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TRAFFIC AND PARKING STUDY

FOR

KINGDOM HALL OF JEHOVAH'S WITNESSES

2900 West Bangs Avenue
Block 26.01, Lot 33
Township of Neptune
Monmouth County, New Jersey

January 3, 2023

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INTRODUCTION

Dolan & Dean Consulting Engineers, LLC (D&D) has prepared this Traffic and Parking Study in support of the parking lot improvements of Block 26.01, Lot 33 in the Township of Neptune, Monmouth County. The site is located at the southwest corner of the intersection of West Bangs Avenue and Wayside Road.

Under the development program, the existing Kingdom Hall of Jehovah's Witnesses site would be modified with 25 additional spaces, enhanced landscaping, and a solar panel canopy over the rear parking area. No changes are proposed to seating capacity of site There is no anticipated increase in membership/attendance. However, a traffic study has been requested to assess possible impacts at the Wayside Road intersection with West Bangs Avenue.

EXISTING CONDITIONS

The site is located at the southwest corner of the intersection of West Bangs Avenue and Wayside Road as shown on appended Figure 1. As noted, the site is developed with a Kingdom Hall of Jehovah's Witnesses.

EXISTING ROADWAY CONDITIONS

West Bangs Avenue is an urban major collector under Monmouth County jurisdiction with a general east-west orientation. One lane of travel is provided in each direction with a posted speed limit of 40 miles per hour. The street primarily serves single family residential type buildings in the site vicinity. Shoulders with varying width are provided but sidewalk is not.

Wayside Road is an urban major collector under municipal jurisdiction with a general north-south orientation. One lane of travel is provided in each direction with a posted speed limit of 25 miles per hour. The street primarily serves single family residential type buildings in the site vicinity. No shoulder or sidewalk is provided along the roadway.

West Bangs Avenue and Wayside Road come together to form a 4-leg STOP-sign controlled intersection with a flashing yellow/red signal. Movements along West Bangs Avenue have the right of way.

EXISTING TRAFFIC VOLUMES

To review the traffic conditions surrounding the subject site, manual turning movement counts were conducted during the weekday evening and Sunday peak hour at the intersection of West Bangs Avenue and Wayside Road and at the site driveway along

Wayside Road. These counts were performed on Thursday, November 10, 2022, from 7:00 p.m. to 9:00 p.m. and Sunday November 13, 2022, from 12:00 p.m. to 2:00 p.m. to capture peak activity at Kingdom Hall.

The traffic count data is appended. The existing peak hour volumes are summarized on appended Figure 2.

EXISTING TRAFFIC CONDITIONS

While traffic volumes provide a measure of activity on the area roadway system, it is also important to evaluate how well that system can accommodate those volumes – i.e., a comparison of peak hour traffic volumes with available roadway capacity. Capacity represents the maximum number of vehicles that can be accommodated given the constraints of roadway geometry, environment, traffic characteristics, and controls. Intersections are usually the critical point in any road network since it is at such points that conflicts exist between through, crossing, and turning traffic. It is at these locations where congestion is most likely to occur. A description of intersection Levels of Service is noted below.

INTERSECTION LEVELS OF SERVICE AND DELAY

Level of Service	Signalized Delay per Vehicle (seconds)	Unsignalized Delay per Vehicle (seconds)
A	< 10.0	<0-10
B	>10 and <20	>10 to <15
C	>20 and < 35	>15 to <25
D	>35 and < 55	> 25 to <35
E	>55 and < 80	> 35 to <50
F	> 80	>50

A volume/capacity Level of Service analysis[1] was conducted for the existing peak hour traffic volumes at the subject intersections using the updated Highway Capacity Manual (HCM) and the Highway Capacity Software (HCS) that follows the HCM procedures. This type of analysis is performed to assist intersection operations and to identify any areas of excessive delay or congestion.

From the analyses and because of the very low traffic volumes on the roadway system, all movements at the site driveway and at the intersection of West Bangs Avenue & Wayside Road operate at very favorable Levels of Service "C" or better during both peak hours. The existing peak hour Levels of Service are summarized on appended Figure 3.

Observations made during the traffic counts show that the site driveway and adjacent intersection operate free from congestion or any significant delays, thus confirming the HCS and LOS modeling.

[1] See Technical Appendix for volume/capacity analysis and Level of Service descriptions.

TRIP GENERATION

PROJECTED TRIP GENERATION

Data compiled by the ITE is typically used to forecast trip generation for new development. Based on a review of the 11th Edition of the ITE Trip Generation Manual, Land Use 560 – "Church" is applicable to the development proposal. Table I below summarizes the weekday evening and Sunday peak hour trip generation based on building size and the number of seats provided.

TABLE I
TRIP GENERATION PROJECTIONS

Size	Evening Peak Hour			Sunday Peak Hour		
	Enter	Exit	Total	Enter	Exit	Total
8,480 SF	14	10	24	77	83	160
350 Seats	34	22	56	80	84	164

As noted from the anticipated traffic generation, the proposed use will generate minimal peak hour traffic activity during the week. On Sundays it is expected that Kingdom Hall will have a weekly surge of arrivals and departures around its weekly scheduled Sunday meeting.

Additionally, the actually, existing trip generation was tabulated during peak hours for the existing Kingdom Hall before/after the twice weekly meetings on Thursday evenings and Sunday afternoons. Table II summarizes the peak hour trips for the existing 8,480 square foot/350 seat Kingdom Hall during the weekday evening and Sunday peak hours.

TABLE II
EXISTING TRIP GENERATION
8,480 SF/350 SEAT – KINGDOM HALL

Evening Peak Hour			Sunday Peak Hour		
Enter	Exit	Total	Enter	Exit	Total
45	2	47	96	8	104

As shown, existing trip activity for the peak hours is less than the ITE trip generation projections with the exception of the evening peak hour projection based off of building size. Therefore, the Kingdom Hall is underperforming in terms of trips to/from the site according to ITE data collected at similar uses.

