

February 10, 2023

Frank W. Petise, P.E.
Luke Bittenwieser
City of Stamford – Transportation, Traffic & Parking
888 Washington Boulevard
Stamford, CT 06901

**Re: 29 Intervale Road, 131 & 139 Turn of River Road
Planning Board Application No. 4046**

Dear Messrs. Petise and Bittenwieser,

We are in receipt of Transportation, Traffic & Parking Interoffice Memorandum comments dated November 30, 2022, with respect to the pending Planning Board Application No. 4046 related to subdividing three parcels into eleven parcels located at 29 Intervale Road, 131 & 139 Turn of River Road in Stamford. The following point-by-point responses are provided to address comments related to the subdivision plans and report:

Traffic Study

1. Attached find an updated Traffic Impact Study prepared by KWH Enterprise, LLC dated February 10, 2023, which includes the crash data analysis as requested.

Site Development Plan

1. The Turn of River sidewalk along the driveway apron will be designed to be flush prior to a Building Permit submission.
2. Comment shall be addressed prior to a Building Permit submission.
3. Comment shall be addressed prior to a Building Permit submission.
4. The stop sign detail depicted on sheet SE-5 will be updated to depict a 30" sign prior to a Building Permit submission.
5. Comment shall be addressed prior to a Building Permit submission.
6. Comment shall be addressed prior to a Building Permit submission.
7. Understood. Such permit will be obtained by the contractor.
8. Comment shall be addressed by the contractor prior to a Building Permit submission.
9. The attached 11"x17" Fire Truck Articulation Exhibit, prepared by this office dated February 10, 2023, depicts a ladder truck entering the driveway.

The subdivision site plan was modified to incorporate comments received during the Environmental Protection Board (EPB) hearing on January 19, 2023. The lots and roadway were reconfigured to provide a curvature similar to that of the wetlands limit and where necessary moved the dwellings closer to the front property line pursuant to Section 4.B.2. paragraph (4) of the Stamford Zoning Regulations effective January 24, 2023, as approved under Text Change Application 222-35. In response to Environmental Protection Board comments received we prepared the attached Revised Site Plan Exhibit, dated February 3, 2023. The roadway was also shifted 12-feet to the south to address neighboring comments.

Messrs. Petise and Battenwieser
February 10, 2023
Page 2 of 2

We trust the attached information satisfactorily addresses Transportation, Traffic & Parking comments received. If you have any questions regarding the submitted documents, please feel free to contact us.

Sincerely,

A handwritten signature in black ink, appearing to read 'T Milone', written in a cursive style.

Ted Milone, P.E., LEED AP BD+C

Enclosures

CC: R. Blessing
L. Cohen

RIGHT OF WAY
INFILTRATION SYSTEMS

INDIVIDUAL LOT INFILTRATION
SYSTEMS (TYP.)

PERMEABLE POROUS
PAVEMENT (TYP.)

PROPOSED BOULDER DEMARCATION. REFER
TO PLANS PREPARED BY WILLIAM KENNY
ASSOCIATES FOR FURTHER INFORMATION.

TURN OF RIVER ROAD

INTERVALE ROAD

LOT #1

LOT #2

LOT #3

LOT #4

LOT #5

LOT #11

LOT #10

LOT #9

LOT #8

LOT #7

LOT #6

25' EPB UPLAND
REVIEW AREA

LIMIT OF WETLANDS

REVISED SITE PLAN EXHIBIT

131 & 139 TURN OF RIVER ROAD AND 29 INTERVALE ROAD
STAMFORD, CT



REDNISS & MEAD

LAND SURVEYING
CIVIL ENGINEERING
PLANNING & ZONING CONSULTING
PERMITTING

22 First Street | Stamford, CT 06905
Tel: 203.327.0500 | Fax: 203.357.1118
www.rednissmead.com

COMM. NO.: 9734	DATE: 02/03/2023
	SCALE: 1"=50'

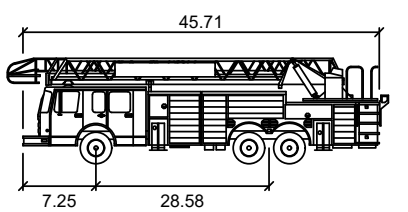


SITE DISTANCE INFORMATION PROVIDED BY KWH ENTERPRISE, LLC. AS FOLLOWS:

- 480 ft from the northbound approach on Turn of River Road
- 520 ft from the southbound approach on Turn of River Road

LEGEND

FRONT TIRES	—
REAR TIRES	—
VEHICLE BODY	—



Stamford Ladder 2022

	feet
Width	: 8.00
Track	: 9.00
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

**PROPOSED FIRETRUCK ARTICULATION EXHIBIT
131 & 139 TURN OF RIVER ROAD AND 29 INTERVALE ROAD
STAMFORD, CT**

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COMM. NO.: 9734	DATE: 02/10/2023
	SCALE: 1"=50'



Traffic Impact Study

139 and 131 Turn of River Road and 29 Intervale Road
Stamford, Connecticut

Prepared for:
Silver Heights Development, LLC

Prepared by:
KWH Enterprise, LLC
February 10, 2023 Revised



Traffic Impact Study

139 and 131 Turn of River Road and 29 Intervale Road

Stamford, Connecticut

This study examines the traffic impact of a residential development in Stamford, Connecticut. Levels of Service (LOS) for traffic flows under 2022 existing and 2024 no-build and build traffic conditions were analyzed to identify any deficiencies in existing and future traffic operations at area intersections. For the purpose of this traffic study, 2024 was assumed to be the year during which the construction is completed and the houses are occupied.

I. Summary

- 11 new single-family houses are proposed on a site with three existing houses that will be demolished, which will result in a net increase of eight houses for this location.
- The development will generate negligible numbers of new site trips: six, eight, and seven new trips for the respective weekday morning, weekday afternoon, and Saturday midday peak hours.
- The development will not result in change of LOS at the adjacent intersection of Turn of River Road and Intervale Road, which is operating at generally acceptable LOS. All traffic movements at the proposed site driveway intersection will operate at favorable LOS A or B during peak hours. The traffic impact of the 11 houses will be limited and will be safely and adequately accommodated by existing roadways and intersections.
- Recent-year accident records for segments of Turn of River Road and Intervale Road near the development were reviewed. No abnormal accident patterns were identified.

II. Project Description

The development is located at on the southeast corner of the intersection of Turn of River Road and Intervale Road in Stamford, Connecticut. Three existing houses at 139 and 131 Turn of River Road and 29 Intervale Road will be replaced by 11 single-family detached houses, which will result in a net increase of eight houses on the site. The new houses will be accessed via a two-way driveway on Turn of River Road.

Both Turn of River Road and Intervale Road are two-lane roadways with posted speed limits of 25 mph. The intersection of the two roadways is controlled by all-way stop signs. Figures 1 shows the site location and area roadways.

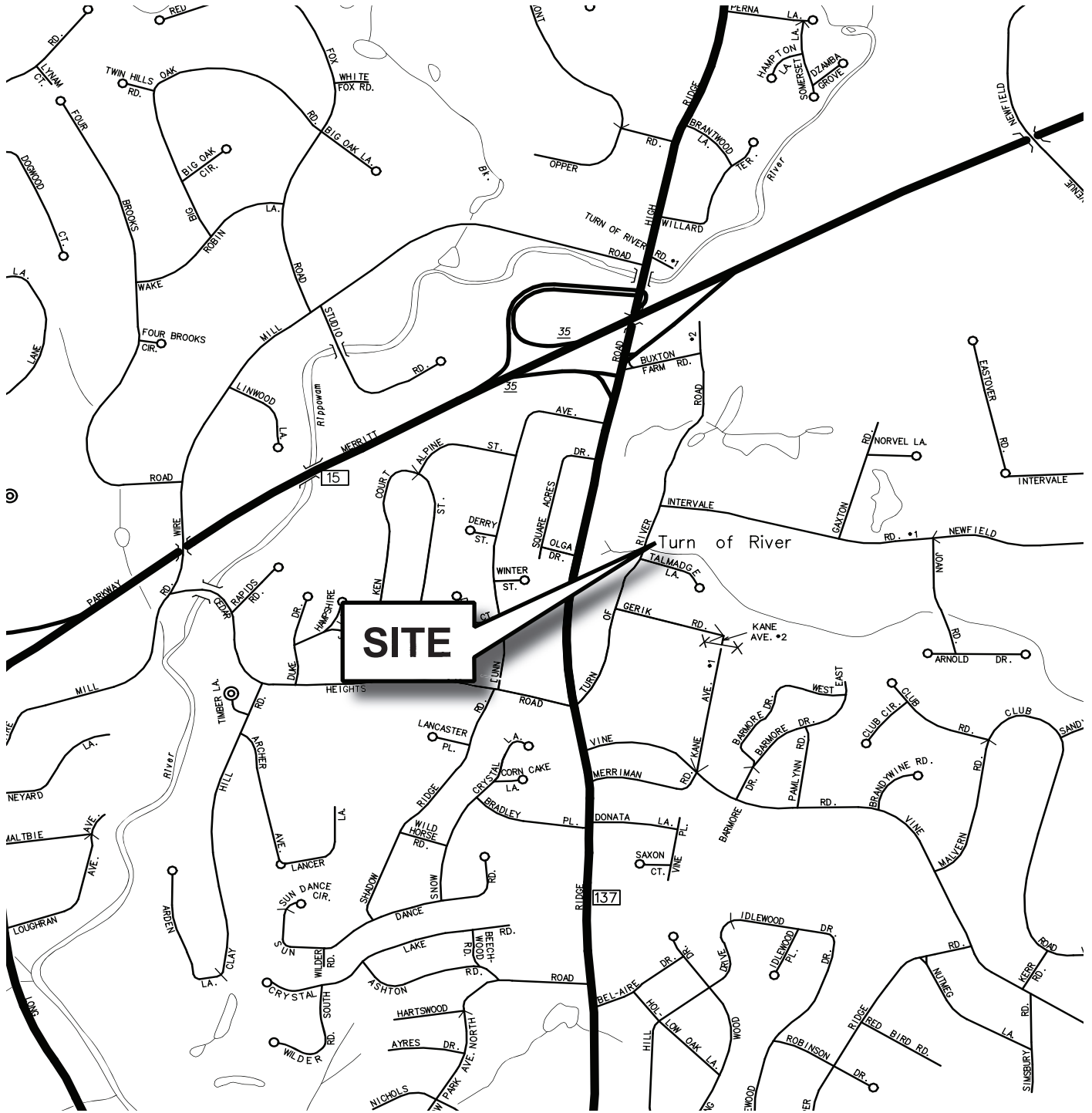


Figure 1 Project Location

III. Existing Traffic Conditions

To evaluate the quality of traffic operation in the vicinity of the development, the following unsignalized intersections were analyzed for the study:

- Turn of River Road and Intervale Road; and
- Proposed site driveway intersection on Turn of River Road.

Peak-hour traffic volumes were collected during weekday morning, weekday afternoon, and Saturday midday peak hours in September 2022. The 2022 existing traffic volumes used in the traffic analyses are shown in Figures 2, 3, and 4.

