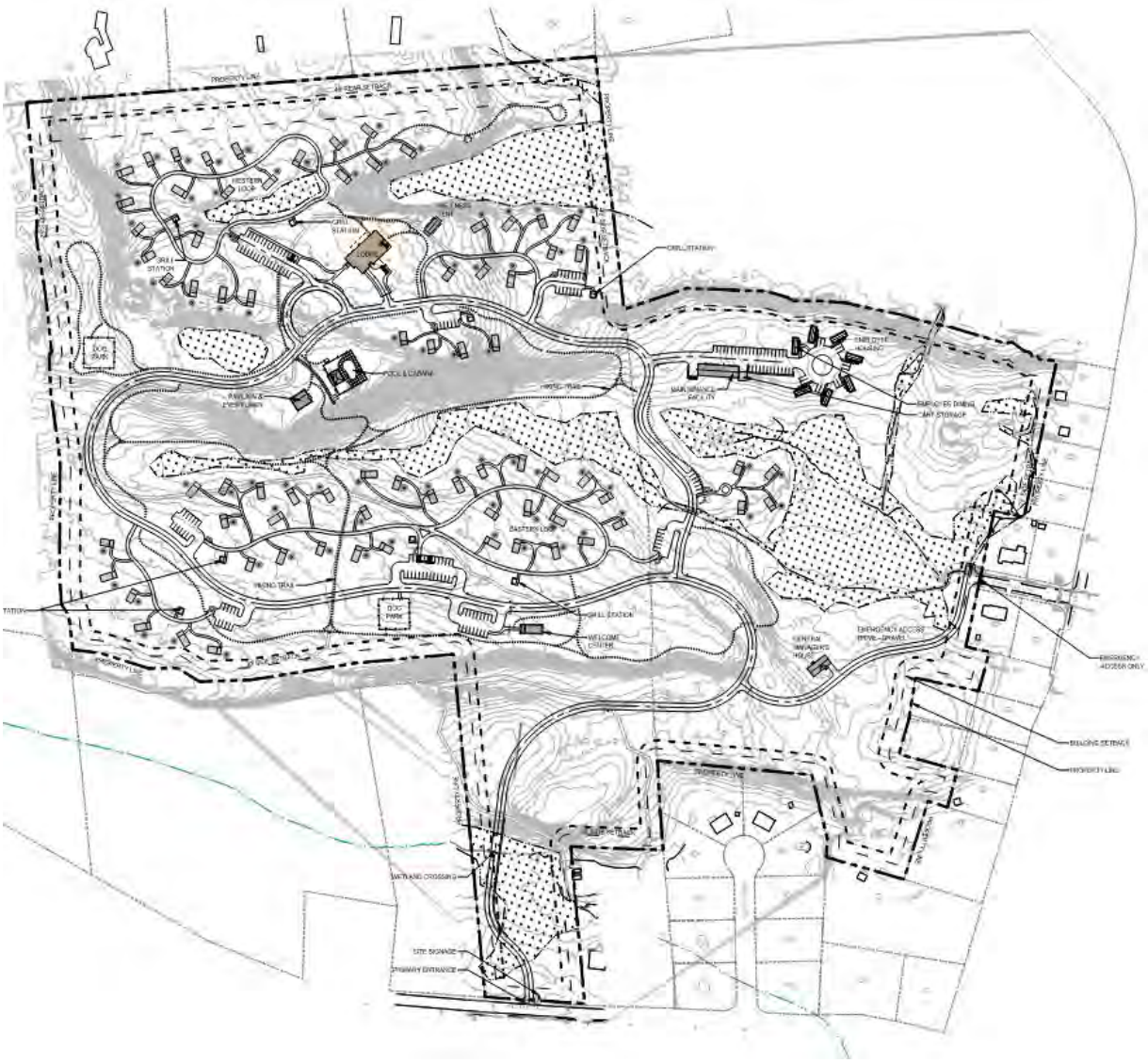
GPI

Engineering | Design | Planning | Construction Management

Traffic Impact Study

June 2022

TERRAMOR CATSKILLS CAMPGROUND • Saugerties, New York



OWNER: Terramor Outdoor Resorts
550 North 31st Street
Billings, Montana 59101

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80 Wolf Road | Suite 300, Albany, NY 12205 | 518.453.9431 | gpinet.com

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1.0 Introduction

Greenman-Pedersen Inc. (GPI) has been retained to assess the traffic impacts of the Terramor Catskills campground being proposed along Saugerties-Woodstock Rd (NY Route 212) in the Town of Saugerties, Ulster County, New York.

The following report details the analysis performed to assess the traffic impacts of the proposed campground on the adjacent roadway network within the study area. This report includes a summary of the assumptions and procedures used in the analysis, as well as the findings of the analysis and any recommended improvements to mitigate identified site impacts.

2.0 Project Area

The campground is proposed to consist of up to 75 "glamping" campsites, supporting lodge, swimming pool and maintenance facilities, as well as on-site lodging for employees.

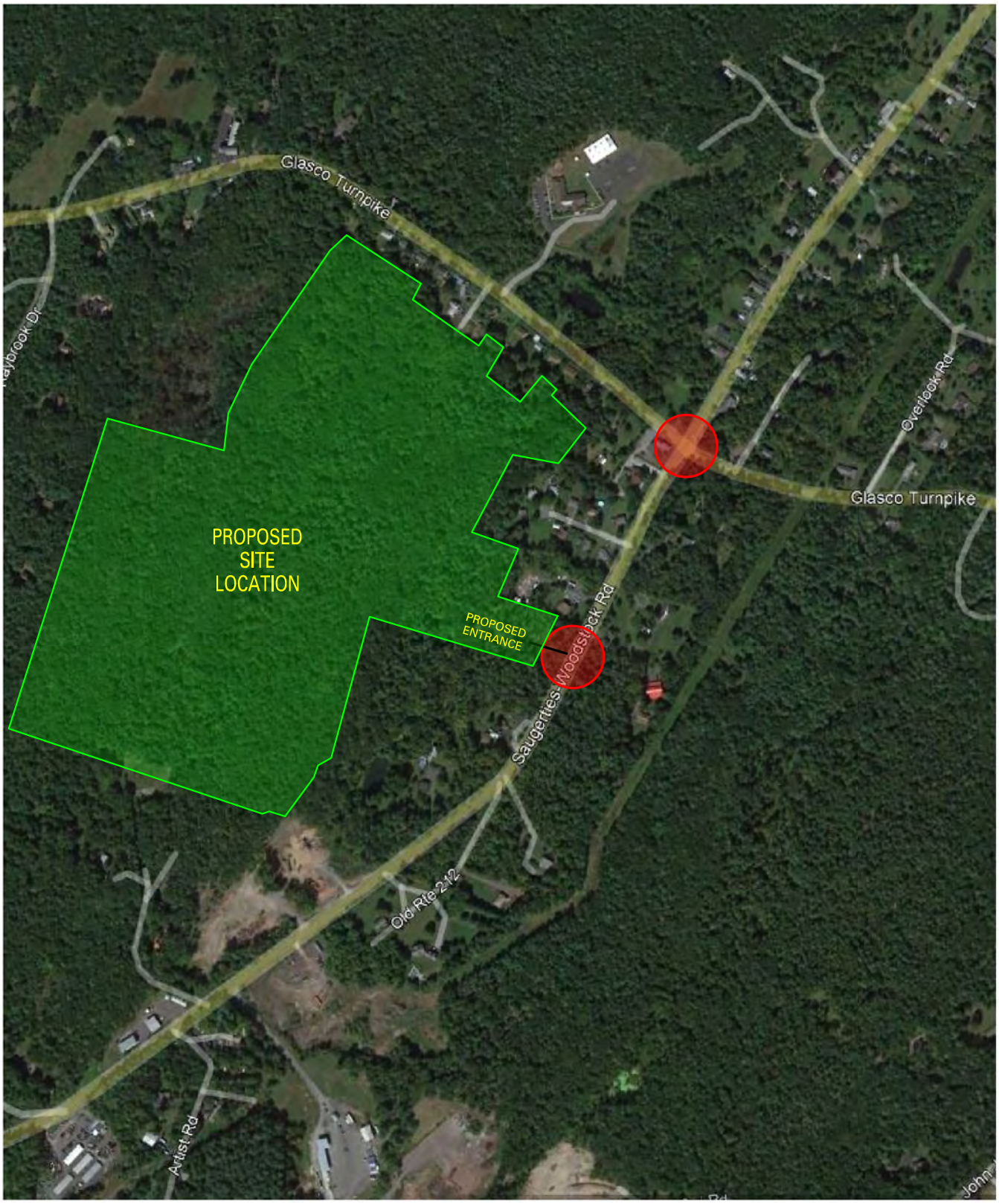
For vehicular access, the campground will utilize a new site driveway that will be constructed along NYS Route 212, approximately 1,000 feet south of Glasco Turnpike. A secondary access will also be constructed, which will access Glasco Turnpike via Cottontail Lane, but that driveway will be gated and for emergency access only.

A site plan showing the proposed site layout is included in Appendix A.

The study area for the traffic analysis was determined by GPI, based on anticipated traffic volumes and directionality, and includes the following intersections:

- NY Route 212 at Glasco Turnpike (CR 32) (4-leg intersection with two-way stop control on minor approaches)
- NY Route 212 at the proposed campground entrance (3-leg intersection with minor street stop control only)

Figure 1 – "Site Location Map" depicts the location of the proposed campground and the studied intersections in relation to the area's roadways.



KEY:

STUDIED INTERSECTIONS

GPI Engineering Design Planning Construction Management

TERRAMOR CATSKILLS CAMPGROUNDS
TRAFFIC IMPACT STUDY
TOWN OF SAUGERTIES, NY

SITE LOCATION MAP

SCALE:	DATE:	FIGURE NO.
NO SCALE	JUNE 2022	1

3.0 Existing Conditions

3.1 Roadway Description

The study area's intersections are located along Saugerties-Woodstock Rd (NYS Route 212) and Glasco Turnpike in the Town of Saugerties, New York. A description of each of these roadways and the existing intersections within the study area is as follows:

Saugerties-Woodstock Rd (NYS Route 212) is a two-lane state roadway that generally runs east-west between the Towns of Woodstock and Saugerties, but in the area of the proposed development runs north and south (which is how it will be referred to in this study). This roadway is classified as a Major Rural Collector, and within the study area, NY-212 consists of travel lane that are between 11-feet and 12-feet in width, with 2'-4' paved shoulders. The posted speed limit is 55 mph adjacent to the proposed site, but changes to 45 mph approximately 500 feet north of the proposed driveway. The average annual daily traffic along this segment of roadway is approximately 4,900 vehicles.

