

July 16, 2024

20233707.0001

MARLBOROUGH RESORT

TOWN OF MARLBOROUGH, NY

PREPARED FOR:
Marlborough Resort, LLC
100 Ring Road
West Garden City, NY 11530

TABLE OF CONTENTS

1.0	EXECUTIVE SUMMARY	2
2.0	INTRODUCTION.....	5
2.1	Study Purpose and Objectives	5
2.2	Traffic Impact Report Methodology.....	5
2.3	Project Location	5
2.4	Study Area	5
3.0	TRANSPORTATION SETTING	6
3.1	Description of Study Area Roadways	6
	Table 1: Existing Highway System.....	6
3.2	Description of Multimodal Network	6
	Table 2: Multimodal Network.....	7
3.3	Planned/Programmed Highway Improvements.....	7
4.0	EXISTING CONDITIONS ANALYSIS	8
4.1	Peak Intervals for Analysis.....	8
4.2	Existing Traffic Volume Data	8
	Table 3: Study Intersection Peak Hours.....	8
4.3	Field Observations	10
4.4	Existing Crash Investigation	12
5.0	BACKGROUND (NO BUILD) CONDITIONS	14
6.0	PROPOSED DEVELOPMENT CONDITIONS	14
6.1	Project Description	14
6.2	Trip Generation	15
	Table 4: Site Generated Trips	17
6.3	Trip Distribution.....	17
6.4	Trip Assignment.....	18
6.5	Full Development Volumes.....	18
7.0	TRAFFIC OPERATIONS AND ANALYSIS.....	18
7.1	Left-Turn Warrant Analysis	18
7.2	Description of Capacity Analysis	18
	Table 5: Level of Service Criteria	19
7.3	Capacity Analysis Results	19
	Table 6: Capacity Analysis Results	20
7.4	Sight Distance Evaluation	23
	Table 7: Sight Distance Measurements.....	23
8.0	CONCLUSIONS AND RECOMMENDATIONS	24
9.0	REFERENCES	25
10.0	FIGURES.....	25

APPENDICES

APPENDIX A:	EXISTING TRAFFIC COUNT DATA
APPENDIX B:	MISCELLANEOUS CALCULATIONS
APPENDIX C:	LOS CALCULATIONS – EXISTING CONDITIONS
APPENDIX D:	LOS CALCULATIONS – BACKGROUND CONDITIONS
APPENDIX E:	LOS CALCULATIONS – FULL BUILD (PROPOSED ACTION)

July 16, 2024

1.0 EXECUTIVE SUMMARY

The purpose of this report is to evaluate the potential traffic impacts associated with the proposed multi-use resort hotel and accessory uses located at 626 Lattintown Road in the Town of Marlborough, New York. Within this report, the operating characteristics of the proposed access points and impacts to the adjacent roadway network are identified. Mitigating measures, if needed, are provided to minimize capacity or safety concerns.

To define traffic impact, this analysis establishes existing baseline traffic conditions, projects background traffic flow including area growth, and determines the traffic operations that would result from the proposed project. The site plan, all figures, and supporting calculations are included at the end of this report.

This comprehensive Traffic Impact Report provides the Town of Marlborough, the Ulster County Planning Department, the New York State Department of Transportation (NYSDOT), and other involved and interested agencies with detailed information allowing for a “hard look” of potential traffic impacts. This study was completed in accordance with the procedures of the State Environmental Quality Review Act (SEQRA), the NYSDOT, Institute of Transportation Engineers (ITE), and local requirements.

Project Location and Description

The project site is located at 626 Lattintown Road (CR-11) comprised of four separate tax lots (102.4-3-8.8.320; 102.4-2-12; 102.4-2-13; 102.4-2-29) in the Town of Marlborough, Ulster County, NY. The following describes the project location and context:

- **Site Status:** The portion of the site with direct access to Lattintown Road is occupied by the St. Hubert’s Lodge and Club. The eastern portion of the site is undeveloped.
- **Site Boundary:**
 - **North:** Agricultural lands.
 - **East:** The site has access to Ridge Road.
 - **South:** Agricultural lands and residential uses.
 - **West:** Lattintown Road.
- **Vicinity Land Uses:** There is a mix of land uses, including residential, agriculture, agri-business, and hospitality.

The project is comprised of the following components:

- **Proposed Land Uses:**
 - **Living and Sleeping Accommodations**
 - Guestrooms (cabins, hotel, cottage, lodge): **93 units (170 total bedrooms)**
 - Staff Dorm & Locker Room: **35 units**
 - **Dining Accommodations**
 - Clubhouse Dining Room 1: **8,897 SF**
 - Clubhouse Dining Room 2: **5,000 SF**
 - Distillery with Tasting Room: **1,260 SF**
 - Farm Market & Barbeque: **1,656 SF**
 - **Recreational Facilities**
 - Events Center: **15,870 SF** (up to 250 seats during special events)
 - Orangery (small events center): **3,168 SF** (up to 100 seats during special events)
 - **Resort Spa and Gym**
 - Spa and gym will include a gym, wellness center, and medi-spa with small pools for spa therapy): **19,701 SF**

- Animal Planet – Petting Zoo (Barn): **400 SF**
- **Access:** Access will be provided via the existing driveway along Lattintown Road and a driveway along Ridge Road. The proposed distillery and staff dorms are proposed adjacent to the Ridge Road access. All other uses are generally found in the western and central portion of the property.
- **Parking:** The Resort Hotel grounds include several at-grade parking areas throughout the site providing a total of 331 surface parking spaces.

Study Area

To ensure a comprehensive analysis of potential traffic impacts, a study area was selected consisting of the following intersections. Project scoping was undertaken with Ulster County to determine study area, peak periods of analysis, and other requirements for completion of the full study.

- US-9W at Old Indian Road
- Old Indian Road at Ridge Road
- Old Indian Road at Lattintown Road (CR-11)
- Lattintown Road at St. Hubert's Lodge Driveway
- Lattintown Road at Plattekill Road (CR-14)
- US-9W at Western Avenue
- US-9W at Lattintown Road

Existing and Background Conditions

Manual turning movement traffic counts were conducted by PA on Thursday, May 23, Friday, May 24, and Saturday, May 25, 2024, to coincide with the area's typically highest documented traffic volumes. This study conducted traffic counts from 4:00 to 7:00 PM on May 23 and May 24, and from 11:00 AM to 2:00 PM on May 25 to determine peak hour traffic volumes at the study intersections.

The weekday turning movement count data was collected while local schools were in session. No adverse weather conditions impacted the traffic counts. The traffic volumes were reviewed to confirm accuracy, seasonality, and relative balance between intersections.

The project is anticipated to be completed within five years; therefore, a five-year design year was used. Based on feedback from local municipal personnel, several projects were included in the background analysis.

- **Hudson West:** This residential project consists of 104 condos just north of Marlboro Hamlet along the west side of US-9W.
 - The traffic volumes generated by the project were specifically included in the background analysis.
- **Dock Road Residential:** This residential project consists of 103 townhomes just east of Marlboro Hamlet along the east side of US-9W.
 - The traffic volumes generated by the project were specifically included in the background analysis.

Several other projects are under consideration based on feedback from the Town of Marlborough. Not all the projects under consideration are certain to occur. Nonetheless, given that these projects are in the planning stages, potential traffic volumes generated by these developments are included in the adjusted background growth rate to provide a conservative assessment.

A review of available historical NYSDOT traffic volume data in the vicinity of the site indicates that traffic has fluctuated, if not decreased, between 2014 and 2021. For reference, the *Route 9W Corridor Management Plan* determined an annual growth rate of 0.5% per year. To account for normal increases in background traffic growth, including the noted

developments and any unforeseen projects in the study area, a growth rate of 0.75% per year was applied to the existing traffic volumes.

Conclusions and Recommendations

This report identified and evaluated the potential traffic impacts that can be expected from the proposed Marlborough Resort. The results of this comprehensive study determined that the existing transportation network can adequately accommodate the projected traffic volumes and resulting minor traffic impacts to study area intersections. The following sets forth the conclusions and recommendations based upon the results of the analyses:

1. The proposed project is anticipated to generate 134 entering and 92 exiting vehicle trips during the PM peak hour with 162 entering and 131 exiting vehicle trips during the SAT peak hour. Internal trips between site uses are likely to occur, notably between the guestrooms, spa, and dining accommodations.
2. Though no ITE data is available for this condition, this assessment assumed a portion of site traffic will be classified as internal capture. Thus, the site is projected to generate approximately 87 entering and 63 exiting vehicle trips during the PM peak hour with 113 entering and 92 exiting vehicle trips during the SAT peak hour.
3. The crash analysis generally did not identify any geometric deficiencies. However, the crash analysis did identify potential concerns at the US-9W and Lattintown Road intersection.
4. Between the field observations at the US-9W and Lattintown Road intersection and reported crashes, a northbound left turn treatment (dedicated left turn lane or bypass lane) is a potential improvement. This intersection currently satisfies the warrant criteria for a left-turn lane. As these are existing conditions, the NYSDOT should lead efforts to implement potential infrastructure improvements with assistance from secondary agencies and/or future applicants.
5. The proposed Lattintown Road access satisfies recommended sight distances. The proposed Ridge Road access results in less than the recommended sight distance to the left. Consideration should be given to installing an intersection warning sign in advance of the driveway.
6. Most intersection movements operate at an acceptable Level of Service D or better under existing and projected background conditions during the peak hours except for the noted conditions in Section 7.3.
7. There are generally very minor increases in delay at the study intersections under full development.
8. The detailed capacity analysis showed that the additional traffic volumes generated by the proposed project can be accommodated by the existing roadway network, as there is adequate intersection capacity.
9. Pursuant to the State Environmental Quality Review Act, this detailed analysis demonstrates that the proposed project does not result in any significant adverse traffic impacts.

2.0 INTRODUCTION

2.1 Study Purpose and Objectives

The purpose of this report is to evaluate the potential traffic impacts associated with the proposed multi-use resort hotel and accessory uses located at 626 Lattintown Road in the Town of Marlborough, New York. Within this report, the operating characteristics of the proposed access points and impacts to the adjacent roadway network are identified. Mitigating measures, if needed, are provided to minimize capacity or safety concerns. To define traffic impact, this analysis establishes existing baseline traffic conditions, projects background traffic flow including area growth, and determines the traffic operations that would result from the proposed project. The site plan, all figures, and supporting calculations are included at the end of this report.

2.2 Traffic Impact Report Methodology

This comprehensive Traffic Impact Report provides the Town of Marlborough, the Ulster County Planning Department, the NYSDOT, and other involved and interested agencies with detailed information allowing for a “hard look” of potential traffic impacts. The study was completed in accordance with the procedures of the SEQRA, the NYSDOT, ITE, and local requirements.

2.3 Project Location

The project site is located at 626 Lattintown Road (CR-11) comprised of four separate tax lots (102.4-3-8.8.320; 102.4-2-12; 102.4-2-13; 102.4-2-29) in the Town of Marlborough, Ulster County, NY. The following describes the project location and context:

- **Site Status:** The portion of the site with direct access to Lattintown Road is occupied by the St. Hubert’s Lodge and Club. The eastern portion of the site is undeveloped.
- **Site Boundary:**
 - **North:** Agricultural lands.
 - **East:** The site has access to Ridge Road.
 - **South:** Agricultural lands and residential uses.
 - **West:** Lattintown Road.
- **Vicinity Land Uses:** There is a mix of land uses, including residential, agriculture, agri-business, and hospitality.

2.4 Study Area

To ensure a comprehensive analysis of potential traffic impacts, a study area was selected consisting of the following intersections. Project scoping was undertaken with Ulster County to determine study area, peak periods of analysis, and other requirements for completion of the full study. **Figure 1** illustrates the study area and project location.

- US-9W at Old Indian Road
- Old Indian Road at Ridge Road
- Old Indian Road at Lattintown Road (CR-11)
- Lattintown Road at St. Hubert’s Lodge Driveway
- Lattintown Road at Plattekill Road (CR-14)
- US-9W at Western Avenue
- US-9W at Lattintown Road

3.0 TRANSPORTATION SETTING

3.1 Description of Study Area Roadways

The information outlined in **Table 1** provides a description of the existing roadway network within the study area. **Figure 2** illustrates the lane geometry and traffic controls at each of the study intersections and the Annual Average Daily Traffic (AADT) volumes on the study roadways. The AADTs, in vehicles per day (vpd), reflect the most recently collected data obtained from the NYSDOT or Passero Associates (PA) via an extrapolation of turning movement counts performed at the study intersections.

Functional classification (FC) of roadways is determined by the NYSDOT and the Federal Highway Administration (FHWA). Both the NYSDOT and FHWA groups roads, streets, and highways into different classes based on how they are used. This is called functional classification. Roads and streets do not work alone to move traffic. Instead, they form a network. Functional classification defines how each road or street fits into this network, how it provides access to nearby properties, and whether it is in an urban or rural area. The following lists the primary functional classifications within the study area:

- Rural Minor Collector (Class 8)
- Rural Local (Class 9)
- Urban Principal Arterial – Other (Class 14)
- Urban Major Collector (Class 17)
- Urban Local (Class 19)

Table 1: Existing Highway System

Roadway	FC	Agency	Speed (mph)	Lanes per Direction	Lane Width (feet)	Shoulder Width (feet)	AADT		
							Volume	Source	Year
Lattintown Road (CR-11)	8	County	40	1	10	0-1	1,638	NYSDOT	2011
Old Indian Road	9	Town	35	1	10	N/A	500	PA	2024
US-9W	14	NYSDOT	30-55	1-2	11-12	1-10	16,861	NYSDOT	2021
Ridge Road	19	Town	35	1	10	N/A	500	PA	2024
Plattekill Road (CR-14)	9, 17	County	30-35	1	10	0-1	2,200	PA	2024
Western Avenue (CR-14A)	17	County	30-35	1 (one-way)	12	N/A	3,369	NYSDOT	2018
King Street	19	Town	30	1 (one-way)	10	N/A	1,600	PA	2024

3.2 Description of Multimodal Network

Table 2 summarizes the traffic controls, pedestrian, bicycle, and transit accommodations within the study area. Ulster County Area Transit (UCAT) provides bus service within the greater area.

Table 2: Multimodal Network

Intersection	Traffic Control	Pedestrian			Bicycle		Other	
		Sidewalk	Crosswalk	Ped Signal	Lane	Other	Transit	Lighting
US-9W at Old Indian Road	Stop	N	N	N	N	In-lane, shoulder	N	Y
Old Indian Road at Ridge Road	Stop	N	N	N	N	In-lane	N	N
Old Indian Road at Lattintown Road (E)	Stop	N	N	N	N	In-lane	N	Y
Old Indian Road at Lattintown Road (W)	Stop	N	N	N	N	In-lane	N	Y
Lattintown Road at St. Hubert's Lodge	Stop	N	N	N	N	In-lane	N	N
Lattintown Road at Plattekill Road	Stop	N	N	N	N	In-lane	N	Y
US-9W at Western Avenue	Stop	++	+	N	N	In-lane, shoulder	Y	Y
US-9W at King Street	Stop	+	N	N	N	In-lane, shoulder	Y	Y
US-9W at Lattintown Road	Stop	N	N	N	N	In-lane, shoulder	N	Y

++ Present at entire intersection

+ Present at portion of intersection

3.3 Planned/Programmed Highway Improvements

The Ulster County Planning Department oversaw the 2018 *Route 9W Corridor Management Plan* in the Towns of Marlborough and Lloyd. As noted within:

“The study’s main goal is to develop short-term and long-term recommendations to improve vehicular and non-vehicular access, safety and mobility in the corridor, and to assess and mitigate the impacts of development proposals and local land use laws on future access and safety of Route 9W. The corridor management plan has to be embraced by the community, in accordance with local plans and regulations, and serve all users.”

With coordination from the County’s transportation consultant and other involved agencies, several recommendations were made for US-9W. Notable recommendations affecting the study area’s intersections include:

- Northbound left-turn lane at US-9W and Old Indian Road intersection.
- Generally, reconfigure the number of travel lanes along US-9W.
- Reduce the speed limit between Marlboro Hamlet to Milton Hamlet from 55 mph to 45 mph.
- Provide consistent shoulders throughout the corridor.
- Evaluate centerline markings, guardrails, and reflectors.
- Install new pedestrian infrastructure at Marlboro Triangle.
- Install new pedestrian throughout the Marlboro Hamlet.
- Implement shared roadways within the Marlboro Hamlet.

- Provide bicycle parking within the Marlboro Hamlet.
- Install shared use path between Marlboro Hamlet to Milton Hamlet.
- Install bicycle compatible shoulders along Western Avenue and Lattintown Road.

Several of the recommendations from this plan appear to still be in plan. This study noted the new pedestrian infrastructure within Marlboro Hamlet.

PA reviewed the NYSDOT *Projects in Your Neighborhood* web portal and found that a recent project along US-9W was substantially completed in late 2023 consisting of cleaning and sealing pavement cracks. No other significant projects were identified.

4.0 EXISTING CONDITIONS ANALYSIS

4.1 Peak Intervals for Analysis

Given the functional characteristics of the corridors, adjacent land uses, the proposed land uses for the project site, and input from the Ulster County Planning Department, the peak hours selected for analysis are the weekday evening (PM) and Saturday (SAT) midday peak periods. The combination of site traffic and adjacent street traffic produces the greatest demand during these time periods. At all other times throughout a typical day, the site will generally produce less traffic.

4.2 Existing Traffic Volume Data

Manual turning movement traffic counts were conducted by PA on Thursday, May 23, Friday, May 24, and Saturday, May 25, 2024, to coincide with the area's typically highest documented traffic volumes. This study conducted traffic counts from 4:00 to 7:00 PM on May 23 and May 24, and from 11:00 AM to 2:00 PM on May 25 to determine peak hour traffic volumes at the study intersections. This study compared the total traffic volumes and peak hour traffic volumes for the Thursday, May 23 and Friday, May 24 collection days and found that Thursday volumes were 5% higher based on total volumes and 11% higher based on peak hour volumes. Therefore, this study used the data obtained on Thursday, May 23 and Saturday, May 25 as the basis for existing and future analyses.

Table 3 depicts the peak hours at each study intersection. This analysis utilized the peak hour traffic conditions at each study intersection to maintain a "worst case" approach.

Table 3: Study Intersection Peak Hours

Intersection	PM Peak Hour	SAT Peak Hour
US-9W at Old Indian Road	4:30 to 5:30 PM	11:15 AM to 12:15 PM
Old Indian Road at Ridge Road	4:15 to 5:15 PM	1:00 to 2:00 PM
Old Indian Road at Lattintown Road (E)	4:00 to 5:00 PM	1:00 to 2:00 PM
Old Indian Road at Lattintown Road (W)	4:00 to 5:00 PM	1:00 to 2:00 PM
Lattintown Road at St. Hubert's Lodge	4:00 to 5:00 PM	1:00 to 2:00 PM
Lattintown Road at Plattekill Road	4:00 to 5:00 PM	11:30 AM to 12:30 PM
US-9W at Western Avenue	4:30 to 5:30 PM	11:15 AM to 12:15 PM
US-9W at King Street	4:30 to 5:30 PM	11:15 AM to 12:15 PM
US-9W at Lattintown Road	4:45 to 5:45 PM	1:00 to 2:00 PM

July 16, 2024

The weekday turning movement count data was collected while local schools were in session. Ulster County noted during project scoping the influence of areawide destinations which can exhibit higher than normal traffic volumes during weekend or holiday times. Thus, as noted, this study performed the traffic counts during a holiday weekend. No adverse weather conditions impacted the traffic counts. The traffic volumes were reviewed to confirm accuracy, seasonality, and relative balance between intersections.

