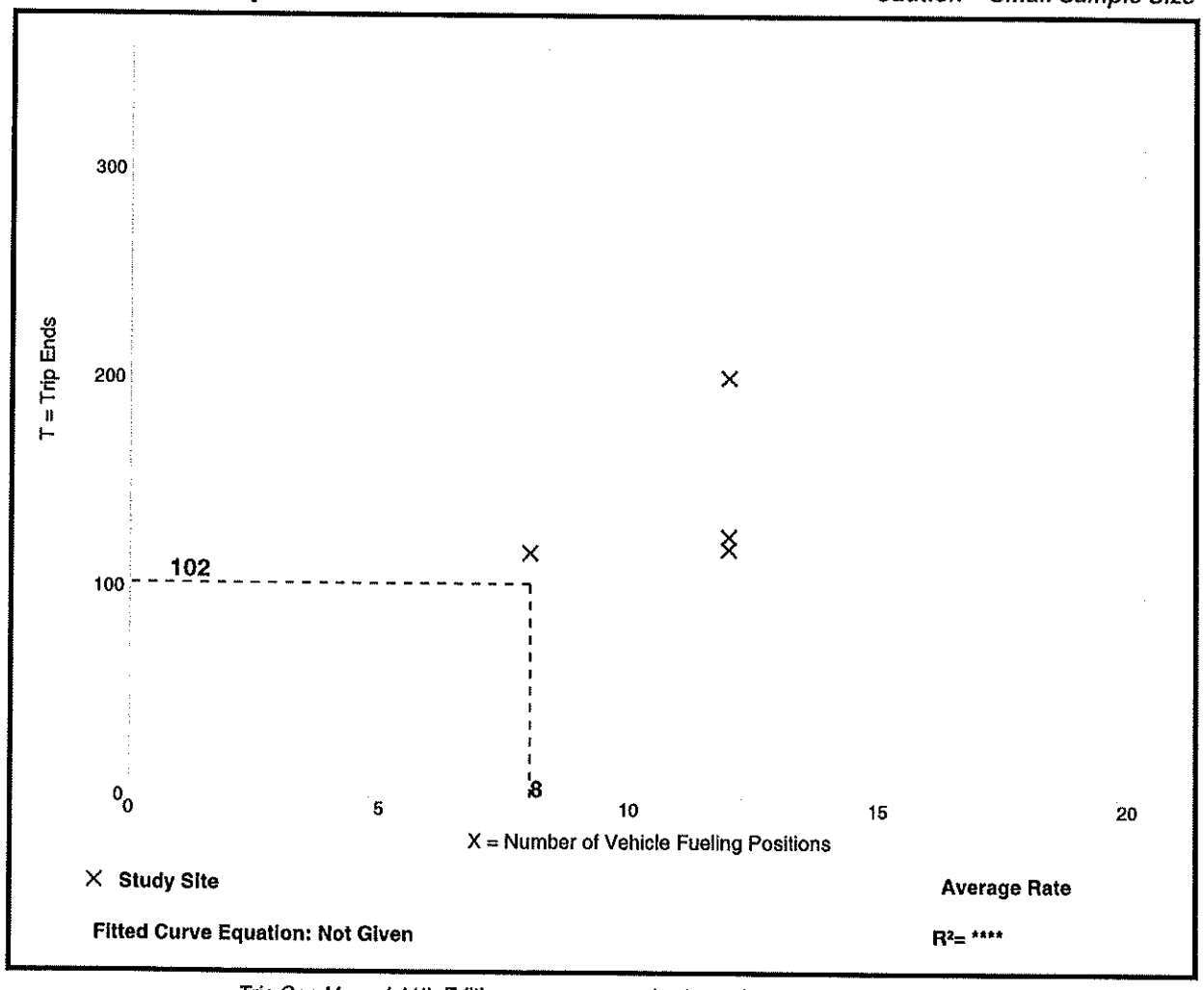
Setting/Location: **General Urban/Suburban**
Number of Studies: 4
Avg. Num. of Vehicle Fueling Positions: 11
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
12.77	9.92 - 16.75	3.40

Data Plot and Equation

Caution – Small Sample Size



Land Use: 945
Convenience Store/Gas Station

Description

A convenience store/gas station is a facility with a co-located convenience store and gas station. The convenience store sells grocery and other everyday items that a person may need or want as a matter of convenience. The gas station sells automotive fuels such as gasoline and diesel.

A convenience store/gas station is typically located along a major thoroughfare to optimize motorist convenience. Extended hours of operation (with many open 24 hours, 7 days a week) are common at these facilities.

The convenience store product mix typically includes pre-packaged grocery items, beverages, dairy products, snack foods, confectionary, tobacco products, over-the-counter drugs, and toiletries. A convenience store may sell alcohol, often limited to beer and wine. Coffee and pre-made sandwiches are also commonly sold at a convenience store. Made-to-order food orders are sometimes offered. Some stores offer limited seating.