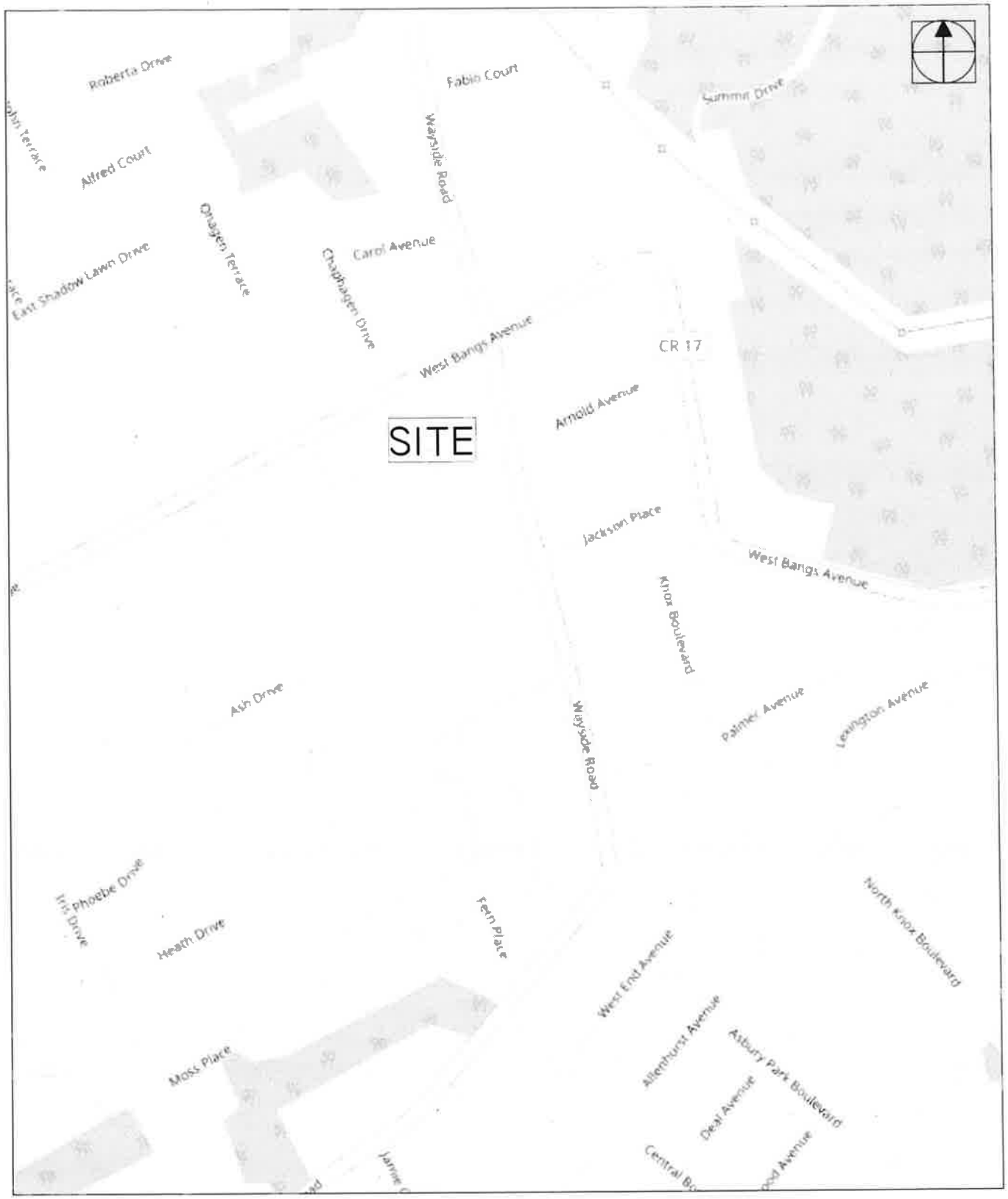
PARKING

The ordinance parking requirements are 1 parking space per 4 seats (or 12 feet of pew). This equates to 88 required parking spaces for the 350 seats (every 3 feet of pew horizontally is considered a seat) provided. Currently, the site provides 122 parking spaces. The plan proposes 25 additional parking spaces bringing the total on site to 147 spaces including the 5 ADA parking spaces.

The 5th Edition of the ITE Parking Generation Manual provides hour-by-hour parking demand tables for many land uses, including churches. Using the ITE projections based on 8,480 square foot church and a 350-seat Church, 80 parking spaces and 77 parking spaces are recommended respectively.

The Kingdom Hall exceeds both the town ordinance for parking and the ITE parking generation projections for the maximum amount of parking needed for a Church based on both building size and seating provided. Therefore, the amount of parking provided is more than sufficient for the use. The proposed extra 25 parking spaces will ensure the parking provided can support the Kingdom Hall's use during its largest drawing occasions/events.