Glasco Turnpike (County Road 32) is a two lane east-west County roadway that consists of travel lanes that are between 10-feet and 11-feet in width and little to no paved shoulders. The posted speed limit is 40 mph along the roadway and the average annual daily traffic is approximately 1,500 vehicles.

NYS Route 212 and Glasco Turnpike Intersection is a 4-legged intersection located approximately 1,000 feet north of the proposed campground's driveway. All four approaches of this intersection consist of a single lane and there are stop signs on each of the Glasco Turnpike approaches (eastbound and westbound) for traffic control. Through movements northbound and southbound along NYS Route 212 are uncontrolled and free flowing.

3.2 Data Collection

Data collection in the field for the proposed site consisted of turn movement traffic counts at the NYS Route 212 and Glasco Turnpike intersection, travel speed observations, sight distance measurements, and a review of roadway geometry, traffic control and signage. All of which are detailed in this section of the report.

3.3 Existing Traffic Volumes

Vehicular traffic data was recorded by Greenman-Pedersen, Inc. (GPI) at the intersection of NY Route 212 and Glasco Turnpike (CR 32) during the 13-hour period between 6:00 am and 7:00 pm on Thursday February 10, 2022. Based on the count data, it was determined that the weekday morning and afternoon peak hours were 8:00 am to 9:00 am and 3:00 pm to 4:00 pm respectively. Additionally, GPI reviewed NYSDOT seasonal adjustment factors to determine how the count data compared to average annual conditions. The adjustment factor for February (when the counts were conducted) is 0.804, which indicates that February traffic is generally about 20% lower than average annual conditions. For this reason, the counted traffic volumes were adjusted by this seasonal adjustment factor to project average annual conditions and develop the 2022 existing peak hour traffic volumes. These volumes were then compared to pre-pandemic historic traffic volume data to determine if traffic reductions seen during the COVID-19 pandemic were still applicable. This comparison showed that the counted volumes were higher than those reported pre-pandemic, so it appears that traffic volumes have recovered from the pandemic period along these roadways and no pandemic adjustment was needed.

The existing traffic volumes are depicted on Figure 2 – "2022 Existing Peak Hour Traffic Volumes" included at the end of Section 3 of this report. Detailed traffic count data sheets are included in Appendix B.

3.4 Travel Speeds

Travel speeds were measured in both the northbound and southbound directions along NY Route 212 on February 13, 2022 at the location of the proposed entrance to the site. During this time, weather conditions were clear and the roadway was dry. The speed measurements were taken by radar gun and only the speeds of vehicles traveling at free flow speeds were recorded, per methodology discussed in the Manual of Transportation Engineering Studies published by ITE. Thirty speed readings in each direction were taken. The resulting data revealed that the average speed is 49.1 mph in the southbound direction and 53.2 mph in the northbound direction, while the 85th percentile speed, which is typically used as the design speed for the roadway, is 52.7 mph in the southbound direction and 59.0 mph in the northbound direction. Data sheets for the speed data collected are included in Appendix C.

3.5 Sight Distance Evaluation

Sight distance measurements were taken on Route 212 at the location of the proposed site's entrance using the methodology and procedures outlined in *A Policy on Geometric Design of Highways and Streets,* 7th Edition, published by the American Association of State Highway and Transportation Officials (AASHTO). The general findings from conducting these measurements are as follows:

- Looking north from the site (to the left), the road is mostly straight and level. Sight distance extends past the intersection of Route 212 and Glasco Turnpike, which is more than 1,000 feet away. On-site vegetation will need to be kept trimmed after construction to maintain this distance.
- Looking south from the site (to the right), the road curves sharply to the west limiting the available sight distance. From the currently proposed site driveway location, the available sight distance in that direction is approximately 570 feet. There is the potential to further increase sight distance in that direction if tree cutting and vegetation removal was performed on the two adjacent properties to the south of the site. This would require either right-of-way acquisition or an agreement with the adjacent property owner's. This tree clearing would add at least 50 feet to the available sight line, increasing sight distance to approximately 620 feet in that direction.

The available sight distance was compared to recommended minimum sight distance values shown in AASHTO's *A Policy on Geometric Design of Highways and Streets* and the NYSDOT *Highway Design Manual*. The recommended values for this location, which are based on the design speed along each approach (55 mph southbound, 60 mph northbound), are shown in the table below, along with the available sight distance for comparison.

Table 1
Sight Distance Summary

Direction	Available Sight Distance	Design Speed	Required Stopping Sight Distance	Recommended Intersection Sight Distance
Looking Left (to the north)	1,000'+	55 mph	495'	610'
Looking Right (to the south)	570' - 620' *	60 mph	570'	665'

* 570' exists currently, but 620' should be achievable through tree clearing.

As can be seen in the table, there should be no sight distance issues looking north, and stopping sight distance requirements are met looking south. If northbound speeds were reduced by 5 mph and the southern tree clearing occurred, Intersection sight distance recommended could be achieved as well. This speed reduction could be accomplished by extending the adjacent 45 mph zone to the south by approximately 1,500 feet and possibly

reinforcing that speed using a speed feedback sign northbound. If these countermeasures were employed, recommended intersection sight distances could be met in both directions. If not, stopping sight distance requirements are still met looking south, which should still produce reasonably safe traffic operations.

3.6 Crash History

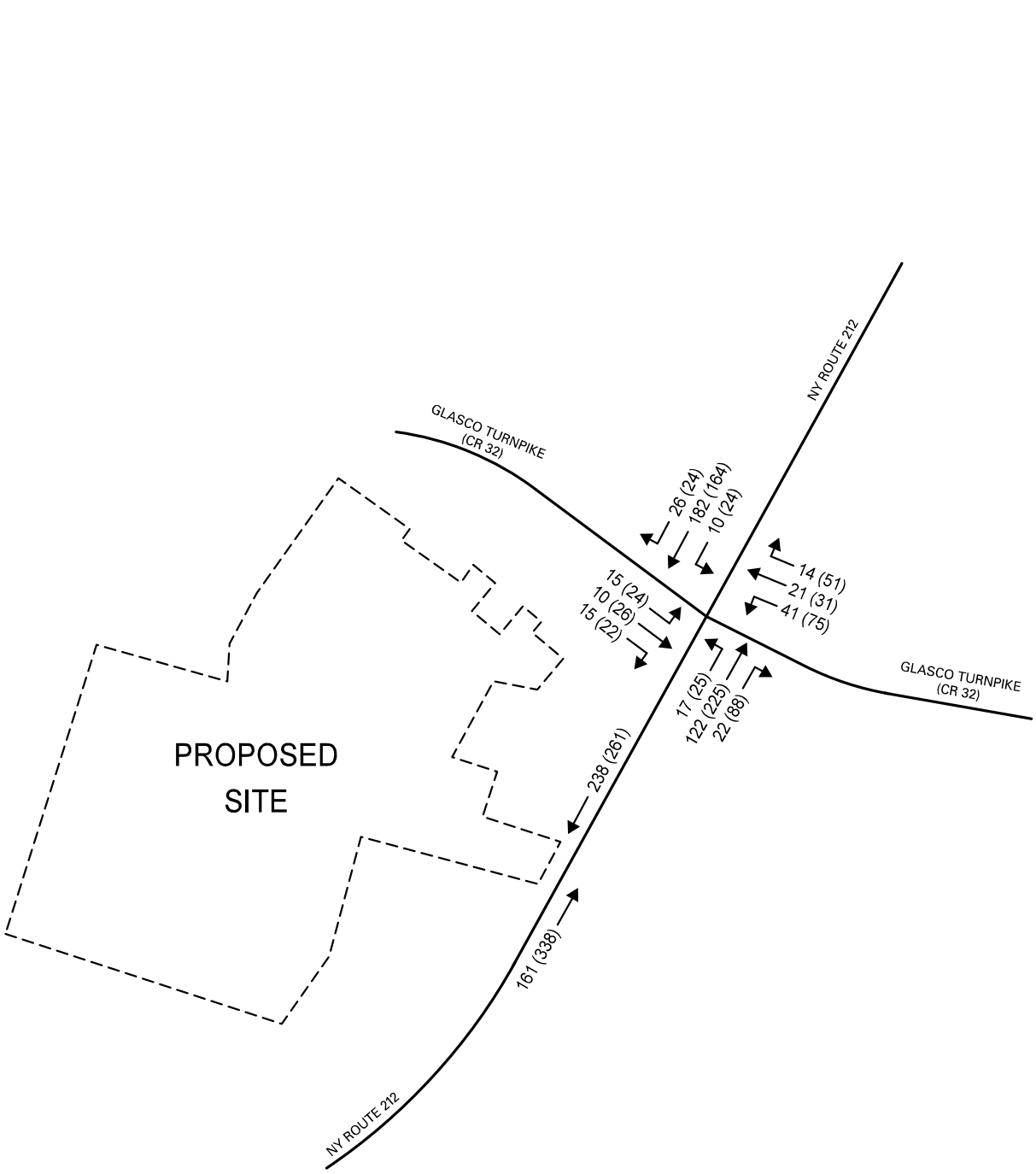
A crash analysis was performed for the road segment of NY Route 212 between Old Route 212 (located approximately 700 feet south of the proposed site) and Glasco Turnpike (located approximately 1,000 feet north of the proposed site). The analysis reviewed the three-year period between November 1, 2018 and October 31, 2021 and the general findings are as follows:

- At the intersection of NY Route 212 and Glasco Turnpike, there were 11 crashes that occurred over the studied period. Of these crashes, 5 resulted in injuries and 6 in property damage only. Right-Angle crashes occurred at a much higher rate than would be anticipated, accounting for 6 of the 11 crashes, and the crash rate was found to be 5.51 times higher than the state-wide average for comparable intersections. Westbound sight distance limitations and northbound travel speeds appear to be the most significant contributing factors to this rate. If tree trimming and vegetation removal was performed near the intersection and the 45-mph speed zone at the intersection was extended further south to reduce northbound speeds, the crash rate would likely improve.
- Along NY Route 212, from Old Route 212 to Glasco Turnpike, there were 10 crashes that occurred over the studied period. Of these crashes, 2 resulted in injuries and 8 in property damage only. Crashes involving animals or alcohol accounted for half of the crashes. The crash rate for the segment was found to be 2.23 times higher than the state-wide average for comparable roadway segments. The high number of animal crashes could possibly be reduced if speeds were decreased along the roadway to allow drivers more reaction time.