The sites in this land use include both self-pump and attendant-pumped fueling positions and both pre-pay and post-pay operations.

Convenience store (Land Use 851), gasoline/service station (Land Use 944), and truck stop (Land Use 950) are related uses.

Land Use Subcategory

Multiple subcategories were added to this land use to allow for multi-variable evaluation of sites with single-variable data plots. All study sites are assigned to one of three subcategories, based on the number of vehicle fueling positions (VFP) at the site: between 2 and 8 VFP, between 9 and 15 VFP, and between 16 and 24 VFP. For each VFP range subcategory, data plots are presented with GFA as the independent variable for all time periods and trip types for which data are available. The use of both GFA and VFP (as the independent variable and land use subcategory, respectively) provides a significant improvement in the reliability of a trip generation estimate when compared to the single-variable data plots in prior editions of *Trip Generation Manual*.

Further, the study sites were also assigned to one of three other subcategories, based on the gross floor area (GFA) of the convenience store at the site: between 2,000 and 4,000 square feet, between 4,000 and 5,500 square feet, and between 5,500 and 10,000 square feet. For each GFA subcategory range, data plots are presented with VFP as the independent variable for all time periods and trip types for which data are available. The use of both VFP and GFA (as the independent variable and land use subcategory, respectively) provides a significant improvement in the reliability of a trip generation estimate when compared to the single-variable data plots in prior editions of *Trip Generation Manual*.

When analyzing the convenience store/gas station land use with each combination of GFA and VFP values as described above, the two sets of data plots will produce two estimates of site-generated trips. Both values can be considered when determining a site trip generation estimate.

Data plots are also provided for three additional independent variables: AM peak hour traffic on adjacent street, PM peak hour traffic on adjacent street, and employees. These independent variables are intended to be analyzed as single independent variables and do not have sub-categories associated with them. Within the data plots and within the ITETripGen web app, these plots are found under the land use subcategory "none."

Additional Data

ITE recognizes there are existing convenience store/gas station sites throughout North America that are larger than the sites presented in the data plots. However, the ITE database does not include any site with more than 24 VFP or any site with gross floor area greater than 10,000 square feet. Submission of trip generation data for larger sites is encouraged.

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 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), Arkansas, California, Connecticut, Delaware, Florida, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Nevada, New Hampshire, New Jersey, Pennsylvania, Rhode Island, South Dakota, Texas, Utah, Vermont, Washington, and Wisconsin.

Source Numbers

221, 245, 274, 288, 300, 340, 350, 351, 352, 355, 359, 385, 440, 617, 718, 810, 813, 844, 850, 853, 864, 865, 867, 869, 882, 883, 888, 904, 926, 927, 936, 938, 954, 960, 962, 977, 1004, 1024, 1025, 1027, 1052