Capacity Analysis

To assess the quality of traffic flow, intersection capacity analysis was conducted for the existing, future no-build, and future build traffic conditions. Capacity analysis provides an indication of how well roadway facilities serve the traffic demands placed upon them. Synchro 10, a software package that includes the evaluation criteria of the *Highway Capacity Manual, 6th Edition*, was used to analyze the intersections.

Level of service (LOS) is the term used to describe the different operating conditions that occur on a given roadway segment or intersection under various traffic conditions. It is a qualitative measure of the effects of a number of factors including roadway geometry, speed, travel delay, freedom to maneuver, and safety. Six levels of service can be defined for each type of facility. Each level of service (LOS) is given a letter designation from A to F, with LOS A representing the best operating conditions and LOS F representing the worst.

Table 1 that follows shows the capacity analysis results for the analyzed intersection under the 2022 existing traffic conditions. Most approaches of the all-way stop intersection of Turn of River Road and Intervale Road are operating at LOS D or better with relatively short delays during peak hours with the exception of the westbound Intervale Road approach during the weekday morning peak hour, which operates at a LOS E with an acceptable average delay of 42.6 seconds. The all-way stop control at this location ensures that all traffic travel through the intersection safely and efficiently during peak hours.

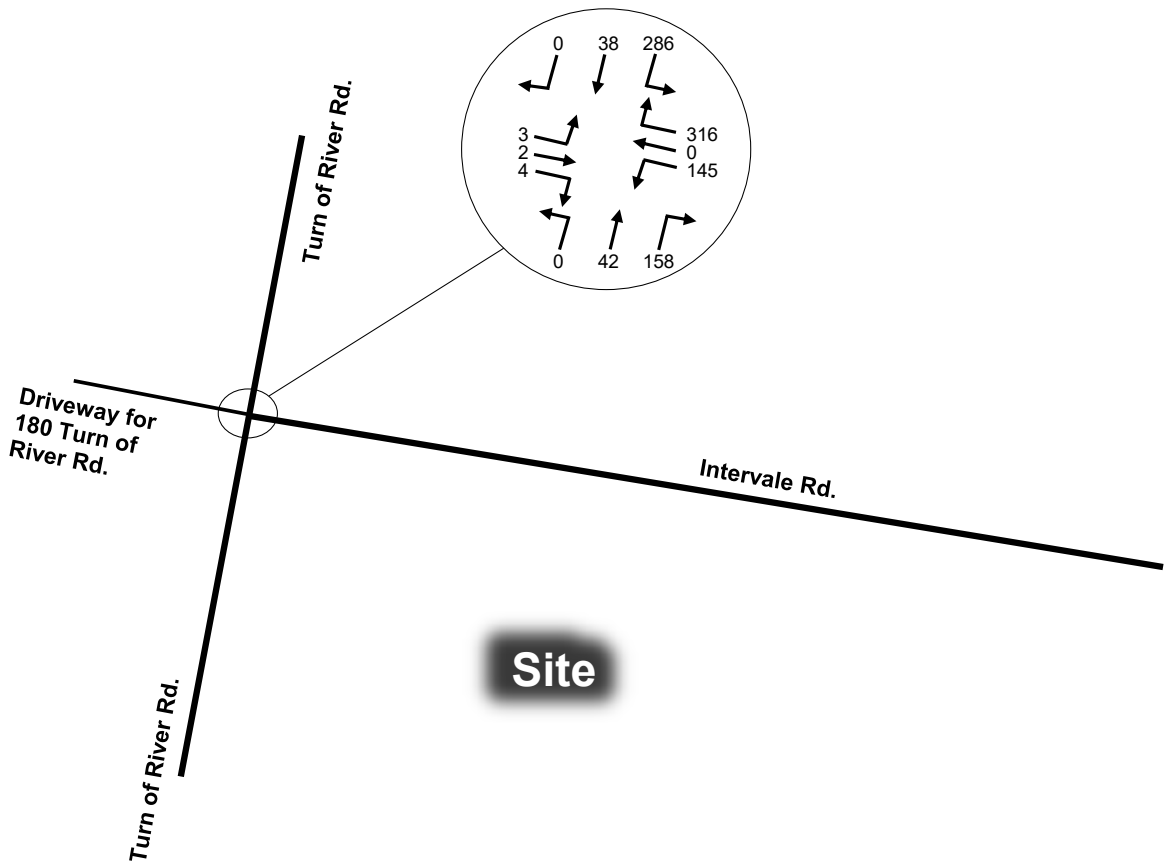


Figure 2 Year 2022 Existing Traffic Volumes
Weekday Morning Peak Hour

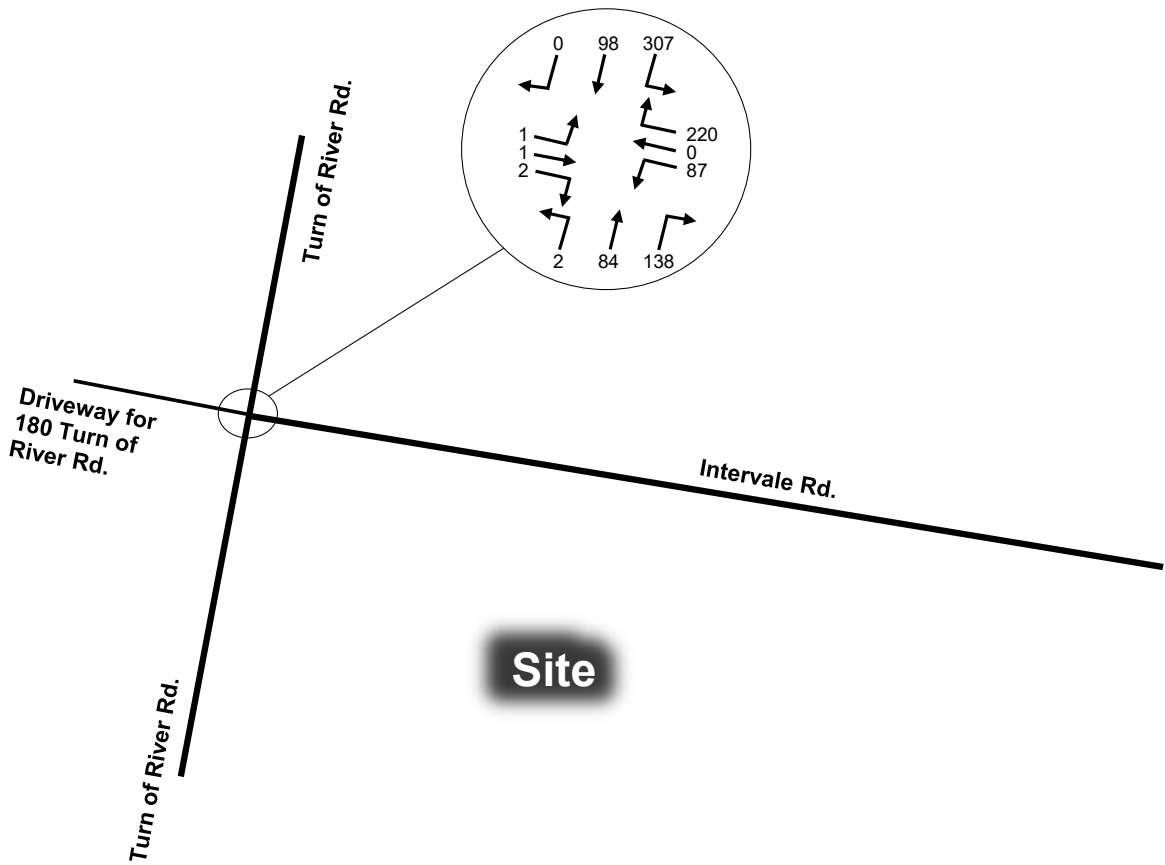


Figure 3 Year 2022 Existing Traffic Volumes
Weekday Afternoon Peak Hour

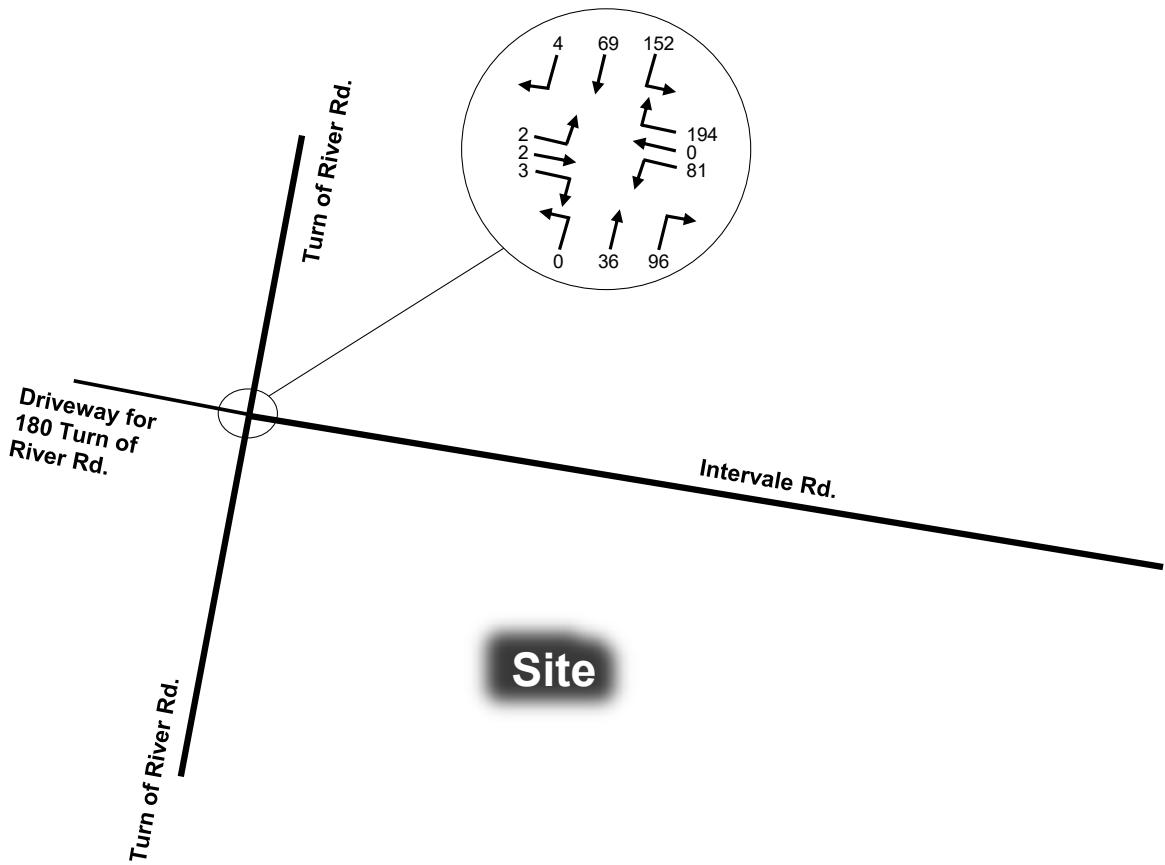


Figure 4 Year 2022 Existing Traffic Volumes
Saturday Midday Peak Hour

Table 1 Capacity Analyses for Existing Conditions

Intersection	2022 Existing Conditions					
	Weekday Morning Peak Hour		Weekday Afternoon Peak Hour		Saturday Midday Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Turn of River Rd. and Intervale Rd. (Unsignalized)						
NB Turn of River Road	13.9	B	11.8	B	9.0	A
EB Driveway for 180 Turn of River Road	10.5	B	9.6	A	8.4	A
WB Intervale Road	42.6	E	14.9	B	11.3	B
SB Turn of River Rd.	25.3	D	21.6	C	11.4	B

EB Eastbound
 WB Westbound
 NB Northbound
 SB Southbound
 LOS Level of Service

IV. Future Traffic Conditions

For the purpose of this traffic impact study, it was assumed that the proposed houses will be built and occupied in 2024.