Based on the crash analysis, a reduction in northbound speed would be beneficial. As suggested earlier in this report, this could be achieved by extending the 45-mph zone further south by approximately 1,500 feet and installing a speed feedback sign as a traffic calming measure. Crash History data can be found in Appendix D.

Table 2
Crash Type Summary

Location	Animal	Fixed Object	Rear End	Head On	Left Turn	Right Angle	Over-taking	Other	Total
NY-212 from Old Rt. 212 to Glasco Turnpike	3	3	1	1	1	-	-	1	10
Intersection of NY-212 and Glasco Turnpike	-	1	1	-	2	6	1	-	11



KEY:

XXX (XXX) = AM (PM) PEAK HOUR TRAFFIC VOLUMES

GPI Engineering Design Planning Construction Management	TERRAMOR CATSKILLS CAMPGROUNDS TRAFFIC IMPACT STUDY TOWN OF SAUGERTIES, NY	2022 EXISTING CONDITION PEAK HOUR VOLUMES		
		SCALE: NO SCALE	DATE: JUNE 2022	FIGURE NO. 2

4.0 Projected Traffic Conditions

4.1 Background Traffic Growth

To address the impacts of the proposed campground development on the surrounding roadway system, it was first necessary to determine the background traffic operations as a baseline. Since the proposed development is anticipated to be fully constructed within the next two years, an analysis year of 2024 was selected for evaluation. "No-Build" traffic volumes were developed for the year 2024 using NYSDOT historic traffic data to determine an annual growth rate that reflects the expected growth of traffic along the roadways as a result of regional development. This historic data revealed that traffic has generally declined within the study area since 2006. Generally speaking, NYS Route 212 traffic has dropped a half a percent per year since that time, and Glasco Turnpike traffic has declined 2%-4% per year. However, to be conservative, it is assumed that traffic will grow by half a percent per year for the next couple years for analysis purposes. As such, exiting traffic volumes were increased by a factor of 1.01 to develop the 2024 No-Build Traffic, which are depicted in Figure 3 – "No Build Condition (2024) Peak Hour Volumes".

4.2 Site Generated Traffic

The number of trips generated by the proposed site was estimated for the peak hour conditions using data contained in the *Trip Generation Manual,* 11th Edition, published by the Institute of Transportation Engineers (ITE). For the proposed site, Land Use Code (LUC) 416 – "Campground/Recreational Vehicle Park" was used to estimate the trip generation potential for the proposed 75-site campground.

LUC 416 includes multiple case study examples that exhibit a general trip generation pattern that can be used to predict the trip generation potential of any new campground site. These examples include campgrounds that accommodate a variety of camping facilities to include tents, trailers and recreational vehicles, and that offer various services, from restrooms and showers, to recreational facilities, swimming pools, convenience stores and laundromats.

The Terramor site does vary slightly from a standard campground, in that it provides overnight staff housing for 24-28 staff members, but other than that, campsite occupancy and amenities are expected to be similar to a typical campground. To conservatively account for the overnight staff members, 10 additional campsites were assumed on-site, and the trip generation estimate for the Terramor campground was based on 85 occupied sites. Using this methodology, it is estimated that the site will generate 17 AM peak hour trips (6 entering / 11 exiting) and 22 PM peak hour trips (14 entering / 8 exiting). The trip generation numbers are shown in Table 3.

Table 3
Trip Generation Summary

Land Use Code	Land Use	Size	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
416	Campground/Recreation Vehicle Park	85 Occupied Campsites*	6	11	**17**	14	8	**22**

* 85 occupied sites are for calculation purposes only. Actual development has 75 planned campsites plus on-site staff.

It should be noted that New York State Department of Transportation (NYSDOT) has a general policy to require a traffic impact study if a development adds 100 or more peak hour trips to the adjacent roadway. The proposed site generates less than a quarter of that threshold.

Additionally, the Institute of Transportation Engineers (ITE), states in their *Traffic Impact Analyses for Site Development* publication… "In lieu of other locally preferred thresholds, it is suggested that a transportation impact study be conducted whenever a proposed development will generate 100 or more added (new) trips during the adjacent roadways' peak hour or the development's peak hour." This publication goes on to say that 100 vehicles can change the level of service or appreciably increase the volume to capacity ratio of an intersection approach. This, and other ITE publications, suggest that developments that generate less than 100 peak hour vehicles will have minimal effect on the adjacent roadway traffic operations.

Based on these references, it can be qualitatively concluded that the amount of traffic generated by the proposed site is far below that which would cause any significant impact to traffic operations or roadway capacity. This will be confirmed through our analysis found in Section 5 of this report.

It should be noted that the *Trip Generation Handbook,* 3rd Edition, published by ITE defines two major categories for trips: pass-by trips and primary trips. Pass-by trips are those made by a driver enroute to a separate primary destination. They are trips that are attracted from existing traffic passing the site on an adjacent roadway and are not diverted from another roadway. Generally, trips classified as Pass-By only affect the generators entrance intersections and do not increase traffic volumes throughout the remainder of the roadway network. Primary trips are made for the specific purpose of visiting the generating site. The stop at the generator is the primary reason for the trip and the trips generally go from origin to generator then return to the generator.

For a campground land use, it is assumed that all trips will be primary for the proposed development.

4.3 Trip Distribution

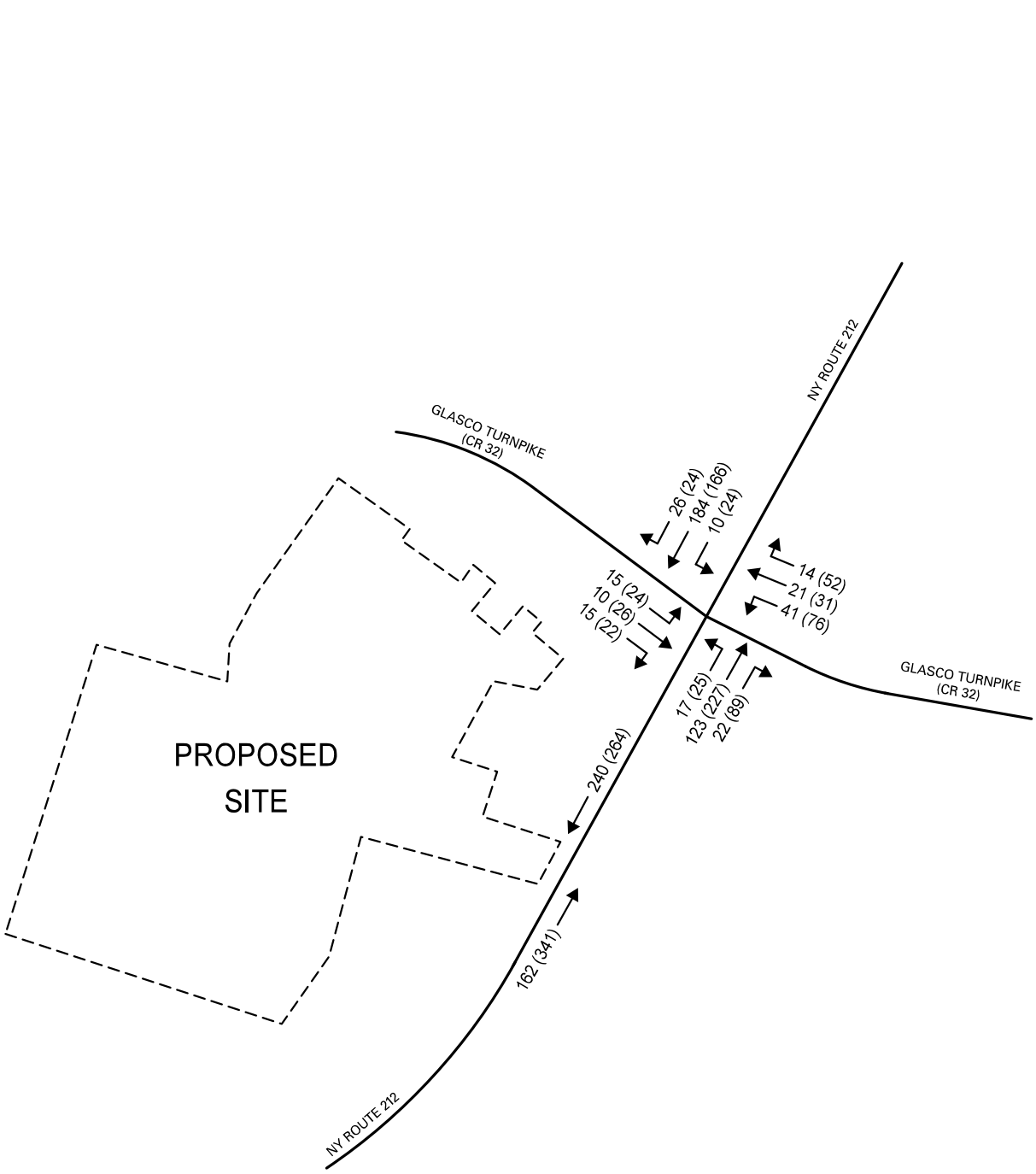
As this type of "glamping" campground will tend to draw from longer distances, the trip distribution will be weighed heavily towards the nearest Interstate 87 access, which is in Saugerties to the north. Although there will be users from all directions, including those from Route 9W that will utilize Glasco Turnpike and those from the south and west that utilize Route 212. Based on the likely origins and destinations for campground users, the following general directional distribution is assumed.

- 70% to/from the North via NYS Route 212
- 20% to/from the South via NYS Route 212
- 10% to/from the East via Glasco Turnpike

Trip assignments were made by applying the above percentages to the trip generation projected for the proposed campground shown in Table 3. These trip assignments are shown in Figure 4 – "Trip Assignment Pass-By Trips (PM Peak Hour) and Figure 5 – "Trip Assignment For New Site Trips".