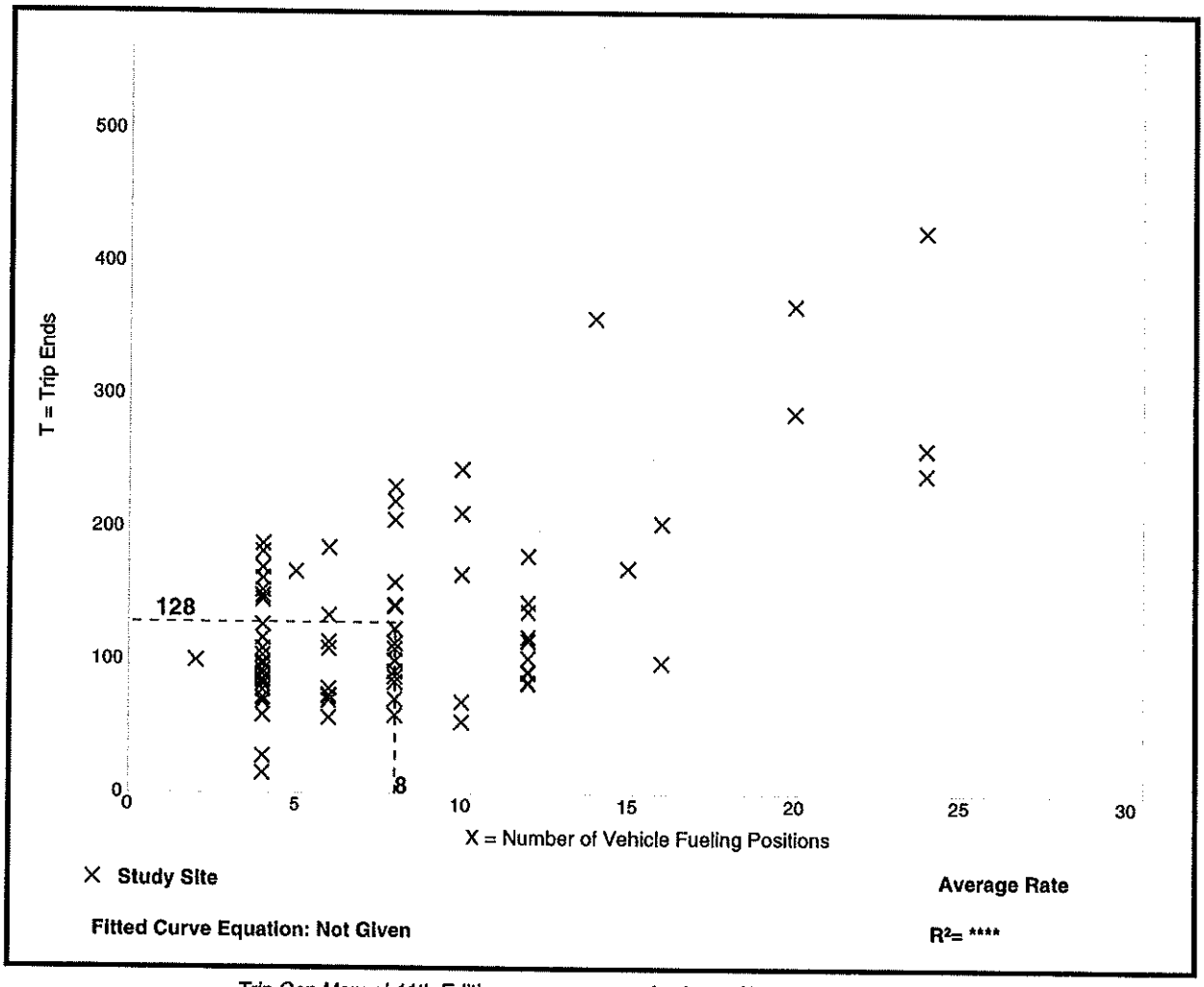
Convenience Store/Gas Station - GFA (2-4k)
(945)

Vehicle Trip Ends vs: **Vehicle Fueling Positions**
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: 76
Avg. Num. of Vehicle Fueling Positions: 8
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
16.06	3.75 - 50.00	8.79

Data Plot and Equation



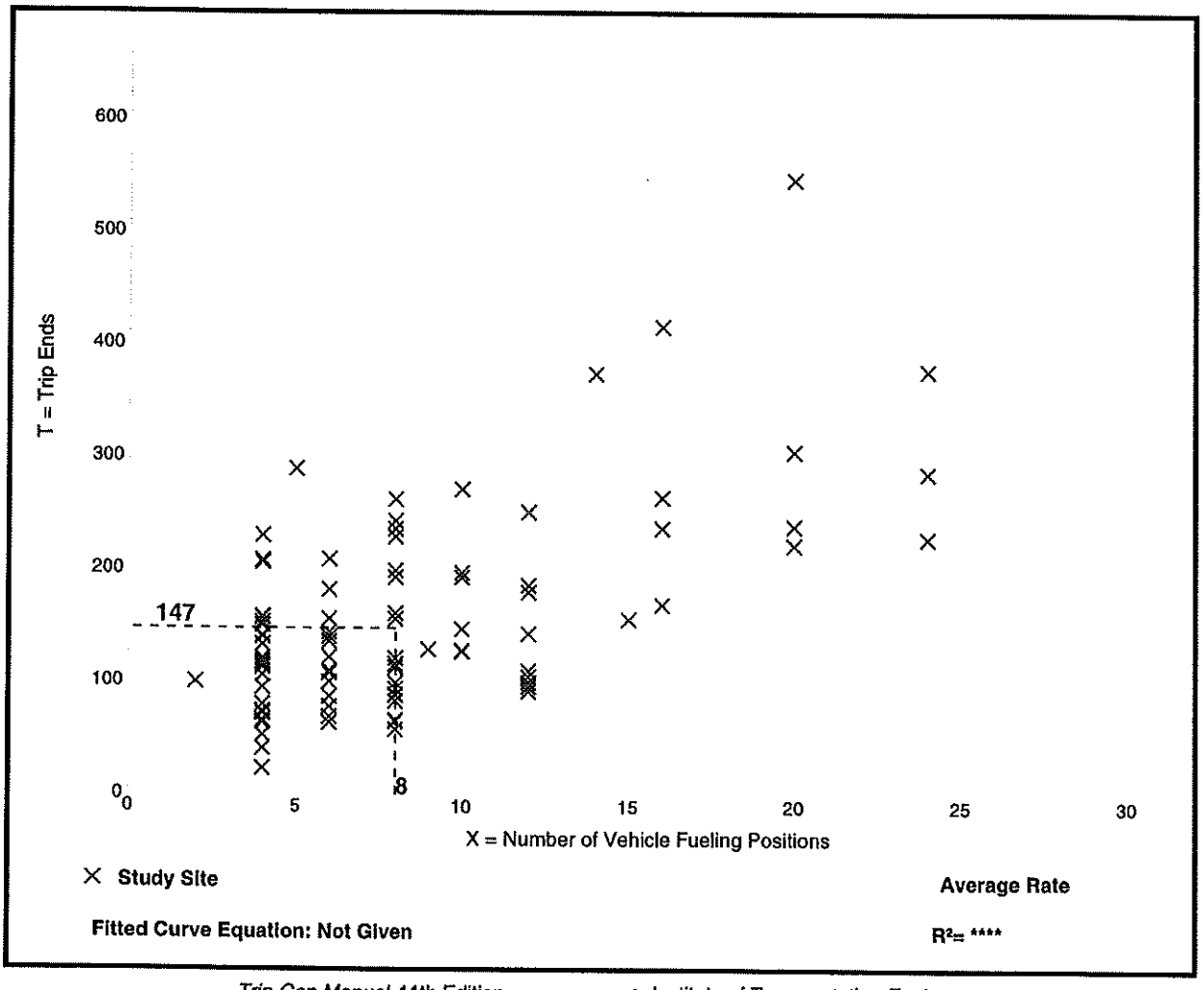
Convenience Store/Gas Station - GFA (2-4k)
(945)