According to the NYSDOT and traffic engineering principles, traffic is typically affected by the seasons of the year with it being lower during the winter months and higher during the summer months. The NYSDOT Seasonal Adjustment Factors are used to remove this seasonal bias by converting the Average Daily Traffic (ADT) from short count data into AADT data, where AADT is the average daily traffic for the entire year.

The factors are grouped into three major groups according to how much the road segments are affected by the seasons of the year. These factor groups follow the suggestions of the Federal Highway Administration (FHWA) *Traffic Monitoring Guide*. The categories are labelled:

Factor Group 30

- Urbanized traffic patterns
- Minimally affected by the seasons
- Coefficient of variation < 10%

Factor Group 40

- Suburban traffic patterns
- Moderately affected by the seasons
- Coefficient of variation $\geq 10\%$ and $\leq 25\%$

Factor Group 60

- Recreational traffic patterns
- Extremely affected by the seasons
- Coefficient of variation > 25%

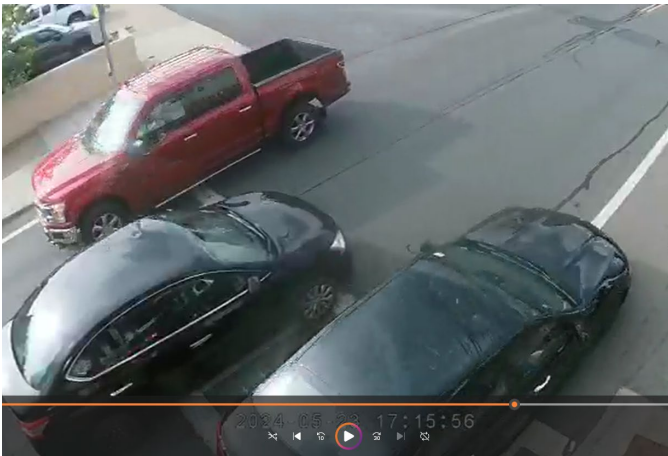
This study reviewed the latest NYSDOT *Seasonal Adjustment Factors* published in January 2024. The study roadways are Factor Group 30, which is “commuter dominated.” The seasonal adjustment factor for May over a full week is 1.056 (1.091 for a work week), which means May traffic counts are slightly higher than average yearly traffic. Further investigation was conducted using continuous count station traffic data, which collects daily traffic data over an entire year. This assessment reviewed 2023 data and found that **May resulted in the highest weekend traffic volumes compared to any other month.** Moreover, Memorial Day weekend traffic is higher than average October traffic volumes; a time of year noted for fall foliage sightseeing. Given the time of year the traffic counts were conducted and resulting additional analysis, no seasonality adjustments were necessary.

The actual differences in traffic volumes can be attributed to temporal variations in traffic volumes as well as activity related to driveways located in the segments between the study intersections. **Figure 3** illustrates the existing peak hour traffic volumes.

4.3 Field Observations

The study intersections were observed during peak intervals to assess current traffic operations. Several notable observations were made and area summarized hereafter.

US-9W at Western Avenue: If there are no vehicles parked along the east side of US-9W, northbound drivers will pass on the right while a driver is waiting to turn left onto Western Avenue. Doing so, these passing drivers will come within two feet of the flush pedestrian curb ramp. The following image shows an example of this condition. This intersection currently satisfies the warrant criteria for a left-turn lane.

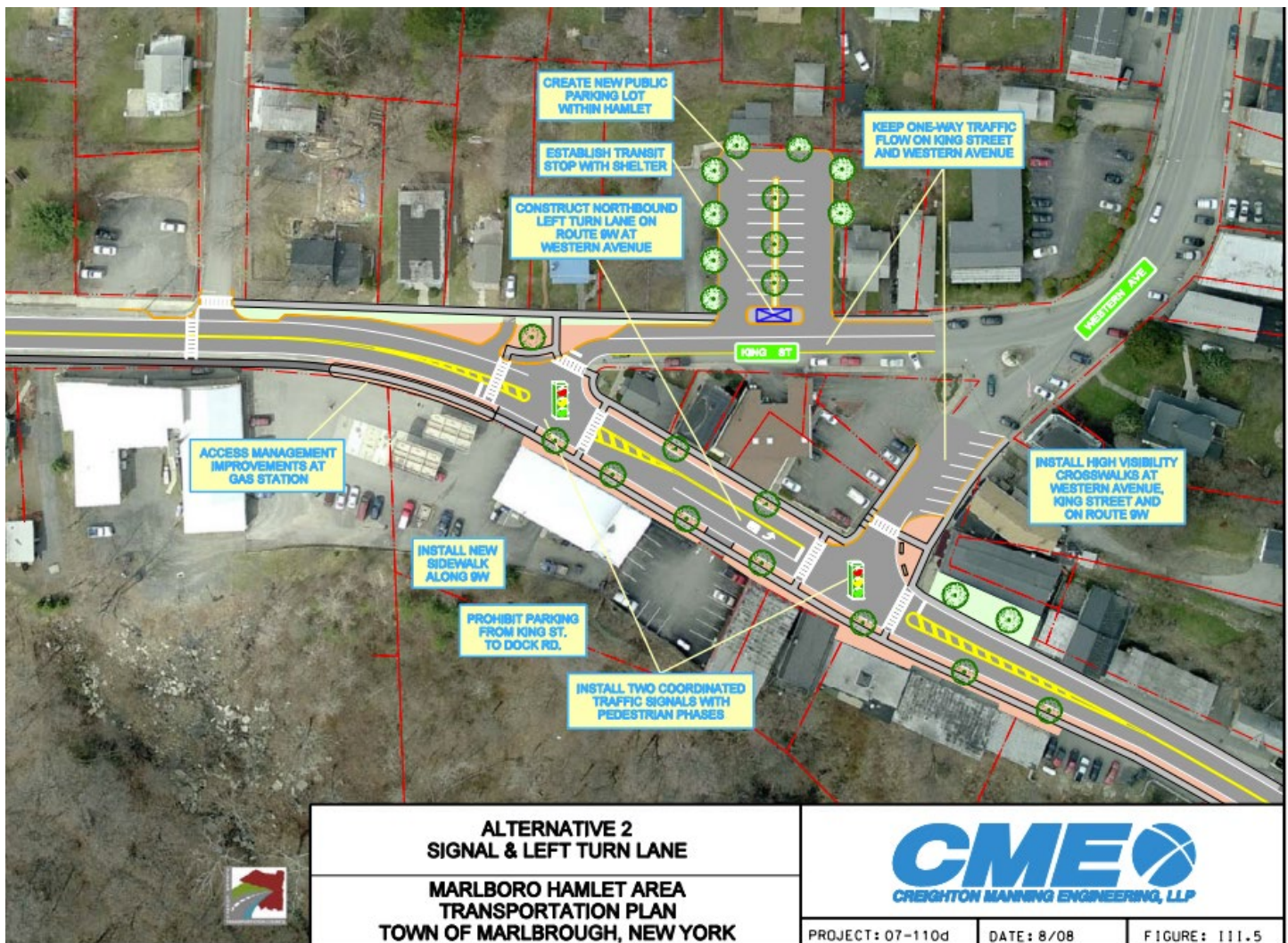


US-9W at King Street: Observed vehicle delays may be, at times, less than the Synchro delays for drivers turning left from King Street. As noted in the 2018 *Route 9W Corridor Management Plan* and prior studies, Western Avenue and King Street are recommended for several improvements:

- Full signalization at one or both intersections. Currently, King Street is stop-controlled on the King Street approach with a flashing signal on a three-head signal assembly.
- Construct a northbound left-turn lane at Western Avenue.
- Install pedestrian crossing and bicycle network improvements. The pedestrian crossing treatments have been implemented thus far.

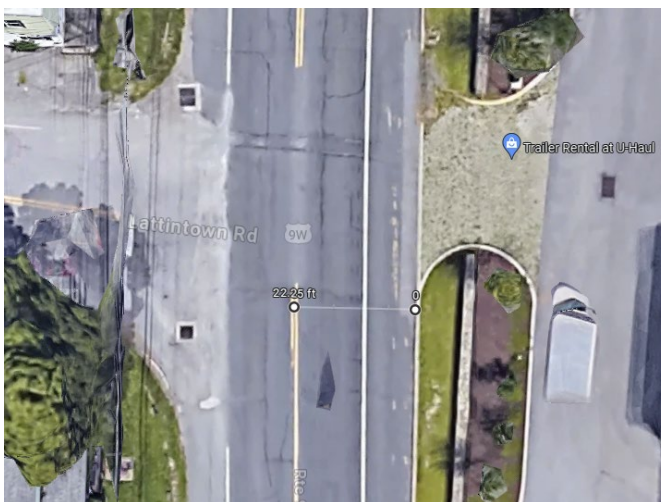
It is recommended that these intersections be reexamined and/or programmed for the noted improvements to address observed and documented conditions. As these are existing conditions, the NYSDOT and Ulster County Transportation Council (UCTC) should lead this effort with assistance from secondary agencies. The 2008 *Marlboro Hamlet Area Transportation Plan* noted several improvements for these two intersections. The traffic impact study for the proposed Bayside Development (2016) also noted this plan. The Bayside Development traffic impact study states:

“As discussed in Section III.F of this report the Marlboro Hamlet Area Transportation Plan proposed improvements to this intersection which include possible turning lanes, signalization and reconfiguration of the King Street approach and signalization. Regardless of the proposed Bayside project, these improvements should be completed to improve the operation of this intersection as well as upgrade the entire Marlboro Hamlet area.”



Marlboro Hamlet Triangle recommendations per 2008 Hamlet Transportation Plan.

US-9W at Lattintown Road: Northbound drivers will pass on the right while a driver is waiting to turn left onto Lattintown Road. The total width between the centerline striping and edge of pavement is approximately 22 feet. There is room for two drivers to stop side-by-side on the eastbound approach. The following images show examples of these conditions. As these are existing conditions, the NYSDOT should lead efforts to implement potential infrastructure improvements with assistance from secondary agencies and/or future applicants. This intersection currently satisfies the warrant criteria for a left-turn lane. Additionally, observed vehicle delays are less, at times, than the Synchro delays for drivers turning left from Lattintown Road.



4.4 Existing Crash Investigation

The purpose of this crash analysis is to identify inherent safety issues by studying and quantifying historical crashes at the study intersections and identifying potential crash patterns and clusters. A crash cluster is defined as an abnormal occurrence of similar crash types occurring at approximately the same location or involving the same geometric features. The severity of the crashes should also be considered. A history of crashes is an indication that further analysis is required to determine the cause(s) of the crash(es) and to identify what actions, if any, could be taken to mitigate the crashes.

This study reviewed potentially significant safety concerns at the study intersections using the 2023 (revision) UCTC *Ulster County Road Safety Plan*. The study identified the County's Top-50 priority intersections based on reported crashes and subsequent crash rates. None of the study area intersections were identified on this list.

Given that the US-9W at Lattintown Road intersection falls outside of the UCTC program area, crash history data was obtained from MV-104A Police Accident Reports provided by the NYSDOT *Crash Location & Engineering Analysis & Reporting (CLEAR)* database. This study conducted the evaluation from January 31, 2019, through December 31, 2023.

Intersections are evaluated using the Potential for Safety Improvement (PSI) and Safety Performance Function (SPF) methodology described in the latest NYSDOT *Red Book* (2023). The accompanying SPF worksheet can be obtained from the NYSDOT *Crash Analysis Toolbox*. NYSDOT defines PSI and SPF as:

Potential for Safety Improvement

A comparison of the site-specific safety performance compared to the statewide average using either observed or expected crashes depending on whether traffic volume is available.

Safety Performance Function

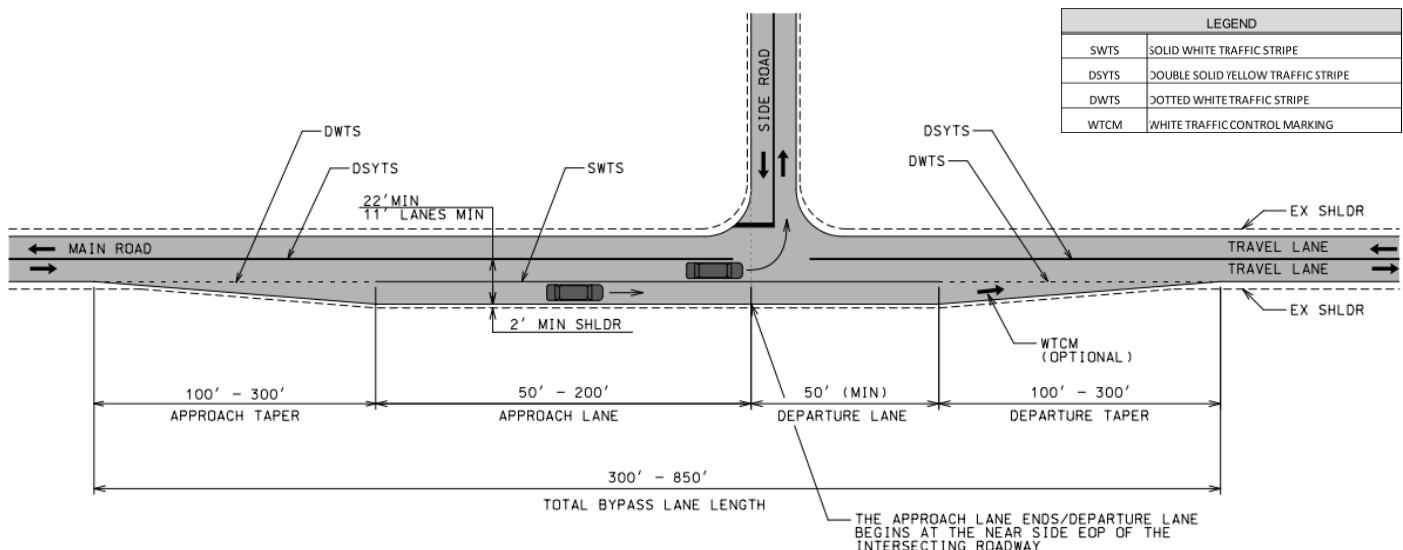
An equation used to estimate or predict the average crash frequency per year at a location as a function of traffic volume and, in some cases, roadway or intersection characteristics (e.g., number of lanes, traffic control, or type of median).

A summary of the crashes that occurred at intersection locations and resulting PSI are shown below. SPF Prediction, Expected Crashes, and Excess Expected Crashes are shown as crashes per year. LOSS = Level of Service of Safety (Range 1-4). 1 = Lowest Excess Expected Cashes, 4 = Highest Excess Expected Crashes.

- Number of crashes: **14**
- Number of injury crashes: **3**
- SPF Prediction: **1.5615**
- Expected Crashes: **2.8366**
- Excess Expected Crashes: **1.2751**
- LOSS: **3**

US-9W at Lattintown Road: Of the 14 crashes, nine occurred in the northbound direction. There were six rear end crashes, two sideswipes, and one fixed object. The remaining crashes occurred in the eastbound direction. There were two left turn crashes, one sideswipe, one backing, and one animal-related crash. The primary reason for the northbound rear end crashes was attributed to left turning vehicles being hit from behind. As noted earlier, drivers either wait behind someone waiting to turn left or pass on the right.

Potential Improvements: Provide a dedicated left-turn lane or left-turn bypass lane (example shown below).



5.0 BACKGROUND (NO BUILD) CONDITIONS

Background traffic volumes represent the traffic conditions during the proposed build year without development of the project. The project is anticipated to be completed within five years; therefore, a five-year design year was used. The widely accepted methodology for preparing traffic impact studies requires that any projects in the study area that are currently approved and/or under construction must be considered in the traffic analysis. Projects that are contemplated but not yet approved are not typically included in a traffic analysis. Local municipal personnel were contacted to discuss any other specific projects that are currently approved or under construction that would generate additional traffic in the study area. Several projects were noted and described.

- **Hudson West:** This residential project consists of 104 condos just north of Marlboro Hamlet along the west side of US-9W.
 - The traffic volumes generated by the project were specifically included in the background analysis.
- **Dock Road Residential:** This residential project consists of 103 townhomes just east of Marlboro Hamlet along the east side of US-9W.
 - The traffic volumes generated by the project were specifically included in the background analysis.

Several other projects are under consideration based on feedback from the Town of Marlborough. Not all the projects under consideration are certain to occur. Nonetheless, given that these projects are in the planning stages, potential traffic volumes generated by these developments are included in the adjusted background growth rate to provide a conservative assessment.

A review of available historical NYSDOT traffic volume data in the vicinity of the site indicates that traffic has fluctuated, if not decreased, between 2014 and 2021. For reference, the *Route 9W Corridor Management Plan* determined an annual growth rate of 0.5% per year. To account for normal increases in background traffic growth, including the noted developments and any unforeseen projects in the study area, a growth rate of 0.75% per year was applied to the existing traffic volumes. **Figure 4** illustrates the background traffic conditions.

6.0 PROPOSED DEVELOPMENT CONDITIONS

6.1 Project Description

The project is comprised of the following components:

- **Proposed Land Uses:**
 - **Living and Sleeping Accommodations**
 - Guestrooms (cabins, hotel, cottage, lodge): **93 units (170 total bedrooms)**
 - Staff Dorm & Locker Room: **35 units**
 - **Dining Accommodations**
 - Clubhouse Dining Room 1: **8,897 SF**
 - Clubhouse Dining Room 2: **5,000 SF**
 - Distillery with Tasting Room: **1,260 SF**
 - Farm Market & Barbeque: **1,656 SF**
 - **Recreational Facilities**
 - Events Center: **15,870 SF** (up to 250 seats during special events)
 - Orangery (small events center): **3,168 SF** (up to 100 seats during special events)
 - **Resort Spa and Gym**

- Spa and Gym will include a gym, wellness center, and medi-spa with small pools for spa therapy): **19,701 SF**
- Animal Planet – Petting Zoo (Barn): **400 SF**
- **Access:** Access will be provided via the existing driveway along Lattintown Road and a driveway along Ridge Road. The proposed distillery and staff dorms are proposed adjacent to the Ridge Road access. All other uses are generally found in the western and central portion of the property.
- **Parking:** The Resort Hotel grounds include several at-grade parking areas throughout the site providing a total of 331 surface parking spaces.

6.2 Trip Generation

A. Baseline Trip Generation

The volume of traffic generated by a site is dependent on the intended land use and size of the development. Trip generation is an estimate of the number of trips generated by a specific building or land use. These trips represent the volume of traffic entering and exiting the development.