As a comparison for demonstrating the traffic impact of the project, a 2024 no-build scenario is included in the study. Figures 5, 6, and 7 show the 2024 no-build traffic volumes, which were generated by using an annual background traffic growth rate of 0.6 percent, or 1.2 percent over two years, between 2022 and 2024. The 0.6 percent annual traffic growth rate for Stamford was recommended by CTDOT.

Table 2 details the capacity analysis results for the 2024 no-build traffic conditions. All traffic approaches will continue to operate at the same LOS as those under the existing conditions. There will be little change in average traffic delays as a result of the 1.2 percent traffic growth for the no-build conditions.

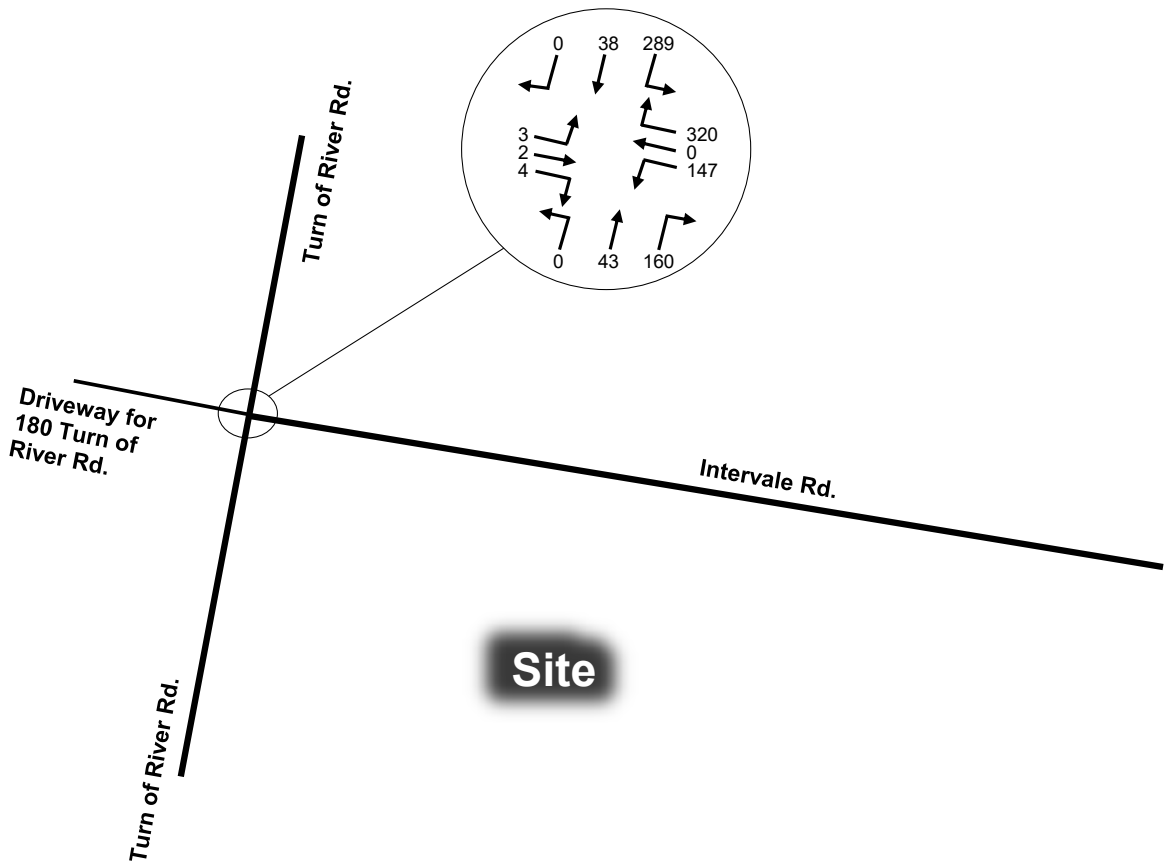


Figure 5 Year 2022 No-Build Traffic Volumes
Weekday Morning Peak Hour

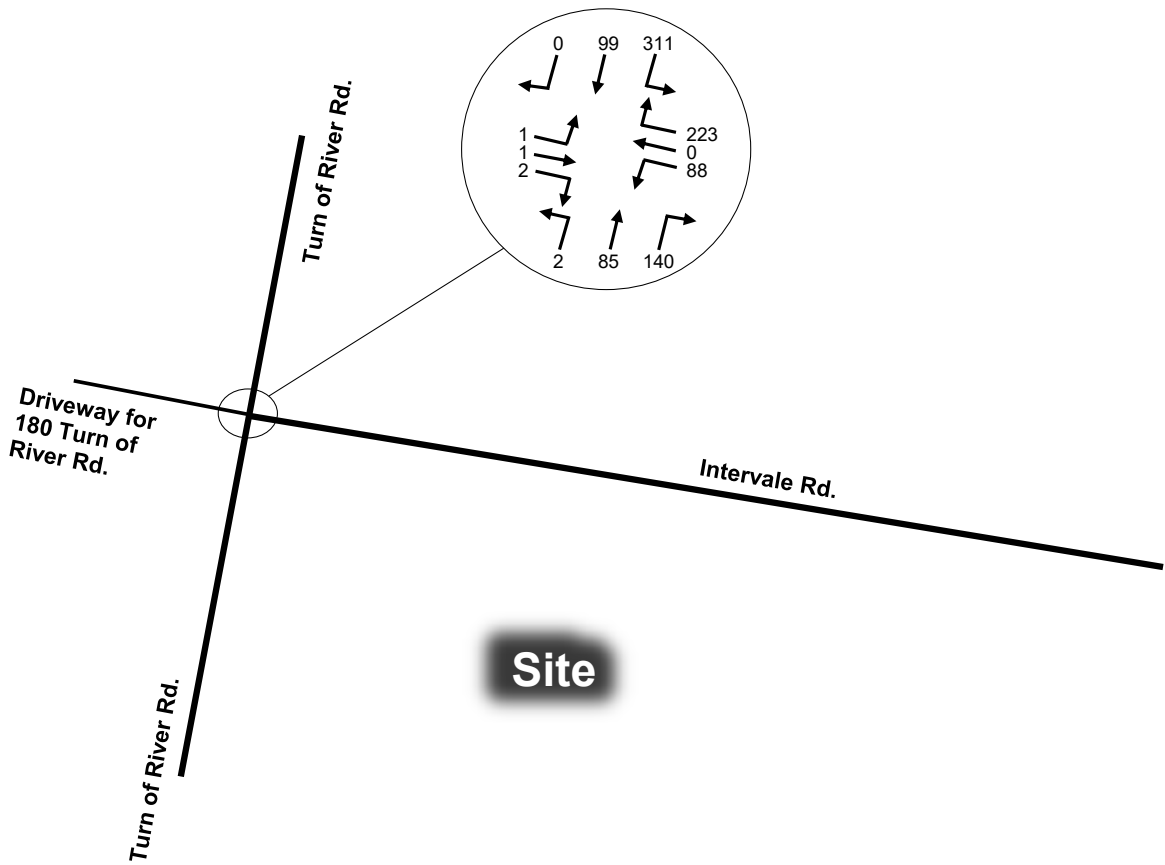


Figure 6 Year 2022 No-Build Traffic Volumes
Weekday Afternoon Peak Hour

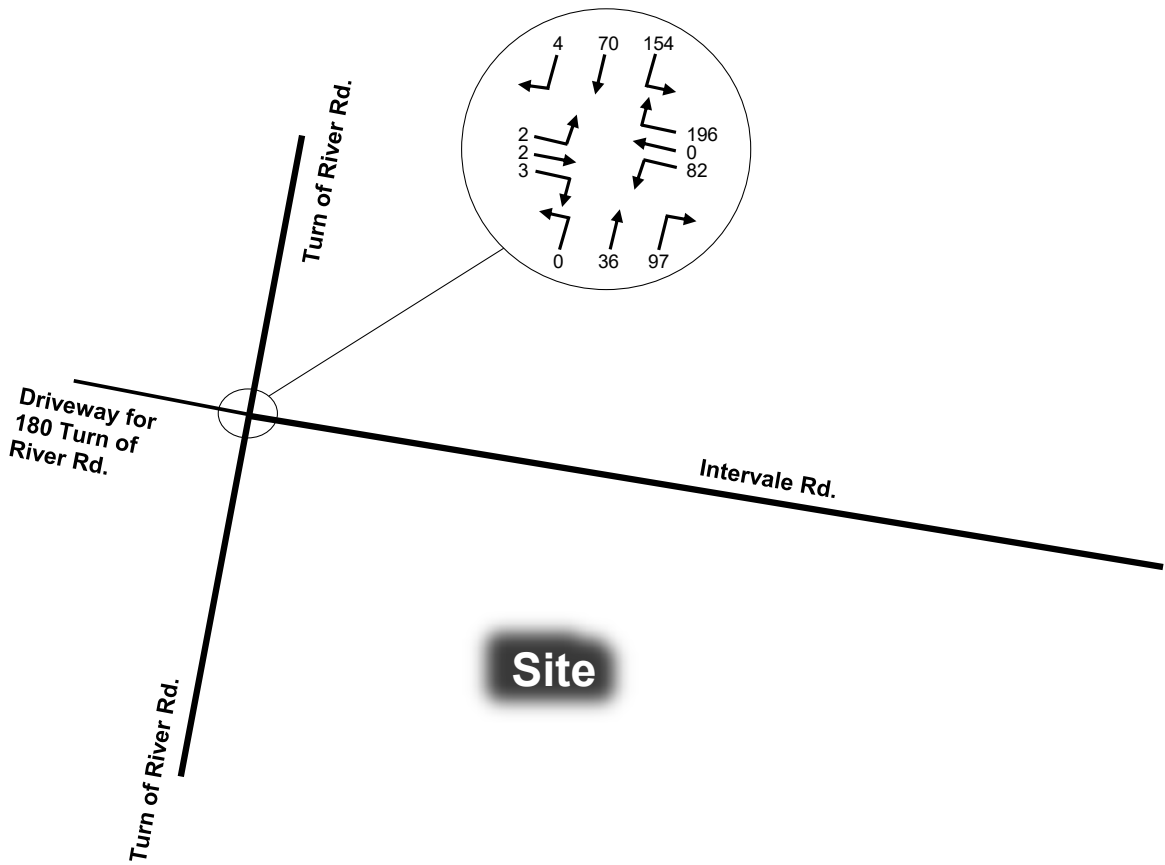
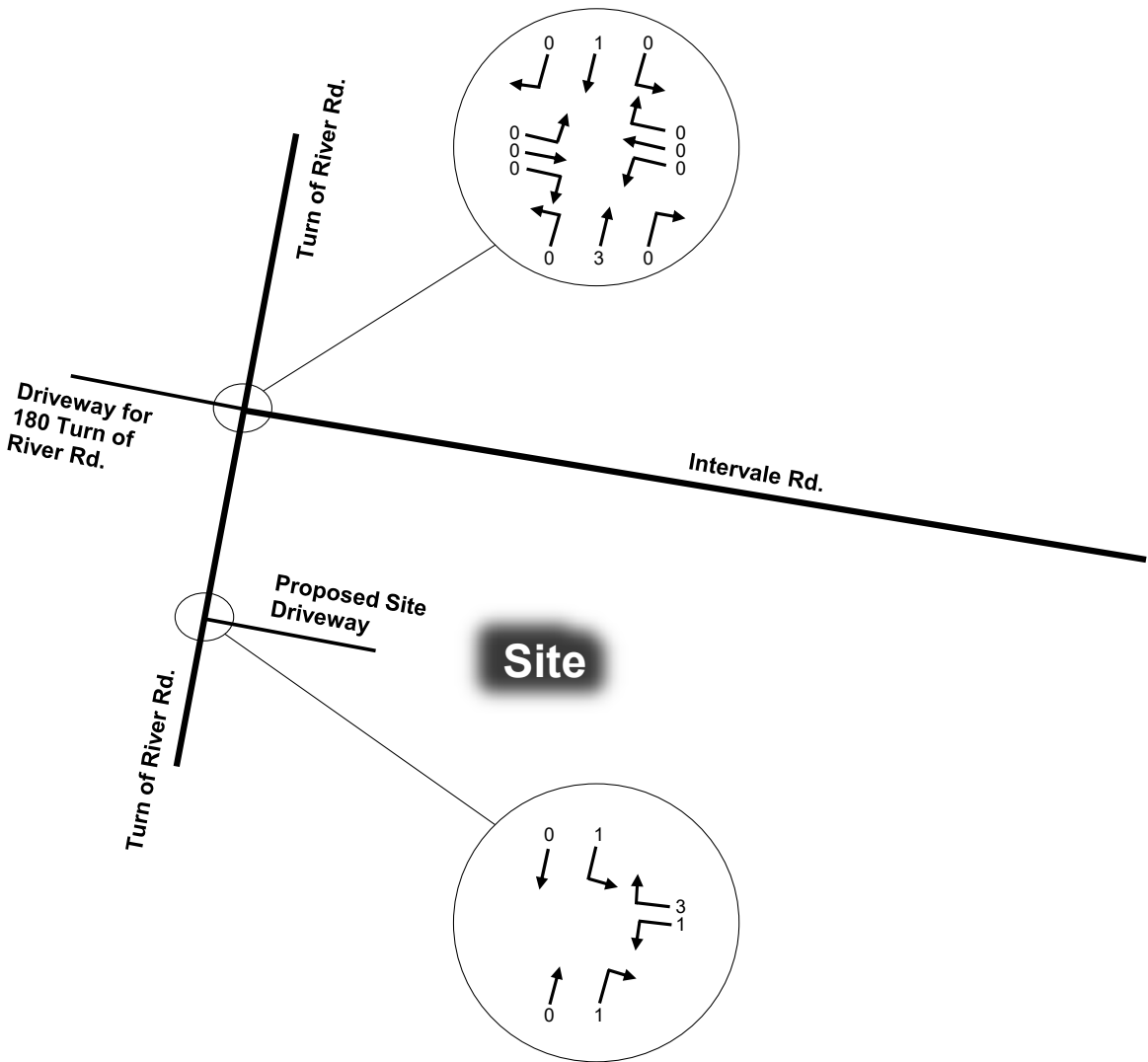
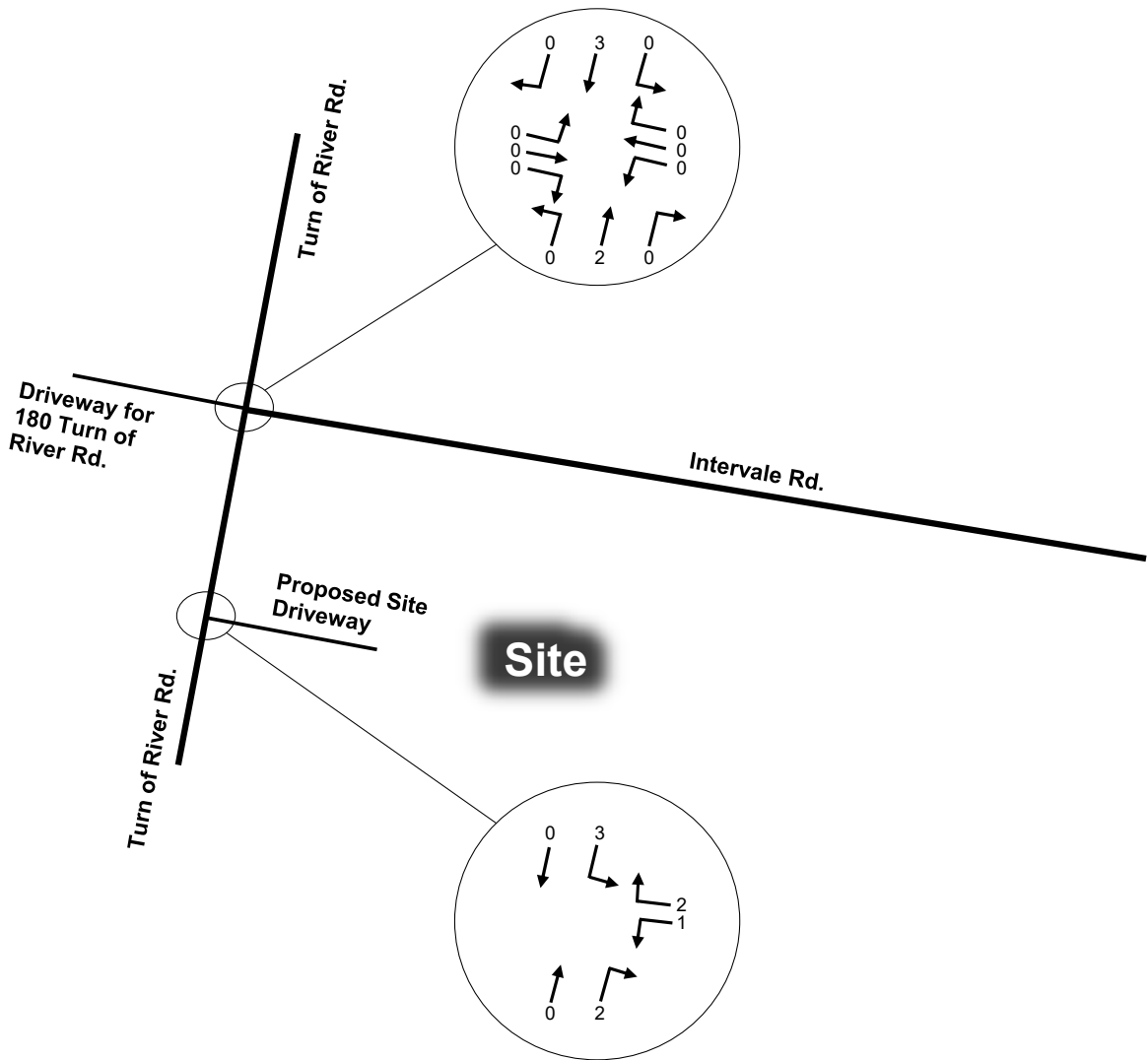