4.4 Build Condition Traffic Volumes

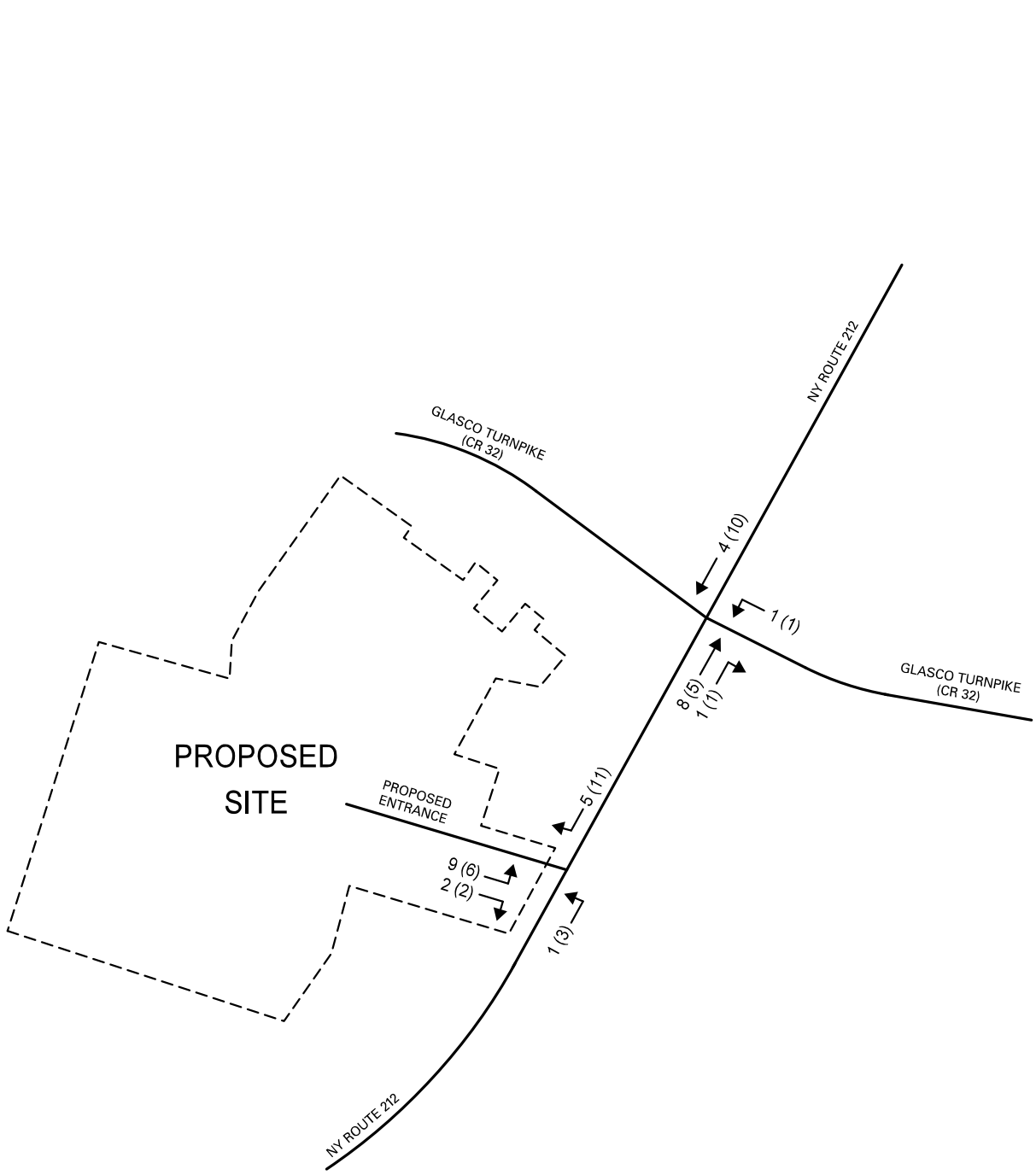
The Build Condition peak hour traffic volumes were developed by combining the 2024 future No-Build condition traffic volumes with the trip assignments for new site traffic. These volumes are graphically depicted on Figure 5 – "2024 Build Condition Peak Hour Traffic Volumes".



KEY:

XXX (XXX) = AM (PM) PEAK HOUR TRAFFIC VOLUMES

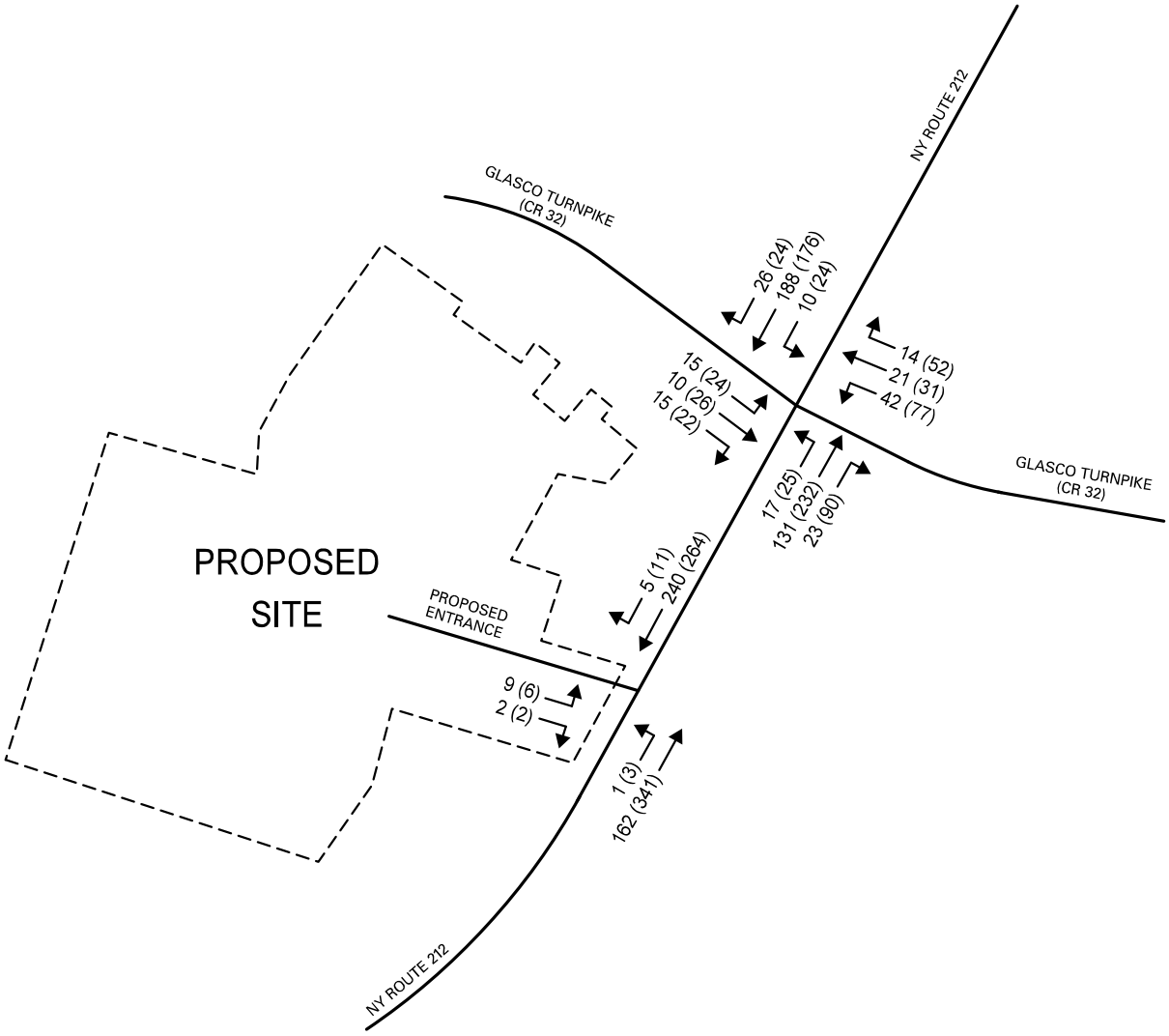
GPI Engineering Design Planning Construction Management	TERRAMOR CATSKILLS CAMPGROUNDS TRAFFIC IMPACT STUDY TOWN OF SAUGERTIES, NY	2024 NO-BUILD CONDITION PEAK HOUR VOLUMES		
		SCALE: NO SCALE	DATE: JUNE 2022	FIGURE NO. 3



KEY:

XXX (XXX) = AM (PM) PEAK HOUR TRAFFIC VOLUMES

GPI Engineering Design Planning Construction Management	TERRAMOR CATSKILLS CAMPGROUNDS TRAFFIC IMPACT STUDY TOWN OF SAUGERTIES, NY	TRIP ASSIGNMENT FOR NEW SITE TRIPS		
		SCALE: NO SCALE	DATE: JUNE 2022	FIGURE NO. 4



KEY:

XXX (XXX) = AM (PM) PEAK HOUR TRAFFIC VOLUMES

GPI Engineering Design Planning Construction Management	TERRAMOR CATSKILLS CAMPGROUNDS TRAFFIC IMPACT STUDY TOWN OF SAUGERTIES, NY	2024 BUILD CONDITION PEAK HOUR VOLUMES		
		SCALE: NO SCALE	DATE: JUNE 2022	FIGURE NO. 5

5.0 Operating Conditions

5.1 Capacity Analysis Description

The operating conditions of transportation facilities are evaluated based on the relationship of existing or projected traffic volumes to the theoretical capacity of the highway facility, which can be equated to a level of service (LOS) based on the delay experienced by each vehicle. Level of service ranges from LOS A to LOS F and the delay thresholds that define various levels of service can be found in the *Highway Capacity Manual*, 6th Edition (HCM6), published by the Transportation Research Board. In general, "A" represents the best operating condition with unrestricted flow and little or no delay per vehicle, and "F" represents the worst, with congested conditions, long delays and poor traffic operations. LOS C or better is generally desirable, but LOS D for signalized locations and LOS E for unsignalized are generally acceptable during peak periods, as long as the volume to capacity ratio (v/c) is below 1.0.

Table 4 below presents the LOS criteria for both signalized and unsignalized intersections.