The latest *Trip Generation Manual 11th Edition* published by the ITE is the industry standard and is used as a reference for this information. The trip rate for the peak hour of the generator may or may not coincide in time or volume with the trip rate for the peak hour of adjacent street traffic. Volumes generated during the peak hour of the adjacent street traffic, adjacent existing land uses, and the proposed project—in this case the weekday late afternoon/evening PM (4:00 to 7:00 PM) and Saturday midday (11:00 AM to 2:00 PM) peak hours—represent a more critical volume when analyzing the capacity of the system; those intervals will provide the basis of this analysis.

According to the ITE, the following steps are recommended when determining trip generation for proposed land uses:

1. Utilize ITE data.
2. Utilize consultant or developer data for use in specific development applications.
3. If existing data is very limited, check for the availability of local trip generation rates for comparable uses.
4. If local trip data for similar developments are not available, and time and funding permit, conduct trip generation studies at sites with characteristics like those of the proposed development.

Given the unique use proposed for this site and the lack of available ITE trip generation data for spa resorts, this assessment obtained entering and exiting traffic at the existing Mirbeau Spa in Skaneateles, NY as a point of reference. Traffic data at Mirbeau Spa was collected on Thursday, February 14, February 15, and February 16, 2013. These trips represent Valentine's Day traffic which is indicative of high trip generation time periods. Mirbeau Spa provides similar uses to those proposed on this site (14,000 SF spa, 2,500 SF indoor meeting/conference space, a restaurant open to guests and the public, and a 34-room hotel). A trip generation rate was developed for Mirbeau for entering and exiting traffic during each peak hour based on the size of the spa. The existing Mirbeau Spa generated 18 entering and 22 exiting vehicle trips during the PM peak hour and 20 entering and 31 exiting vehicle trips during the Saturday peak hour.

The ITE does not have Saturday data for Resort Hotel (ITE 330); therefore, weekday PM Peak of Generator rates were applied for the site's Saturday trip generation estimates.

The ITE does not have data for special events and conferences. Therefore, data obtained from a study performed at two sites in the Vancouver, BC (Canada) area in 2003 was used to estimate site generated traffic volumes. The sites ranged in attendance from 190 to 600 guests. Each site was in a suburban location, not well served by transit with no patrons arriving by walking or bicycling. Vehicle generation rates of 0.26 trips per person to 0.29 trips per person were

calculated. This assessment used a 0.29 rate with an average directional distribution of 97% entering and 3% exiting. Attendees are expected to arrive during the beginning of the analysis period.

The proposed Events Center can host up to 250 attendees while the Orangery can host up to 100 attendees. It is important to note that the event space will not be utilized daily like the other land uses. Further, not all events will take place with peak generation occurring during the peak periods of the site's other uses. A portion of on-site guests will attend events in these spaces and not be considered new vehicle trips.

B. Trip Reduction Adjustments

In mixed-use developments, it is common for individuals to engage in multiple activities on a single visit. Traffic engineering principles, such as the latest ITE *Trip Generation Handbook 3rd Edition*, acknowledge that this behavior allows for a decrease in the overall number of trips calculated for such projects. This is because trips made to one part of the development often include visits to other parts, eliminating the need for separate trips through the main access points. For instance, in a development that houses both retail and dining establishments, many visitors will patronize both without necessitating additional trips. Similarly, guests at a restaurant might also stay at the hotel or use other amenities on the premises. The extent to which visitors to a mixed-use site will frequent multiple facilities depends on the variety of services offered, the scale of each service, and their proximity to one another.

Data is limited for sites like the proposed Resort Hotel. Research of hotel spas indicates that the industry uses a metric called guest capture rate. As a general guideline, resort spas tend to achieve higher hotel guest capture rates compared to urban facilities. In resort destinations, guests primarily travel for leisure purposes, and they are more inclined to utilize the spa to unwind and disconnect. While the capture rate in city hotels typically falls within the range of 5% to 8%, it can significantly increase to 10% to 18% for urban resorts and even reach 20% to 35% for beach destinations. In wellness retreats, where guests primarily book to participate in wellness programs, the capture rates may be upwards of 75% to 95% (*Spa Profitability Handbook*, Horwath HTL, 2020). When considering the marketing approach this resort is taking and the variety of on-site land uses, this assessment assumed a 50% reduction in spa trips.

Further, internal capture is highly likely to occur between the dining offerings and the remaining resort visitors. The description for ITE Resort Hotel states:

"A resort hotel is similar to a hotel (Land Use 310) in that it provides sleeping accommodations, full-service restaurants, cocktail lounges, retail shops, and guest services. The primary difference is that a resort hotel caters to the tourist and vacation industry, often providing a wide variety of recreational facilities/programs (e.g., golf courses, tennis courts, beach access, or other amenities) rather than convention and meeting business."

Given that the site will be marketed primarily to resort guests with the public in mind, a 50% reduction in traffic was assumed for both primary dining facilities.

The site will provide living and sleeping accommodation for 35 staff members. These individuals will already be on-site during typical peak traffic generation hours; thus, no traffic is assigned to these employees.

Table 4 shows the total baseline traffic generation, traffic reductions, and total new vehicle trips added to the transportation system for the peak hours of study for all phases of development.

Table 4: Site Generated Trips

Description	Size	PM Peak Hour			SAT Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Guestrooms (ITE 330)	93 units	16	22	38	27	26	53
Staff Housing	35 units	-	-		-	-	
Clubhouse Dining Room 1 (ITE 931)	8,896 SF	46	23	69	56	39	95
Clubhouse Dining Room 2 (ITE 931)	5,000 SF	26	13	39	32	21	53
Spa and Gym (ITE 492)	19,701 SF	39	29	68	31	32	63
Distillery (ITE 971)	1,260 SF	7	5	12	16	13	29
Baseline Traffic Generation		134	92	226	162	131	293
<i>Internal Capture (dining)</i>		-27	-14	-41	-33	-23	-56
<i>Internal Capture (spa)</i>		-20	-15	-35	-16	-16	-32
Total New Vehicle Trips		87	63	150	113	92	205
Events center	250 seats	71	2	73	71	2	73
Orangery	100 seats	28	1	29	28	1	29

The proposed project is anticipated to generate 134 entering and 92 exiting vehicle trips during the PM peak hour with 162 entering and 131 exiting vehicle trips during the SAT peak hour. Internal trips between site uses are likely to occur, notably between the guestrooms, spa, and dining accommodations.

Though no ITE data is available for this condition, this assessment assumed a portion of site traffic will be classified as internal capture. Thus, the site is projected to generate approximately 87 entering and 63 exiting vehicle trips during the PM peak hour with 113 entering and 92 exiting vehicle trips during the SAT peak hour.

6.3 Trip Distribution

The cumulative effect of site generated traffic on the transportation network is dependent on the origins and destinations of that traffic and the location of the access drives serving the site. The proposed arrival and departure distribution of traffic generated by the proposed project is considered a function of several parameters, including:

- Residential density within 90 miles of the project site using the U.S. Census *OnTheMap* application. Notable centers include the New York Metro/tri-state area and the greater Albany area.
- Proximity and greater access to major highways, such as I-84, I-87, US-9W, and Taconic State Parkway.
- Proximity to access to activity centers, such as Marlboro Hamlet, Newburgh, and areawide parks and wineries.
- Site layout and site access locations via Lattintown Road and Ridge Road.
- Existing roadway network and posted speed limits.
- Use of navigational aids, such as Google Maps, Apple Maps, and Waze during peak times.
- Existing traffic patterns along US-9W, Western Avenue, and Lattintown Road.
- Existing traffic conditions and controls.

Figure 5 shows the anticipated trip distribution pattern percentage for the proposed action. Traffic patterns generated by the project site were distributed via the following:

- **20% north:** 15% via Lattintown Road and 5% via Old Indian Road.
- **20% east:** 12% via Lattintown Road, 3% via Western Avenue/King Street, 5% via Old Indian Road.
- **10% west:** 5% via Lattintown Road, 5% via Plattekill Road.
- **50% south:** 40% via Lattintown Road, 10% via Western Avenue/King Street.

This study assumed an approximate 80% and 20% split between trips using the Lattintown Road driveway and the Ridge Road driveway, respectively.

6.4 Trip Assignment

Based on the projected trip distribution patterns, **Figure 6** illustrates the total peak hour traffic assignments for the proposed project.

6.5 Full Development Volumes

The proposed design hour traffic volumes are developed for the peak hours by combining the background traffic conditions (**Figure 4**) and the new site-generated traffic volumes (**Figure 6**) to yield the traffic volumes under full development conditions. **Figure 7** illustrates the total peak hour volumes anticipated for the proposed project.

7.0 TRAFFIC OPERATIONS AND ANALYSIS

7.1 Left-Turn Warrant Analysis

Left-turn warrants are typically based on Transportation Research Board's (TRB) *NCHRP Report 279 Intersection Channelization Design Guide*. Provisions for left-turn lane facilities should be established where traffic volumes are high enough and safety considerations are sufficient to warrant the additional lane. The left-turn warrants are based on a combination of the percentage of left-turning traffic, advancing traffic, opposing traffic, and the design speed of the major roadway (posted speed plus 5 mph) at the study intersection.

The anticipated number of left-turns does not meet the suggested warrant criteria for a left-turn lane in the build condition for the site driveways on Lattintown Road and Ridge Road during the study peak hours.

7.2 Description of Capacity Analysis

Capacity analysis is a technique used for determining a measure of effectiveness for a section of roadway and/or intersection based on the number of vehicles during a specific time period. The measure of effectiveness used for the capacity analysis is referred to as a Level of Service (LOS). Levels of service are calculated to provide an indication of the amount of delay that a motorist experiences while traveling along a roadway or through an intersection. Since the most amount of delay to motorists usually occurs at intersections, capacity analysis focuses on intersections, as opposed to highway segments.

The standard procedure for capacity analysis of signalized and unsignalized intersections is outlined in the latest *Highway Capacity Manual (HCM) 7th Edition* published by the Transportation Research Board (TRB). Traffic analysis software, Synchro 12, which is based on procedures and methodologies contained in the HCM, was used to analyze operating conditions at study area intersections. The procedure yields a Level of Service based on the HCM as an indicator of how well intersections operate.

Six levels of service are defined for analysis purposes. They are assigned letter designations, from A to F, with LOS A representing the conditions with little to no delay, and LOS F conditions with very long delays. LOS C or better is desirable, but LOS D for signalized locations and LOS E for unsignalized locations are generally thresholds of acceptable operation during peak periods so long as the volume to capacity ratio (v/c) is below 1.0. **Table 5** depicts Level of Service criteria for both signalized and unsignalized intersections and associated delays per vehicle in seconds.

Table 5: Level of Service Criteria

LOS	Signalized Control	Unsignalized Control
A	< 10	< 10
B	10 – 20	10 – 15
C	20 – 35	15 – 25
D	35 – 55	25 – 35
E	55 – 80	35 – 50
F	> 80	> 50

LOS for signalized intersections is defined in terms of delay specifically, average total delay per vehicle for a 15-minute analysis period. LOS for unsignalized intersections, however, are different from a signalized intersection. The primary reason for this is driver expectation that a signalized intersection is designed to carry higher volumes than an unsignalized intersection. Unsignalized intersections are also associated with more uncertainty for users, as delays are less predictable than they are at signals.

The v/c ratio, also referred to as degree of saturation, represents the sufficiency of an intersection to accommodate the vehicular demand. A v/c ratio less than 0.85 generally indicates that adequate capacity is available, and vehicles are not expected to experience significant queues and delays. As the v/c ratio approaches 1.0, traffic flow may become unstable, and delay and queuing conditions may occur.

This evaluation was supplemented with traffic simulation modeling using an extension of Synchro called SimTraffic. During simulation modeling, vehicles are individually tracked, and statistics are recorded on a second-by-second basis to determine the delays each vehicle experiences. Since SimTraffic simulation modeling is microscopic and stochastic, meaning car movement parameters vary randomly within a set distribution based on an initial seed number, the same traffic volume may result in slightly different results depending on the random seed used. Therefore, simulation results are reported based on an average value of multiple simulation runs to reduce the variability in results.

7.3 Capacity Analysis Results

Existing and background operating conditions during the peak study periods are evaluated to determine a basis for comparison with the projected future conditions. The future traffic conditions generated by the project were analyzed to assess the operation of the study area intersections. Capacity results for existing, background, and full build conditions are listed in **Table 6**. The discussion following the table summarizes capacity conditions. The detailed Synchro capacity analysis worksheets are contained in the Appendices.

Table 6: Capacity Analysis Results

Intersection	2024 Existing Baseline Conditions				2029 Background (No-Build) Conditions				2029 Full Build Conditions			
	PM		SAT		PM		SAT		PM		SAT	
1. US-9W at Old Indian Road / South Road (U)												
EB - Old Indian Road	D	32.5	C	21.3	E	37.9	C	23.3	E	42.1	C	24.4
WB - South Road	F	51.0	D	34.1	F	60.3	E	39.0	F	61.0	E	39.0
NB Left - US-9W	B	11.1	A	0.0	B	11.5	A	0.0	B	11.6	A	0.0
SB Left - US-9W	A	9.4	A	9.4	A	9.5	A	9.6	A	9.5	A	9.6
2. Old Indian Road at Ridge Road (U)												
WB - Old Indian Road	A	7.3	A	7.3	A	7.3	A	7.3	A	7.4	A	7.3
NB - Ridge Road	A	9.2	A	8.8	A	9.3	A	8.9	A	9.4	A	9.0
3. Old Indian Road at Lattintown Road (U)												
EB - Lattintown Road	A	1.2	A	1.0	A	1.3	A	1.0	A	1.3	A	1.1
WB - Old Indian Road	A	6.2	A	5.8	A	6.3	A	5.9	A	6.2	A	5.7
NB - Lattintown Road	A	3.7	A	3.3	A	3.7	A	3.6	A	4.2	A	3.7
4. Old Indian Road at Lattintown Road / Sonny's Weeds (U)												
EB - Old Indian Road	A	5.8	A	5.0	A	5.3	A	4.8	A	5.8	A	5.1
WB - Lattintown Road	A	1.8	A	1.6	A	1.7	A	1.6	A	1.9	A	1.5
NB - Sonny's Weed's Dwy	A	2.0	A	2.0	A	2.3	A	1.2	A	2.2	A	1.6
SB - Lattintown Road	A	3.9	A	3.6	A	4.0	A	3.6	A	4.2	A	3.9
5. Lattintown Road at St. Hubert's Lodge (U)												
WB - St. Hubert's Lodge	A	9.9	A	8.7	A	9.9	A	8.7	B	10.2	B	10.5
SB - Lattintown Road	A	7.4	A	0.0	A	7.4	A	0.0	A	7.6	A	7.6
6. Ridge Road at Proposed Driveway (U)												
WB - St. Hubert's Lodge	n/a				n/a				A	8.7	A	8.6
NB - Lattintown Road									A	7.3	A	7.3
7. Lattintown Road at Plattekill Road (U)												
EB - Plattekill Road	A	7.8	A	8.1	A	7.9	A	8.1	A	8.2	A	8.6
WB - Plattekill Road	A	7.6	A	7.6	A	7.7	A	7.7	A	7.9	A	8.0
NB - Lattintown Road	A	7.8	A	8.1	A	7.8	A	8.1	A	8.3	A	8.9
SB - Lattintown Road	A	8.1	A	7.9	A	8.2	A	8.0	A	8.6	A	8.7
8. Plattekill Road at Plattekill Road Bend (U)												
WB Left - Plattekill Road	A	7.4	A	7.4	A	7.4	A	7.4	A	7.4	A	7.4
NB - Plattekill Rd Bend	A	8.7	A	8.7	A	8.7	A	8.7	A	8.7	A	8.7
9. Lattintown Road at Plattekill Road Bend (U)												
WB - Plattekill Rd Bend	A	9.7	A	9.9	A	9.8	A	10.0	B	10.4	B	11.0
SB Left - Lattintown Road	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
10. US-9W at Western Avenue (U)												
NB - US-9W	B	10.2	A	2.4	B	12.9	A	3.1	B	14.3	A	3.7
SB - US-9W	A	3.1	A	1.4	A	3.4	A	1.7	A	3.7	A	1.7
11. US-9W at King Street (U)												
SEB Left - King Street	F	86.3	E	37.8	F	160.6	F	53.0	F	166.9	F	55.3
SEB Right - King Street	C	16.1	B	11.9	C	17.3	B	12.4	C	17.6	B	12.6
12. US-9W at Lattintown Road (U)												
EB - Lattintown Road	F	79.5	C	24.5	F	125.5	D	28.2	F	248.1	D	34.6
NB Left - US-9W	B	10.5	A	9.3	B	10.8	A	9.5	B	11.4	A	9.9

A(2.8) = Level of Service (Delay in seconds per vehicle)

(S) = Signalized; (U) = Unsignalized

NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound

N/A = Approach does not exist and/or was not analyzed during this condition

Green shaded cells indicate low delays, yellow shaded cells indicate moderate delays, red shaded cells indicate long delays.

1. US-9W at Old Indian Road

The eastbound and westbound movements operate with moderate to longer delays at times throughout the peak hours under existing and projected background conditions. However, observed conditions show that actual delays may, at times, be less than the reported Synchro results. Despite the LOS F for the westbound approach, there are seven vehicles exiting South Road during the PM peak hour (one vehicle every 8.6 minutes).

The anticipated traffic volumes generated by the project constitute 1.4% or less of peak hour traffic. There is no change in level of service with development of the project. The additional traffic volumes generated by the project can be accommodated as there is adequate intersection capacity. No capacity improvements are warranted nor recommended.

As noted in the *Route 9W Corridor Management Plan*, this intersection is recommended for installation of a northbound left-turn lane and associated lane modifications along US-9W.

2. Old Indian Road at Ridge Road

All movements operate at LOS A during the peak hours under existing, projected background, and anticipated full build conditions. There is no change in level of service with development of the project. The additional traffic volumes generated by the project can be accommodated as there is adequate intersection capacity. No capacity improvements are warranted nor recommended.

3. Old Indian Road at Lattintown Road (West)

All movements operate at LOS A during the peak hours under existing, projected background, and anticipated full build conditions. There is no change in level of service with development of the project. The additional traffic volumes generated by the project can be accommodated as there is adequate intersection capacity. No capacity improvements are warranted nor recommended.

4. Old Indian Road at Lattintown Road (East)

All movements operate at LOS A during the peak hours under existing, projected background, and anticipated full build conditions. There is no change in level of service with development of the project. The additional traffic volumes generated by the project can be accommodated as there is adequate intersection capacity. No capacity improvements are warranted nor recommended.

5. Lattintown Road at Site Access

All movements are projected to operate at LOS B or better under full build conditions during the peak hours. No capacity improvements are warranted nor recommended.

6. Ridge Road at Site Access

All movements are projected to operate at LOS A under full build conditions during the peak hours. No capacity improvements are warranted nor recommended.