Figure 7 Year 2022 No-Build Traffic Volumes
Saturday Midday Peak Hour



**Figure 8 New Site Trips
Weekday Morning Peak Hour**



**Figure 9 New Site Trips
Weekday Afternoon Peak Hour**

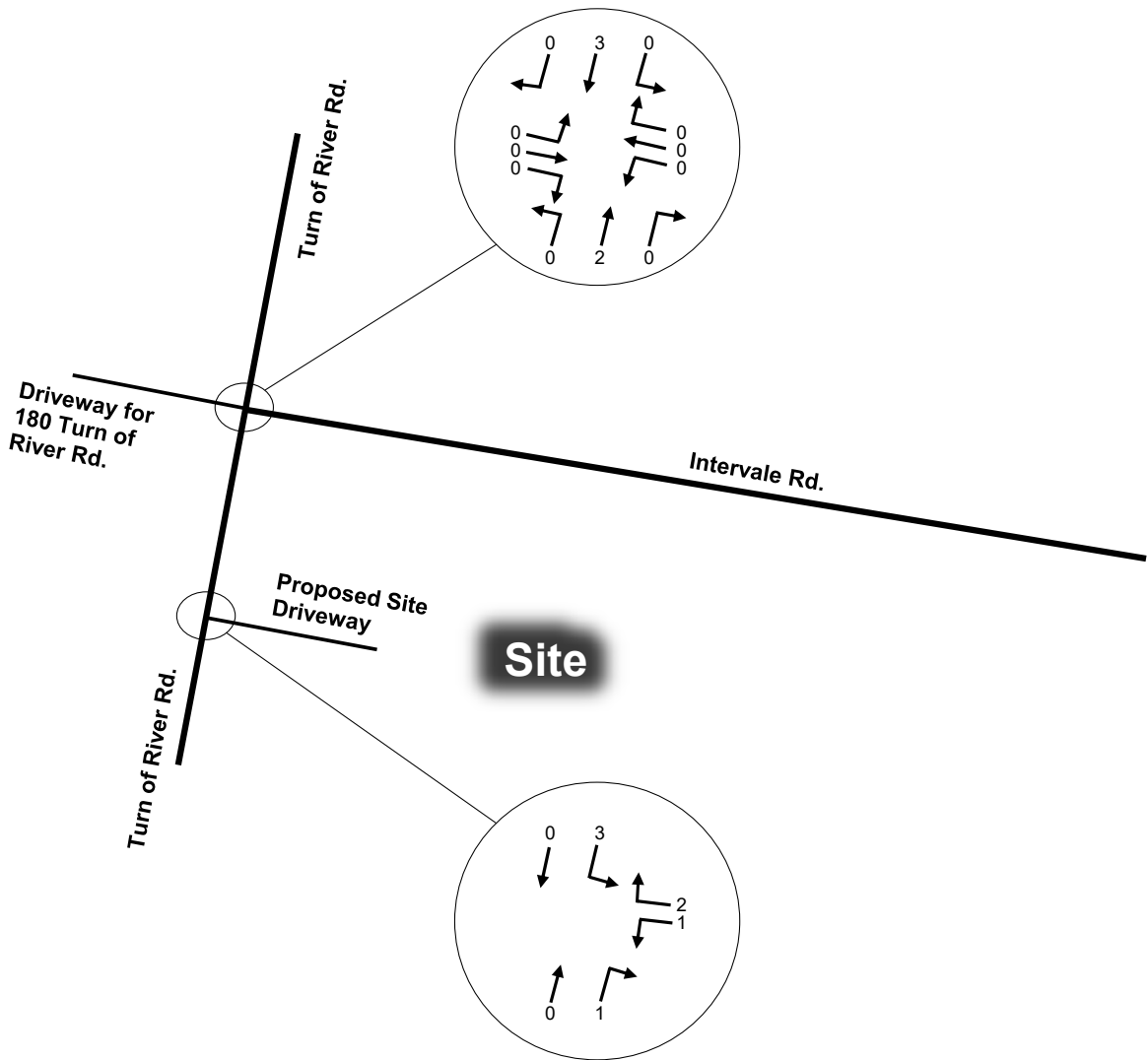


Figure 10 New Site Trips
Saturday Midday Peak Hour

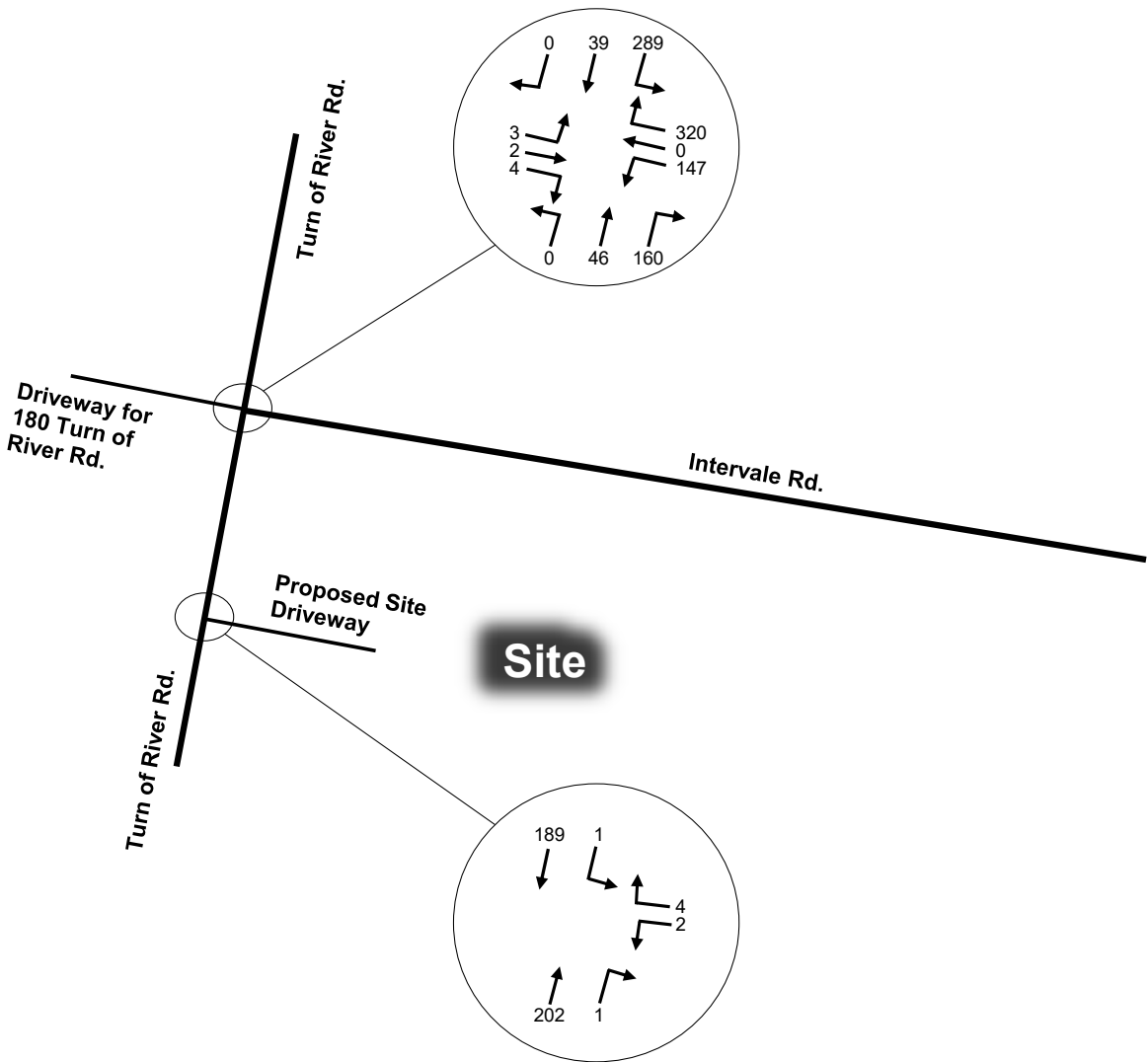


Figure 11 Year 2024 Build Traffic Volumes
Weekday Morning Peak Hour

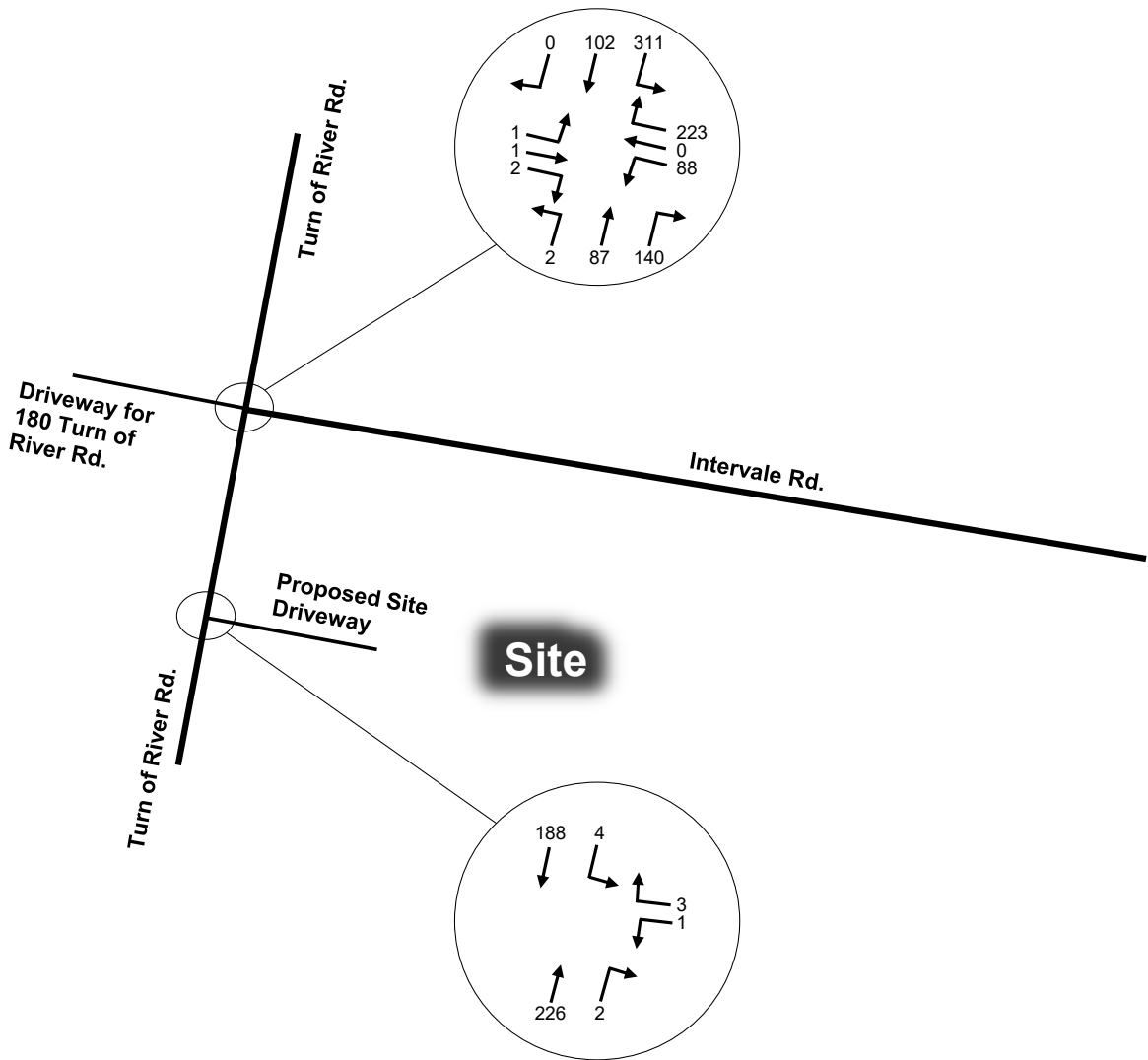


Figure 12 Year 2024 Build Traffic Volumes
Weekday Afternoon Peak Hour

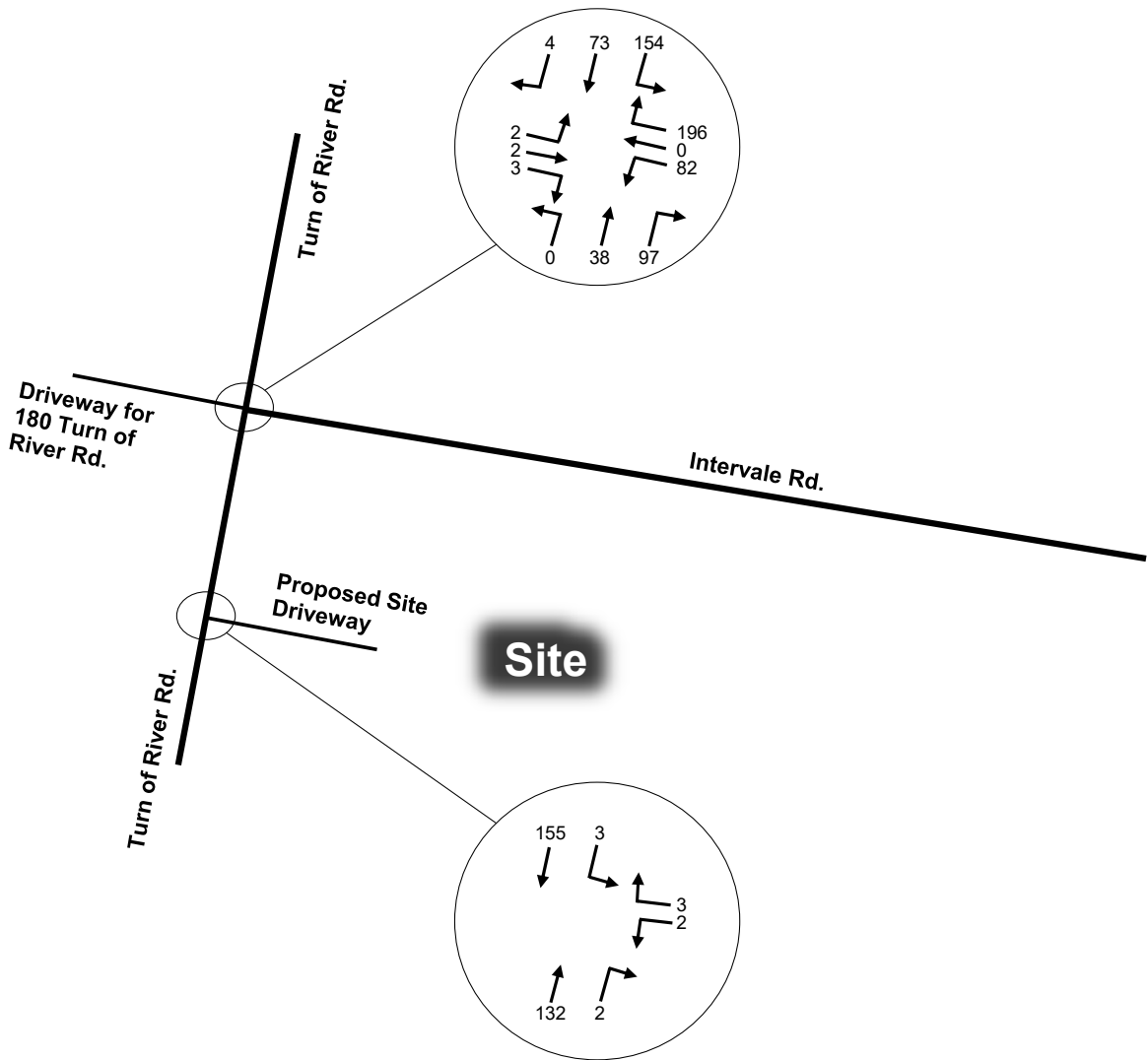


Figure 13 Year 2024 Build Traffic Volumes
Saturday Midday Peak Hour

Table 2 Capacity Analyses for No-Build Conditions

Intersection	2024 No-Build Conditions					
	Weekday Morning Peak Hour		Weekday Afternoon Peak Hour		Saturday Midday Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Turn of River Rd. and Intervale Rd. (Unsignalized)						
NB Turn of River Road	14.2	B	11.9	B	9.1	A
EB Driveway for 180 Turn of River Road	10.6	B	9.6	A	8.4	A
WB Intervale Road	46.0	E	15.2	C	11.4	B
SB Turn of River Rd.	26.3	D	22.4	C	11.6	B

EB Eastbound
 WB Westbound
 NB Northbound
 SB Southbound
 LOS Level of Service

Trip Generation

The peak-hour vehicular trips generated by the development (Table 3) were estimated using data from ITE (Institute of Transportation Engineers) *Trip Generation Manual, 11th Edition*. The development, which will result in a net increase of eight houses, will only generate six, eight, and seven new trips during the respective weekday morning, weekday afternoon, and Saturday midday peak hours.

Table 3 Net Increases of Site Trips (vph)

Single-Family Detached Housing (ITE LU 210) (Net Increase of Eight Units)			
	Entry	Exit	Entry & Exit
Weekday Morning Peak Hour	2	4	6
Weekday Afternoon Peak Hour	5	3	8
Saturday Midday Peak Hour	4	3	7

vph Vehicles per hour

Table 4 depicts the distribution of the site-generated trips along area routes. The distribution takes into account the relative traffic volumes of area roadways and the development patterns in this part of Stamford. Traffic volumes for the 2024 build conditions, which combine the no-build volumes and the site trips, are presented in Figures 11, 12, and 13. Please note that the driveway volumes in these three figures are more than the new trips in Table 3 because they include trips for the three existing houses on the site.

Table 4 Trip Distribution

To / From Route	Entry and Exit
East: Intervale Road	10%
North: Turn of River Road	60%
South: Turn of River Road	30%
Total	100%

Capacity Analysis

Table 5 shows the capacity analysis results for the 2024 build traffic conditions. There will be no change in LOS for the all-way stop intersection under the build conditions when compared with the no-build conditions. The incremental changes in average delays at the intersection as a result of the development will be 0.4 second or less. All traffic movements at the proposed site driveway intersection will operate at favorable LOS A or B during the peak hours.

In terms of changes in delays at the adjacent intersection, the traffic impact of the development will be very limited. All site trips will be adequately and safely accommodated by existing roadways and intersections.

Table 5 Capacity Analyses for Build Conditions

Intersection	2024 Build Conditions					
	Weekday Morning Peak Hour		Weekday Afternoon Peak Hour		Saturday Midday Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Turn of River Rd. and Intervale Rd. (Unsignalized)						
NB Turn of River Road	14.3	B	12.0	B	9.1	A
EB Driveway for 180 Turn of River Road	10.6	B	9.6	A	8.5	A
WB Intervale Road	45.6	E	15.3	C	11.5	B
SB Turn of River Rd.	26.6	D	22.8	C	11.6	B
Turn of River Rd. and Proposed Site Driveway (Unsignalized)						
WB Proposed Site Driveway	10.0	B	10.1	B	9.6	A