Vehicle Trip Ends vs:	**Vehicle Fueling Positions**
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:	93
Avg. Num. of Vehicle Fueling Positions:	8
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
18.42	5.75 - 57.80	10.16

Data Plot and Equation



Convenience Store/Gas Station - GFA (2-4k)
(945)

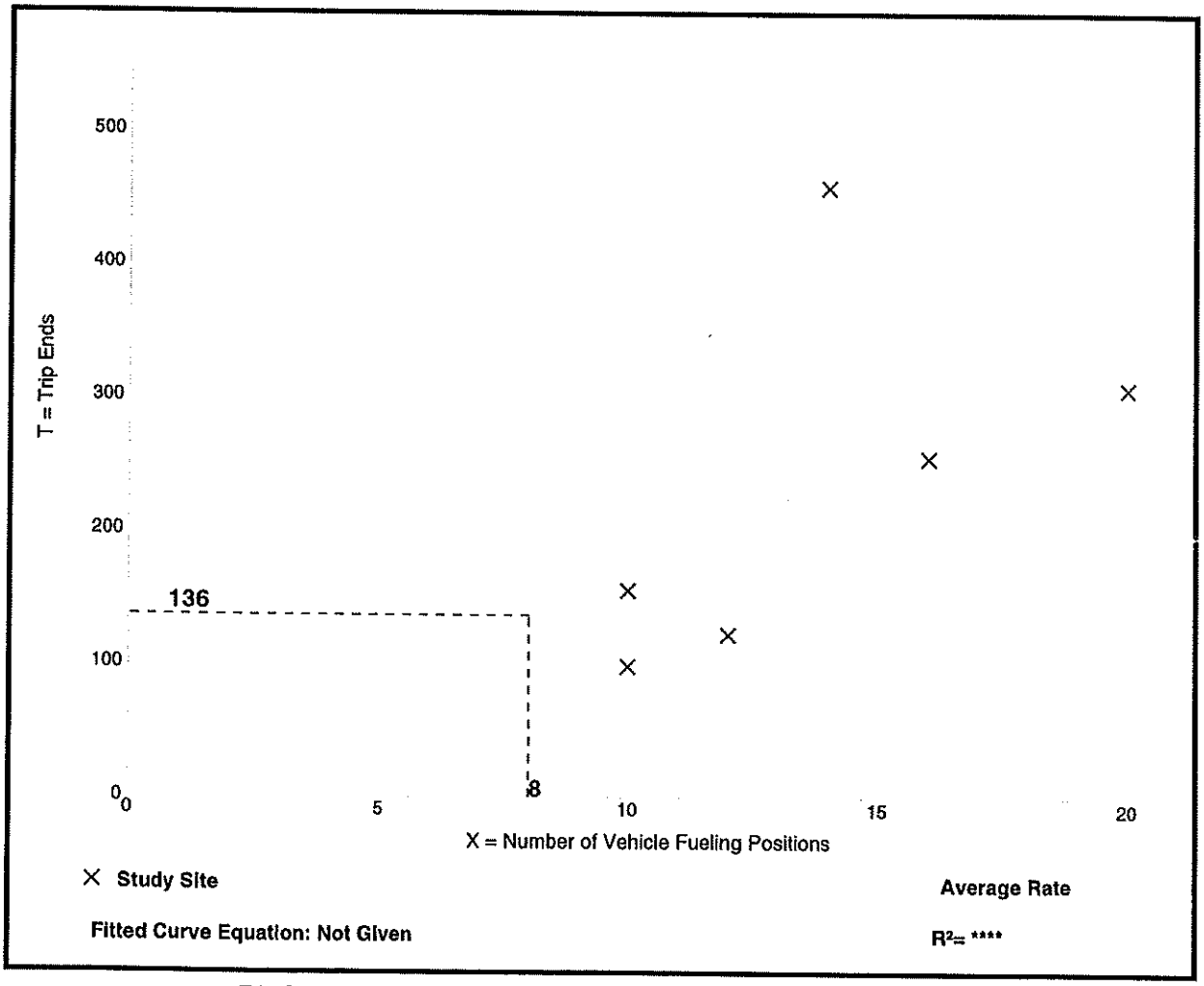
Vehicle Trip Ends vs: **Vehicle Fueling Positions**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 6
Avg. Num. of Vehicle Fueling Positions: 14
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
17.01	9.80 - 32.71	8.23