TECHNICAL APPENDIX

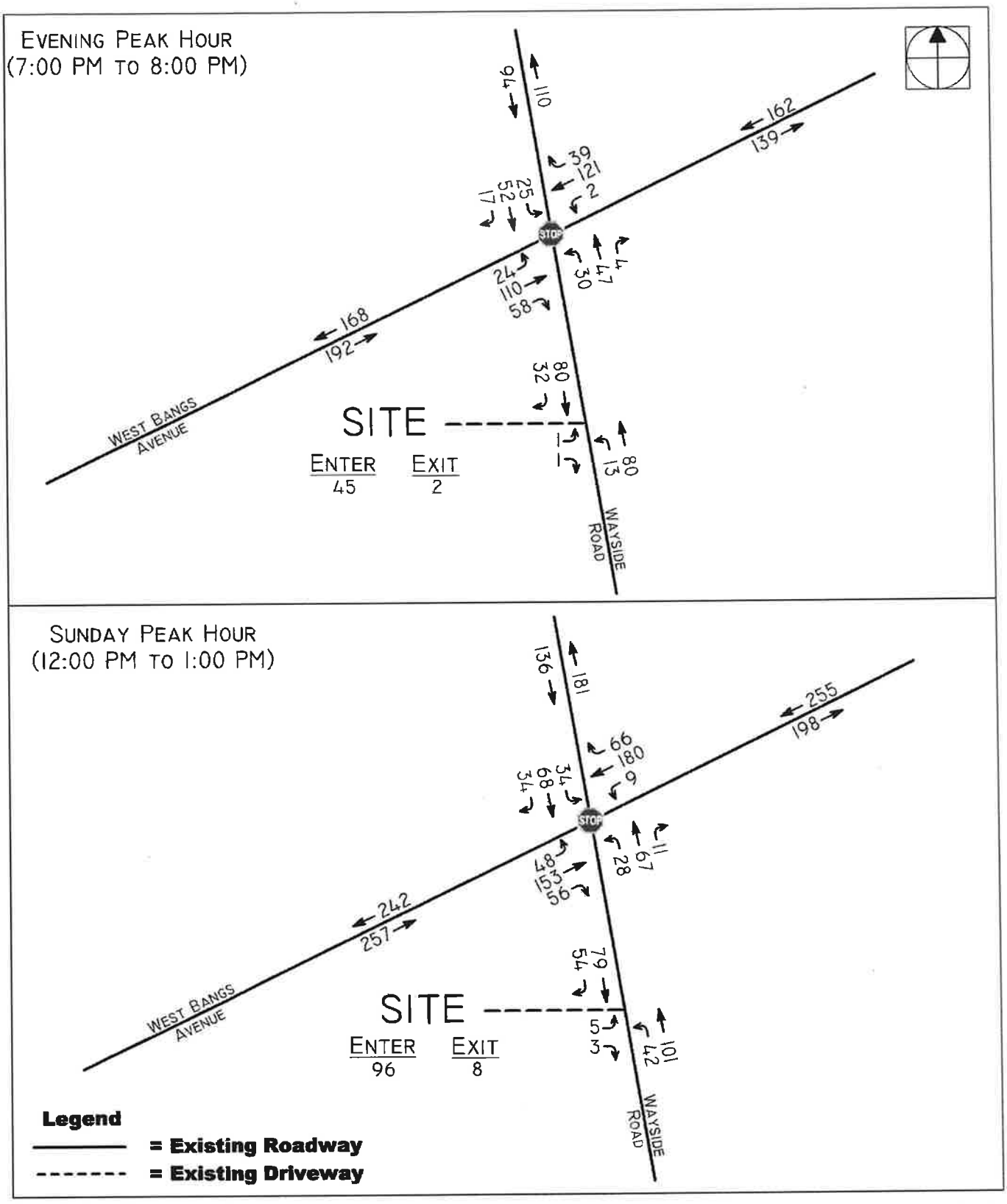


PROPOSED PARKING EXPANSION
NEPTUNE TOWNSHIP
MONMOUTH COUNTY, NEW JERSEY

FIGURE 1

DOLAN&DEAN
CONSULTING ENGINEERS, LLC

SITE LOCATION MAP

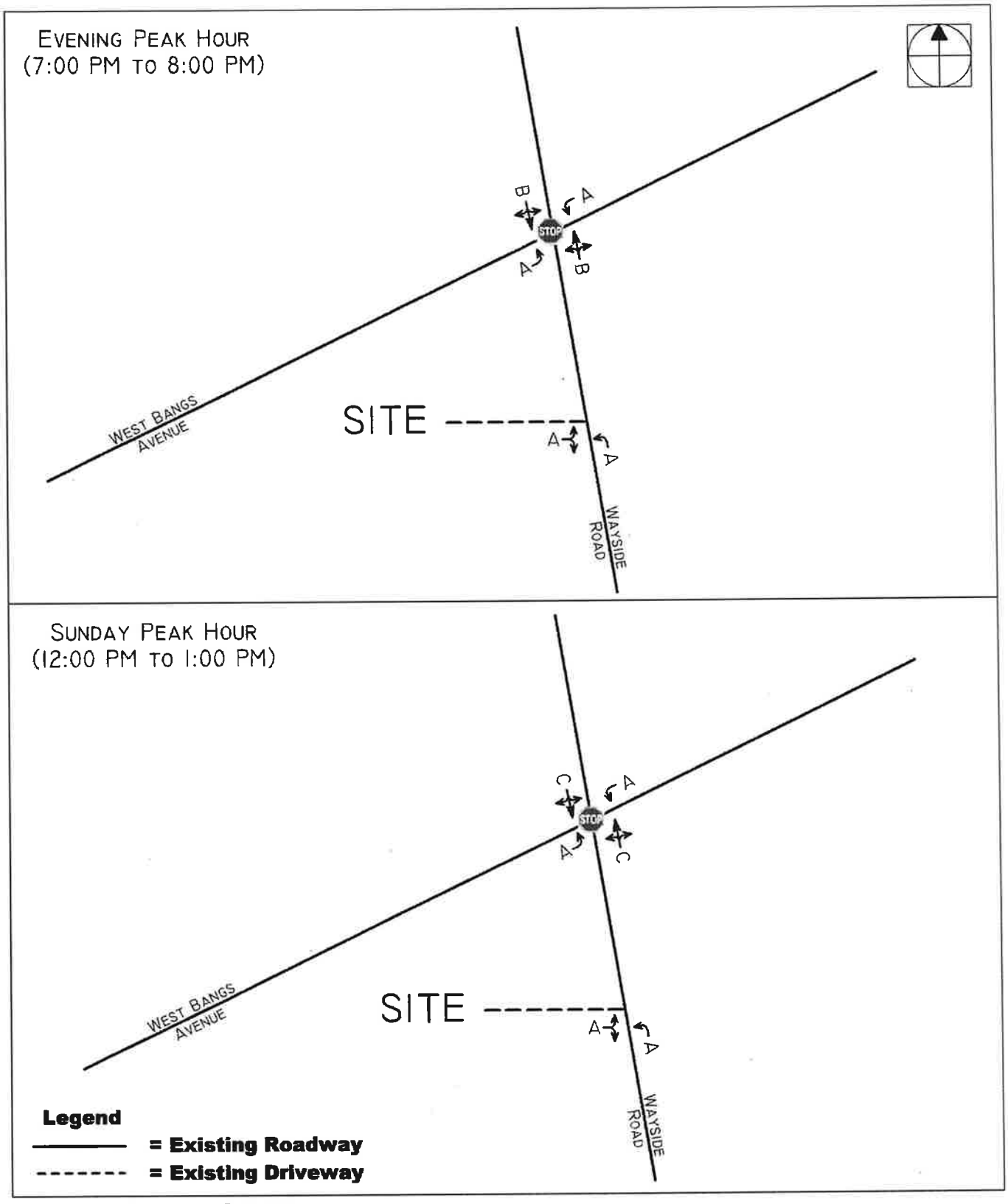


PROPOSED PARKING EXPANSION
NEPTUNE TOWNSHIP
MONMOUTH COUNTY, NEW JERSEY

FIGURE 2

DOLAN&DEAN
CONSULTING ENGINEERS, LLC

2022 EXISTING TRAFFIC VOLUMES



PROPOSED PARKING EXPANSION
NEPTUNE TOWNSHIP
MONMOUTH COUNTY, NEW JERSEY

FIGURE 3

DOLAN&DEAN
CONSULTING ENGINEERS, LLC

2022 EXISTING LEVELS OF SERVICE

Prepared by National Data & Surveying Services

Wayside Rd & W Bangs Ave

Peak Hour Turning Movement Count

ID: 22-340105-001
City: Neptune City

Day: Thursday
Date: 11/17/2022

PEAK HOURS

AM	NONE
NOON	NONE
PM	07:00 PM - 08:00 PM

COUNT PERIODS

AM	NONE
NOON	NONE
PM	7:00 PM - 09:00 PM

CONTROL: 2-Way Stop(NB/SB)

	AM	NOON	PM
TEV	0	0	529
PHF			0.84

SOUTHBOUND (Wayside Rd)

AM	0	0	0	0	0	AM
NOON	0	0	0	0	0	NOON
PM	17	52	25	0	110	PM

EASTBOUND (W Bangs Ave)

AM	NOON	PM	
0	0	168	⇦
0	0	0	↶ 0
0	0	24	↱ 0
0	0	110	→ 1
0	0	58	↴ 0

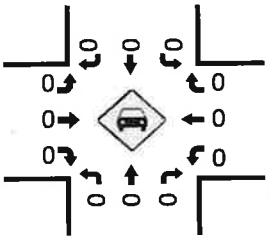
WESTBOUND (W Bangs Ave)

	PM	NOON	AM
0 ↰	39	0	0
1 ←	121	0	0
0 ↰	2	0	0
0 ↶	0	0	0
⇨	139	0	0

NORTHBOUND (Wayside Rd)

PM	112	0	30	47	4	PM
NOON	0	0	0	0	0	NOON
AM	0	0	0	0	0	AM

Cars (AM)



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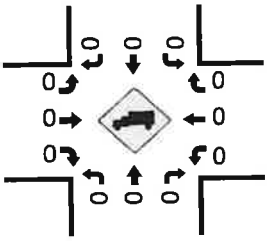
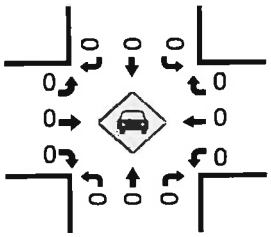


Cars (NOON)



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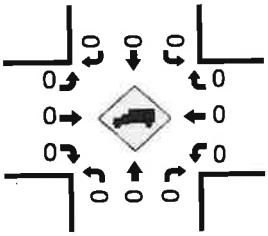