7. Lattintown Road at Plattekill Road

All movements operate at a highly acceptable LOS B or better during the peak hours under existing, projected background, and anticipated full build conditions. The additional traffic volumes generated by the project can be accommodated as there is adequate intersection capacity. No capacity improvements are warranted nor recommended.

8. US-9W at Western Avenue

All movements operate at a highly acceptable LOS B or better during the peak hours under existing, projected background, and anticipated full build conditions. The project is anticipated to constitute 1.22% or less of total intersection traffic during either peak hour. There is no change in level of service with development of the project. The additional traffic volumes generated by the project can be accommodated as there is adequate intersection capacity. No capacity improvements are warranted nor recommended.

9. US-9W at King Street

The left-turn movement from King Street operates with moderate to longer delays at times throughout the peak hours under existing and projected background conditions. These delays are characteristic of unsignalized intersections along heavily trafficked arterials, such as US-9W. However, observed conditions show that actual delays may, at times, be less than the reported Synchro results.

The anticipated traffic volumes generated by the project constitute 0.97% or less of peak hour traffic.

As noted on page 10 of this report, these are existing conditions identified by earlier transportation studies undertaken for public or private reasons. It is recommended that these intersections be reexamined and/or programmed for the noted improvements to address observed and documented conditions. As these are existing conditions, the NYSDOT and Ulster County Transportation Council (UCTC) should lead this effort with assistance from secondary agencies and/or future applicants.

10. US-9W at Lattintown Road

The eastbound movement from Lattintown Road operates with moderate to longer delays at times throughout the peak hours under existing and projected background conditions. These delays are characteristic of unsignalized intersections along heavily trafficked arterials, such as US-9W. Page 11 describes the existing observations which reveal two important conditions.

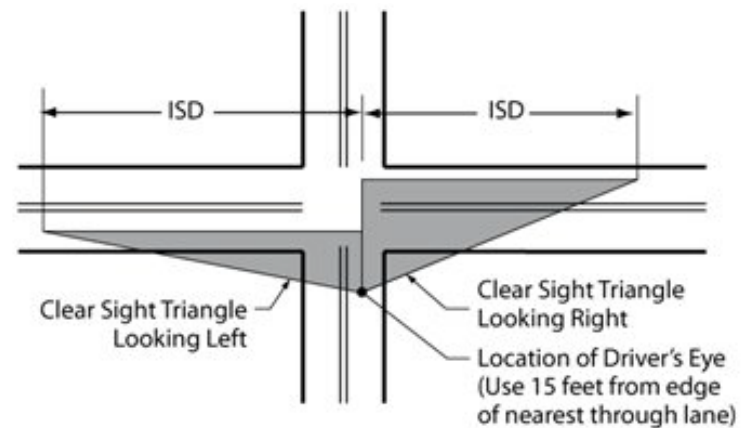
- Northbound drivers will pass on the right while a driver is waiting to turn left onto Lattintown Road.
- There is room for two drivers to stop side-by-side on the eastbound approach.

Between the field observations at the US-9W and Lattintown Road intersection and reported crashes, a northbound left turn treatment (dedicated left turn lane or bypass lane) is a potential improvement. This intersection currently satisfies the warrant criteria for a left-turn lane. As these are existing conditions, the NYSDOT should lead efforts to implement potential infrastructure improvements with assistance from secondary agencies and/or future applicants.

7.4 Sight Distance Evaluation

This study investigated available sight distances at the driveway locations. Sight distance is provided at intersections to allow drivers to perceive the presence of potentially conflicting vehicles. This should occur in sufficient time for a motorist to stop or adjust their speed, as appropriate, to avoid a collision at the intersection. Sight distance is also provided at intersections to allow the drivers of stopped vehicles a sufficient view of the intersecting highway to anticipate and avoid potential incidents.

If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate Stopping Sight Distance (SSD) for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. To enhance traffic operations, Intersection Sight Distances (ISD) that exceed that exceed SSD are desirable along the major road.



Sight distance is evaluated using guidance contained within the latest edition of *A Policy on Geometric Design of Highways and Streets 7th Edition* published by the American Association of State Highway and Transportation Officials (AASHTO) and the NYSDOT *Highway Design Manual* to establish the required SSD and desirable ISD. The recommended sight distances are based on a road's design speed (posted plus 5 mph). **Table 10** describes the sight distance measurements.

Table 7: Sight Distance Measurements

Intersection	Category	AASHTO Recommendation	Measurements	
			From Left	From Right
Lattintown Road at Saint Hubert's Lodge	Stopping Sight Distance	360 feet	>400 feet	>400 feet
			To Left	To Right
	Intersection Sight Distance	500 feet	>600 feet	>600 feet
			To Left	To Right
Ridge Road at Proposed Driveway	Stopping Sight Distance	305 feet	>400 feet	>400 feet
			To Left	To Right
	Intersection Sight Distance	445 feet	<445 feet	>600 feet
			To Left	To Right

Lattintown Road is 40 mph (45 mph design speed). Ridge Road is 35 mph (40 mph design speed).

The Lattintown Road intersection has adequate sight distance conditions. Sight distances at the proposed Ridge Road driveway are generally adequate, except for the ISD to the left. Consideration may be given to installing an intersection warning sign. Per the latest *Manual on Uniform Traffic Control Devices (MUTCD) 11th Edition*, the appropriate sign is the W2-2R assembly. This sign should be placed between 400 to 500 feet in advance of the driveway and not impact existing signage. Vegetation or other obstructions, where applicable, should be minimized to ensure sight distance is not impacted.

8.0 CONCLUSIONS AND RECOMMENDATIONS

This report identified and evaluated the potential traffic impacts that can be expected from the proposed Marlborough Resort. The results of this comprehensive study determined that the existing transportation network can adequately accommodate the projected traffic volumes and resulting minor traffic impacts to study area intersections. The following sets forth the conclusions and recommendations based upon the results of the analyses:

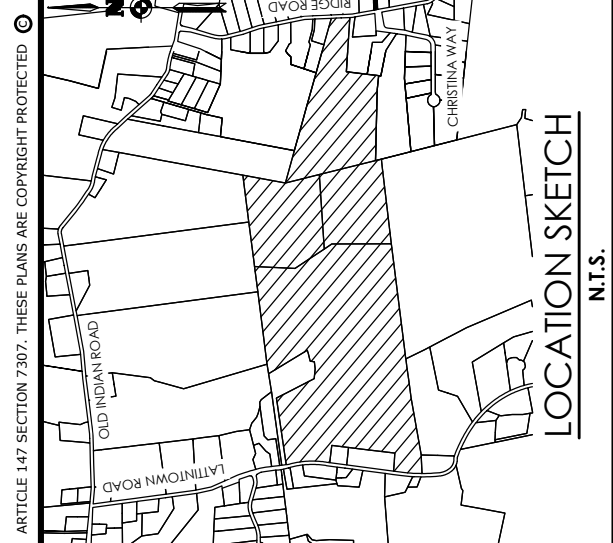
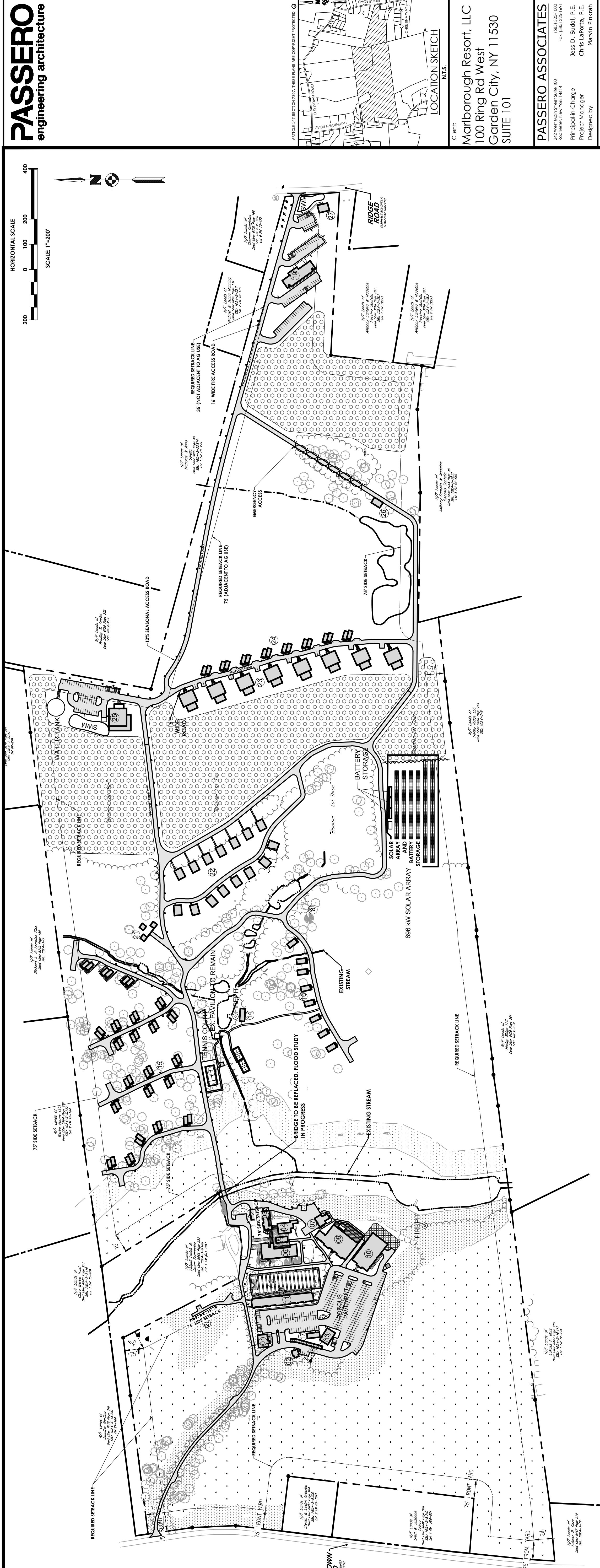
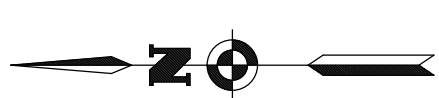
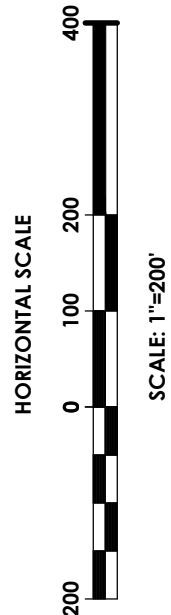
1. The proposed project is anticipated to generate 134 entering and 92 exiting vehicle trips during the PM peak hour with 162 entering and 131 exiting vehicle trips during the SAT peak hour. Internal trips between site uses are likely to occur, notably between the guestrooms, spa, and dining accommodations.
2. Though no ITE data is available for this condition, this assessment assumed a portion of site traffic will be classified as internal capture. Thus, the site is projected to generate approximately 87 entering and 63 exiting vehicle trips during the PM peak hour with 113 entering and 92 exiting vehicle trips during the SAT peak hour.
3. The crash analysis generally did not identify any geometric deficiencies. However, the crash analysis did identify potential concerns at the US-9W and Lattintown Road intersection.
4. Between the field observations at the US-9W and Lattintown Road intersection and reported crashes, a northbound left turn treatment (dedicated left turn lane or bypass lane) is a potential improvement. This intersection currently satisfies the warrant criteria for a left-turn lane. As these are existing conditions, the NYSDOT should lead efforts to implement potential infrastructure improvements with assistance from secondary agencies and/or future applicants.
5. The proposed Lattintown Road access satisfies recommended sight distances. The proposed Ridge Road access results in less than the recommended sight distance to the left. Consideration should be given to installing an intersection warning sign in advance of the driveway.
6. Most intersection movements operate at an acceptable Level of Service D or better under existing and projected background conditions during the peak hours except for the noted conditions in Section 7.3.
7. There are generally very minor increases in delay at the study intersections under full development.
8. The detailed capacity analysis showed that the additional traffic volumes generated by the proposed project can be accommodated by the existing roadway network, as there is adequate intersection capacity.
9. Pursuant to the State Environmental Quality Review Act, this detailed analysis demonstrates that the proposed project does not result in any significant adverse traffic impacts.

9.0 REFERENCES

- Synchro 12 Software. Cubic ITS. 2023.
- Highway Capacity Manual (7th Edition). Transportation Research Board (TRB). Washington, DC. 2022.
- Trip Generation Manual (11th Edition). Institute of Transportation Engineers (ITE). Washington, DC. 2021.
- Trip Generation Handbook (3rd Edition). Institute of Transportation Engineers (ITE). Washington, DC. 2017.
- OnTheMap. United States Census Bureau. 2024.
- Traffic Data Viewer. New York State Department of Transportation (NYSDOT). 2024.
- Manual on Uniform Traffic Control Devices (11th Edition). Federal Highway Administration (FHWA). 2023.
- NCHRP Report 279 Intersection Channelization Design Guide. Transportation Research Board (TRB). 1985.
- Highway Functional Classification Concepts, Criteria, and Procedures. Federal Highway Administration (FHWA). 2023.
- Traffic Monitoring Guide. FHWA. 2022.
- Highway Design Manual. New York State Department of Transportation (NYSDOT). Latest Revisions.
- A Policy on Geometric Design of Highways and Streets (7th Edition). The American Association of State Highway and Transportation Officials (AASHTO). 2018.
- Route 9W Corridor Management Plan. Ulster County Planning Department. 2018.
- Ulster County Road Safety Plan. Ulster County Transportation Council. 2023
- Crash Location and Engineering Analysis Repository (CLEAR). New York State Department of Transportation. 2024.
- Spa Profitability Handbook. Horwath HTL. 2020.
- Seasonal Adjustment Factors. New York State Department of Transportation. 2024.
- Projects in Your Neighborhood. New York State Department of Transportation. 2024.

10.0 FIGURES

Figures 1 through 7 are included on the following pages.



Client:
Marlborough Resort, LLC
100 Ring Rd West
Garden City, NY 11530
SUITE 101

PASSERO ASSOCIATES
242 West Adams Street Suite 100
Rochester, New York 14614
(585) 325-1000
Fax: (585) 325-1691
Principal-in-Charge: Jess D. Sudol, P.E.
Project Manager: Chris LaPorta, P.E.
Designed by: Marvin Phikrah



Revisions	
No.	Description
1	

UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS IN VIOLATION OF STATE EDUCATION LAW ARTICLE 148 SECTION 7209 AND ARTICLE 29 SECTION 2401. THESE PLANS ARE COPYRIGHT PROTECTED ©

OVERALL
SITE PLAN

MARLBOROUGH
RESORT

Municipality: MARLBOROUGH
County: ULSTER
State: NY

Project No.:
20233707.0001

Drawing No.

Scale:
C 130

1" = 200'

Date
MAY 24, 2024

NOT FOR CONSTRUCTION

GRAND TOTAL BUILDING AREA-ALL PHASES (S.F.)

SITE DATA - PHASE 03					214239
BUILDING NAME	BUILDING NUMBER	No. of BUILDINGS	BUILDING AREA (S.F.)	TOTAL BUILDING AREA (S.F.)	
CLUBHOUSE DINING ROOM 2	25	1	5000	5000	
ORCHARD POND PAVILION	26	1	1000	1000	
DISTILLERY WITH TASTING ROOM	27	1	1260	1260	
TOTAL BUILDING AREA (S.F.)				7260	

SITE DATA - PHASE 02					
BUILDING NAME	BUILDING NUMBER	No. of BUILDINGS	BUILDING AREA (S.F.)	TOTAL BUILDING AREA (S.F.)	
HILLSIDE - 2 GUESTROOM CABINS	22	15	1200	18000	
5-BEDROOM GUEST HOUSES	23	8	4000	32000	
ORCHARD - 2 GUESTROOM CABINS	24	8	1200	9600	
TOTAL BUILDING AREA (S.F.)				58600	

SITE DATA - PHASE 01					
BUILDING NAME	BUILDING NUMBER	No. of BUILDINGS	BUILDING AREA (S.F.)	TOTAL BUILDING AREA (S.F.)	
WELCOME BUILDING	1	1	2077	2077	
ENTRY COTTAGE - EXISTING CABIN	2	1	648	648	
RENOVATED MAIN LODGE WITH 2 GUESTROOMS, A PRIVATE DINING AREA, AND SALOON	3	1	7223	7223	
ORANGERIE - SMALL EVENTS CENTER	4	1	3168	3168	
CABIN BAR	5	1	1022	1022	
CLUBHOUSE DINING ROOM 1	6	1	8897	8897	
FARM MARKET & BARBEQUE	7	1	1656	1656	
POND CABIN - EXISTING CABIN	8	1	695	695	
SPA AND GYM	9	1	19701	19701	
EVENTS CENTER	10	1	15870	15870	
28 ROOM HOTEL	11	1	17244	17244	
WALLED GARDEN	12	1	15340	15340	
BACK-OF-HOUSE OPERATION	13	1	2106	2106	
POND PAVILION	14	1	1000	1000	
TREE HOUSE - 2 GUESTROOM CABINS	15	22	1161	25542	
STORAGE/GENERATOR BUILDING	17	1	1000	1000	
COVERED PARKING (ELEC. VEHICLES)	18	1	1550	1550	
STAFF DORM & LOCKER ROOM	19	1	14672	14672	
WASTEWATER MECHANICAL BLDG	20	2	288	576	
ANIMAL PLANET - PETTING ZOO (BARN)	21	3	400	1200	
TOTAL BUILDING AREA (S.F.)				147604	