Data Plot and Equation



Land Use: 960 Super Convenience Market with Gas Station

Description

This land use includes gasoline/service stations with convenience markets where there is significant business related to the sale of convenience items and the fueling of motor vehicles. Some commonly sold convenience items include freshly brewed coffee, daily-made donuts, bakery items, hot and cold beverages, breakfast items, dairy items, fresh fruits, soups, light meals, ready-to-go and freshly made sandwiches and wraps, and ready-to-go salads. Stores typically also had automated teller machines (ATMs), and public restrooms. The sites included in this land use category have the following two specific characteristics:

- the gross floor area of the convenience market is at least 3,000 square feet
- the number of vehicle fueling positions is at least 10

Convenience market with gasoline pumps (Land Use 853) is a related use.

Additional Data

The average parking supply ratio for the ten study sites with parking supply information is 13 spaces per 1,000 square feet GFA.

The sites were surveyed in the 1990s and the 2000s in New Jersey.

Source Numbers

417, 433

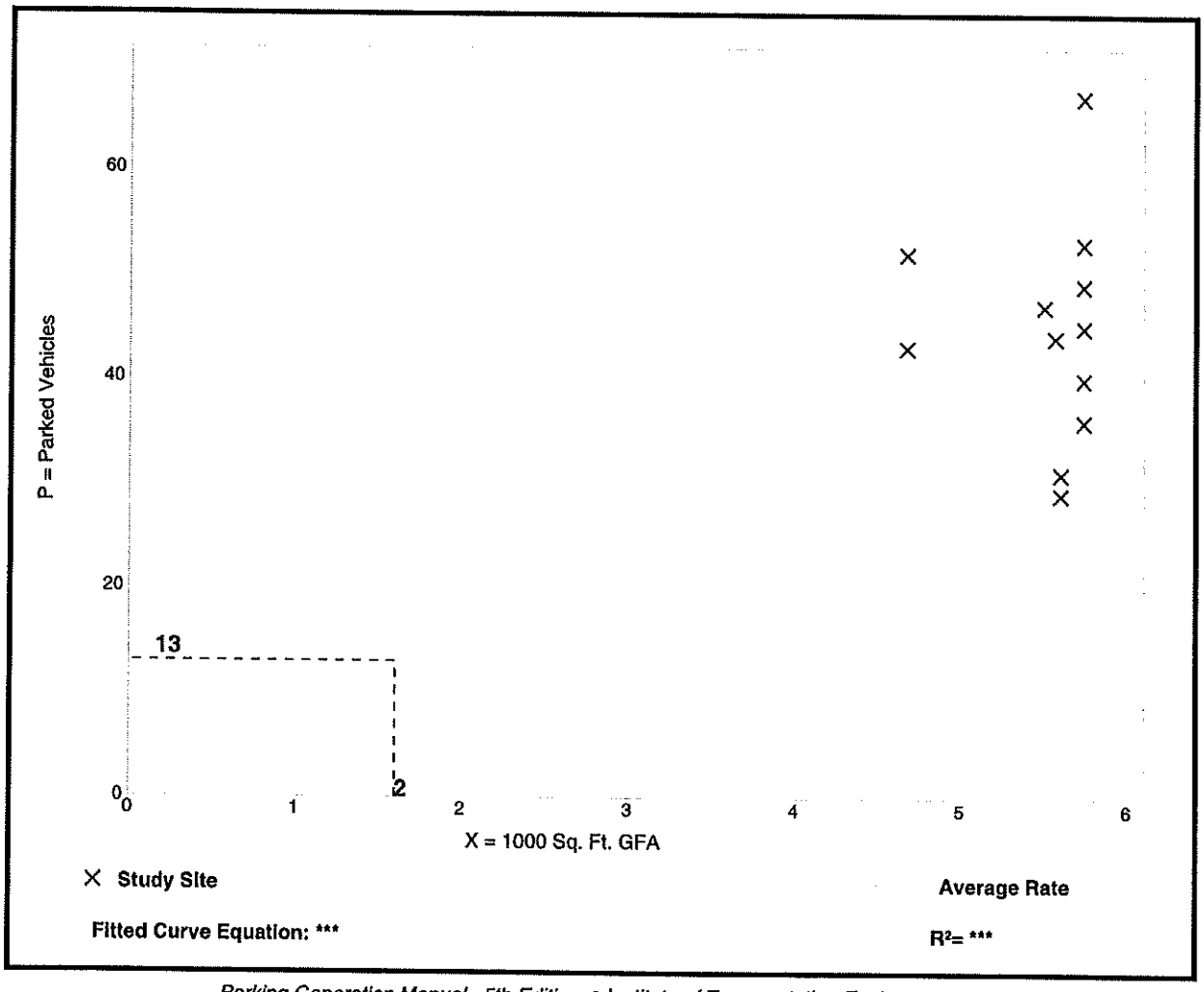
Super Convenience Market/Gas Station
(960)