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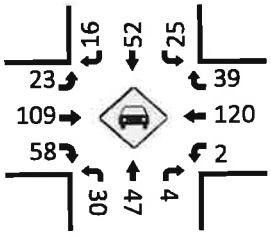
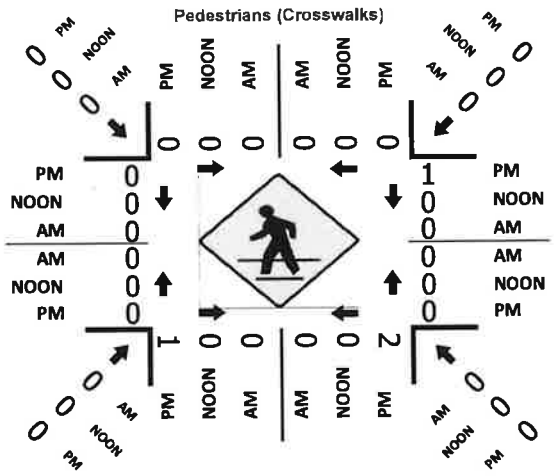


Pedestrians (Crosswalks)



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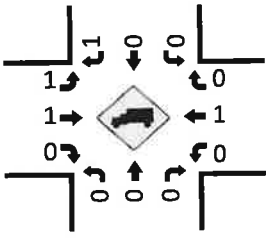


Prepared by National Data & Surveying Services

Wayside Rd & Kingdom Hall of Jehovah's Witnesses Dwy

Peak Hour Turning Movement Count

ID: 22-340105-002
City: Neptune City

Day: Thursday
Date: 11/17/2022

PEAK HOURS

AM	NONE
NOON	NONE
PM	07:00 PM - 08:00 PM

COUNT PERIODS

AM	NONE
NOON	NONE
PM	7:00 PM - 09:00 PM

Wayside Rd

SOUTHBOUND

AM	0	0	0	0	0	AM
NOON	0	0	0	0	0	NOON
PM	32	80	0	0	81	PM

0 1 0 0

EASTBOUND — Kingdom Hall of Jehovah's Witnesses Dwy

AM	NOON	PM	
0	0	45	
0	0	0	0
0	0	1	0
0	0	0	1
0	0	1	0
AM	NOON	PM	

CONTROL

1-Way Stop(EB)

	AM	NOON	PM
TEV	0	0	207
PHF			0.72

WESTBOUND — Kingdom Hall of Jehovah's Witnesses Dwy

PM	NOON	AM	
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	
PM	NOON	AM	

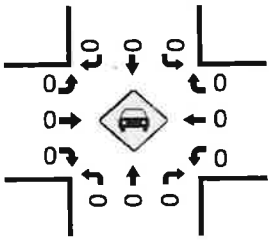
0 0 1 0

NORTHBOUND

PM	81	0	13	80	0	PM
NOON	0	0	0	0	0	NOON
AM	0	0	0	0	0	AM

Wayside Rd

Cars (AM)



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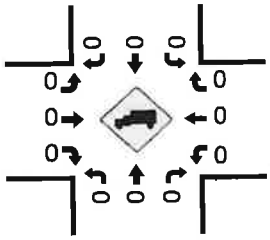
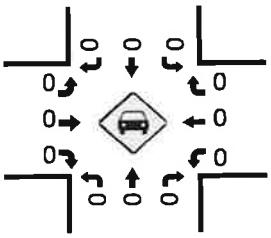


Cars (NOON)



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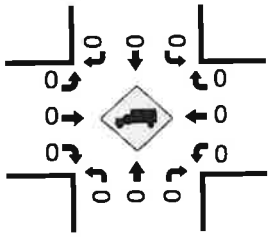
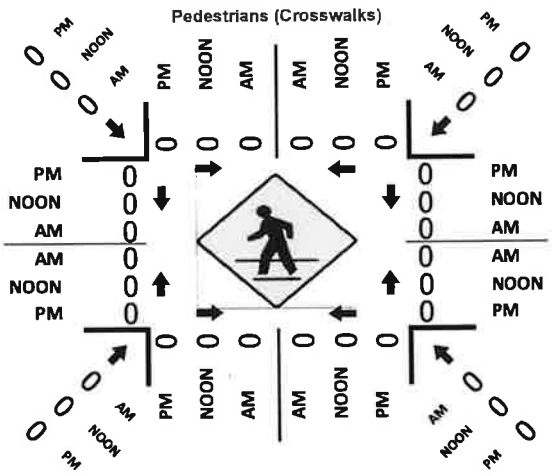


Pedestrians (Crosswalks)



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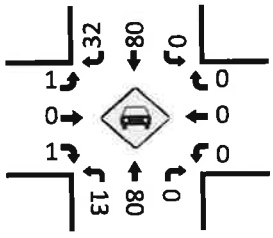

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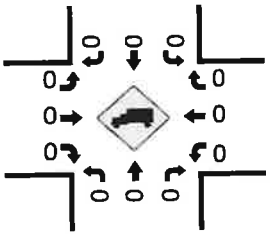


Prepared by National Data & Surveying Services

Wayside Rd & W Bangs Ave

Peak Hour Turning Movement Count

ID: 22-340105-001
City: Neptune City

Day: Sunday
Date: 11/20/2022

PEAK HOURS

AM	NONE
NOON	12:00 PM - 01:00 PM
PM	NONE

COUNT PERIODS

AM	NONE
NOON	12:00 PM - 02:00 PM
PM	NONE

CONTROL: 2-Way Stop(NB/SB)

	AM	NOON	PM
TEV	0	738	0
PHF		0.89	

SOUTHBOUND (Wayside Rd)

AM	0	0	0	0	0	AM
NOON	20	67	34	0	180	NOON
PM	0	0	0	0	0	PM
	0	1	0	0		

EASTBOUND (W Bangs Ave)

AM	NOON	PM	
0	228	0	
0	0	0	0
0	48	0	0
0	153	0	1
0	56	0	0
AM	NOON	PM	

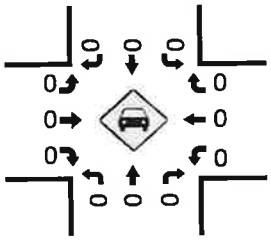
WESTBOUND (W Bangs Ave)

PM	NOON	AM	
0	66	0	0
0	180	0	1
0	9	0	0
0	0	0	0
0	198	0	
PM	NOON	AM	

NORTHBOUND (Wayside Rd)

	0	0	1	0		
PM	0	0	0	0	0	PM
NOON	132	0	28	66	11	NOON
AM	0	0	0	0	0	AM

Cars (AM)



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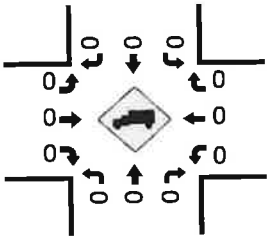

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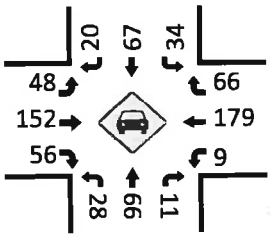