SB Turn of River Rd. Left Turn	7.7	A	7.7	A	7.5	A
SB Turn of River Rd. Through	0.0	A	0.0	A	0.0	A

EB Eastbound
 WB Westbound
 NB Northbound
 SB Southbound
 LOS Level of Service

V. Traffic Accident Record Summary

Traffic accident records for Turn of River Road between the intersections of Talmadge Lane and Sterling Lake Lane and for Intervale Road along the site frontage during 2019-2021 are summarized in Table 6.

Two accidents occurred over the three years. Both were rear-end accidents near the intersection of Turn of River Road and Intervale Road. These are typical for the all-way-stop intersection.

Based on the numbers and locations of the accidents over the three-year period and the accident categories in the table, no abnormal accident patterns were identified from these records. Because this development will generate a limited number of site trips, it is not expected to adversely affect the safety conditions of the adjacent roadways.

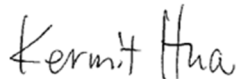
Table 6 Accident Record Summary

Location	Turn of River Rd., between Talmadge Ln. and Sterling Lake Ln.	Intervale Rd. along Site Frontage
Year		
2019		
2020	1	
2021		1
Total	1	1
Accident Severity		
Fatality		
Injury (No Fatality)		
Property Damage Only	1	1
Total	1	1
Type of Collision		
Front to Rear	1	1
Total	1	1
Weather Condition		
Clear	1	1
Total	1	1
Road Surface Condition		
Dry	1	1
Total	1	1
Light Condition		
Daylight	1	1
Total	1	1

Source: Connecticut Crash Data Repository

VI. Conclusions

Area traffic operation was analyzed for the construction of 11 residential houses under 2022 existing and 2024 no-build and build traffic conditions. The development will generate a negligible number of new trips and little traffic impact. Traffic generated by the development will be adequately and safely accommodated by existing area roadways and intersections.



Kermit Hua, PE, PTOE
Principal
KWH Enterprise, LLC
(203) 606-3525
kermit.hua@kwhenterprise.com

Land Use: 210

Single-Family Detached Housing

Description

A single-family detached housing site includes any single-family detached home on an individual lot. A typical site surveyed is a suburban subdivision.

Specialized Land Use

Data have been submitted for several single-family detached housing developments with homes that are commonly referred to as patio homes. A patio home is a detached housing unit that is located on a small lot with little (or no) front or back yard. In some subdivisions, communal maintenance of outside grounds is provided for the patio homes. The three patio home sites total 299 dwelling units with overall weighted average trip generation rates of 5.35 vehicle trips per dwelling unit for weekday, 0.26 for the AM adjacent street peak hour, and 0.47 for the PM adjacent street peak hour. These patio home rates based on a small sample of sites are lower than those for single-family detached housing (Land Use 210), lower than those for single-family attached housing (Land Use 251), and higher than those for senior adult housing -- single-family (Land Use 251). Further analysis of this housing type will be conducted in a future edition of *Trip Generation Manual*.

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/>).

For 30 of the study sites, data on the number of residents and number of household vehicles are available. The overall averages for the 30 sites are 3.6 residents per dwelling unit and 1.5 vehicles per dwelling unit.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Arizona, California, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Minnesota, Montana, New Jersey, North Carolina, Ohio, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, Virginia, and West Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 869, 903, 925, 936, 1005, 1007, 1008, 1010, 1033, 1066, 1077, 1078, 1079