Peak Period Parking Demand vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday (Monday - Friday)**
Setting/Location:	**General Urban/Suburban**
Peak Period of Parking Demand:	**7:00 - 8:00 a.m.; 11:00 a.m. - 12:00 p.m.**
Number of Studies:	12
Avg. 1000 Sq. Ft. GFA:	5.5

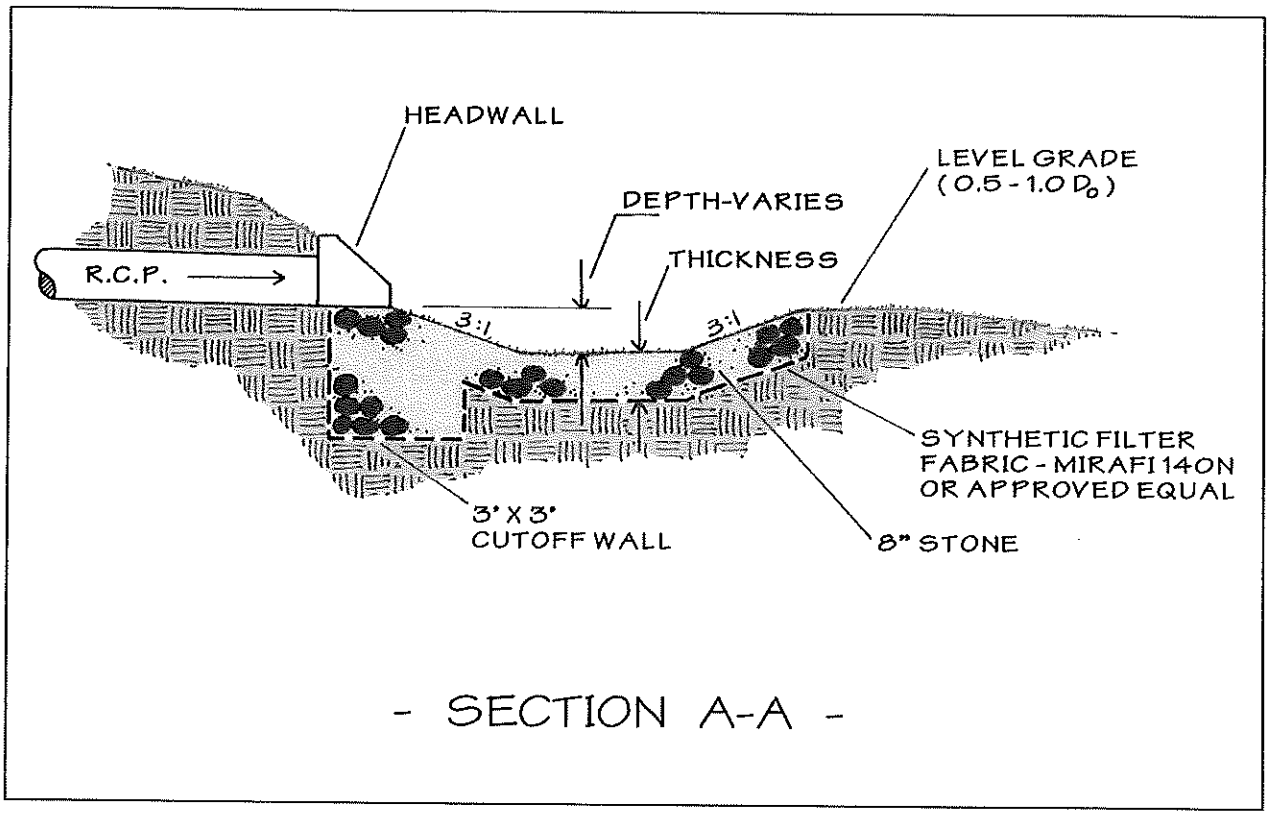
Peak Period Parking Demand per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
8.11	5.18 - 11.67	7.22 / 11.15	***	2.00 (25%)

Data Plot and Equation



Land Development Standards
Morris County, New Jersey



- SECTION A-A -

The Board of Chosen Freeholders
of the County of Morris

Prepared by the Morris County Planning Board

5. No part of any driveway shall be located within the minimum distance of a side property line as established in Table 500-4 and Figure 500-1. However, upon application to the Planning Board and approval the of design by the County Traffic Engineer, the Planning Board may permit a driveway serving two or more adjacent sites to be located on or within 10 feet of the side property line between the adjacent sites.