TABLE 4
LEVEL OF SERVICE CRITERIA

LOS	Signalized Intersection Delay Per Vehicle (sec.)	Unsignalized Intersection Delay Per Vehicle (sec.)
A	≤ 10.0	≤ 10.0
B	> 10.0 and ≤ 20.0	> 10.0 and ≤ 15.0
C	> 20.0 and ≤ 35.0	>15.0 and ≤25.0
D	> 35.0 and ≤ 55.0	> 25.0 and ≤ 35.0
E	> 55.0 and ≤ 80.0	> 35.0 and ≤ 50.0
F	> 80.0	> 50.0

5.2 Results of Analysis

To determine the impact of the proposed Terramor campground on the operations of the adjacent transportation system, traffic operations were analyzed for both the weekday AM and PM peak hour under existing, no-build and future build conditions. Level of Service and delay within the study area for each of these conditions are summarized in Table 5 and computation worksheets for each of the analyses are provided in Appendix E.

TABLE 5
PEAK HOUR LEVEL OF SERVICE SUMMARY

Intersection	Movement/ Approach	2022 Existing		2024 No-Build		2024 Build	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
NY-212 and Glasco Turnpike	NB Left Turn*	A (7.8)	A (7.7)	A (7.8)	A (7.7)	A (7.8)	A (7.7)
	SB Left Turn*	A (7.6)	A (8.0)	A (7.6)	A (8.0)	A (7.6)	A (8.1)
	EB Approach	B (12.1)	C (15.5)	B (12.1)	C (15.6)	B (12.2)	C (15.9)
	WB Approach	B (13.3)	C (18.9)	B (13.4)	C (19.1)	B (13.6)	C (19.8)
NY-212 and Campground Driveway	NB Left Turn*	-	-	-	-	A (7.8)	A (7.9)
	EB Approach	-	-	-	-	B (11.3)	B (12.8)

Note: the above table lists level of service and delay per vehicle (in seconds) results for each analysis.

* HCM6 Two-way Stop Control (TWSC) methodology assumes uncontrolled through and right turn movements have a theoretical delay of zero, so only mainline left turn movement and side street delays are shown in the table for these type intersections.

To summarize the findings from the table above for each of the studied intersections:

5.2.1 NYS Route 212 and Glasco Turnpike

The analysis shows that this intersection operates with no approach worse than LOS C during any of the analyzed peak hours, and the build conditions adds less than a second of delay per vehicle to the approaches. The build condition traffic volumes will have no noticeable impact on the operations at this intersection.

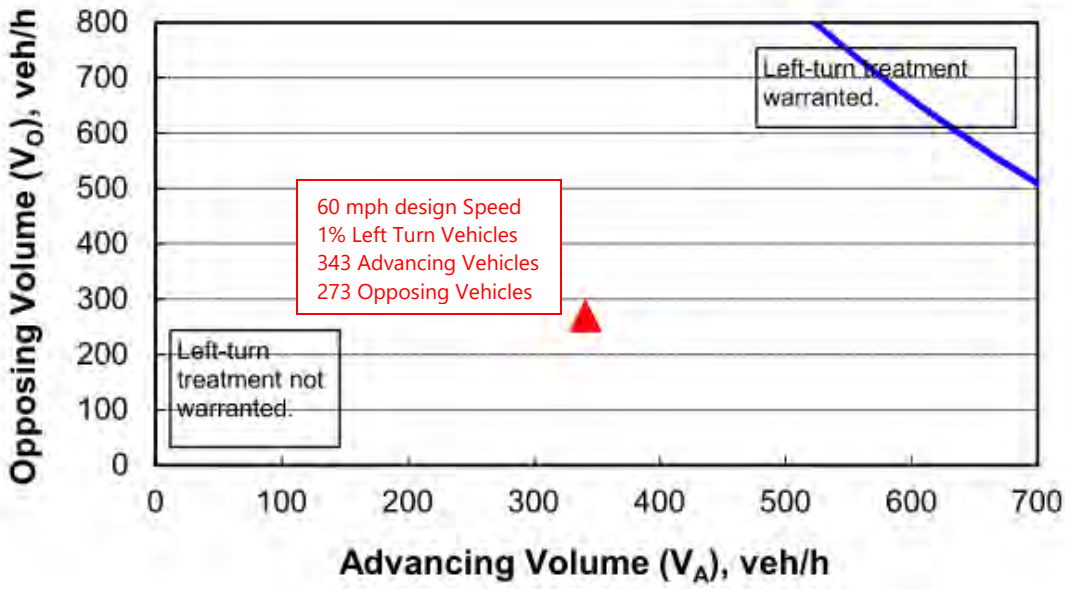
5.2.2 NYS Route 212 and Terramor Campground Driveway

This new intersection is assumed to have a single entering and single exiting lane, with stop sign control for the site driveway (eastbound) and no traffic control on NYS Route 212. Based on the projected volumes, the new driveway will operate at LOS B or better throughout the day and the inbound left turn movement will operate at LOS A, with no appreciable queue. This intersection poses no significant impacts to NYS Route 212 operations.

5.4 Turn Lane Warrants

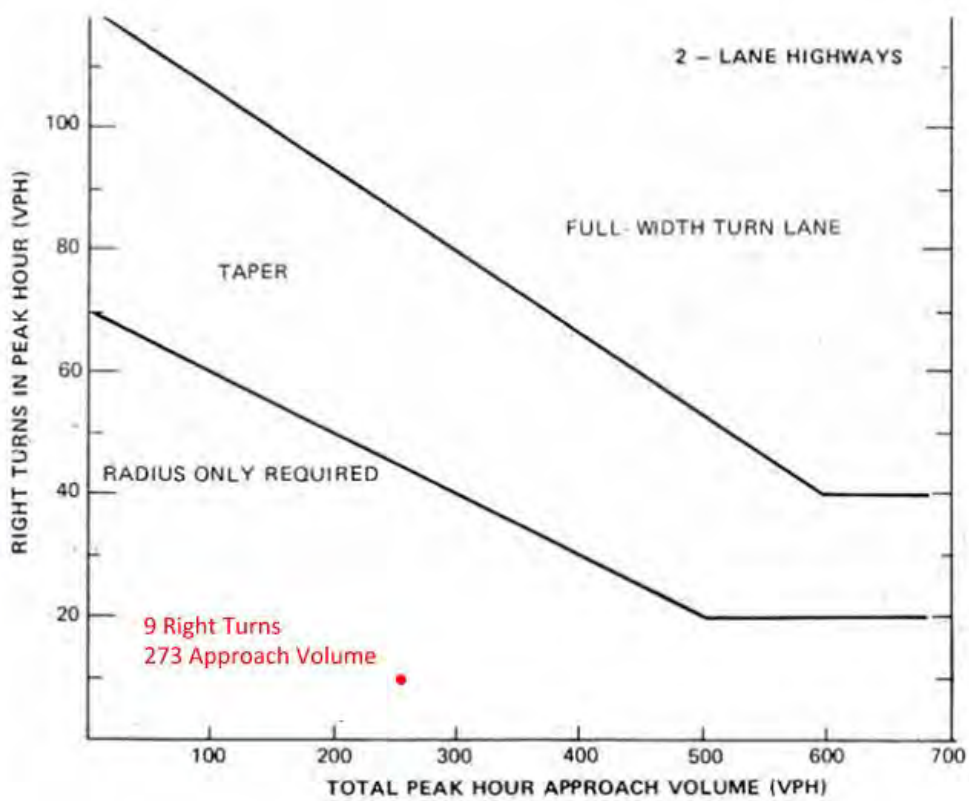
To determine the need for turn lanes at the site driveway, both left turn and right turn lane warrants were reviewed. For the left turn lane warrant, NCHRP Report 457 "Evaluating Intersection Improvements: An Engineering Study Guide" outlines the methodology used to justify a left turn lane at an unsignalized intersection. This procedure was followed and a left turn lane was not warranted at the Terramor campground driveway. See the graph below for details.

Left Turn Lane Warrant Graph



For the right turn lane warrant, ITE's *Traffic Engineering Handbook* includes a graph that can be used to determine the need for a right turn lane. Based on this graph, a right turn lane is not warranted at the Terramor campground driveway.

Right Turn Lane Warrant Graph



6.0 Findings & Recommendations

The preceding analysis evaulated the potential traffic impacts resulting from the proposed Terramor Campground in Saugerties, New York. The site includes 75 "glamping" campsites, supporting amenities such as lodge and swimming pool, maintenance facilities and on-site lodging for staff. Findings and recommendations derived from the analysis include the following.

- Trip Generation was conducted assuming 85 occupied campsites to estimate the trip generation potential of the 75-campsites plus on-site staff lodging. Trip generation is estimated to be 17 vehicles in the AM peak hour and 22 vehicles in the PM peak hour.
- Measured travel speeds indicate that the 85th percentile operating speed along NY Route 212 is 52.7 mph southbound and 59.0 mph northbound. Based on these speeds, the design speeds assumed for sight distance purposes were 55 mph southbound and 60 mph northbound.
- The crash rate at NY Route 212 and Glasco Turnpike was found to be five and a half times higher than the state-wide average for comparable intersections, and the NY Route 212 road segment adjacent to the proposed site is about twice the statewide average. In both cases, reducing northbound travel speeds would likely help to reduce the crash rate, as would tree trimming and clearing on the east side of the intersection.
- Sight distance measurments were taken at the proposed driveway location and it was found that intersection sight distance guidelines were fully met looking north, but there were some limitations looking south. Recommendations to improve this condition include tree trimming and clearing south of the proposed site, shifting the 45-mph speed zone transition located near the site to a point 1,500 feet south of the site, and the installation of a radar speed feedback sign northbound in advance of the site.
- Per guidelines from NYSDOT and the Institute of Traffic Engineers, trip generation of less than 100 vehicles is typically not sufficient to impact level of service and generally does not require a traffic study.
- Highway capacity analysis confirmed that NY Route 212 and Glasco Turnpike in the build condition operates at the same level of service as in the no-build condition. In both cases, no movement operates worse than LOS C.
- For the proposed driveway along NY Route 212, a single entering lane and a single exiting lane will result in LOS B or better operations for all traffic movements.
- Turn Lane warrants were conducted to determine the need for either a left turn lane or a right turn lane at the site driveway. In both cases, warrants were not met and neither type turn lane is justified.