Figure 1A



Marlborough Resort | Town of Marlborough, Ulster County, NY

Site Location and Study Area



- Key:
- # Study Intersection
 - * Study/Proposed Intersection
 - Study Area

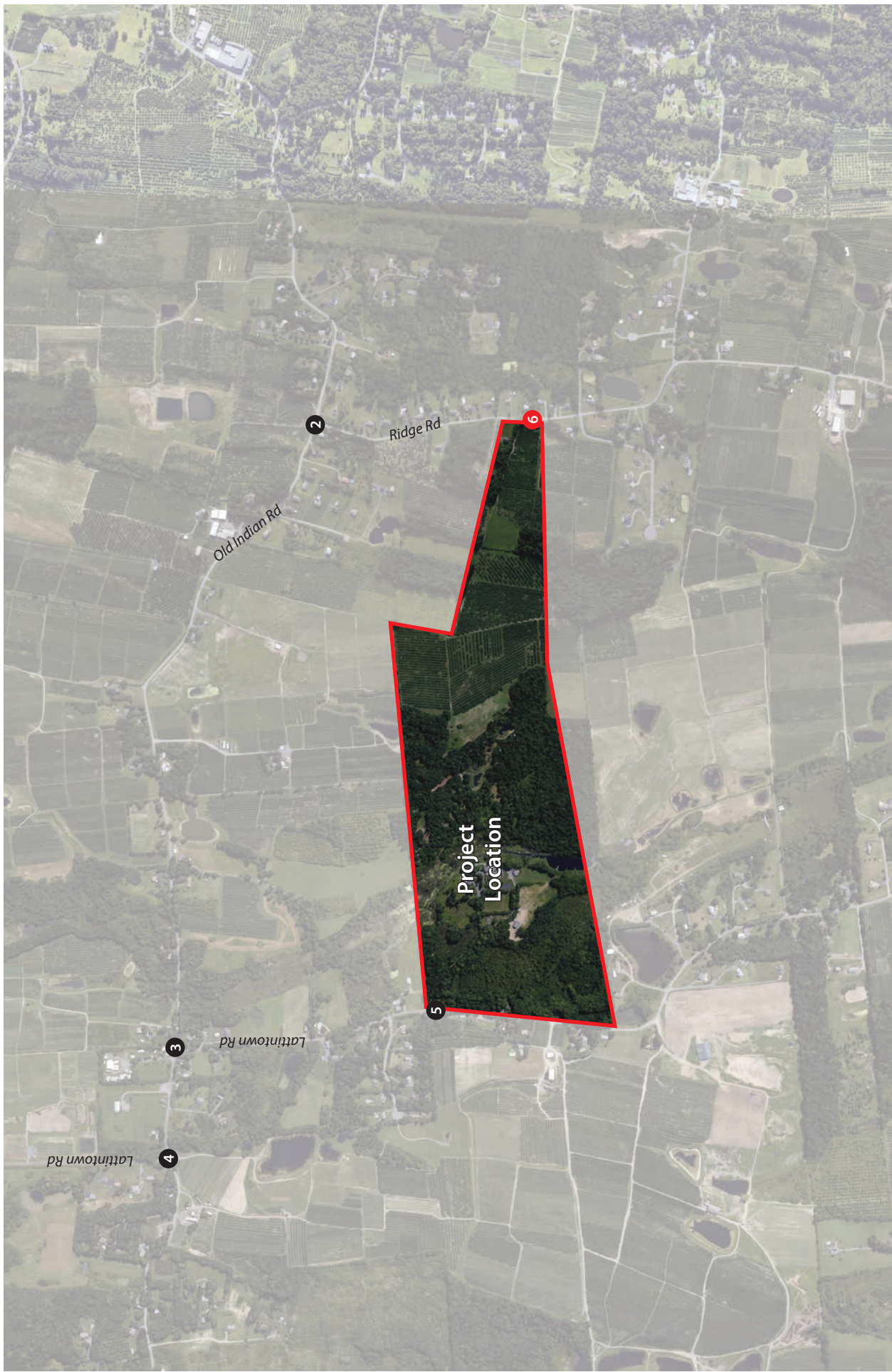
Figure 1B



Marlborough Resort | Town of Marlborough, Ulster County, NY
Site Location and Study Area

- Key:
- Study Intersection
 - Study/Proposed Intersection

Figure 1C



Marlborough Resort | Town of Marlborough, Ulster County, NY

Site Location and Study Area

Key:
● Study Intersection
● Proposed Intersection

Figure 1D



Marlborough Resort | Town of Marlborough, Ulster County, NY
Site Location and Study Area



- Key:
- # Study Intersection
 - # Study/Proposed Intersection

Figure 1E



Marlborough Resort | Town of Marlborough, Ulster County, NY
Site Location and Study Area



- Key:
- # Study Intersection
 - # Study/Proposed Intersection

Figure 1F



Marlborough Resort | Town of Marlborough, Ulster County, NY
Site Location and Study Area



- Key:
- # Study Intersection
 - # Study/Proposed Intersection

Figure 2

- Notes:
- 1. All AADT volumes by those noted:
 - 1.1. NYSDOT = New York State Department of Transportation.
 - 1.2. PA = Passero Associates.
 - 2. vpd = Vehicles per day.
 - 3. Turn lane lengths shown include storage and taper.