6. Driveways shall be designed to prevent vehicles from backing out on the County road.

C. Sight Distance of Driveways

1. Any exit driveway or driveway lane shall be so designed in profile and grading and shall be so located to permit the following minimum sight distance measured in each direction along the County road; the measurement shall be from the driver's seat of a vehicle standing on that portion of the exit driveway with the front of the vehicle a minimum of 10 feet behind the curb line or edge of shoulder of the County road; with the height of eye of 3.25 feet to top of object 4.0 feet above the pavement. (See Table 500-3.)

Table 500-3: Required Sight Distance

Allowable Speed on County Road	Required Sight Distance in Feet*
25 MPH	300 Ft.
30 MPH	350 Ft.
35 MPH	425 Ft.
40 MPH	475 Ft.
45 MPH	525 Ft.
50 MPH	600 Ft.

*** Where 25% or more of traffic using the driveway is comprised of single-unit trucks or tractor-trailer trucks, the above required sight-distance shall be increased by 25% and 50% respectively.**

D. Geometric Design

The geometric design of a driveway connection to a County road should be governed by sound traffic engineering principles. Below are guidelines in preparing a geometric design, but deviation from them may be necessitated from time to time due to the many variables encountered in the course of preparing a design. The applicant should be aware, therefore, that although the driveway layout may conform to these guidelines, conditions may dictate deviations from them and requirements of the County Traffic Engineer shall be final. Driveway design standards #1 through #3 are further described in Figure 500-1 and Table 500-4.

1. Two-Way Operation: Driveways used for two-way operation will intersect the County road at an angle to as near 90 degrees as site conditions will permit and in no case will be less than 60 degrees.

2. One-Way Operation: Driveways used by vehicles in one direction of travel (right turn only) shall not form an angle smaller than 45 degrees with a County road.

Chapter 360. Zoning

Article IX. Off-Street Parking and Loading

§ 360-53. Minimum required off-street parking spaces.

[Amended 10-25-2005 by Ord. No. 2005-21; 10-24-2006 by Ord. No. 2006-30]

A. Except in the case of one-family houses, no parking areas shall be established for fewer than four spaces.

B. Required spaces.
[Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I)]

Nonresidential Land Uses	**Required Off-Street Parking Spaces Per Indicated Area**
Assembly operations	1 per 800 square feet GFA
Bar	1 per 2 seats
Bowling alley	4 per alley
Car wash	10 per washing lane
Church/synagogue	1 per 3 seats
Dwellings	
Up to 6 units	2 per unit
Over 6 units	1 1/2 per unit
Fiduciary institutions	1 per 300 square feet GFA
Finishing operations	1 per 800 square feet GFA
Hotel	1 per guest room plus 1 per 1,000 square feet of GFA related to hotel operations exclusive of restaurant or catering facilities which must meet separate parking requirements listed herein
Industrial	1 per 800 square feet GFA
Library	1 per 300 square feet GFA
Manufacturing	1 per 800 square feet GFA
Medical center	1 per 250 square feet GFA
Neighborhood convenience center less than 400,000 square feet GFA	4 per 1,000 square feet GFA
Nightclub	1 per 3 seats
Offices	
Under 49,999 square feet GFA	4.5 per 1,000 GFA
50,000 to 99,999 square feet GFA	4 per 1,000 square feet GFA

Nonresidential Land Uses	Required Off-Street Parking Spaces Per Indicated Area
100,000+ square feet GFA	3.5 per 1,000 square feet GFA
Quick-food establishment	1 per 30 square feet GFA
Receiving	1 per 5,000 square feet GFA
Research	1 per 1,000 square feet GFA
Restaurant	1 per 3 seats
Retail store	1 per 200 square feet GFA
Schools	
Elementary	2 per classroom; but not less than 1 per teacher and staff
Intermediate	1.5 per classroom, but not less than 1 per teacher and staff
Secondary	2.5 per classroom, but not less than 1 per teacher and staff
Service station	4 per bay and work area
Shipping	1 per 5,000 square feet GFA
Shopping center	
Less than 400,000 square feet GFA	4 per 1,000 square feet GFA
400,000 to 599,999 square feet GFA	4.5 per 1,000 square feet GFA
600,000+ square feet GFA	5 per 1,000 square feet GFA
Storage areas	1 per 5,000 square feet GFA
Theater	1 per 3 seats
In shopping center	1 per 4 seats
Warehouse	1 per 5,000 square feet GFA

GFA = Gross floor area.