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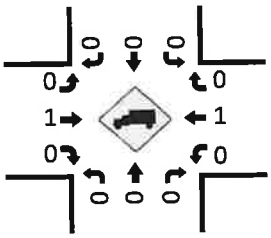

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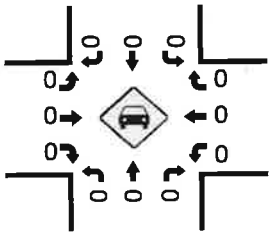
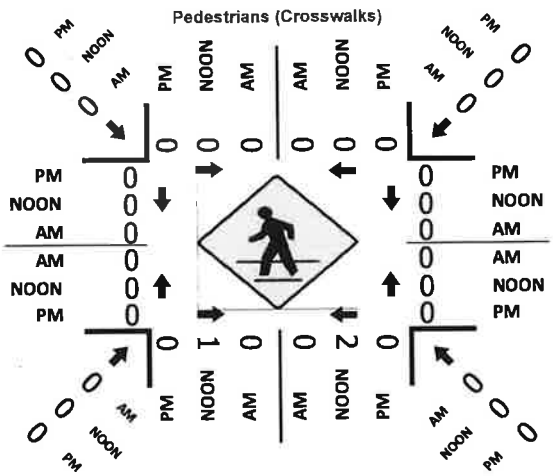


Pedestrians (Crosswalks)



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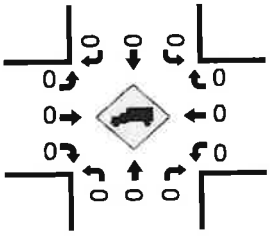


Prepared by National Data & Surveying Services

Wayside Rd & Kingdom Hall of Jehovah's Witnesses Dwy

Peak Hour Turning Movement Count

ID: 22-340105-002
City: Neptune City

Day: Sunday
Date: 11/20/2022

PEAK HOURS

AM	NONE
NOON	12:00 PM - 01:00 PM
PM	NONE

COUNT PERIODS

AM	NONE
NOON	12:00 PM - 02:00 PM
PM	NONE

Wayside Rd

SOUTHBOUND

AM	0	0	0	0	0	AM
NOON	54	79	0	0	106	NOON
PM	0	0	0	0	0	PM

0 1 0 0

EASTBOUND — Kingdom Hall of Jehovah's Witnesses Dwy

AM	NOON	PM	
0	96	0	
0	0	0	0
0	5	0	0
0	0	0	1
0	3	0	0
AM	NOON	PM	

CONTROL

1-Way Stop(EB)

	AM	NOON	PM
TEV	0	284	0
PHF		0.72	

WESTBOUND — Kingdom Hall of Jehovah's Witnesses Dwy

PM	NOON	AM	
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	
PM	NOON	AM	

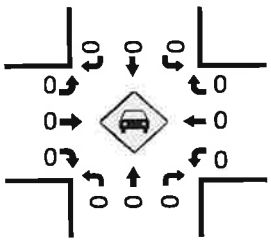
0 0 1 0

NORTHBOUND

PM	0	0	0	0	0	PM
NOON	82	0	42	101	0	NOON
AM	0	0	0	0	0	AM

Wayside Rd

Cars (AM)



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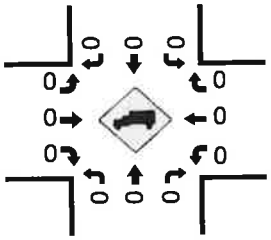
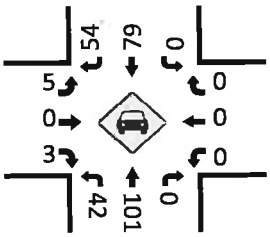


Cars (NOON)



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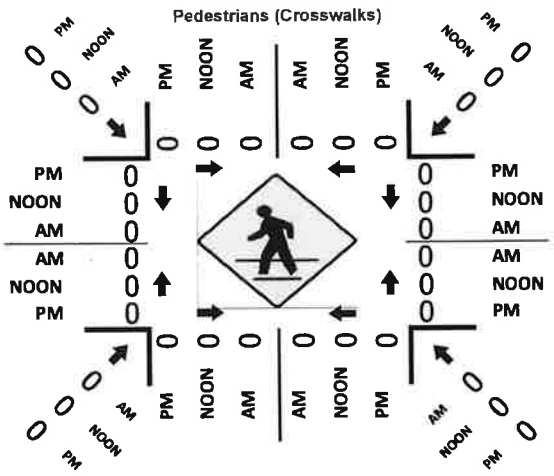

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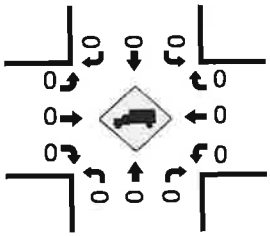

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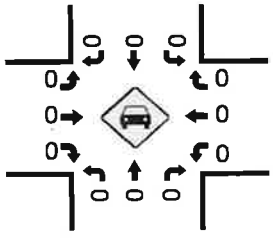

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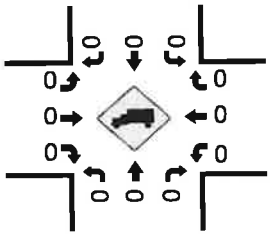


Church
(560)