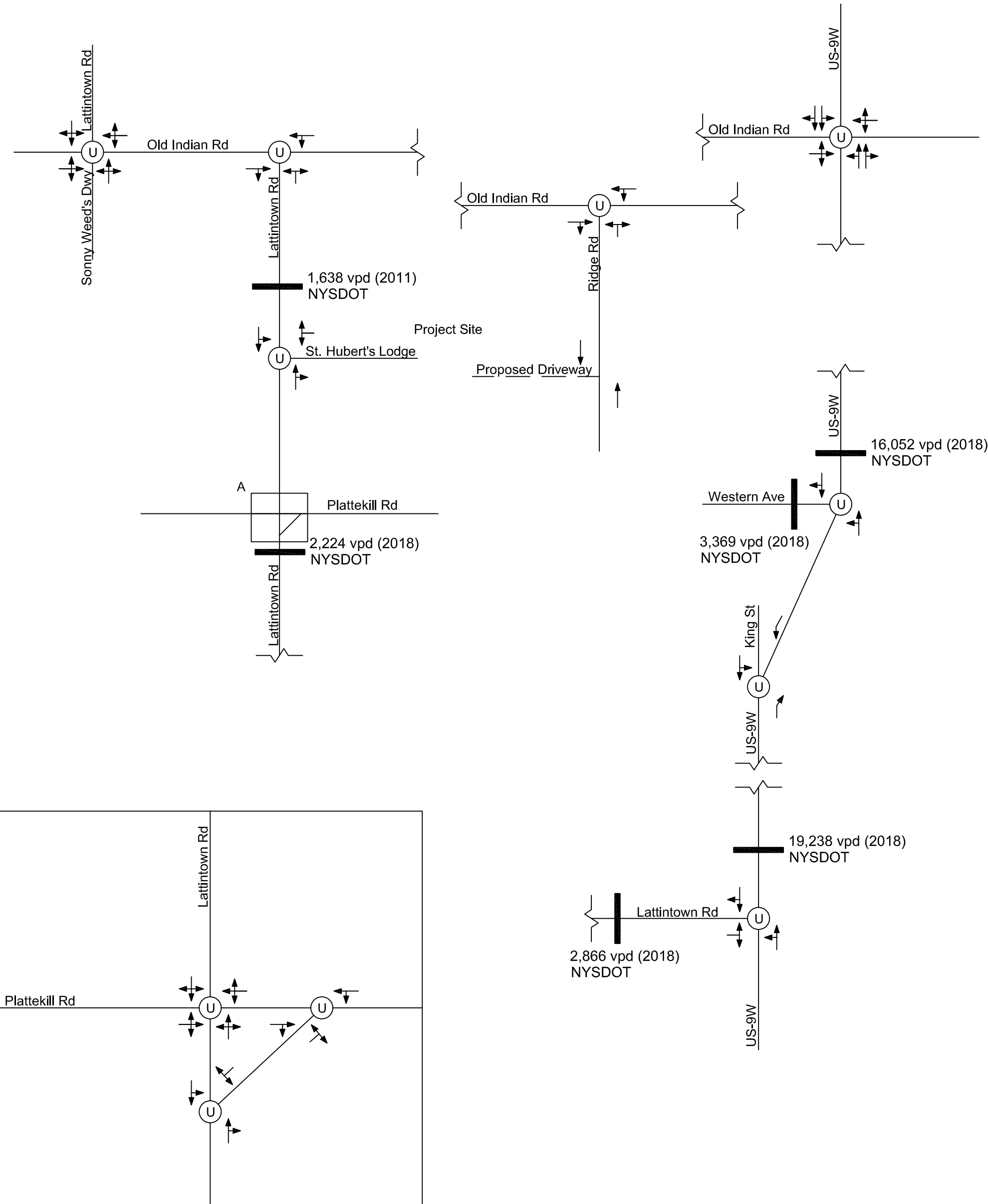


Figure 3

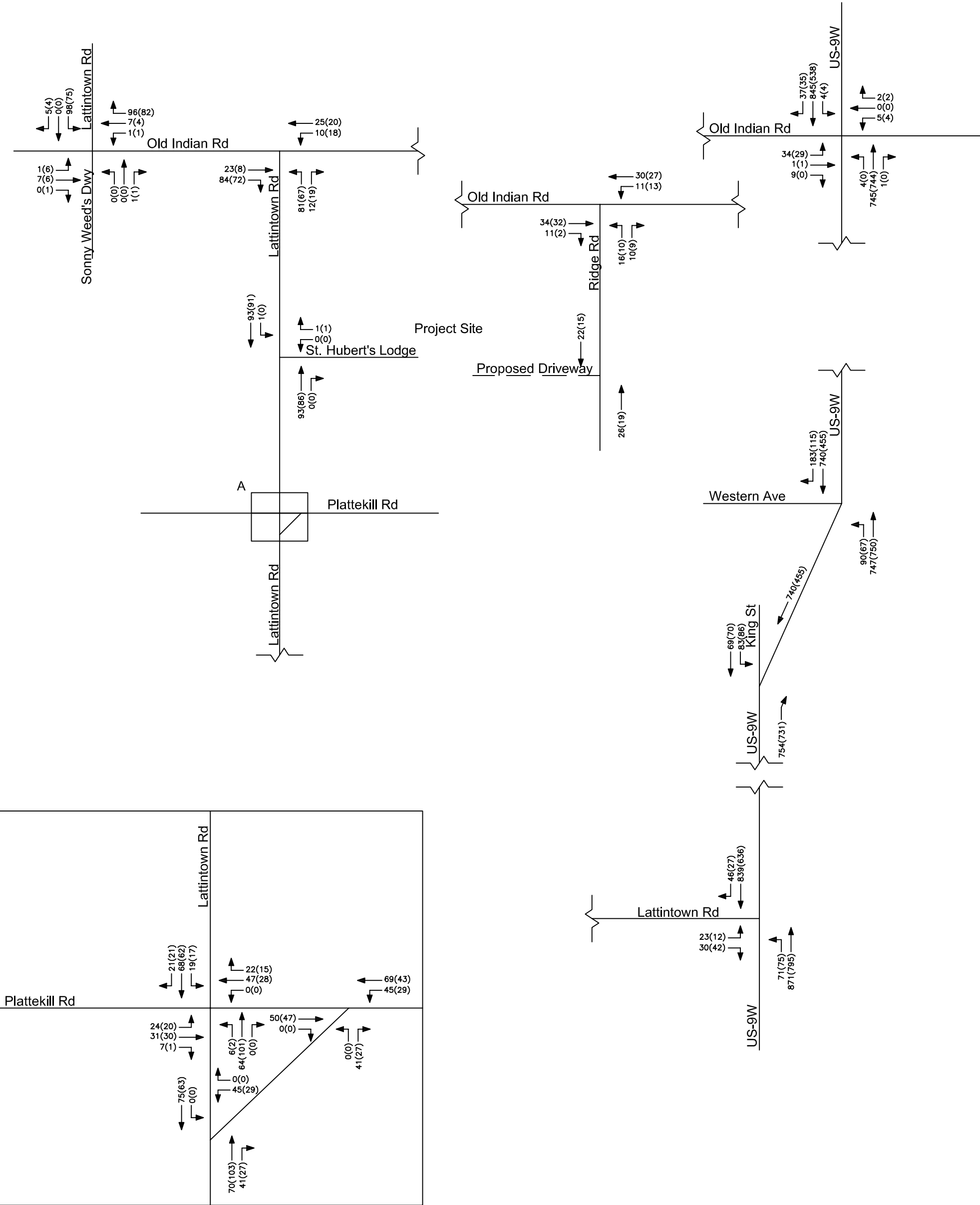


Figure 4

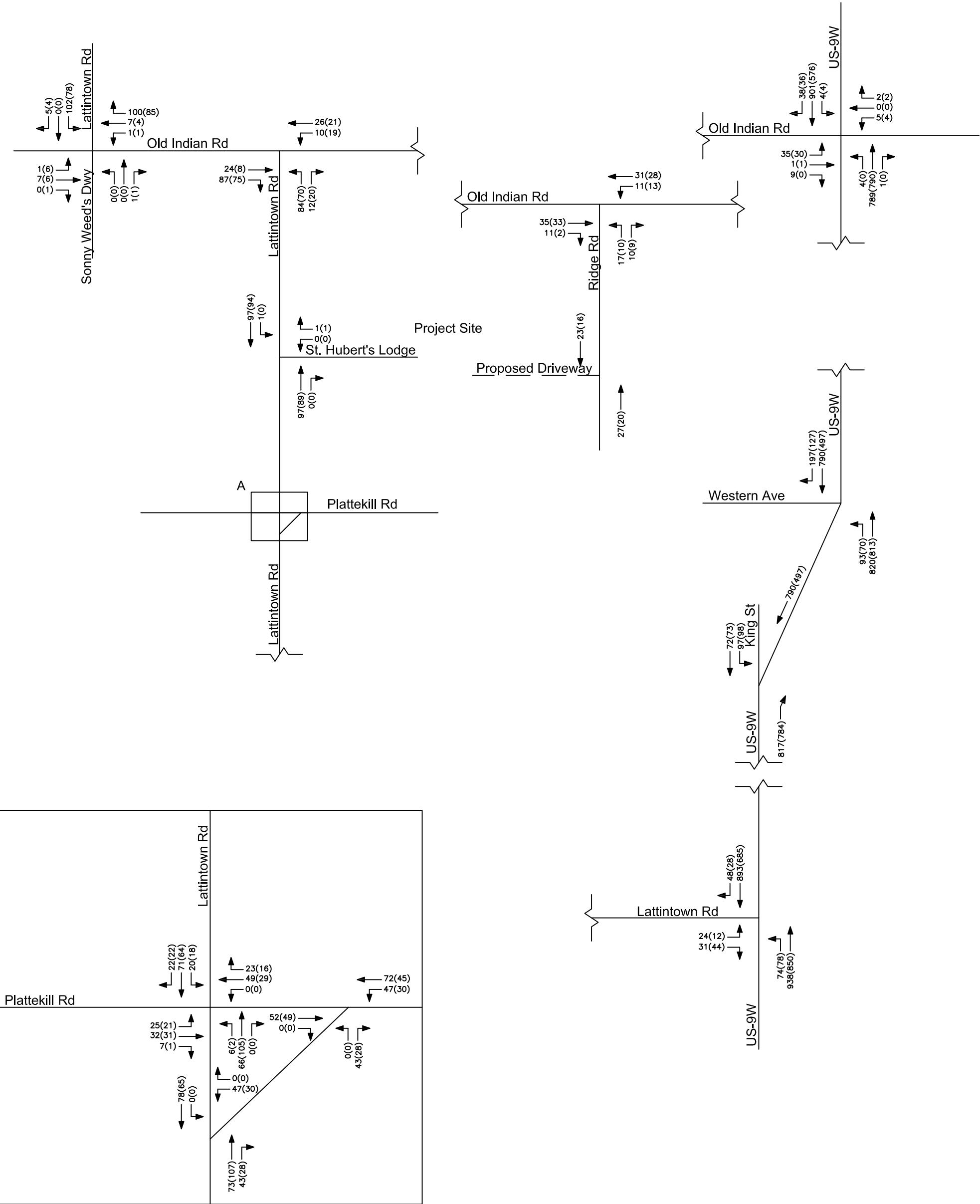


Figure 5

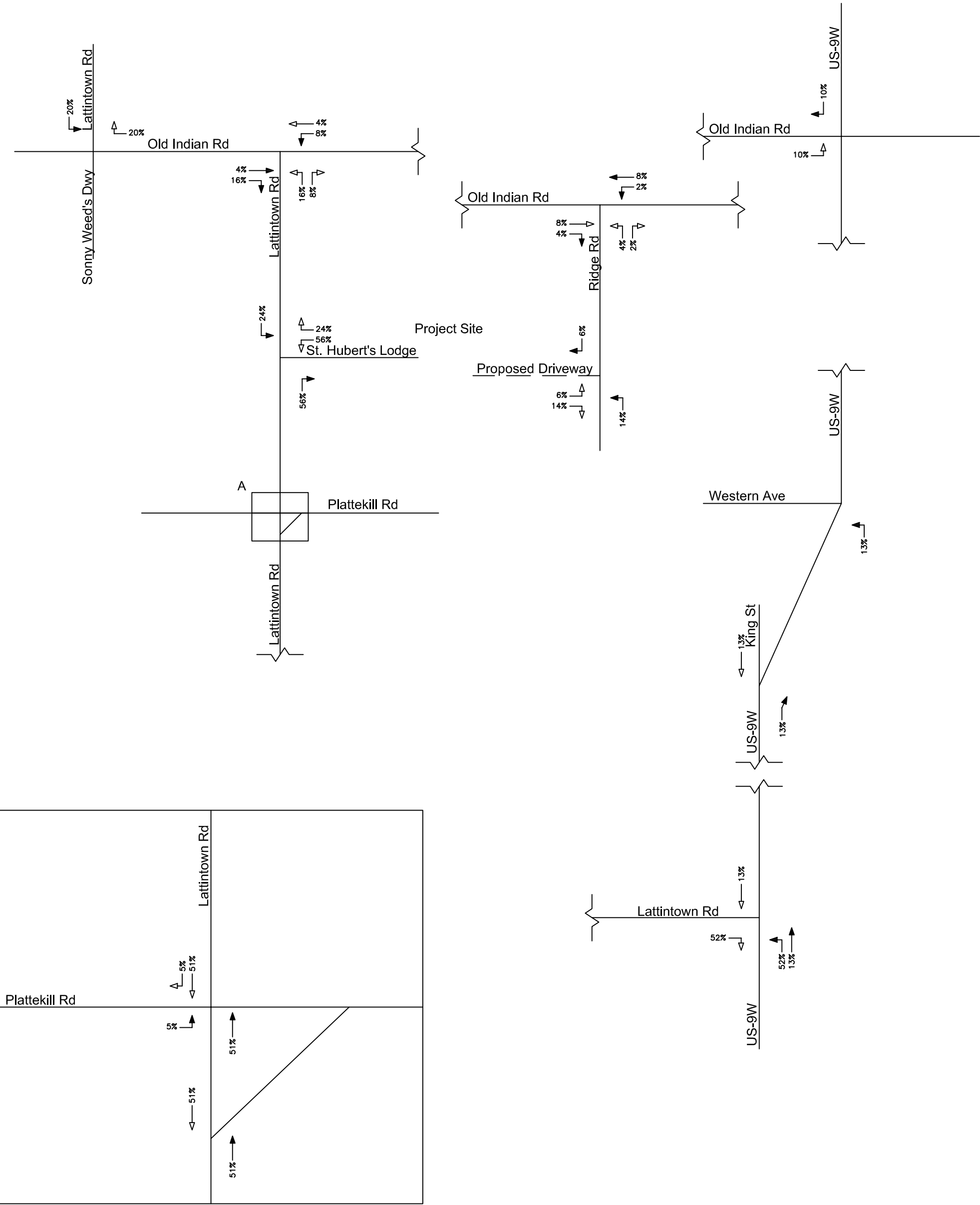


Figure 6

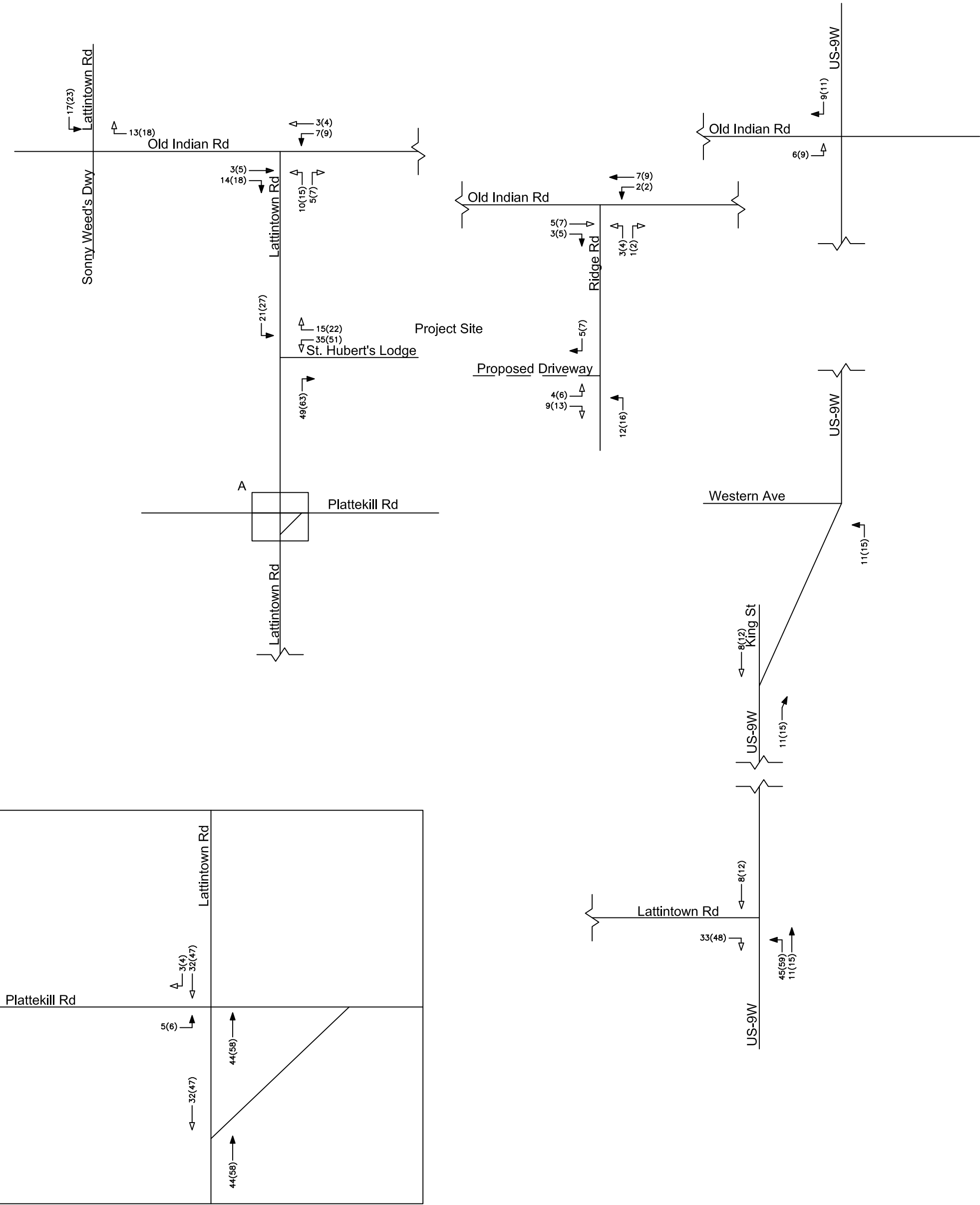
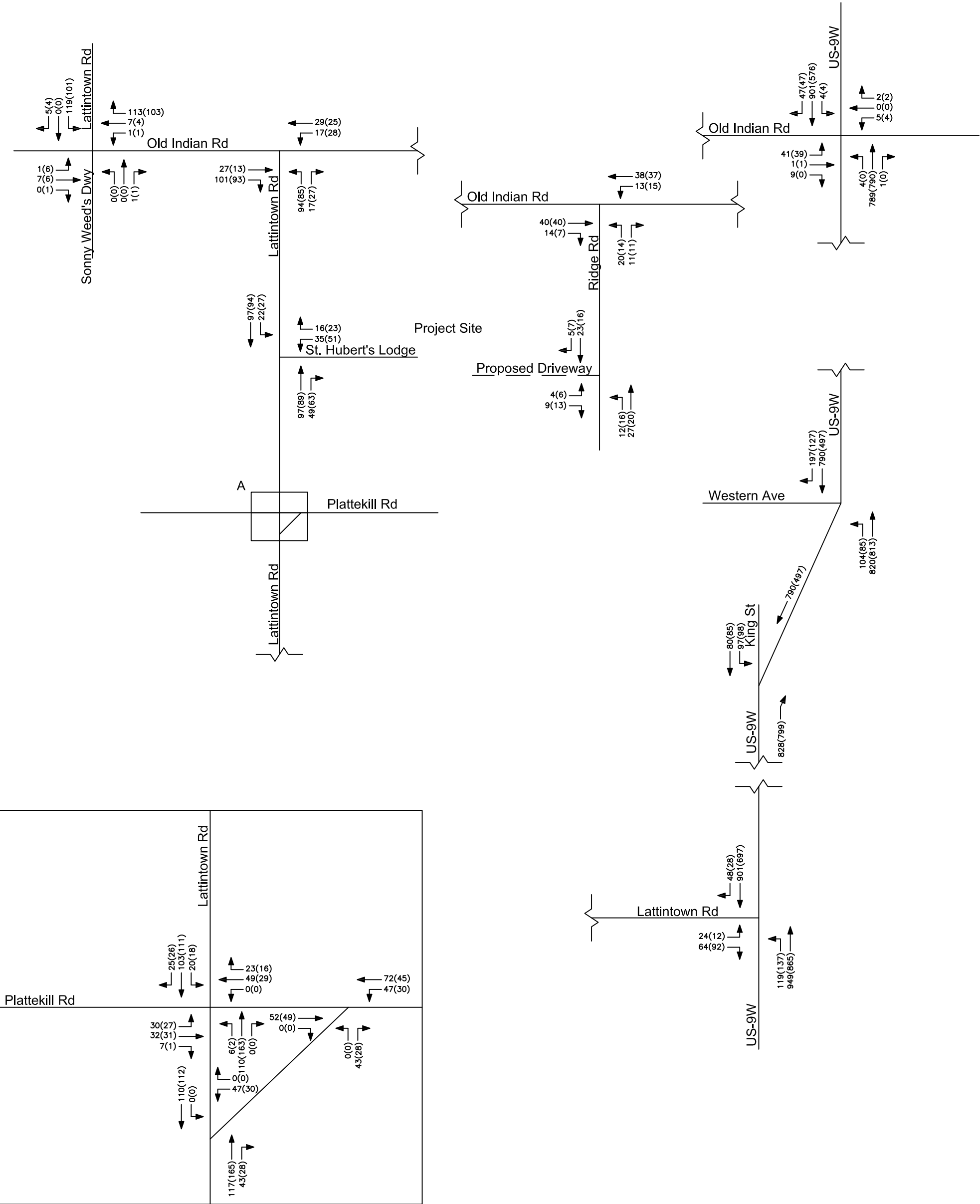


Figure 7



APPENDICES

APPENDIX A: EXISTING TRAFFIC COUNT DATA

National Data & Surveying Services

Location: Lattintown Rd/CR 11 E & Old Indian Rd/Lattintown Rd/CR 11

City: Milton

Control: 2-Way Stop(NB/WB)

Project ID: 24-380027-001

Date: 5/23/2024

NS/EW Streets:		Lattintown Rd/CR 11 E					Lattintown Rd/CR 11 E					Old Indian Rd/Lattintown Rd/CR 11					Old Indian Rd/Lattintown Rd/CR 11				
		NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND				
PM		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL			
	4:00 PM	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	59		
	4:15 PM	24	0	2	0	0	0	0	0	0	3	23	0	2	5	0	0	0	62		
	4:30 PM	18	0	2	0	0	0	0	0	0	10	20	0	2	10	0	0	0	55		
	4:45 PM	15	0	3	0	0	0	0	0	0	4	22	0	3	8	0	0	0	55		
	5:00 PM	24	0	5	0	0	0	0	0	0	0	6	19	0	3	2	0	0	59		
	5:15 PM	24	0	4	0	0	0	0	0	0	0	14	0	3	8	0	0	0	56		
	5:30 PM	13	0	2	0	0	0	0	0	0	0	24	0	2	5	0	0	0	54		
5:45 PM	19	0	1	0	0	0	0	0	0	0	5	16	0	3	6	0	0	50			
6:00 PM	11	0	0	0	0	0	0	0	0	0	1	16	0	0	3	0	0	35			
6:15 PM	14	0	4	0	0	0	0	0	0	0	17	0	0	4	1	0	0	41			
6:30 PM	11	0	7	0	0	0	0	0	0	0	2	20	0	1	2	0	0	43			
6:45 PM	10	0	0	0	0	0	0	0	0	0	1	12	0	4	3	0	0	30			
		12	0	2	0	0	0	0	0	0	2	13	0	5	6	0	0	40			
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL			
APPROACH %'s :		195	0	32	0	0	0	0	0	0	46	216	0	36	59	0	0	584			
APPROACH %'s :		85.90%	0.00%	14.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	17.56%	82.44%	0.00%	37.89%	62.11%	0.00%	0.00%				
PEAK HR :																					
PEAK HR VOL :		81	0	12	0	0	0	0	0	0	23	84	0	10	25	0	0	235			
PEAK HR FACTOR :		0.844	0.000	0.600	0.000	0.000	0.000	0.000	0.000	0.000	0.575	0.913	0.000	0.833	0.625	0.000	0.000	0.948			
		0.802																			

National Data & Surveying Services

Intersection Turning Movement Count

Location: Lattintown Rd/CR 11 W & Old Indian Rd/Lattintown Rd/CR 11

City: Milton

Control: 2-Way Stop(SB/EB)

Project ID: 24-380027-002

Date: 5/23/2024

Data - Total

NS/EW Streets:		Lattintown Rd/CR 11 W					Lattintown Rd/CR 11 W					Old Indian Rd/Lattintown Rd/CR 11					Old Indian Rd/Lattintown Rd/CR 11				
PM	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL				
	0	1	1	0	0	1	0	0	0	1	0	0	0	1	0	0	57				
	0	0	0	0	27	0	1	0	0	0	0	0	0	1	28	0	59				
	0	0	1	0	26	0	2	0	1	2	0	0	1	2	24	0	47				
	0	0	0	0	22	0	0	0	0	2	0	0	0	3	20	0	53				
	0	0	0	0	23	0	2	0	0	3	0	0	0	1	24	0	53				
	0	0	1	0	18	0	0	0	2	0	0	0	1	0	31	0	53				
	0	0	1	0	27	0	0	0	0	1	0	0	0	1	15	0	45				
	0	0	0	0	22	0	0	0	1	0	1	0	0	0	21	0	47				
5:45 PM					16	0	0	0	1	1	1	0	0	2	13	0	34				
6:00 PM					17	0	1	0	1	0	0	0	0	1	11	0	31				
6:15 PM					19	0	2	0	3	2	0	0	0	2	10	0	38				
6:30 PM					13	0	0	0	2	1	0	0	0	1	13	0	30				
6:45 PM					9	0	0	0	0	4	0	0	0	1	15	0	29				
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL			
APPROACH %'s :		0	0	3	0	239	0	8	0	11	16	2	0	2	17	225	0	523			
PEAK HR :		0.00%	0.00%	100.00%	0.00%	96.76%	0.00%	3.24%	0.00%	37.93%	55.17%	6.90%	0.00%	0.82%	6.97%	92.21%	0.00%				
PEAK HR VOL :																					
PEAK HR FACTOR :		0	0	1	0	98	0	5	0	1	7	0	0	1	7	96	0	TOTAL			
		0.000	0.000	0.250	0.000	0.907	0.000	0.625	0.000	0.250	0.583	0.000	0.000	0.250	0.583	0.857	0.000	216			
		0.250																			
		0.667																			
		0.897																			
		0.915																			

National Data & Surveying Services

Intersection Turning Movement Count

Location: Lattintown Rd/CR 11 & Plattekill Rd

City: Marlboro

Control: 4-Way Stop

Project ID: 24-380027-003

Date: 5/23/2024

Data - Total

NS/EW Streets:		Lattintown Rd/CR 11						Lattintown Rd/CR 11						Plattekill Rd						Plattekill Rd					
PM	NORTHBOUND						SOUTHBOUND						EASTBOUND						WESTBOUND						
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL								
	0	1	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0								
	1	14	10	0	4	16	6	0	6	9	2	0	19	9	10	0	106								
	1	14	8	0	8	18	6	0	9	8	1	0	9	16	5	0	103								
	1	19	12	1	5	19	3	0	5	6	2	0	9	12	8	0	102								
	3	17	11	0	2	15	6	0	4	8	2	0	8	10	2	0	88								
	1	15	10	0	2	14	3	0	3	11	0	0	6	13	3	0	81								
	0	20	14	0	8	7	7	0	6	12	0	0	12	8	4	0	98								
	0	17	6	0	3	15	3	0	3	9	0	0	6	16	2	0	80								
5:45 PM	0	21	14	0	5	11	5	0	2	5	1	0	7	6	7	0	84								
6:00 PM	2	16	8	0	2	13	3	0	4	10	0	0	9	13	3	0	83								
6:15 PM	0	13	9	0	4	14	6	0	4	8	0	0	7	5	3	0	73								
6:30 PM	0	14	7	0	6	11	1	0	2	6	0	0	8	11	1	0	67								
6:45 PM	0	13	13	0	6	9	1	0	6	11	0	0	8	4	0	0	71								
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL							
APPROACH %'s :		9	193	122	1	55	162	50	0	54	103	8	0	108	123	48	0	1036							
PEAK HR :		04:00 PM - 05:00 PM																							
PEAK HR VOL :		6	64	41	1	19	68	21	0	24	31	7	0	45	47	25	0	399							
PEAK HR FACTOR :		0.500	0.842	0.854	0.250	0.594	0.895	0.875	0.000	0.667	0.861	0.875	0.000	0.592	0.734	0.625	0.000	0.941							
		0.848																							
		0.770																							

National Data & Surveying Services

Location: Rte 9W & Old Indian Rd

City: Milton

Control: 2-Way Stop(EB/WB)

Project ID: 24-380027-004

Date: 5/23/2024

NS/EW Streets:		Rte 9W				Rte 9W				Old Indian Rd				Old Indian Rd				
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND					
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL	
	0	2	0	0	0	2	6	0	0	0	3	0	2	0	1	0	0	381
	1	163	1	0	1	193	14	0	9	0	3	0	1	0	0	0	367	
	1	154	0	0	0	187	5	0	9	0	3	0	0	0	0	0	395	
	2	188	0	0	1	187	9	0	9	0	3	0	0	0	0	0	403	
	0	175	1	0	0	209	9	0	6	0	2	0	1	0	0	0	434	
	1	195	0	0	1	207	10	0	12	1	4	0	2	0	1	0	434	
	1	187	0	0	2	242	13	0	7	0	0	0	2	0	1	0	455	
	2	150	0	1	0	192	7	0	10	0	1	0	1	0	2	0	366	
5:45 PM	4	141	0	0	0	148	13	0	8	1	3	0	0	0	0	0	318	
6:00 PM	0	156	0	0	0	152	8	0	8	0	0	0	1	1	2	0	328	
6:15 PM	2	143	0	0	1	134	3	0	2	1	1	0	1	0	0	0	288	
6:30 PM	1	133	0	0	2	135	11	0	4	0	0	0	0	0	0	0	286	
6:45 PM	1	135	0	0	0	103	15	0	8	0	4	0	0	0	0	0	266	
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :		16	1920	2	1	8	2089	114	0	92	3	22	0	11	1	8	0	4287
APPROACH %'s :		0.83%	99.02%	0.10%	0.05%	0.36%	94.48%	5.16%	0.00%	78.63%	2.56%	18.80%	0.00%	55.00%	5.00%	40.00%	0.00%	
PEAK HR :																		
PEAK HR VOL :		4	745	1	0	4	845	37	0	34	1	9	0	5	0	2	0	1687
PEAK HR FACTOR :		0.500	0.955	0.250	0.000	0.500	0.873	0.712	0.000	0.708	0.250	0.563	0.000	0.625	0.000	0.500	0.000	0.927
		0.957																

National Data & Surveying Services

Intersection Turning Movement Count

Location: Lattintown Rd/CR 11 & Saint Hubert's Lodge and Club Dwy

City: Marlboro

Control: No Control

Project ID: 24-380027-005

Date: 5/23/2024

Data - Total

NS/EW Streets:		Lattintown Rd/CR 11						Lattintown Rd/CR 11						Saint Hubert's Lodge and Club Dwy						Saint Hubert's Lodge and Club Dwy									
PM		NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL											
4:00 PM	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TOTAL
4:15 PM	0	27	0	0	0	1	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52
4:30 PM	0	18	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44
4:45 PM	0	28	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41
5:00 PM	0	22	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51
5:15 PM	0	17	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43
5:30 PM	0	19	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44
5:45 PM	0	25	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39
6:00 PM	0	20	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43
6:15 PM	0	19	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41
6:30 PM	0	15	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40
6:45 PM	0	10	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29
																													28
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL		WL	WT	WR	WU	TOTAL					
APPROACH %'s :		0	240	0	0	1	250	0	0	0	0	0	0	0	0	4	0	495		0	0	4	0	495					
PEAK HR :		0.00%						99.60%		0.00%		0.00%		0.00%		100.00%		TOTAL		0.00%		0.00%		TOTAL					
PEAK HR VOL :		0	93	0	0	1	93	0	0	0	0	0	0	0	0	1	0	188		0	0	1	0	188					
PEAK HR FACTOR :		0.000	0.830	0.000	0.000	0.250	0.969	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.904		0.000	0.000	0.250	0.000	0.904					
		0.830						0.979		0.250		0.250		0.250															

National Data & Surveying Services

City: Milton

Control: 1-Way Stop(NB)