Based on the analysis, the proposed Terramor campground will not significantly impact traffic operations within the study area. Levels of service are not expected to changes and queuing will not be significant. Sight distance to the south, at the site driveway, is somewhat limited, but can be adequately addressed through the recommendations above.

APPENDIX A

Site Plan

LEGEND

- PROPERTY LINE
- BUILDING SETBACK
- 50' FACILITIES BUFFER
- HIKING TRAIL
- >25% SLOPES
- PREVIOUSLY DELINEATED WETLAND
- STREAM
- EXISTING STONE WALL
- GLAMPING TENT

120 0 40 80 120

Scale: 1" = 120' FOR 24X36 SHEET

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Architect:
DGC Architects
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Ellsworth, ME 04605

Traffic Engineer:
GPI
80 Wolf Road, Suite 300,
Albany, NY 12205

Surveyor:
Ausfeld & Waldruff
323 Clinton Street
Schenectady, NY 12305

Project Title:

Terramor Catskills

NY ROUTE 212
Saugerties, NY 12477

ISSUED FOR:
SITE PLAN APPLICATION

Project No.:			2021096
Design:			MJT/KAC
Drawn:	BAS	Chk'd:	MJT
Date:	06/07/2022	Scale:	1"=120'

Rev:	Description:	Date:

Drawing Title

OVERALL SITE PLAN PLAN

Drawing No.

L-2.0

Plotted By: BRIDGET A. SNOYER
Plot Date: 6/7/2022 11:19 AM
File Name: G:\2021\2021096_Terramor_Saugerties\2021096CAD\1-2.0_Project Master Plan.dwg

APPENDIX B

Traffic Counts/Data Collection

Greenman-Pedersen, Inc.
80 Wolf Rd, Suite 300
Albany, NY 12205
(518) 453-9431

Intersection: NY Route 212 and Glasco Turnpike
Location: Town of Saugerties, NY

Project No.: 2200004.00
Count Date: 2/10/2022

Total Traffic - Cars & Heavy Vehicles

Start Time	NY Route 212 Southbound					Glasco Turnpike Westbound					NY Route 212 Northbound					Glasco Turnpike Eastbound				
	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes
6:00 AM	0	1	10	2	0	0	4	1	0	0	0	0	3	0	0	0	0	1	0	0
6:15 AM	0	0	13	1	0	0	1	1	1	0	0	0	8	0	0	0	0	1	1	0
6:30 AM	0	0	41	0	0	0	3	0	0	0	0	1	9	1	0	0	2	0	1	0
6:45 AM	0	3	28	0	0	0	7	0	3	0	0	0	12	2	0	0	0	1	0	0
7:00 AM	0	3	20	0	0	0	4	0	2	0	0	1	15	1	0	0	0	1	1	0
7:15 AM	0	1	30	0	0	0	1	2	4	0	0	1	19	3	0	0	4	1	4	0
7:30 AM	0	2	20	4	0	0	4	0	4	0	0	1	13	8	0	0	3	1	1	0
7:45 AM	0	1	27	5	0	0	6	4	2	0	0	3	17	3	0	0	0	1	7	0
8:00 AM	0	1	38	4	0	0	3	4	6	0	0	3	20	4	0	0	1	1	3	0
8:15 AM	0	1	33	3	0	0	7	2	1	0	0	4	16	3	0	0	2	5	4	0
8:30 AM	0	3	41	5	0	0	13	5	2	0	0	2	31	7	0	0	2	2	2	0
8:45 AM	0	3	34	9	0	0	10	6	2	0	0	5	31	4	0	0	7	0	3	0
9:00 AM	0	2	44	4	0	0	8	2	2	0	0	4	37	2	0	0	4	0	8	0
9:15 AM	0	4	31	3	0	0	10	4	2	0	0	0	21	13	0	0	5	2	4	0
9:30 AM	0	4	35	5	0	0	10	0	7	0	0	4	27	10	0	0	2	1	4	0
9:45 AM	0	4	42	9	0	0	9	1	2	0	0	5	29	11	0	0	5	4	1	0
10:00 AM	0	10	34	2	0	0	12	2	7	0	0	7	31	17	0	0	4	7	3	0
10:15 AM	0	10	32	6	0	0	30	6	9	0	0	2	36	21	0	0	6	7	4	0
10:30 AM	0	6	33	5	0	0	12	3	6	0	0	2	26	8	0	0	8	4	12	0
10:45 AM	0	5	34	8	0	0	15	2	3	0	1	1	31	5	0	0	3	4	7	0
11:00 AM	0	2	27	4	0	0	9	3	6	0	0	5	33	9	0	0	6	2	4	0
11:15 AM	0	2	30	9	0	0	7	0	2	0	0	9	39	9	0	0	7	1	2	0
11:30 AM	0	4	30	4	0	0	7	2	6	0	0	2	42	6	0	0	3	2	7	0
11:45 AM	0	3	38	2	0	0	7	1	3	0	0	4	40	5	0	0	5	3	4	0
12:00 PM	0	3	31	8	0	0	8	4	1	0	0	8	24	4	0	0	6	4	7	0
12:15 PM	0	2	43	8	0	0	10	4	2	0	0	4	26	7	0	0	1	2	6	0
12:30 PM	0	3	30	5	0	0	7	1	2	0	0	6	41	11	0	0	7	6	7	0
12:45 PM	0	4	41	3	0	0	7	4	4	0	0	4	35	6	0	0	2	3	7	0
1:00 PM	0	1	26	3	0	0	12	5	4	0	0	5	38	9	0	0	6	2	4	0
1:15 PM	0	2	32	6	0	0	7	5	2	0	0	1	38	10	0	0	5	3	6	0
1:30 PM	0	1	28	5	0	0	6	7	3	0	0	5	26	4	0	0	1	3	7	0
1:45 PM	0	4	34	2	0	0	11	3	4	0	0	3	50	12	0	0	6	4	6	1
2:00 PM	0	1	34	4	0	0	7	4	4	0	0	4	32	6	0	0	7	1	4	0
2:15 PM	0	1	28	4	0	0	10	0	6	0	0	6	32	9	0	0	6	4	7	0
2:30 PM	0	3	30	5	0	0	6	4	3	0	0	3	40	7	0	0	4	3	6	0
2:45 PM	0	10	37	2	0	0	7	3	1	0	0	4	35	14	0	0	3	8	5	0
3:00 PM	0	7	27	3	0	0	9	6	7	0	0	12	48	25	0	0	4	7	6	0
3:15 PM	0	3	32	7	0	0	38	9	16	0	0	2	32	14	0	0	7	7	4	0
3:30 PM	0	6	33	5	0	0	9	7	11	0	0	1	55	20	0	0	3	4	5	0
3:45 PM	0	3	40	4	0	0	4	3	7	0	0	5	46	12	0	0	5	3	3	0
4:00 PM	0	7	37	4	0	0	13	3	1	1	0	4	47	14	0	0	5	3	8	0
4:15 PM	0	5	53	6	0	0	4	9	8	0	0	10	38	12	0	0	7	5	3	0
4:30 PM	0	6	26	6	0	0	5	6	6	0	0	4	43	8	0	0	8	3	6	0
4:45 PM	0	3	39	1	0	0	6	4	1	0	0	1	36	5	0	0	2	3	2	0
5:00 PM	0	1	38	3	0	0	8	2	4	0	0	5	54	8	0	0	6	2	4	0
5:15 PM	0	2	43	5	0	0	5	4	4	0	0	0	22	12	0	0	3	3	4	0
5:30 PM	0	3	42	5	0	0	13	4	6	0	0	1	30	5	0	0	4	10	9	0
5:45 PM	0	1	19	2	0	0	4	2	3	0	0	7	28	7	0	0	6	1	6	0
6:00 PM	0	1	19	0	0	0	4	3	2	0	0	3	33	5	0	0	3	2	3	0
6:15 PM	0	4	16	1	0	0	7	2	3	0	0	2	24	10	0	0	1	2	1	0
6:30 PM	0	1	16	2	0	0	2	2	1	0	0	6	21	5	0	0	0	0	4	0
6:45 PM	0	0	15	2	0	0	2	0	0	0	0	2	12	3	0	0	1	1	2	0

Greenman-Pedersen, Inc.
80 Wolf Rd, Suite 300
Albany, NY 12205
(518) 453-9431

Intersection: NY Route 212 and Glasco Turnpike
Location: Town of Saugerties, NY

Project No.: 2200004.00
Count Date: 2/10/2022

Peak Hour Traffic Volumes

	NY Route 212 Southbound					Glasco Turnpike Westbound					NY Route 212 Northbound					Glasco Turnpike Eastbound				
	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes
AM Peak Hour:			**8:00 AM**	**to**	**9:00 AM**															
8:00 AM	0	1	38	4	0	0	3	4	6	0	0	3	20	4	0	0	1	1	3	0
8:15 AM	0	1	33	3	0	0	7	2	1	0	0	4	16	3	0	0	2	5	4	0
8:30 AM	0	3	41	5	0	0	13	5	2	0	0	2	31	7	0	0	2	2	2	0
8:45 AM	0	3	34	9	0	0	10	6	2	0	0	5	31	4	0	0	7	0	3	0
Total Volume	0	8	146	21	0	0	33	17	11	0	0	14	98	18	0	0	12	8	12	0
398			175					61					130					32		
No. of Trucks	0	1	5	3	0	0	1	3	2	0	0	0	4	0	0	0	1	1	1	0
Truck %	0.0%	12.5%	3.4%	14.3%			3.0%	17.6%	18.2%	0.0%	0.0%	0.0%	4.1%	0.0%		0.0%	8.3%	12.5%	8.3%	
5.5%			5.1%					9.8%					3.1%					9.4%		
PHF	0.00	0.67	0.89	0.58			0.63	0.71	0.46	0.00	0.00	0.70	0.79	0.64		0.00	0.43	0.40	0.75	
0.87			0.89					0.76					0.81					0.73		