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

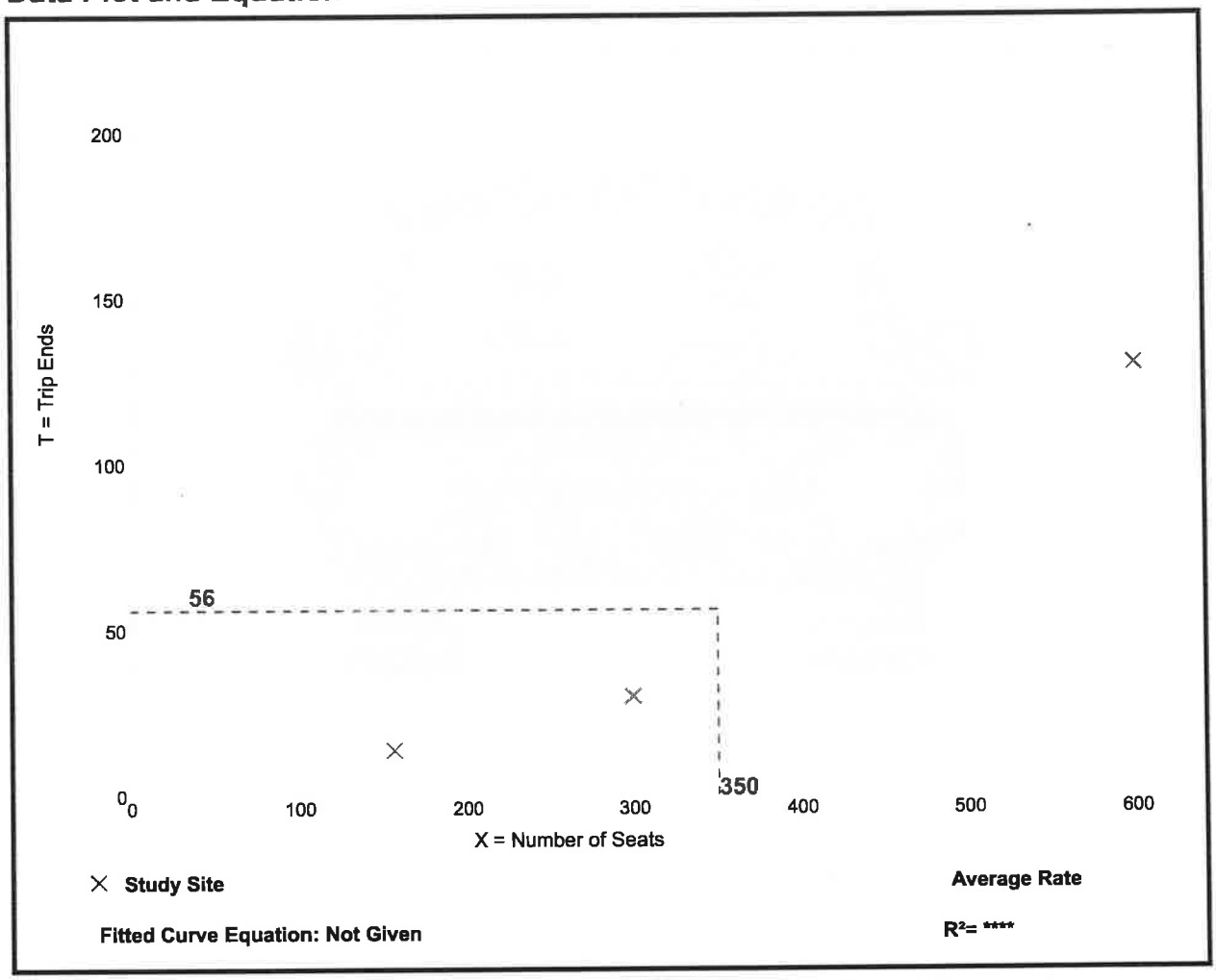
Setting/Location: **General Urban/Suburban**
Number of Studies: 3
Avg. Num. of Seats: 352
Directional Distribution: 60% entering, 40% exiting

Vehicle Trip Generation per Seat

Average Rate	Range of Rates	Standard Deviation
0.16	0.09 - 0.22	0.07

Data Plot and Equation

Caution – Small Sample Size



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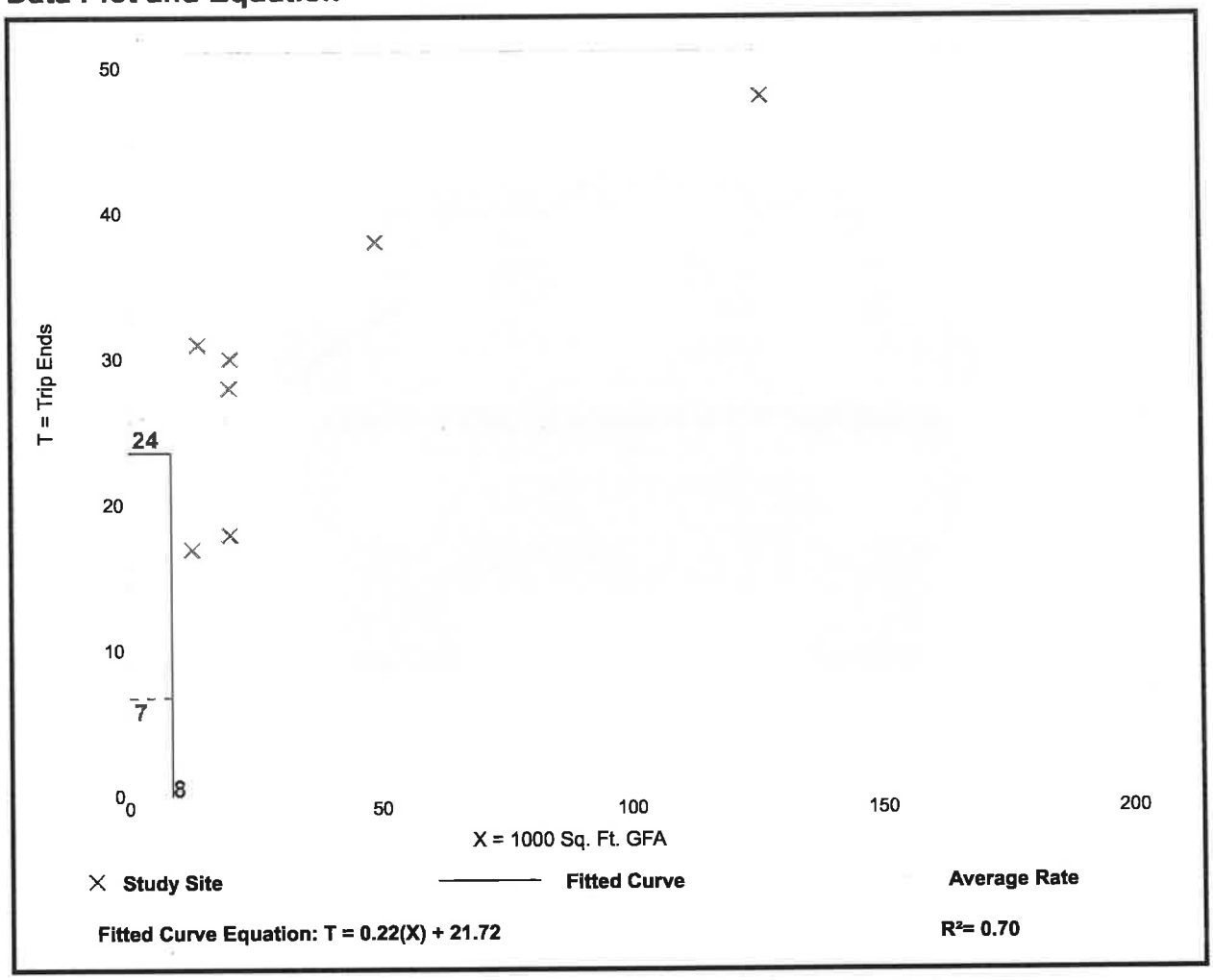
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 7
Avg. 1000 Sq. Ft. GFA: 37
Directional Distribution: 59% entering, 41% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.80	0.38 - 2.21	0.56