Date: 5/23/2024

Data - Total

National Data & Surveying Services

City: Marlboro

Project ID: 24-380027-007

Date: 5/23/2024

Data - Total

National Data & Surveying Services

City: Newburgh

Project ID: 24-380027-008

NS/EW Streets:		Rte 9W				Rte 9W				Rte 9W				Rte 9W				Rte 9W				Rte 9W			
		NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND											
PM	0		1		0		0		0		0		0		0		0		0		0				
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL								
	16	188	0	0	0	209	6	0	5	0	11	0	0	0	0	0	435								
	13	221	0	0	0	173	7	0	6	0	14	0	0	0	0	0	434								
	15	215	0	0	0	182	16	0	5	0	11	0	0	0	0	0	444								
	17	226	0	0	0	188	10	0	9	0	13	0	0	0	0	0	463								
	19	203	0	0	0	208	11	0	2	0	7	0	0	0	0	0	450								
	25	241	0	0	0	207	13	0	7	0	8	0	0	0	0	0	501								
10	201	0	0	0	236	14	0	5	0	5	0	0	0	0	0	471									
5:30 PM	15	209	0	0	0	178	4	0	3	0	6	0	0	0	0	0	415								
5:45 PM	16	193	0	0	0	173	7	0	5	0	10	0	0	0	0	0	404								
6:00 PM	15	211	0	0	0	131	5	0	2	0	5	0	0	0	0	0	369								
6:15 PM	13	156	0	0	0	145	4	0	7	0	9	0	0	0	0	0	334								
6:30 PM	12	175	0	0	0	128	8	0	3	0	10	0	0	0	0	0	336								
6:45 PM																									
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL							
APPROACH % :		186	2439	0	0	0	2158	105	0	59	0	109	0	0	0	0	0	5056							
APPROACH % :		7.09%	92.91%	0.00%	0.00%	0.00%	95.36%	4.64%	0.00%	35.12%	0.00%	64.88%	0.00%												
PEAK HR :																									
PEAK HR VOL :		71	871	0	0	0	839	48	0	23	0	33	0	0	0	0	0	1885							
PEAK HR FACTOR :		0.710	0.904	0.000	0.000	0.000	0.889	0.857	0.000	0.639	0.000	0.635	0.000	0.000	0.000	0.000	0.000	0.941							

National Data & Surveying Services

Location: Lattintown Rd/CR 11 E & Old Indian Rd/Lattintown Rd/CR 11

City: Milton

Control: 2-Way Stop(NB/WB)

Project ID: 24-380027-001

Date: 5/24/2024

NS/EW Streets:		Lattintown Rd/CR 11 E				Lattintown Rd/CR 11 E				Old Indian Rd/Lattintown Rd/CR 11				Old Indian Rd/Lattintown Rd/CR 11					
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL		
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL		
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	58	
	24	0	2	0	0	0	0	0	0	2	23	0	2	5	0	0	0	58	
	24	0	3	0	0	0	0	0	0	11	14	0	5	1	0	0	0	58	
	12	0	4	0	0	0	0	0	0	5	15	0	1	8	0	0	0	45	
	13	0	7	0	0	0	0	0	1	7	21	0	4	4	0	0	0	57	
	18	0	2	0	0	0	1	0	0	2	14	0	5	6	0	0	0	48	
	25	0	2	0	0	0	0	0	0	0	27	0	3	5	0	0	0	62	
	20	0	2	0	0	0	0	0	0	3	18	0	5	2	0	0	0	50	
26	0	3	0	0	0	0	0	0	0	19	0	5	2	0	0	0	58		
15	0	6	0	0	0	0	0	0	0	9	0	2	5	0	0	0	40		
21	0	2	1	0	0	0	0	0	0	7	18	0	2	2	0	0	53		
12	0	2	0	0	0	0	0	0	0	2	17	0	1	5	0	0	39		
9	0	4	0	0	0	0	0	0	0	2	7	0	2	0	0	0	24		
TOTAL VOLUMES :		219	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL	
APPROACH %'s :		84.56%	0.00%	15.06%	0.39%	0.00%	0.00%	100.00%	0.00%	1	47	202	0	37	45	0	0	592	
PEAK HR :		05:00 PM - 06:00 PM																	
PEAK HR VOL :		89	0	9	0	0	0	1	0	0	8	78	0	18	15	0	0	218	
PEAK HR FACTOR :		0.856	0.000	0.750	0.000	0.000	0.000	0.250	0.000	0.000	0.667	0.722	0.000	0.900	0.625	0.000	0.000	0.879	
		0.845																	
		0.796																	

National Data & Surveying Services

Intersection Turning Movement Count

Location: Lattintown Rd/CR 11 W & Old Indian Rd/Lattintown Rd/CR 11

City: Milton

Control: 2-Way Stop(SB/EB)

Project ID: 24-380027-002

Date: 5/24/2024

Data - Total

NS/EW Streets:		Lattintown Rd/CR 11 W					Lattintown Rd/CR 11 W					Old Indian Rd/Lattintown Rd/CR 11					Old Indian Rd/Lattintown Rd/CR 11				
PM	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL				
	0	1	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0				
	0	0	0	0	20	0	1	0	1	2	0	0	0	3	19	0	46				
	0	0	0	0	28	0	0	0	1	1	0	0	0	2	24	0	56				
	0	0	0	0	19	0	1	0	0	1	0	0	0	1	21	0	43				
	0	0	0	0	29	0	0	0	2	1	0	0	0	2	15	0	49				
	0	0	0	0	15	0	0	0	1	1	0	0	0	3	23	0	43				
5:00 PM	0	0	0	0	26	0	2	1	4	0	0	0	0	1	28	0	62				
5:15 PM	0	0	0	0	20	0	1	0	1	1	0	0	0	4	18	0	45				
5:30 PM	0	0	0	0	22	0	0	0	3	1	0	0	0	1	25	0	52				
5:45 PM	0	0	0	0	11	0	0	0	0	0	0	0	0	1	19	0	31				
6:00 PM	0	0	0	0	22	0	0	0	0	0	0	0	0	1	22	0	45				
6:15 PM	0	0	0	0	21	0	0	0	0	0	0	0	0	1	12	0	34				
6:30 PM	0	0	0	0	9	0	1	0	0	0	0	1	0	0	9	0	21				
6:45 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL			
APPROACH %'s :		1	0	0	0	242	0	6	1	13	8	0	1	0	20	235	0	527			
PEAK HR :		100.00% 0.00% 0.00% 0.00% 97.19% 0.00% 2.41% 0.40% 59.09% 36.36% 0.00% 4.55% 0.00% 7.84% 92.16% 0.00%																			
PEAK HR VOL :		05:00 PM - 06:00 PM																			
PEAK HR FACTOR :		0	0	0	0	83	0	3	1	9	3	0	0	0	9	94	0	202			
		0.000	0.000	0.000	0.000	0.798	0.000	0.375	0.250	0.563	0.750	0.000	0.000	0.000	0.563	0.839	0.000	0.815			
		0.750 0.888																			

National Data & Surveying Services

Intersection Turning Movement Count

Location: Lattintown Rd/CR 11 & Plattekill Rd

City: Marlboro

Control: 4-Way Stop

Project ID: 24-380027-003

Date: 5/24/2024

Data - Total

NS/EW Streets:		Lattintown Rd/CR 11						Lattintown Rd/CR 11						Plattekill Rd						Plattekill Rd					
PM		NORTHBOUND						SOUTHBOUND						EASTBOUND						WESTBOUND					
		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL							
		0	1	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0							
		0	21	3	0	1	16	4	0	7	7	1	0	6	5	7	0	0	78						
		1	21	7	0	5	17	5	0	2	9	0	0	7	10	2	0	0	86						
		0	18	6	0	1	15	7	0	1	5	2	0	6	16	6	0	0	83						
		1	24	9	0	3	11	3	0	1	4	1	0	3	10	0	0	0	70						
		2	19	6	0	1	17	4	0	2	3	0	0	4	12	5	0	0	75						
5:00 PM		0	20	10	0	5	16	1	0	6	6	1	0	8	7	13	0	93							
5:15 PM		2	18	10	0	2	24	0	0	4	11	1	0	9	2	6	0	89							
5:30 PM		1	10	6	0	4	10	4	0	4	6	1	0	11	9	6	0	72							
5:45 PM		0	15	6	0	2	18	3	0	4	3	2	0	5	9	6	0	73							
6:00 PM		0	14	12	0	6	13	1	0	6	10	0	0	13	4	3	0	82							
6:15 PM		1	16	10	0	1	12	5	0	3	8	0	0	8	5	2	0	71							
6:30 PM		0	21	7	0	5	10	5	0	2	6	0	0	8	4	2	0	70							
6:45 PM																									
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL							
APPROACH %'s :		8	217	92	0	36	179	42	0	42	78	9	0	88	93	58	0	942							
PEAK HR :		05:00 PM - 06:00 PM																							
PEAK HR VOL :		5	67	32	0	12	67	9	0	16	26	3	0	32	30	30	0	TOTAL							
PEAK HR FACTOR :		0.625	0.838	0.800	0.000	0.600	0.698	0.563	0.000	0.667	0.591	0.750	0.000	0.727	0.625	0.577	0.000	0.884							
		0.867																							
		0.821																							

National Data & Surveying Services

City: Milton

Control: 2-Way Stop(EB/WB)

Date: 5/24/2024

Data - Total

National Data & Surveying Services

Intersection Turning Movement Count

Location: Lattintown Rd/CR 11 & Saint Hubert's Lodge and Club Dwy

City: Marlboro

Control: No Control

Project ID: 24-380027-005

Date: 5/24/2024

Data - Total

NS/EW Streets:		Lattintown Rd/CR 11						Lattintown Rd/CR 11						Saint Hubert's Lodge and Club Dwy						Saint Hubert's Lodge and Club Dwy					
PM		NORTHBOUND						SOUTHBOUND						EASTBOUND						WESTBOUND					
		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL							
		0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	43						
		0	19	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	57						
		0	33	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	30						
		0	16	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	43						
		0	19	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	43						
		0	22	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	43						
4:00 PM		0	26	0	0	0	29	0	0	0	0	0	0	0	0	0	0	55							
4:15 PM		0	33	0	0	0	24	0	0	0	0	0	0	0	0	1	0	49							
4:30 PM		0	16	0	0	0	14	0	0	0	0	0	0	0	0	0	0	44							
4:45 PM		0	19	0	0	0	24	0	0	0	0	0	0	0	0	0	0	32							
5:00 PM		0	22	0	0	0	21	0	0	0	0	0	0	0	0	0	0	42							
5:15 PM		0	26	0	0	0	29	0	0	0	0	0	0	0	0	0	0	34							
5:30 PM		0	24	0	0	0	24	0	0	0	0	0	0	0	0	1	0	16							
5:45 PM		0	24	0	0	0	20	0	0	0	0	0	0	0	0	0	0	44							
6:00 PM		0	21	0	0	0	11	0	0	0	0	0	0	0	0	0	0	32							
6:15 PM		0	25	0	0	0	17	0	0	0	0	0	0	0	0	0	0	42							
6:30 PM		0	12	0	0	0	22	0	0	0	0	0	0	0	0	0	0	34							
6:45 PM		0	10	0	0	0	6	0	0	0	0	0	0	0	0	0	0	16							
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL							
APPROACH %'s :		0	251	0	0	0	236	0	0	0	0	0	0	0	0	1	0	488							
PEAK HR :		0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%							
PEAK HR VOL :		0	96	0	0	0	94	0	0	0	0	0	0	0	0	1	0	TOTAL							
PEAK HR FACTOR :		0.000	0.923	0.000	0.000	0.000	0.810	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	191							
		0.9230.8100.0000.0000.0000.0000.2500.0000.868																							

National Data & Surveying Services

Location: Ridge Rd & Old Indian Rd

City: Milton

Control: 1-Way Stop(NB)

Project ID: 24-380027-006

Date: 5/24/2024

NS/EW Streets:		Ridge Rd				Ridge Rd				Old Indian Rd				Old Indian Rd			
		NORTHBOUND		SOUTHBOUND		SOUTHBOUND		EASTBOUND		EASTBOUND		WESTBOUND		WESTBOUND			
PM	NL	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NT	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	
	NR	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	
	NU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	SR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	SU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	EL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	EU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:00 PM	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TOTAL	
4:15 PM	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	26	
4:30 PM	3	0	6	0	0	0	0	0	0	0	0	0	0	0	0	33	
4:45 PM	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	31	
5:00 PM	4	0	3	0	0	0	0	0	0	0	0	0	0	0	0	34	
5:15 PM	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	18	
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	
5:45 PM	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	14	
6:00 PM	2	0	4	0	0	0	0	0	0	0	0	0	0	0	0	22	
6:15 PM	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	27	
6:30 PM	3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	18	
6:45 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	21	
																16	
TOTAL VOLUMES :		NL	NT	NR	NU	ST	SR	SU	EL	ER	EU	WL	WT	WR	WU	TOTAL	
APPROACH % :		25	1	34	0	0	0	0	0	77	29	31	79	2	0	280	
APPROACH % :		41.67%	1.67%	56.67%	0.00%	0.00%	100.00%	0.00%	0.00%	72.64%	27.36%	27.68%	70.54%	1.79%	0.00%		
PEAK HR :		04:00 PM - 05:00 PM															
PEAK HR VOL :		10	1	13	0	2	0	0	0	33	14	0	35	1	0	124	
PEAK HR FACTOR :		0.833	0.250	0.542	0.000	0.000	0.000	0.000	0.000	0.825	0.700	0.750	0.729	0.250	0.000	0.912	
		0.667															
		0.783															
		0.911															

National Data & Surveying Services

City: Marlboro

Project ID: 24-380027-007

Date: 5/24/2024

[illegible]

National Data & Surveying Services

Intersection Turning Movement Count

Location: Rte 9W & Lattintown Rd

City: Newburgh

Control: 1-Way Stop(EB)

Project ID: 24-380027-008

Date: 5/24/2024

Data - Total

NS/EW Streets:		Rte 9W				Rte 9W				Lattintown Rd				Lattintown Rd					
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND						
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU			
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0			
	21	209	0	0	0	232	7	0	4	0	6	0	0	0	0	0			
	13	206	0	0	0	159	7	0	3	0	9	0	0	0	0	0			
	20	185	0	0	0	187	9	0	6	0	9	0	0	0	0	0			
	21	216	0	0	0	170	11	0	0	0	9	0	0	0	0	0			
	18	205	0	0	0	181	7	0	4	0	11	0	0	0	0	0			
	16	201	0	0	0	196	6	0	3	0	13	0	0	0	0	0			
	12	184	0	0	0	190	9	0	1	0	9	0	0	0	0	0			
	13	203	0	0	0	149	8	0	10	0	10	0	0	0	0	0			
	16	205	0	0	0	141	5	0	2	0	6	0	0	0	0	0			
	11	196	0	0	0	150	2	0	3	0	10	0	0	0	0	0			
	19	192	0	0	0	147	6	0	9	0	6	0	0	0	0	0			
	9	186	0	0	0	148	5	0	3	0	4	0	0	0	0	0			
	TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
	APPROACH %'s :		189	2388	0	0	0	2050	82	0	48	0	102	0	0	0	0	0	4859
	PEAK HR :																		
	PEAK HR VOL :		75	816	0	0	0	748	34	0	13	0	33	0	0	0	0	0	1719
	PEAK HR FACTOR :		0.893	0.944	0.000	0.000	0.000	0.806	0.773	0.000	0.542	0.000	0.917	0.000	0.000	0.000	0.000	0.000	0.897
			0.940 0.818 0.767																

National Data & Surveying Services

Location: Lattintown Rd/CR 11 E & Old Indian Rd/Lattintown Rd/CR 11

City: Milton

Control: 2-Way Stop(NB/WB)

Project ID: 24-380027-001

Date: 5/25/2024

NS/EW Streets:		Lattintown Rd/CR 11 E				Lattintown Rd/CR 11 E				Old Indian Rd/Lattintown Rd/CR 11				Old Indian Rd/Lattintown Rd/CR 11					
NOON		NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL		
11:00 AM	0	1	3	0	0	1	0	0	0	1	0	0	5	7	0	0	47		
11:15 AM	19	1	0	0	0	0	0	0	0	2	9	0	4	1	0	0	30		
11:30 AM	15	1	3	0	0	0	0	0	0	1	18	0	1	4	0	0	43		
11:45 AM	17	1	3	0	0	0	0	0	0	3	14	0	4	2	0	0	44		
12:00 PM	22	1	3	0	0	0	0	0	1	2	21	0	4	1	0	0	55		
12:15 PM	18	0	3	0	0	0	0	0	0	6	13	0	4	4	0	0	48		
12:30 PM	12	0	6	0	0	1	0	0	0	7	9	0	2	2	0	0	39		
12:45 PM	18	0	0	0	0	0	0	0	0	3	11	0	3	3	0	0	38		
1:00 PM	15	0	5	0	0	0	1	0	0	0	22	0	6	5	0	0	55		
1:15 PM	24	0	2	0	0	0	0	0	0	3	22	0	7	3	0	0	61		
1:30 PM	12	0	6	1	0	0	0	0	0	1	15	0	3	6	0	0	44		
1:45 PM	16	0	6	0	0	0	0	0	0	4	14	0	2	6	0	0	48		
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL	
APPROACH %'s :		201	4	41	1	0	2	1	0	1	39	173	0	45	44	0	0	552	
APPROACH %'s :		50.56% 49.44% 0.00% 0.00%																	
PEAK HR :		0.47% 18.31% 81.22% 0.00%																	
PEAK HR VOL :		67	0	19	1	0	0	1	0	0	9	73	0	18	20	0	0	208	
PEAK HR FACTOR :		0.698	0.000	0.792	0.250	0.000	0.000	0.250	0.000	0.000	0.563	0.830	0.000	0.643	0.833	0.000	0.000	0.852	
		0.820 0.864																	

National Data & Surveying Services

Intersection Turning Movement Count

Location: Lattintown Rd/CR 11 W & Old Indian Rd/Lattintown Rd/CR 11

City: Milton

Control: 2-Way Stop(SB/EB)

Project ID: 24-380027-002

Date: 5/25/2024

Data - Total

NS/EW Streets:		Lattintown Rd/CR 11 W					Lattintown Rd/CR 11 W					Old Indian Rd/Lattintown Rd/CR 11					Old Indian Rd/Lattintown Rd/CR 11					
NOON		NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					
		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL				
		0	1	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0	41			
		0	0	0	0	10	0	2	0	0	1	0	0	0	2	1	25	0	26			
		1	0	0	0	9	0	1	0	0	1	0	0	0	0	0	14	0	26			
		0	0	0	0	17	0	1	0	2	2	0	0	0	0	1	16	0	39			
		0	0	0	0	15	0	1	0	2	2	0	0	0	0	2	17	0	39			
		0	0	0	0	24	0	0	0	1	1	0	0	0	0	3	18	0	47			
		0	0	0	0	16	0	1	0	2	1	0	1	0	0	0	20	0	41			
		0	0	0	0	16	0	1	0	2	1	0	0	0	0	2	14	0	36			
		0	0	0	0	14	0	2	0	0	0	0	0	1	1	19	0	37				
		0	0	1	0	24	0	1	0	3	1	1	0	0	0	0	22	0	53			
		0	0	0	0	22	0	1	0	0	1	0	0	0	0	0	26	0	50			
		0	0	0	0	15	0	1	0	3	1	0	0	0	1	15	0	36				
		0	0	0	0	14	0	1	0	0	3	0	0	1	3	19	0	41				
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL				
APPROACH %'s :		1	0	1	0	196	0	13	0	15	15	1	1	4	14	225	0	486				
PEAK HR :		50.00%	0.00%	50.00%	0.00%	93.78%	0.00%	6.22%	0.00%	46.88%	46.88%	3.13%	3.13%	1.65%	5.76%	92.59%	0.00%					
PEAK HR VOL :		01:00 PM - 02:00 PM																TOTAL				
PEAK HR FACTOR :		0	0	1	0	75	0	4	0	6	6	1	0	1	4	82	0	180				
		0.000	0.000	0.250	0.000	0.781	0.000	1.000	0.000	0.500	0.500	0.250	0.000	0.250	0.333	0.788	0.000	0.849				
		0.250																0.837				