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

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: 192

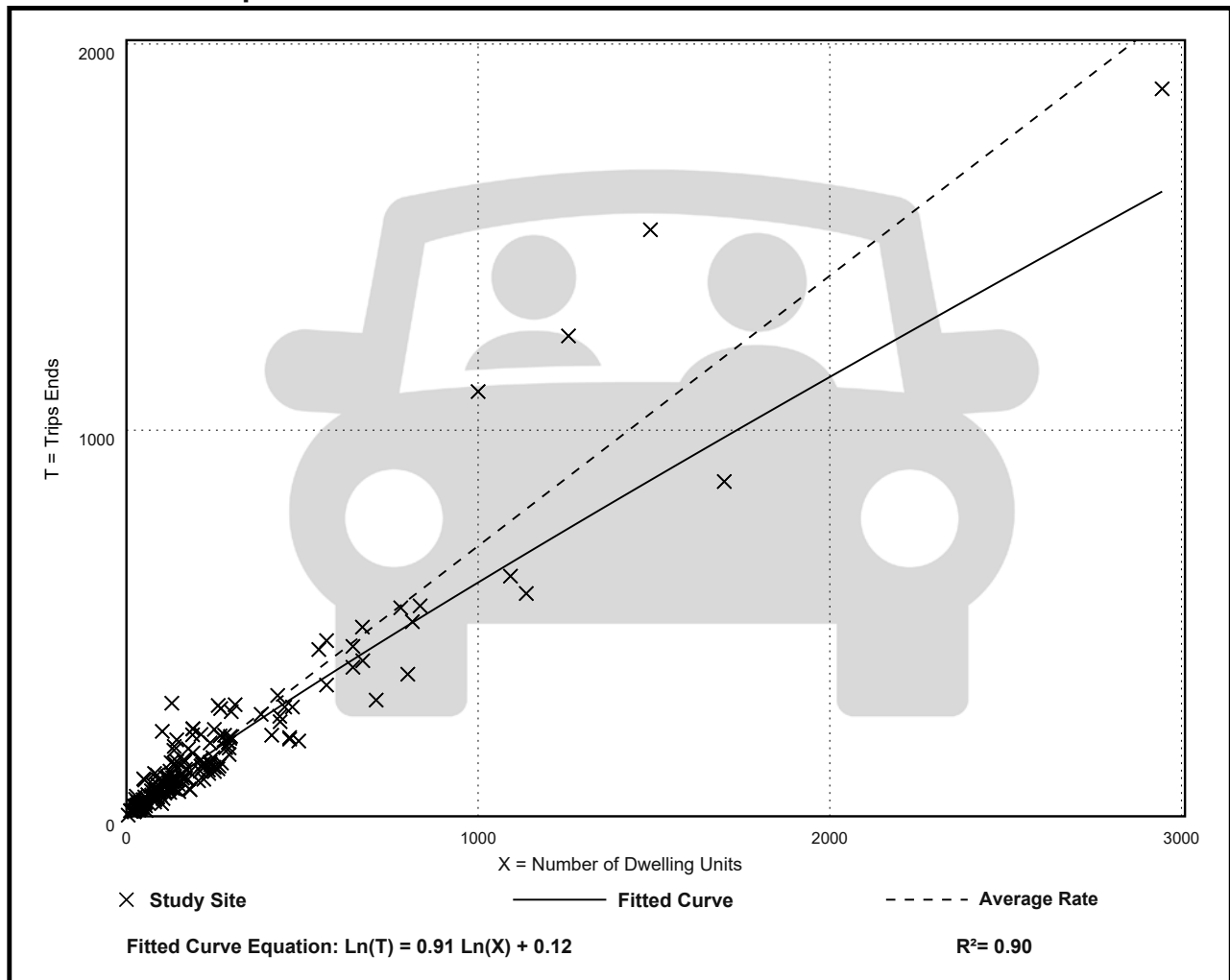
Avg. Num. of Dwelling Units: 226

Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

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: 208

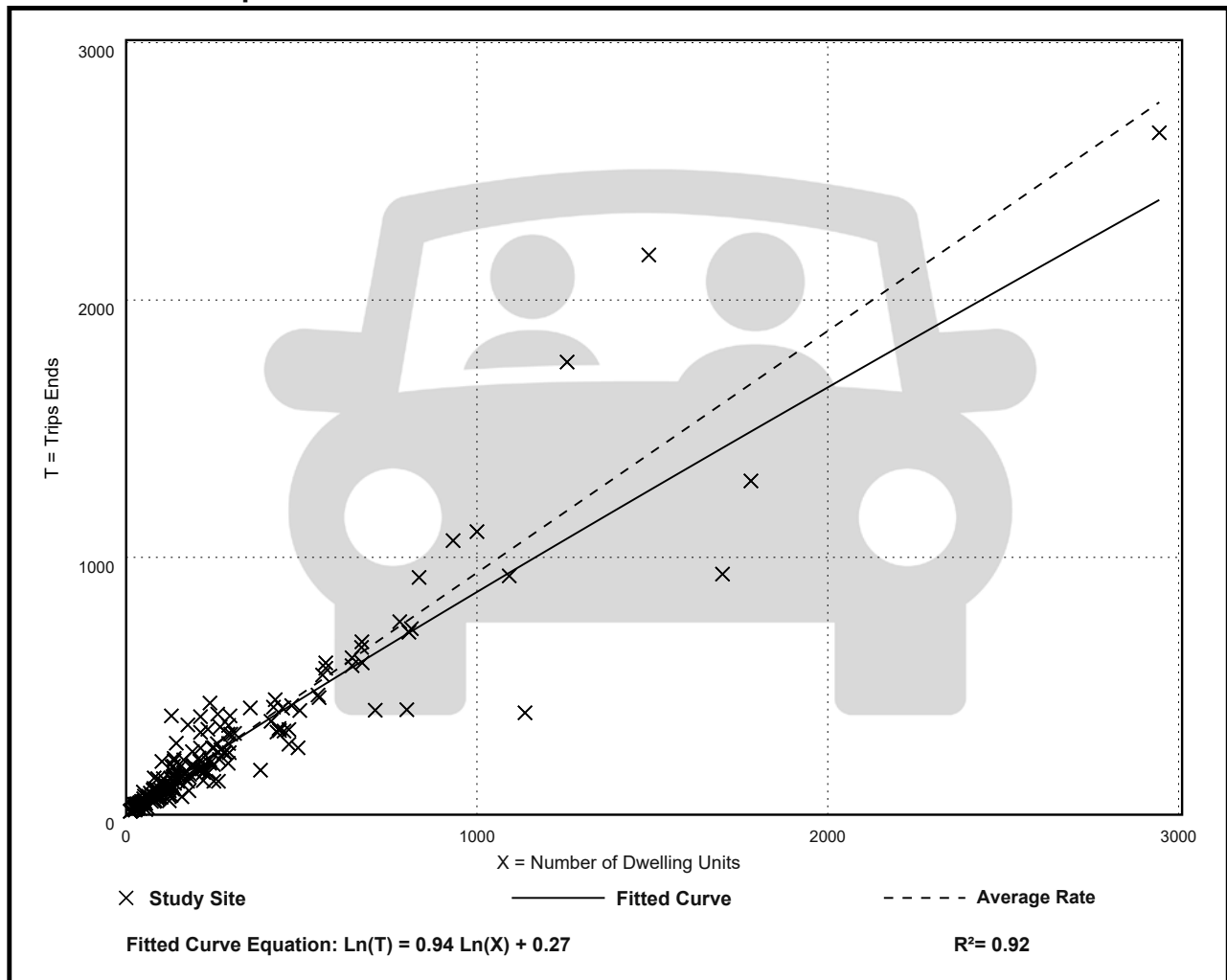
Avg. Num. of Dwelling Units: 248

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban

Number of Studies: 42

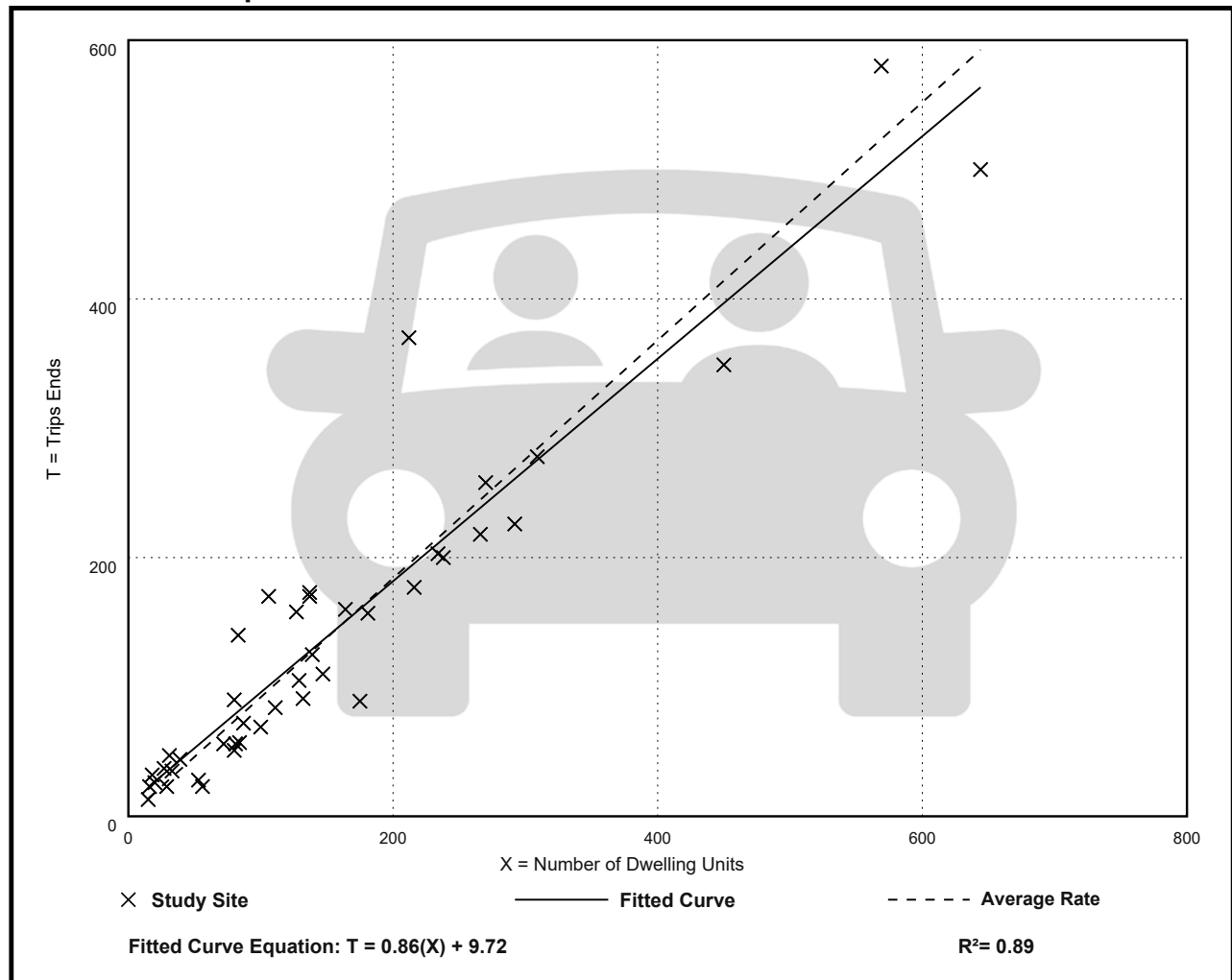
Avg. Num. of Dwelling Units: 152

Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.92	0.41 - 1.78	0.27

Data Plot and Equation



HCM 6th AWSC

3: Turn of River Rd. & Driveway for 180 Turn of River Rd./Intervale Rd.

10/09/2022

Intersection	
Intersection Delay, s/veh	30.9
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	2	4	145	0	316	0	42	158	286	38	0
Future Vol, veh/h	3	2	4	145	0	316	0	42	158	286	38	0
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	3	5	184	0	400	0	53	200	362	48	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.5	42.6	13.9	25.3
HCM LOS	B	E	B	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	33%	31%	88%
Vol Thru, %	21%	22%	0%	12%
Vol Right, %	79%	44%	69%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	200	9	461	324
LT Vol	0	3	145	286
Through Vol	42	2	0	38
RT Vol	158	4	316	0
Lane Flow Rate	253	11	584	410
Geometry Grp	1	1	1	1
Degree of Util (X)	0.432	0.023	0.921	0.734
Departure Headway (Hd)	6.148	7.227	5.684	6.441
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	582	493	642	562
Service Time	4.213	5.31	3.684	4.498
HCM Lane V/C Ratio	0.435	0.022	0.91	0.73
HCM Control Delay	13.9	10.5	42.6	25.3
HCM Lane LOS	B	B	E	D
HCM 95th-tile Q	2.2	0.1	12	6.2

HCM 6th AWSC

3: Turn of River Rd. & Driveway for 180 Turn of River Rd./Intervale Rd.

10/09/2022

Intersection	
Intersection Delay, s/veh	17
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	1	2	87	0	220	2	84	138	307	98	0
Future Vol, veh/h	1	1	2	87	0	220	2	84	138	307	98	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	1	1	2	101	0	256	2	98	160	357	114	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.6	14.9	11.8	21.6
HCM LOS	A	B	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %		1%	25%	28%
Vol Thru, %		38%	25%	0%
Vol Right, %		62%	50%	72%
Sign Control		Stop	Stop	Stop
Traffic Vol by Lane		224	4	307
LT Vol		2	1	87
Through Vol		84	1	0
RT Vol		138	2	220
Lane Flow Rate		260	5	357
Geometry Grp		1	1	1
Degree of Util (X)		0.386	0.008	0.543
Departure Headway (Hd)		5.338	6.401	5.473
Convergence, Y/N		Yes	Yes	Yes
Cap		672	554	657
Service Time		3.398	4.5	3.529
HCM Lane V/C Ratio		0.387	0.009	0.543
HCM Control Delay		11.8	9.6	14.9
HCM Lane LOS		B	A	B
HCM 95th-tile Q		1.8	0	3.3

HCM 6th AWSC

3: Turn of River Rd. & Driveway for 180 Turn of River Rd./Intervale Rd.