	NY Route 212 Southbound					Glasco Turnpike Westbound					NY Route 212 Northbound					Glasco Turnpike Eastbound				
	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes	U Turns	Left Turns	Straight Through	Right Turns	Peds/ Bikes
PM Peak Hour:			**3:00 PM**	**to**	**4:00 PM**															
3:00 PM	0	7	27	3	0	0	9	6	7	0	0	12	48	25	0	0	4	7	6	0
3:15 PM	0	3	32	7	0	0	38	9	16	0	0	2	32	14	0	0	7	7	4	0
3:30 PM	0	6	33	5	0	0	9	7	11	0	0	1	55	20	0	0	3	4	5	0
3:45 PM	0	3	40	4	0	0	4	3	7	0	0	5	46	12	0	0	5	3	3	0
Total Volume	0	19	132	19	0	0	60	25	41	0	0	20	181	71	0	0	19	21	18	0
626			170					126					272					58		
No. of Trucks	0	2	2	1	0	0	3	4	4	0	0	0	4	5	0	0	0	3	0	0
Truck %	0.0%	10.5%	1.5%	5.3%		0.0%	5.0%	16.0%	9.8%		0.0%	0.0%	2.2%	7.0%		0.0%	0.0%	14.3%	0.0%	
4.5%			2.9%					8.7%					3.3%					5.2%		
PHF	0.00	0.68	0.83	0.68		0.00	0.39	0.69	0.64		0.00	0.42	0.82	0.71		0.00	0.68	0.75	0.75	
0.92			0.90					0.50					0.80					0.81		

APPENDIX C

Speed Study

Terramor Campgrounds - Speed Study

NORTHBOUND	
Date:	2/13/2022
Time:	3:37p
Trial	Speed*
1	49
2	47
3	49
4	59
5	61
6	51
7	42
8	55
9	51
10	57
11	54
12	53
13	49
14	48
15	59
16	47
17	55
18	52
19	60
20	57
21	54
22	48
23	55
24	60
25	53
26	49
27	57
28	51
29	54
30	59
Avg.	**53.2**

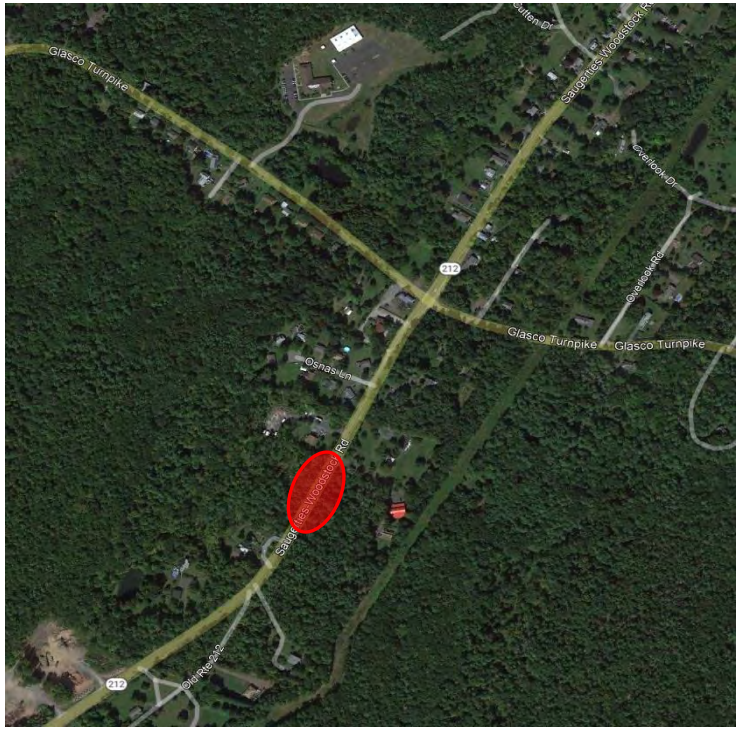
SOUTHBOUND	
Date:	2/13/2022
Time:	3:35p
Trial	Speed*
1	47
2	47
3	46
4	47
5	49
6	54
7	45
8	47
9	52
10	50
11	51
12	54
13	48
14	51
15	56
16	51
17	49
18	42
19	52
20	53
21	40
22	47
23	54
24	47
25	48
26	48
27	50
28	49
29	48
30	52
Avg.	**49.1**

NY Route 212
Roughly 0.2 Miles South
of Glasco Turnpike (CR 32)
Saugerties, New York

Posted Speed Limit: 55 MPH

85th Percentile Speeds		
NB		**SB**
59.0		**52.7**

Location Map



* - Denotes speed measured at proposed access location with vehicles traveling under free flow conditions, in MPH

APPENDIX D
Crash History Data

COUNTY: ULSTER P.I.N.: -

TOWN OF SAUGERTIES

ROUTE NO. OR STREET NAME:

NY ROUTE 212

AT INTERSECTION WITH/OR BETWEEN:

GLASCO TURNPIKE (CR32)

GPI

Engineering | Design | Planning | Construction Management

TIME PERIOD: FROM: 11/01/2018 TO: 10/31/2021

No. OF MONTHS: 36

ENVIRONMENTAL: Use Codes from MV 104 (shown at right) for these categories

Light Conditions:
1. Daylight
2. Dawn
3. Dusk
4. Dark Road Lighted
5. Dark Road Unlighted

Roadway Character:
1. Straight & Level
2. Straight & Grade
3. Straight & Hillcrest
4. Curve & Level
5. Curve & Grade
6. Curve & Hillcrest

Roadway Surface Condition:
1. Dry
2. Wet
3. Muddy
4. Snow/Ice
5. Slush
10. Other

Weather:
1. Clear
2. Cloudy
3. Rain
4. Snow
5. Sleet/Hail/Freezing Rain
6. Fog/Smog/Smoke
10. Other

[1]Use Codes from MV 104 Police Report

ACCIDENT No.	DATE	TIME	No. of VEHICLES	SEVERITY	LIGHT CONDITIONS	ROADWAY SURFACE CONDITION	WEATHER	APPARENT CONTRIBUTING FACTORS	DIRECTION	TYPE[1]	DESCRIPTION	CASE NO.
1	02/05/2019	10:33pm	1	PDO	5	1	1	ALCOHOL INVOLVEMENT	SOUTH	23	FIXED OBJECT	37790887
2	04/27/2019	05:48pm	2	PI	1	1	1	FAILURE TO YIELD RIGHT OF WAY	EAST	1	LEFT TURN	37879047
3	12/09/2019	02:03pm	2	PI	1	2	3	DRIVER INATTENTION	NORTH / WEST	1	RIGHT ANGLE	38223564
4	01/10/2020	03:19pm	2	PDO	1	1	2	FAILURE TO YIELD RIGHT OF WAY	SOUTH / WEST	1	RIGHT ANGLE	38275450
5	02/02/2020	06:21pm	2	PDO	4	1	1	FAILURE TO YIELD RIGHT OF WAY	NORTH / WEST	1	RIGHT ANGLE	38321668
6	07/30/2020	07:19am	2	PI	1	1	1	FAILURE TO YIELD RIGHT OF WAY	NORTH / WEST	1	RIGHT ANGLE	38496934
7	04/09/2021	05:37pm	2	PI	1	1	1	FOLLOWING TOO CLOSELY	EAST	1	REAR END	38811992
8	07/17/2021	11:52am	2	PDO	1	1	2	FAILURE TO YIELD RIGHT OF WAY	EAST / WEST	1	LEFT TURN	38955381
9	08/31/2021	09:59pm	2	PDO	4	1	1	DRIVER INATTENTION	NORTH / WEST	1	RIGHT ANGLE	39010400
10	10/22/2021	09:52pm	2	PDO	4	1	1	UNSAFE LANE CHANGE	NORTH	1	OVERTAKING	39098145
11	10/01/2021	08:53am	2	PI	1	1	1	PRESCRIPTION MEDICATION	NORTH / EAST	1	RIGHT ANGLE	39124164

COUNTY: ULSTER P.I.N.: -

TOWN OF SAUGERTIES

ROUTE NO. OR STREET NAME:

NY ROUTE 212

AT INTERSECTION WITH/OR BETWEEN:

GLASCO TURNPIKE (CR32) & OLD ROUTE 212

GPI

Engineering | Design | Planning | Construction Management

TIME PERIOD: FROM: 11/01/2018 TO: 10/31/2021

No. OF MONTHS: 36

ENVIRONMENTAL: Use Codes from MV 104 (shown at right) for these categories

Light Conditions:
1. Daylight
2. Dawn
3. Dusk
4. Dark Road Lighted
5. Dark Road Unlighted

Roadway Character:
1. Straight & Level
2. Straight & Grade
3. Straight & Hillcrest
4. Curve & Level
5. Curve & Grade
6. Curve & Hillcrest

Roadway Surface Condition:
1. Dry
2. Wet
3. Muddy
4. Snow/Ice
5. Slush
10. Other

Weather:
1. Clear
2. Cloudy
3. Rain
4. Snow
5. Sleet/Hail/Freezing Rain
6. Fog/Smog/Smoke
10. Other

[1]Use Codes from MV 104 Police Report

ACCIDENT No.	DATE	TIME	No. of VEHICLES	SEVERITY	LIGHT CONDITIONS	ROADWAY SURFACE CONDITION	WEATHER	APPARENT CONTRIBUTING FACTORS	DIRECTION	TYPE[1]	DESCRIPTION	CASE NO.
12	11/21/2018	06:35pm	1	PDO	5	1	1	ANIMALS ACTIONS	EAST	7	ANIMAL	37602837
13	01/24/2019	09:58pm	1	PDO	5	2	2	ALCOHOL INVOLVEMENT	EAST	11	FIXED OBJECT	37725279
14	06/08/2019	02:30pm	2	PDO	1	1	1	FOLLOWING TOO CLOSELY	EAST / EAST	1	REAR END	37936468
15	09/14/2019	08:23am	1	PI	1	2	2	ALCOHOL INVOLVEMENT	EAST	34	FIXED OBJECT	38072860
16	03/23/2020	03:04pm	2	PI	1	4	5	UNSAFE SPEED / SLIPPERY PAVEMENT	EAST / WEST	1	HEAD ON	38407206
17	05/02/2020	03:38pm	2	PDO	1	1	1	DRIVER INATTENTION	SOUTH	1	LEFT TURN	38407236
18	05/31/2020	09:30am	1	PDO	1	1	1	ANIMALS ACTIONS	EAST	7	ANIMAL	38426360
19	12/17/2020	10:00am	2	PDO	1	4	4	VIEW OBSTRUCTED/LIMITED	EAST	1	OTHER	38746779
20	07/10/2021	10:02pm	1	PDO	5	2	2	ANIMALS ACTIONS	EAST	4	ANIMAL	38938717
21	10/26/2021	06:15am	1	PDO	4	1	1	OVERSIZED VEHICLE	SOUTH	30	FIXED OBJECT	39098141