C. In the event that the number of parking spaces results in a fraction of a space, one more parking space shall be provided.

D. In cases of uses not specifically mentioned, the requirements for off-street parking facilities of similar uses shall apply. If no use can be described as similar to the proposed use, parking shall be required in accordance with the judgment of the Planning Board or the Zoning Board of Adjustment.

E. In the event of a mixed use, the required off-street parking shall be the sum of the required off-street parking for each use.

F. The gross floor area shall mean the total floor area at all floors and levels.

G. If the applicant can clearly demonstrate to the Planning Board or Zoning Board of Adjustment that, because of the nature of the operation of the permitted use, the above parking requirements are unnecessary and excessive, the Board may approve parking plans showing less parking area than required, in which event a landscaped area shall be reserved than can readily be converted to off-street parking if the conditions for allowing lesser parking ever change. If, in the opinion of the Board, because of the unusual nature of the applicant's business, the set forth parking standards are insufficient, the Board may require a greater number of parking spaces.

H. Required spaces. Single-family, two-family and duplex residence shall provide two spaces one of which must be provided in an enclosed garage.

JOHN A. DESCH, P.E.

CURRICULUM VITAE

EDUCATION:

University of Dayton, Dayton, Ohio, B.S. in Civil Engineering, 1972
Northwestern University, Traffic Institute, Evanston, Illinois, 1988
Certificate in Traffic Accident Reconstruction
University of North Florida, Institute of Police Technology Management,
Seminars in Accident Reconstruction

ACCREDITATION:

State of New Jersey Professional Engineer, P.E. #25885
State of New York Professional Engineer, P.E. #082213
State of Pennsylvania Professional Engineer, P.E. #071482
State of Ohio Professional Engineer, P.E. #70630
Former Construction Official, Building Subcode Official and Building Inspector
I.C.S. License #001384
Full Accreditation: Accreditation Commission for Traffic Accident Reconstructionists
(ACTAR #46)

PROFESSIONAL SOCIETIES:

Society of Automotive Engineers
National Society of Professional Engineers
Institute of Transportation Engineers
National Association of Traffic Accident Reconstructionists & Investigators
New Jersey Association of Accident Reconstructionists
Human Factors and Ergonomics Society

EXPERIENCE:

Self-employed Traffic Consultant and Accident Reconstructionist, 1988 to Present
Instructor in Accident Investigation Programs
Director of Municipal Services, Storch Engineers, 1983 - 1988
Borough Engineer, Lincoln Park, New Jersey, 1983 - 1988
Director of Public Works and Township Engineer, Clark, New Jersey, 1981 – 1983
Principal Engineer and Traffic Engineer, Wayne, New Jersey, 1976 - 1981
Captain, United States Army Reserve, Corps of Engineers

MISCELLANEOUS:

Expert witness before numerous public review boards as well as administrative law, criminal and civil courts with respect to knowledge and experience in the science of engineering as it relates to municipal and traffic engineering and accident reconstruction.

Served as expert commentator for live Court TV programs regarding accident reconstruction trials.

GARY K. ANDERSON, P.E.

CURRICULUM VITAE

EDUCATION:

Stevens Institute of Technology, Hoboken New Jersey
Bachelor of Engineering in Civil Engineering - 1999

CERTIFICATIONS:

State of New Jersey Professional Engineer, P.E. #45110
Fully Accredited Traffic Accident Reconstructionist,
Accreditation Commission for Traffic Accident Reconstruction, A.C.T.A.R. #2227
State of New Jersey Building Inspector R.C.S. #009624
Commonwealth of Pennsylvania, Residential Building Inspector #005714

PROFESSIONAL SOCIETIES:

ASCE American Society of Civil Engineers
ITE Institute of Transportation Engineers
NSPE National Society of Professional Engineers
NJAAR New Jersey Association of Accident Reconstructionists
ICC International Code Council
NYSTARS New York Statewide Traffic Accident Reconstruction Society

EXPERIENCE:

Civil Engineer, URS Corporation, 1999-2003
Civil Engineer and Accident Reconstructionist, John Desch Associates, Inc.,
an Accident Reconstruction and Traffic Engineering Firm, 2003-Present

TRAINING:

McTrans
Highway Capacity Software Training, 2003
New Jersey Department of Transportation
Context Sensitive Design Training, 2001
American Society of Civil Engineers
Roadside Design Training, 2000
Trafficware
Synchro and SimTraffic Training, 2004
County College of Morris
Building Inspector R.C.S. Course, 2006
Bergen Community College
Construction Sub-Code Official Course, 2007