10/09/2022

Intersection	
Intersection Delay, s/veh	10.8
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	2	3	81	0	194	0	36	96	152	69	4
Future Vol, veh/h	2	2	3	81	0	194	0	36	96	152	69	4
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	3	3	4	101	0	243	0	45	120	190	86	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.4	11.3	9	11.4
HCM LOS	A	B	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	29%	29%	68%
Vol Thru, %	27%	29%	0%	31%
Vol Right, %	73%	43%	71%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	132	7	275	225
LT Vol	0	2	81	152
Through Vol	36	2	0	69
RT Vol	96	3	194	4
Lane Flow Rate	165	9	344	281
Geometry Grp	1	1	1	1
Degree of Util (X)	0.214	0.013	0.441	0.395
Departure Headway (Hd)	4.664	5.352	4.616	5.052
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	761	673	773	706
Service Time	2.753	3.352	2.682	3.133
HCM Lane V/C Ratio	0.217	0.013	0.445	0.398
HCM Control Delay	9	8.4	11.3	11.4
HCM Lane LOS	A	A	B	B
HCM 95th-tile Q	0.8	0	2.3	1.9

HCM 6th AWSC

3: Turn of River Rd. & Driveway for 180 Turn of River Rd./Intervale Rd.

10/12/2022

Intersection	
Intersection Delay, s/veh	32.9
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	2	4	147	0	320	0	43	160	289	38	0
Future Vol, veh/h	3	2	4	147	0	320	0	43	160	289	38	0
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	3	5	186	0	405	0	54	203	366	48	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.6	46	14.2	26.3
HCM LOS	B	E	B	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	33%	31%	88%
Vol Thru, %	21%	22%	0%	12%
Vol Right, %	79%	44%	69%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	203	9	467	327
LT Vol	0	3	147	289
Through Vol	43	2	0	38
RT Vol	160	4	320	0
Lane Flow Rate	257	11	591	414
Geometry Grp	1	1	1	1
Degree of Util (X)	0.443	0.023	0.939	0.746
Departure Headway (Hd)	6.201	7.304	5.72	6.489
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	578	487	638	555
Service Time	4.27	5.397	3.72	4.551
HCM Lane V/C Ratio	0.445	0.023	0.926	0.746
HCM Control Delay	14.2	10.6	46	26.3
HCM Lane LOS	B	B	E	D
HCM 95th-tile Q	2.3	0.1	12.7	6.4

HCM 6th AWSC

3: Turn of River Rd. & Driveway for 180 Turn of River Rd./Intervale Rd.

10/12/2022

Intersection	
Intersection Delay, s/veh	17.5
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	1	2	88	0	223	2	85	140	311	99	0
Future Vol, veh/h	1	1	2	88	0	223	2	85	140	311	99	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	1	1	2	102	0	259	2	99	163	362	115	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.6	15.2	11.9	22.4
HCM LOS	A	C	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %		1%	25%	28%
Vol Thru, %		37%	25%	0%
Vol Right, %		62%	50%	72%
Sign Control		Stop	Stop	Stop
Traffic Vol by Lane		227	4	311
LT Vol		2	1	88
Through Vol		85	1	0
RT Vol		140	2	223
Lane Flow Rate		264	5	362
Geometry Grp		1	1	1
Degree of Util (X)		0.394	0.008	0.553
Departure Headway (Hd)		5.371	6.558	5.503
Convergence, Y/N		Yes	Yes	Yes
Cap		668	549	655
Service Time		3.433	4.558	3.561
HCM Lane V/C Ratio		0.395	0.009	0.553
HCM Control Delay		11.9	9.6	15.2
HCM Lane LOS		B	A	C
HCM 95th-tile Q		1.9	0	3.4

Intersection	
Intersection Delay, s/veh	11
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	2	3	82	0	196	0	36	97	154	70	4
Future Vol, veh/h	2	2	3	82	0	196	0	36	97	154	70	4
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	3	3	4	103	0	245	0	45	121	193	88	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.4	11.4	9.1	11.6
HCM LOS	A	B	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	29%	29%	68%
Vol Thru, %	27%	29%	0%	31%
Vol Right, %	73%	43%	71%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	133	7	278	228
LT Vol	0	2	82	154
Through Vol	36	2	0	70
RT Vol	97	3	196	4
Lane Flow Rate	166	9	348	285
Geometry Grp	1	1	1	1
Degree of Util (X)	0.216	0.013	0.447	0.401
Departure Headway (Hd)	4.679	5.376	4.629	5.064
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	756	670	771	704
Service Time	2.771	3.376	2.697	3.148
HCM Lane V/C Ratio	0.22	0.013	0.451	0.405
HCM Control Delay	9.1	8.4	11.4	11.6
HCM Lane LOS	A	A	B	B
HCM 95th-tile Q	0.8	0	2.3	1.9

HCM 6th AWSC

3: Turn of River Rd. & Driveway for 180 Turn of River Rd./Intervale Rd.

10/12/2022

Intersection	
Intersection Delay, s/veh	32.7
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	2	4	147	0	320	0	46	160	289	39	0
Future Vol, veh/h	3	2	4	147	0	320	0	46	160	289	39	0
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	3	5	186	0	405	0	58	203	366	49	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.6	45.6	14.3	26.6
HCM LOS	B	E	B	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	33%	31%	88%
Vol Thru, %	22%	22%	0%	12%
Vol Right, %	78%	44%	69%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	206	9	467	328
LT Vol	0	3	147	289
Through Vol	46	2	0	39
RT Vol	160	4	320	0
Lane Flow Rate	261	11	591	415
Geometry Grp	1	1	1	1
Degree of Util (X)	0.451	0.023	0.936	0.75
Departure Headway (Hd)	6.222	7.338	5.702	6.507
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	579	485	638	556
Service Time	4.275	5.422	3.739	4.554
HCM Lane V/C Ratio	0.451	0.023	0.926	0.746
HCM Control Delay	14.3	10.6	45.6	26.6
HCM Lane LOS	B	B	E	D
HCM 95th-tile Q	2.3	0.1	12.5	6.5

HCM 6th TWSC
6: Turn of River Rd. & Proposed Site Driveway

10/14/2022

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	T		T		T	
Traffic Vol, veh/h	2	4	203	1	1	189
Future Vol, veh/h	2	4	203	1	1	189
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	4	221	1	1	205

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	429	222	0	0	222
Stage 1	222	-	-	-	-
Stage 2	207	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	583	818	-	-	1347
Stage 1	815	-	-	-	-
Stage 2	828	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	582	818	-	-	1347
Mov Cap-2 Maneuver	582	-	-	-	-
Stage 1	815	-	-	-	-
Stage 2	827	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	721	1347
HCM Lane V/C Ratio	-	-	0.009	0.001
HCM Control Delay (s)	-	-	10	7.7
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM 6th AWSC

3: Turn of River Rd. & Driveway for 180 Turn of River Rd./Intervale Rd.

10/12/2022

Intersection	
Intersection Delay, s/veh	17.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	1	2	88	0	223	2	87	140	311	102	0
Future Vol, veh/h	1	1	2	88	0	223	2	87	140	311	102	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	1	1	2	102	0	259	2	101	163	362	119	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.6	15.3	12	22.8
HCM LOS	A	C	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %		1%	25%	28%
Vol Thru, %		38%	25%	0%
Vol Right, %		61%	50%	72%
Sign Control		Stop	Stop	Stop
Traffic Vol by Lane		229	4	311
LT Vol		2	1	88
Through Vol		87	1	0
RT Vol		140	2	223
Lane Flow Rate		266	5	362
Geometry Grp		1	1	1
Degree of Util (X)		0.398	0.009	0.554
Departure Headway (Hd)		5.382	6.581	5.517
Convergence, Y/N		Yes	Yes	Yes
Cap		666	547	651
Service Time		3.447	4.581	3.578
HCM Lane V/C Ratio		0.399	0.009	0.556
HCM Control Delay		12	9.6	15.3
HCM Lane LOS		B	A	C
HCM 95th-tile Q		1.9	0	3.4

HCM 6th TWSC
6: Turn of River Rd. & Proposed Site Driveway

10/14/2022

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	T		T		T	
Traffic Vol, veh/h	1	3	227	2	4	189
Future Vol, veh/h	1	3	227	2	4	189
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	3	247	2	4	205

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	461	248	0	0	249
Stage 1	248	-	-	-	-
Stage 2	213	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	559	791	-	-	1317
Stage 1	793	-	-	-	-
Stage 2	823	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	557	791	-	-	1317
Mov Cap-2 Maneuver	557	-	-	-	-
Stage 1	793	-	-	-	-
Stage 2	821	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.1	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	716	1317
HCM Lane V/C Ratio	-	-	0.006	0.003
HCM Control Delay (s)	-	-	10.1	7.7
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM 6th AWSC

3: Turn of River Rd. & Driveway for 180 Turn of River Rd./Intervale Rd.

10/12/2022

Intersection	
Intersection Delay, s/veh	11
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	2	3	82	0	196	0	38	97	154	73	4
Future Vol, veh/h	2	2	3	82	0	196	0	38	97	154	73	4
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	3	3	4	103	0	245	0	48	121	193	91	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.5	11.5	9.1	11.6
HCM LOS	A	B	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	29%	29%	67%
Vol Thru, %	28%	29%	0%	32%
Vol Right, %	72%	43%	71%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	135	7	278	231
LT Vol	0	2	82	154
Through Vol	38	2	0	73
RT Vol	97	3	196	4
Lane Flow Rate	169	9	348	289
Geometry Grp	1	1	1	1
Degree of Util (X)	0.22	0.013	0.448	0.406
Departure Headway (Hd)	4.693	5.396	4.643	5.067
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	754	667	768	702
Service Time	2.785	3.396	2.713	3.152
HCM Lane V/C Ratio	0.224	0.013	0.453	0.412
HCM Control Delay	9.1	8.5	11.5	11.6
HCM Lane LOS	A	A	B	B
HCM 95th-tile Q	0.8	0	2.3	2

HCM 6th TWSC
6: Turn of River Rd. & Proposed Site Driveway

10/14/2022

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	T		T		T	
Traffic Vol, veh/h	2	3	133	2	3	155
Future Vol, veh/h	2	3	133	2	3	155
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	3	145	2	3	168

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	320	146	0	0	147
Stage 1	146	-	-	-	-
Stage 2	174	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	673	901	-	-	1435
Stage 1	881	-	-	-	-
Stage 2	856	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	672	901	-	-	1435
Mov Cap-2 Maneuver	672	-	-	-	-
Stage 1	881	-	-	-	-
Stage 2	854	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	793	1435
HCM Lane V/C Ratio	-	-	0.007	0.002
HCM Control Delay (s)	-	-	9.6	7.5
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0