Data Plot and Equation



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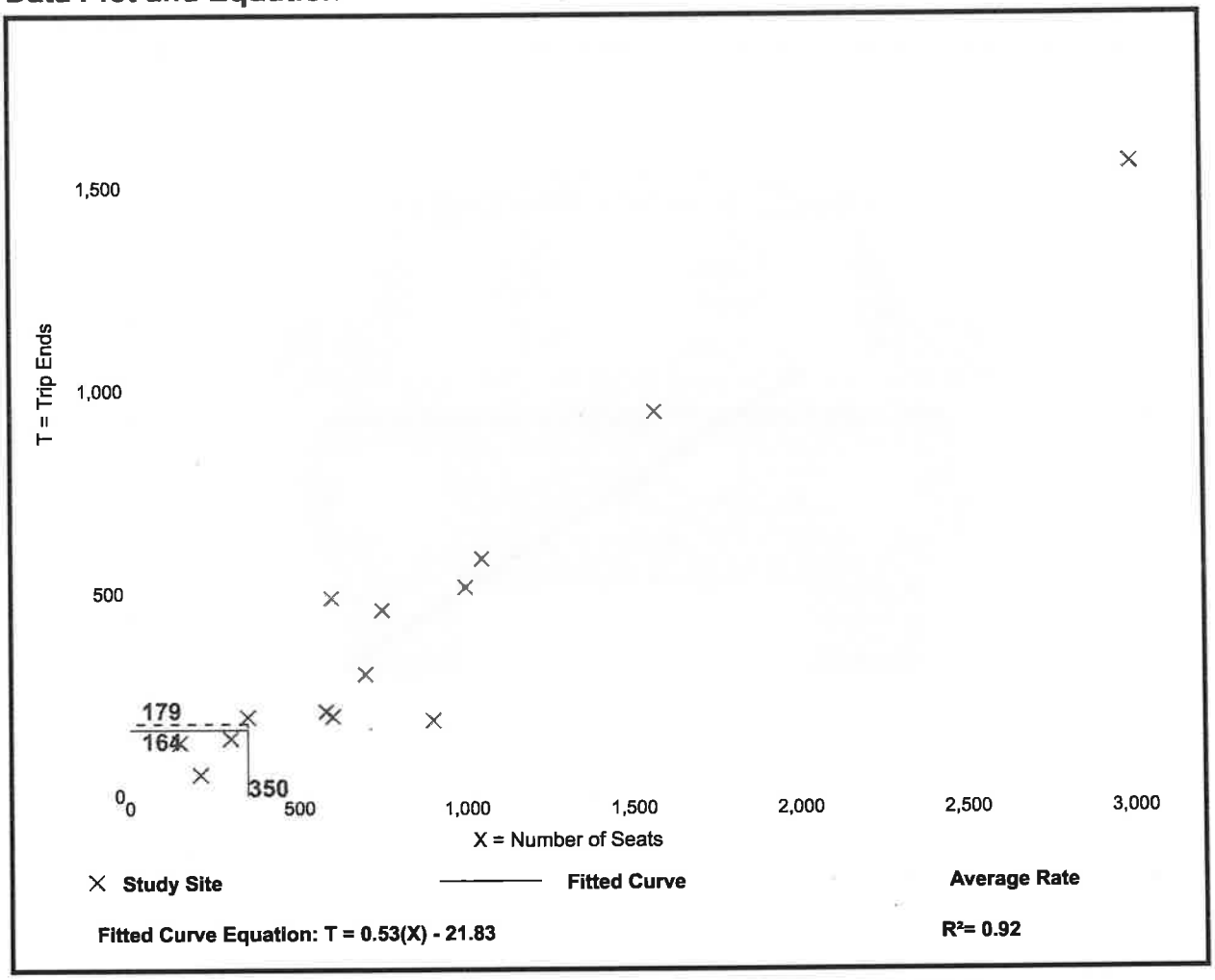
Vehicle Trip Ends vs: Seats
On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 14
Avg. Num. of Seats: 840
Directional Distribution: 49% entering, 51% exiting

Vehicle Trip Generation per Seat

Average Rate	Range of Rates	Standard Deviation
0.51	0.21 - 0.89	0.15

Data Plot and Equation



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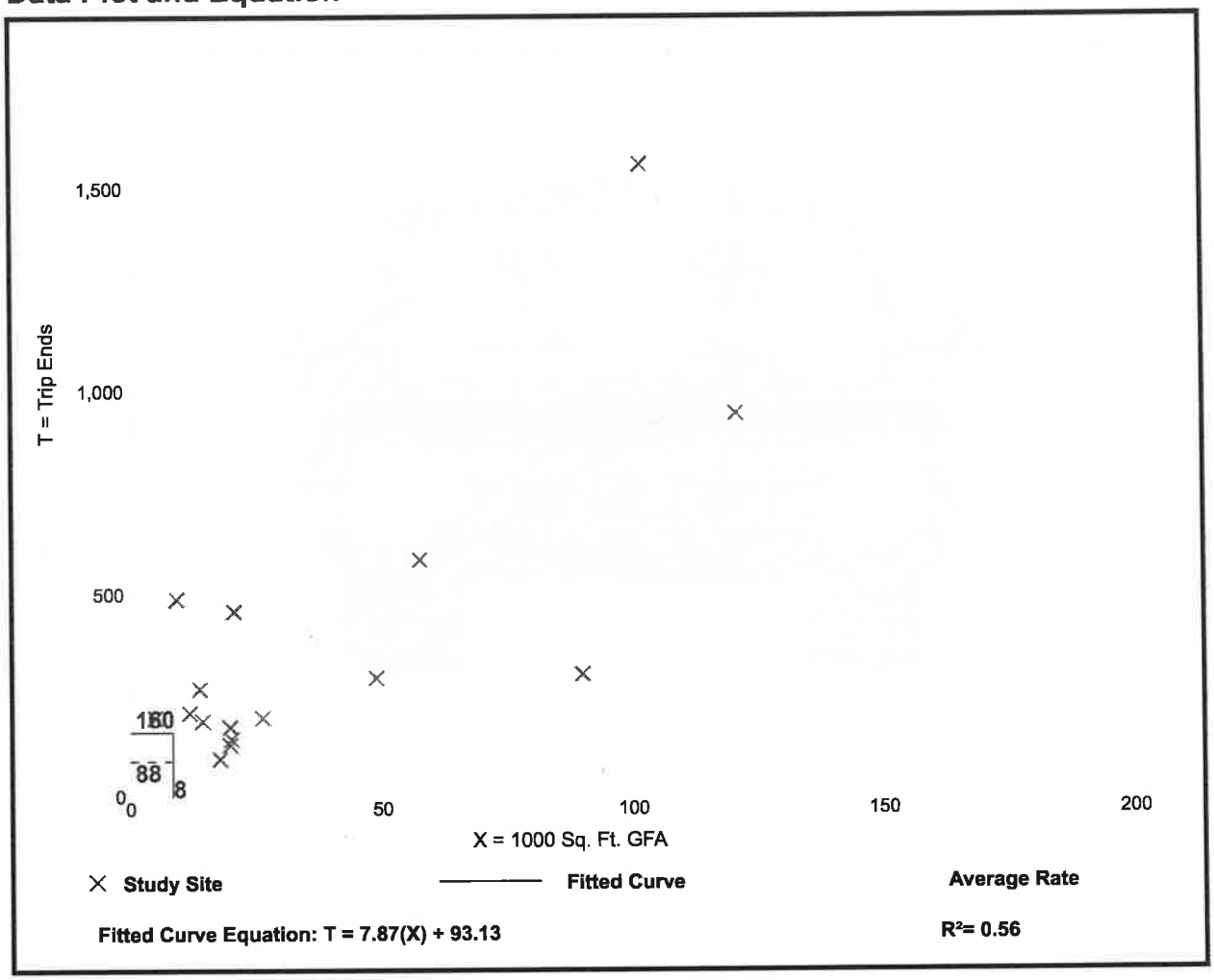
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 16
Avg. 1000 Sq. Ft. GFA: 38
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
10.36	3.36 - 51.31	7.83