APPENDIX E

Capacity Analysis Output Sheets

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	10	15	41	21	14	17	122	22	10	182	26
Future Vol, veh/h	15	10	15	41	21	14	17	122	22	10	182	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	9	9	9	10	10	10	3	3	3	5	5	5
Mvmt Flow	17	11	17	47	24	16	20	140	25	11	209	30

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	459	451	224	453	454	153	239	0	0	165	0	0
Stage 1	246	246	-	193	193	-	-	-	-	-	-	-
Stage 2	213	205	-	260	261	-	-	-	-	-	-	-
Critical Hdwy	7.19	6.59	6.29	7.2	6.6	6.3	4.13	-	-	4.15	-	-
Critical Hdwy Stg 1	6.19	5.59	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.19	5.59	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.581	4.081	3.381	3.59	4.09	3.39	2.227	-	-	2.245	-	-
Pot Cap-1 Maneuver	501	494	798	504	490	872	1322	-	-	1395	-	-
Stage 1	742	690	-	791	726	-	-	-	-	-	-	-
Stage 2	773	719	-	727	678	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	463	481	798	475	477	872	1322	-	-	1395	-	-
Mov Cap-2 Maneuver	463	481	-	475	477	-	-	-	-	-	-	-
Stage 1	729	684	-	778	714	-	-	-	-	-	-	-
Stage 2	721	707	-	693	672	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.1	13.3	0.8	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1322	-	-	556	519	1395	-	-
HCM Lane V/C Ratio	0.015	-	-	0.083	0.168	0.008	-	-
HCM Control Delay (s)	7.8	0	-	12.1	13.3	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.6	0	-	-

Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	26	22	75	31	51	25	225	88	24	164	24
Future Vol, veh/h	24	26	22	75	31	51	25	225	88	24	164	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	9	9	9	3	3	3	3	3	3
Mvmt Flow	26	28	24	82	34	55	27	245	96	26	178	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	635	638	191	616	603	293	204	0	0	341	0	0
Stage 1	243	243	-	347	347	-	-	-	-	-	-	-
Stage 2	392	395	-	269	256	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.19	6.59	6.29	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.19	5.59	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.19	5.59	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.581	4.081	3.381	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	387	391	843	393	404	730	1362	-	-	1213	-	-
Stage 1	754	699	-	655	623	-	-	-	-	-	-	-
Stage 2	627	599	-	721	683	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	322	372	843	347	385	730	1362	-	-	1213	-	-
Mov Cap-2 Maneuver	322	372	-	347	385	-	-	-	-	-	-	-
Stage 1	735	682	-	639	607	-	-	-	-	-	-	-
Stage 2	534	584	-	655	667	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.5	18.9	0.6	0.9
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1362	-	-	422	428	1213	-	-
HCM Lane V/C Ratio	0.02	-	-	0.185	0.399	0.022	-	-
HCM Control Delay (s)	7.7	0	-	15.5	18.9	8	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	1.9	0.1	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	10	15	41	21	14	17	123	23	10	184	26
Future Vol, veh/h	15	10	15	41	21	14	17	123	23	10	184	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	9	9	9	10	10	10	3	3	3	5	5	5
Mvmt Flow	17	11	17	47	24	16	20	141	26	11	211	30

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	462	455	226	456	457	154	241	0	0	167	0	0
Stage 1	248	248	-	194	194	-	-	-	-	-	-	-
Stage 2	214	207	-	262	263	-	-	-	-	-	-	-
Critical Hdwy	7.19	6.59	6.29	7.2	6.6	6.3	4.13	-	-	4.15	-	-
Critical Hdwy Stg 1	6.19	5.59	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.19	5.59	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.581	4.081	3.381	3.59	4.09	3.39	2.227	-	-	2.245	-	-
Pot Cap-1 Maneuver	498	491	796	501	488	871	1320	-	-	1393	-	-
Stage 1	741	689	-	790	725	-	-	-	-	-	-	-
Stage 2	773	718	-	726	676	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	461	478	796	472	475	871	1320	-	-	1393	-	-
Mov Cap-2 Maneuver	461	478	-	472	475	-	-	-	-	-	-	-
Stage 1	728	683	-	777	713	-	-	-	-	-	-	-
Stage 2	721	706	-	692	670	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.1	13.4	0.8	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1320	-	-	553	516	1393	-	-
HCM Lane V/C Ratio	0.015	-	-	0.083	0.169	0.008	-	-
HCM Control Delay (s)	7.8	0	-	12.1	13.4	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.6	0	-	-

Intersection	
Int Delay, s/veh	5.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	26	22	76	31	52	25	227	89	24	166	24
Future Vol, veh/h	24	26	22	76	31	52	25	227	89	24	166	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	9	9	9	3	3	3	3	3	3
Mvmt Flow	26	28	24	83	34	57	27	247	97	26	180	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	640	643	193	621	608	296	206	0	0	344	0	0
Stage 1	245	245	-	350	350	-	-	-	-	-	-	-
Stage 2	395	398	-	271	258	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.19	6.59	6.29	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.19	5.59	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.19	5.59	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.581	4.081	3.381	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	384	388	841	390	401	727	1359	-	-	1209	-	-
Stage 1	752	698	-	652	621	-	-	-	-	-	-	-
Stage 2	624	598	-	720	682	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	318	369	841	344	382	727	1359	-	-	1209	-	-
Mov Cap-2 Maneuver	318	369	-	344	382	-	-	-	-	-	-	-
Stage 1	733	681	-	636	605	-	-	-	-	-	-	-
Stage 2	530	583	-	654	666	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.6	19.1	0.6	0.9
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1359	-	-	418	426	1209	-	-
HCM Lane V/C Ratio	0.02	-	-	0.187	0.406	0.022	-	-
HCM Control Delay (s)	7.7	0	-	15.6	19.1	8	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	1.9	0.1	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	10	15	42	21	14	17	131	23	10	188	26
Future Vol, veh/h	15	10	15	42	21	14	17	131	23	10	188	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	9	9	9	10	10	10	3	3	3	5	5	5
Mvmt Flow	17	11	17	48	24	16	20	151	26	11	216	30

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	477	470	231	471	472	164	246	0	0	177	0	0
Stage 1	253	253	-	204	204	-	-	-	-	-	-	-
Stage 2	224	217	-	267	268	-	-	-	-	-	-	-
Critical Hdwy	7.19	6.59	6.29	7.2	6.6	6.3	4.13	-	-	4.15	-	-
Critical Hdwy Stg 1	6.19	5.59	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.19	5.59	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.581	4.081	3.381	3.59	4.09	3.39	2.227	-	-	2.245	-	-
Pot Cap-1 Maneuver	487	481	791	490	479	860	1314	-	-	1381	-	-
Stage 1	736	685	-	780	718	-	-	-	-	-	-	-
Stage 2	763	710	-	721	673	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	450	468	791	461	467	860	1314	-	-	1381	-	-
Mov Cap-2 Maneuver	450	468	-	461	467	-	-	-	-	-	-	-
Stage 1	723	679	-	767	706	-	-	-	-	-	-	-
Stage 2	711	698	-	687	667	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.2	13.6	0.8	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1314	-	-	543	505	1381	-	-
HCM Lane V/C Ratio	0.015	-	-	0.085	0.175	0.008	-	-
HCM Control Delay (s)	7.8	0	-	12.2	13.6	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.6	0	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	2	1	162	240	5
Future Vol, veh/h	9	2	1	162	240	5
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	87	87	87	87	87	87
Heavy Vehicles, %	2	2	3	3	5	5
Mvmt Flow	10	2	1	186	276	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	467	279	282	0	-	0
Stage 1	279	-	-	-	-	-
Stage 2	188	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	554	760	1275	-	-	-
Stage 1	768	-	-	-	-	-
Stage 2	844	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	553	760	1275	-	-	-
Mov Cap-2 Maneuver	553	-	-	-	-	-
Stage 1	767	-	-	-	-	-
Stage 2	844	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1275	-	582	-	-
HCM Lane V/C Ratio	0.001	-	0.022	-	-
HCM Control Delay (s)	7.8	0	11.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	26	22	77	31	52	25	232	90	24	176	24
Future Vol, veh/h	24	26	22	77	31	52	25	232	90	24	176	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	9	9	9	3	3	3	3	3	3
Mvmt Flow	26	28	24	84	34	57	27	252	98	26	191	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	657	660	204	637	624	301	217	0	0	350	0	0
Stage 1	256	256	-	355	355	-	-	-	-	-	-	-
Stage 2	401	404	-	282	269	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.19	6.59	6.29	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.19	5.59	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.19	5.59	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.581	4.081	3.381	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	374	379	829	380	393	722	1347	-	-	1203	-	-
Stage 1	742	690	-	648	617	-	-	-	-	-	-	-
Stage 2	620	594	-	710	674	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	309	360	829	334	374	722	1347	-	-	1203	-	-
Mov Cap-2 Maneuver	309	360	-	334	374	-	-	-	-	-	-	-
Stage 1	723	673	-	632	602	-	-	-	-	-	-	-
Stage 2	526	579	-	644	657	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.9	19.8	0.6	0.9
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1347	-	-	408	415	1203	-	-
HCM Lane V/C Ratio	0.02	-	-	0.192	0.419	0.022	-	-
HCM Control Delay (s)	7.7	0	-	15.9	19.8	8.1	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	2	0.1	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	2	3	341	264	11
Future Vol, veh/h	6	2	3	341	264	11
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	3	3	3	3
Mvmt Flow	7	2	3	371	287	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	670	293	299	0	-	0
Stage 1	293	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	422	746	1256	-	-	-
Stage 1	757	-	-	-	-	-
Stage 2	694	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	421	746	1256	-	-	-
Mov Cap-2 Maneuver	421	-	-	-	-	-
Stage 1	755	-	-	-	-	-
Stage 2	694	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.8	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1256	-	472	-	-
HCM Lane V/C Ratio	0.003	-	0.018	-	-
HCM Control Delay (s)	7.9	0	12.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

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