Data Plot and Equation



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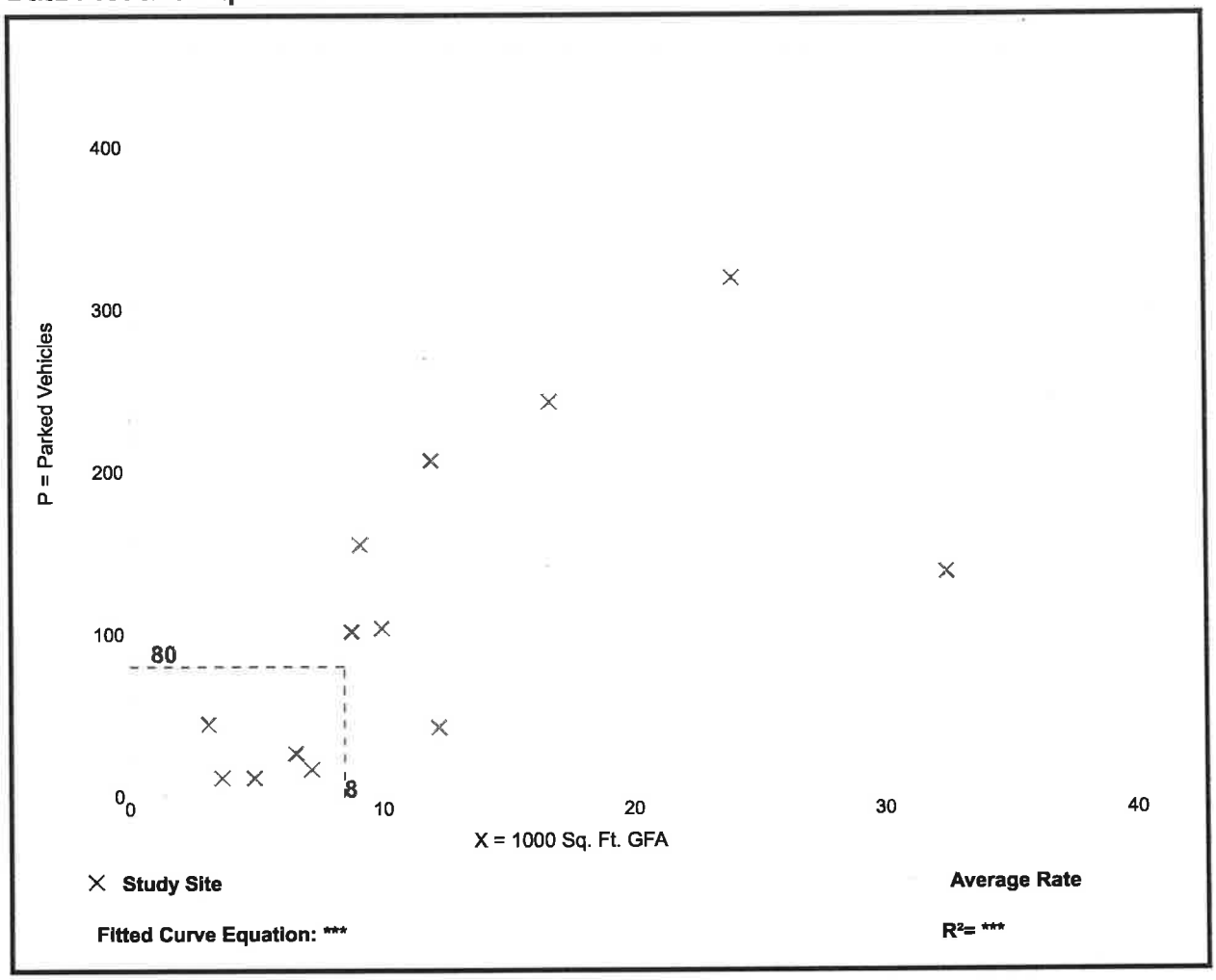
Peak Period Parking Demand vs: **1000 Sq. Ft. GFA**
On a: **Sunday**
Setting/Location: **General Urban/Suburban**
Peak Period of Parking Demand: **9:00 a.m. - 1:00 p.m.**
Number of Studies: 13
Avg. 1000 Sq. Ft. GFA: 12

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)
9.44	2.36 - 17.32	3.88 / 16.70	***	5.63 (60%)

Data Plot and Equation



Parking Generation Manual, 5th Edition • Institute of Transportation Engineers

HCS7 Two-Way Stop-Control Report

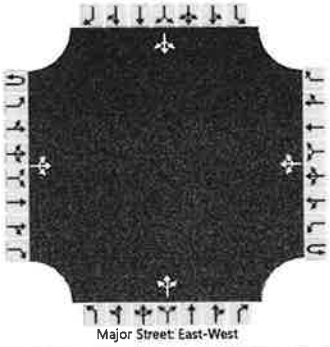
General Information

Analyst	SF
Agency/Co.	D&D
Date Performed	12/2022
Analysis Year	2022
Time Analyzed	PM
Intersection Orientation	East-West
Project Description	Existing

Site Information

Intersection	W Bangs & Wayside
Jurisdiction	
East/West Street	West Bangs Avenue
North/South Street	Wayside Road
Peak Hour Factor	0.84
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		24	110	58		2	121	39		30	47	4		25	52	17
Percent Heavy Vehicles (%)		4				0				0	0	0		0	0	6
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.14				4.10				7.10	6.50	6.20		7.10	6.50	6.26
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.24				2.20				3.50	4.00	3.30		3.50	4.00	3.35

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		29				2					96				112	
Capacity, c (veh/h)		1371				1384					505				542	
v/c Ratio		0.02				0.00					0.19				0.21	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.7				0.8	
Control Delay (s/veh)		7.7				7.6					13.8				13.4	
Level of Service (LOS)		A				A					B				B	
Approach Delay (s/veh)	1.1				0.1				13.8				13.4			
Approach LOS									B				B			

HCS7 Two-Way Stop-Control Report

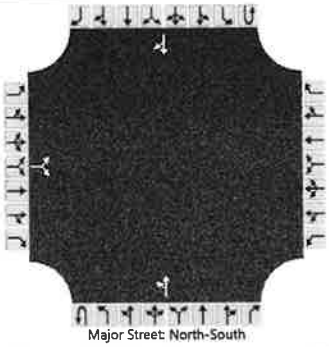
General Information

Analyst	SF
Agency/Co.	D&D
Date Performed	12/2022
Analysis Year	2022
Time Analyzed	PM
Intersection Orientation	North-South
Project Description	Existing

Site Information

Intersection	Driveway & Wayside
Jurisdiction	
East/West Street	Site Driveway
North/South Street	Wayside Road
Peak Hour Factor	0.72
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		1		1						13	80				80	32
Percent Heavy Vehicles (%)		0		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.40		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.50		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			3							18						
Capacity, c (veh/h)			1408							1437						
v/c Ratio			0.00							0.01						
95% Queue Length, Q_{95} (veh)			0.0							0.0						
Control Delay (s/veh)			7.6							7.5						
Level of Service (LOS)			A							A						
Approach Delay (s/veh)	7.6								1.1							
Approach LOS	A															