National Data & Surveying Services

City: Marlboro

Control: 4-Way Stop

Date: 5/25/2024

Data - Total

NS/EW Streets:		Lattintown Rd/CR 11				Lattintown Rd/CR 11				Plattekill Rd				Plattekill Rd				
NOON	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND					
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL	
	0	1	1	0	0	1	2	0	0	1	0	0	0	1	0	0	0	59
	0	17	5	0	4	9	3	0	1	6	0	0	9	4	2	0	74	
	0	21	3	0	5	12	3	0	6	3	1	0	11	3	6	0	84	
	0	24	6	0	4	16	5	0	5	13	0	0	5	4	2	0	107	
	0	25	8	0	5	23	8	0	6	6	0	0	12	8	6	0	81	
	0	35	7	0	0	11	5	0	1	9	0	0	4	7	2	0	81	
	2	17	6	0	8	12	3	0	8	2	1	0	7	9	5	0	71	
	2	26	2	0	5	8	3	0	6	6	0	0	7	3	3	0	77	
1:00 PM	1	20	7	0	3	12	2	0	2	13	0	0	5	6	6	0	77	
1:15 PM	2	16	6	0	3	16	1	0	4	7	1	0	8	6	6	1	74	
1:30 PM	0	23	7	0	2	14	2	0	3	5	0	0	7	7	4	0	83	
1:45 PM	0	25	11	0	1	18	3	0	5	3	0	0	2	9	6	0	84	
	0	20	6	0	8	13	6	0	6	6	0	0	9	7	3	0		
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL	
APPROACH % :	7	269	74	0	48	164	43	0	53	79	3	0	87	73	51	1	952	
APPROACH % s :	2.00%	76.86%	21.14%	0.00%	18.82%	64.31%	16.86%	0.00%	39.26%	58.52%	2.22%	0.00%	41.04%	34.43%	24.06%	0.47%		
PEAK HR :																		
PEAK HR VOL :	2	101	27	0	17	62	21	0	20	30	1	0	29	28	15	0	353	
PEAK HR FACTOR :	0.250	0.721	0.844	0.000	0.531	0.674	0.656	0.000	0.625	0.577	0.250	0.000	0.604	0.778	0.625	0.000	0.825	
	0.774																	

National Data & Surveying Services

City: Milton

Control: 2-Way Stop(EB/WB)

Date: 5/25/2024

Data - Total

NS/EW Streets:		Rte 9W				Rte 9W				Old Indian Rd				Old Indian Rd							
NOON		NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND							
		NL	NT	NR	NU	0	2	0	0	0	0	0	1	0	0	0					
		1	172	1	0	0	112	14	0	6	1	0	1	0	0	0					
		0	200	7	0	0	116	7	0	8	1	0	0	0	0	0					
		0	207	0	0	0	140	8	0	9	0	0	0	0	0	0					
		0	162	0	0	0	141	13	0	6	0	0	0	0	0	0					
		0	175	0	0	0	141	7	0	6	0	0	0	2	0	0					
		0	165	0	0	0	141	9	0	3	0	0	0	0	0	0					
		1	176	0	0	0	131	7	0	12	1	0	0	2	0	0					
		1	151	0	0	0	133	10	0	9	0	1	0	3	0	0					
1:00 PM		2	167	0	0	0	136	10	0	9	0	3	0	0	0	0	0	329			
1:15 PM		1	149	0	0	0	146	10	0	8	0	1	0	1	0	0	0	317			
1:30 PM		1	154	0	0	0	151	8	0	3	1	1	0	0	1	0	0	320			
1:45 PM		1	136	0	0	0	129	8	0	7	0	0	3	0	0	0	0	285			
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL			
APPROACH % S :		8	2014	1	0	5	1617	111	0	86	4	13	0	11	1	11	0	3882			
TOTAL		0.40%				0.29%				83.50%				47.83%				0.00%			
PEAK HR :		11:15 AM - 12:15 PM				0.00%				0.00%				0.00%				0.00%			
PEAK HR VOL :		0	744	0	0	4	538	35	0	29	1	0	0	4	0	2	0	1357			
PEAK HR FACTOR :		0.000	0.899	0.000	0.000	0.333	0.954	0.673	0.000	0.806	0.250	0.000	0.000	0.333	0.000	0.250	0.000	0.924			
		0.899				0.919				0.833				0.500							

National Data & Surveying Services

Location: Lattintown Rd/CR 11 & Saint Hubert's Lodge and Club Dwy

City: Marlboro

Control: No Control

Project ID: 24-380027-005

Date: 5/25/2024

NS/EW Streets:		Lattintown Rd/CR 11				Lattintown Rd/CR 11				Saint Hubert's Lodge and Club Dwy				Saint Hubert's Lodge and Club Dwy			
NOON		NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND			
		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU
11:00 AM		0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0
11:15 AM		0	21	0	0	0	10	0	0	0	0	0	0	0	0	0	0
11:30 AM		0	14	0	0	0	13	0	0	0	0	0	0	0	0	0	0
11:45 AM		0	22	0	0	0	19	0	0	0	0	0	0	0	0	0	0
12:00 PM		0	17	0	0	0	18	0	0	0	0	0	0	0	0	0	0
12:15 PM		0	27	0	0	0	28	0	0	1	0	0	0	0	0	0	0
12:30 PM		0	19	0	0	0	18	0	0	0	0	0	0	0	0	0	0
12:45 PM		0	15	0	0	0	10	0	0	0	0	0	0	0	0	0	0
1:00 PM		0	19	0	0	0	16	0	0	0	0	0	0	0	0	0	0
1:15 PM		0	23	0	0	0	26	0	0	0	0	0	0	0	0	0	0
1:30 PM		0	19	0	0	0	26	1	0	0	0	0	0	0	0	0	0
1:45 PM		0	25	0	0	0	16	0	0	0	0	0	0	0	0	1	0
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU
APPROACH % :		0.00%	240	0	0	0	223	1	0	1	0	0	0	0	0	1	0
PEAK HR :		100.00% 99.55% 0.45% 0.00% 100.00% 0.00% 0.00% 100.00% 0.00%															
PEAK HR VOL :		0.00% 86 0 0															
PEAK HR FACTOR :		0.000 0.860 0.000 0.000 0.000 0.852 0.000 0.000 0.000 0.000 0.000 0.250 0.000 0.000 0.000 0.250 0.000															

National Data & Surveying Services

Intersection Turning Movement Count

Location: Ridge Rd & Old Indian Rd

City: Milton

Control: 1-Way Stop(NB)

Project ID: 24-380027-006

Date: 5/25/2024

Data - Total

NS/EW Streets:		Ridge Rd				Ridge Rd				Old Indian Rd				Old Indian Rd			
NOON		NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND			
		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU
11:00 AM		5	0	3	0	0	0	0	0	0	7	1	0	2	8	0	0
11:15 AM		1	0	3	0	0	0	0	0	0	6	1	0	1	6	0	0
11:30 AM		2	0	2	0	0	0	0	0	0	4	2	0	1	4	0	0
11:45 AM		0	0	1	0	0	0	0	0	0	7	4	0	2	8	0	0
12:00 PM		2	0	0	0	0	0	0	0	0	5	0	0	2	3	0	0
12:15 PM		3	0	4	0	0	0	0	0	0	5	0	0	3	6	0	0
12:30 PM		1	0	0	0	0	0	0	0	0	10	4	0	1	5	0	0
12:45 PM		3	0	4	0	0	0	0	0	0	3	0	0	0	4	0	0
1:00 PM		3	0	1	0	0	0	0	0	0	8	0	0	4	9	0	0
1:15 PM		5	0	2	0	0	0	0	0	0	8	1	0	2	7	0	0
1:30 PM		1	0	2	0	0	0	0	0	0	5	0	0	5	3	0	0
1:45 PM		1	0	4	0	0	0	0	0	0	11	1	0	2	8	0	0
TOTAL VOLUMES :		NL 27	NT 0	NR 26	NU 0	SL 0	ST 0	SR 0	SU 0	EL 0	ET 79	ER 14	EU 0	WL 25	WT 71	WR 0	WU 0
APPROACH %'s :		50.94%	0.00%	49.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	84.95%	15.05%	0.00%	26.04%	73.96%	0.00%	0.00%
PEAK HR :		01:00 PM - 02:00 PM															
PEAK HR VOL :		10	0	9	0	0	0	0	0	0	32	2	0	13	27	0	0
PEAK HR FACTOR :		0.500	0.000	0.563	0.000	0.000	0.000	0.000	0.000	0.000	0.727	0.500	0.000	0.650	0.750	0.000	0.000
		0.679				0.708				0.769				0.861			
		TOTAL				TOTAL				TOTAL				TOTAL			
		93				93				93				93			
		0.861				0.861				0.861				0.861			

National Data & Surveying Services

City: Marlboro

Project ID: 24-380027-007

Date: 5/25/2024

Data - Total

[illegible]

National Data & Surveying Services

City: Newburgh

Project ID: 24-380027-008

Date: 5/25/2024

NS/EW Streets:		Rte 9W				Rte 9W				Lattintown Rd				Lattintown Rd				
NOON	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND					
	NL	NT	NR	NU	0	1	0	0	0	0	1	0	0	0	0	0	0	TOTAL
	9	211	0	0	0	135	9	0	0	4	0	10	0	0	0	0	0	378
	14	221	0	0	0	117	6	0	10	0	10	0	0	0	0	0	0	378
	11	201	0	0	0	164	9	0	6	3	0	6	0	0	0	0	0	394
	10	175	0	0	0	169	5	0	0	0	0	0	0	0	0	0	0	388
	21	188	0	0	0	176	7	0	11	7	0	11	0	0	0	0	0	410
	17	224	0	0	0	163	9	0	6	6	0	6	0	0	0	0	0	425
	12	188	0	0	0	150	6	0	7	7	0	7	0	0	0	0	0	370
	22	213	0	0	0	146	6	0	0	13	0	13	0	0	0	0	0	403
	27	218	0	0	0	150	7	0	0	3	0	14	0	0	0	0	0	419
	12	182	0	0	0	181	5	0	0	3	0	7	0	0	0	0	0	390
20	199	0	0	0	159	9	0	0	2	0	9	0	0	0	0	0	398	
16	213	0	0	0	165	8	0	0	5	0	12	0	0	0	0	0	419	
TOTAL VOLUMES :		NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH % :		191	2433	0	0	0	1875	86	0	62	0	125	0	0	0	0	0	4772
APPROACH % :		7.28%	92.72%	0.00%	0.00%	0.00%	95.61%	4.39%	0.00%	33.16%	0.00%	66.84%	0.00%					
PEAK HR :																		
PEAK HR VOL :		75	812	0	0	0	655	29	0	13	0	42	0	0	0	0	0	1626
PEAK HR FACTOR :		0.694	0.931	0.000	0.000	0.000	0.905	0.806	0.000	0.650	0.000	0.750	0.000	0.000	0.000	0.000	0.000	0.970

APPENDIX B: MISCELLANEOUS CALCULATIONS

Marlborough Resort
Town of Marlborough, NY
 Documentation of Ambient Traffic Volume Growth

Roadway	Segment starts at	Segment end at	2014	2018	2021	Annual Growth
US-9W	Orange/Ulster Co Line	Milton Turnpike (CR-10)	20,711	16,052	16,861	-2.90%
Western Avenue (CR-17)	US-9W	Lattintown Road (CR-11)	3,803	3,369	3,009	-3.29%
					Average	-3.09%

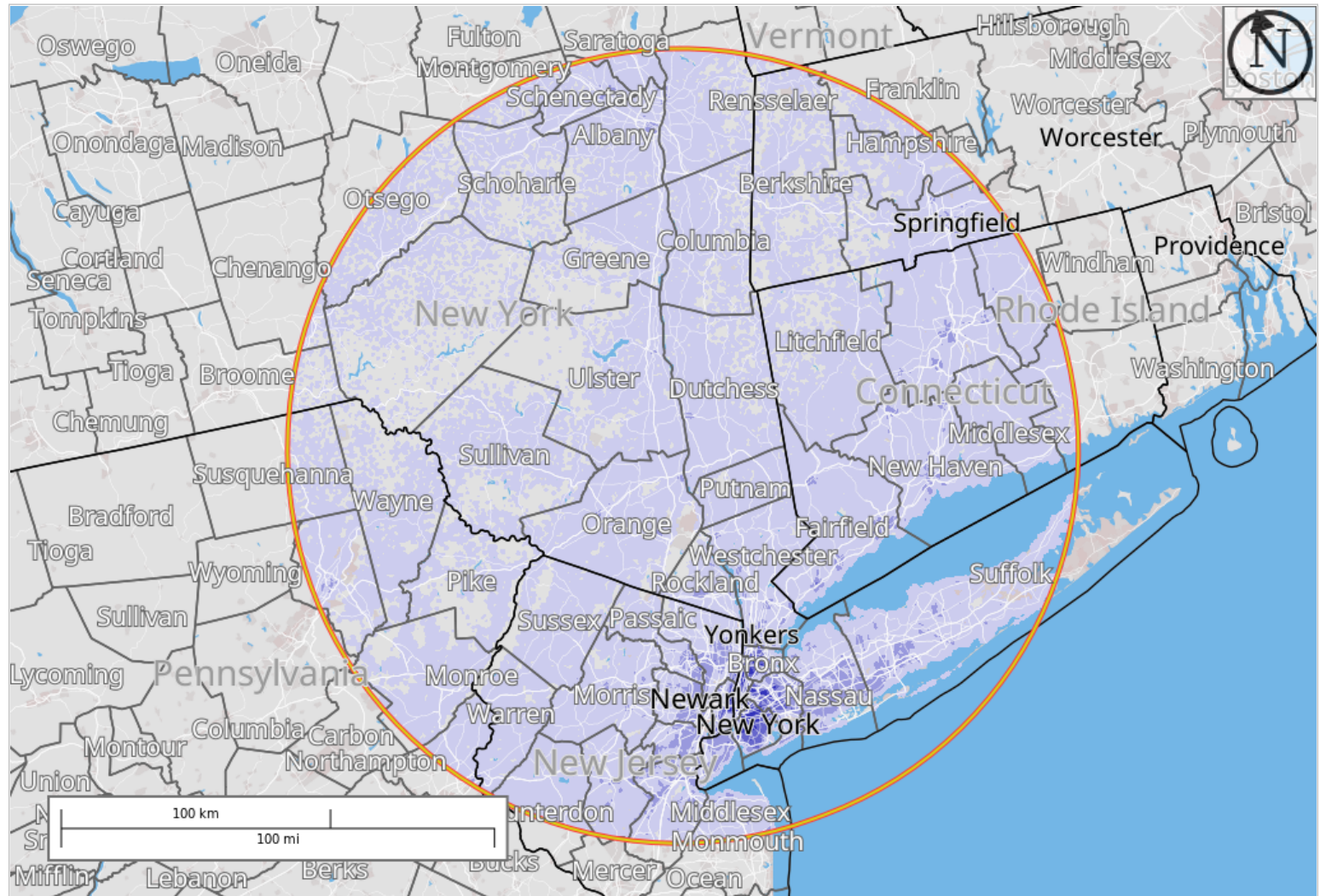
Home Area Profile Report

All Jobs for All Workers in 2021

Created by the U.S. Census Bureau's OnTheMap <https://onthemap.ces.census.gov> on 01/05/2024

Density of All Jobs in Home Selection Area in 2021

All Workers



Map Legend

Job Density [Jobs/Sq. Mile]

- 5 - 2,508
- 2,509 - 10,017
- 10,018 - 22,532
- 22,533 - 40,054
- 40,055 - 62,582

Selection Areas

- Home Area



Additional Information

Analysis Settings

Analysis Type	Area Profile
Selection area as	Home
Year(s)	2021
Job Type	All Jobs
Labor Market Segment	All Workers
Selection Area	Marlboro CDP, NY from Places (Cities, CDPs, etc.) buffered 90.00 miles
Selected Census Blocks	295,536
Analysis Generation Date	01/05/2024 13:12 - OnTheMap 6.23.4
Code Revision	b83319a02a70b14bc14ccfe9d9a4e81022acdb73
LODES Data Vintage	20231016_1512

Data Sources

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2021).

Notes

1. Race, Ethnicity, Educational Attainment, and Sex statistics are beta release results and are not available before 2009.
2. Educational Attainment is only produced for workers aged 30 and over.
3. Firm Age and Firm Size statistics are beta release results for All Private jobs and are not available before 2011.



INDUSTRY REPORT

Spa Profitability Handbook

JANUARY 2020



With the rise of wellness travel globally, spas are chartered for continuous future growth and marketability. In today's hospitality market environment, spas are no longer seen as a "nice-to-have" complementary facility but are established as a core element of the guest experience that not only drives demand but matures as an untapped source of profits.

Whether a spa is a cost or a revenue centre depends largely on how it is integrated into hotel marketing and whether it is actively managed to drive profitable performance.

For a spa to achieve its potential as a tangible asset, operators have to be committed to marketing and integrating spa models into the core business, actively growing revenue drivers and keeping costs under control.

In this article, we discuss what physical and operational attributes affect spa profitability and outline effective strategies for achieving a stronger bottom-line performance.

What drives the bottom line?

To assess the operational profitability of a spa, most operators look at net operating income which refers to the level of profits after cost of goods sold, operating expenses, undistributed operating expenses, and fixed charges have been subtracted.

Although every spa is unique and operating benchmarks can vary considerably, the business volume of a spa facility is generally determined by:

- Hotel guest capture rate;
- Size of the spa facility;
- Square footage allocation to revenue-generating spaces;
- Spa concept and specialisation (e.g. traditional vs. medical spa);
- Treatment mix and pricing;
- Share of retail revenue and product company partnerships;
- Retail sales strategy, set-up and skills of the spa team;
- Volume and pricing of membership programmes (if available);
- Commercial practices and dynamism of the Spa Director;
- Synergies with other departments within the hotel (in case of a hotel spa);
- Location of the hotel and of the spa within the hotel;
- Importance and integration of wellness throughout the property.

Some of these aspects should be considered at early stages of spa development or renovation, while those relating to commercial practices and management initiatives should be observed all the way from pre-opening throughout the spa operation.

How to assess profitability?

If the spa fails to achieve the desired performance levels, understanding where the problem lies is key. Driving spa profitability begins with a careful assessment and analysis of the metrics that most accurately reflect spa performance, helping to reveal pitfalls and areas for improvement. Below we outline some of the most important indicators that should be monitored, analysed, and managed on a regular basis.

Average Treatment Rate

Serving as an alternative to an Average Daily Rate (ADR) in a hotel, Average Treatment Rate (ATR) is determined by the mix of spa service offering, as well as its duration and pricing structure. As mentioned by HFD Spa, the analysis of ATR paired with treatment room utilisation has the potential to support dynamic pricing in the spa industry, by allowing value-added offers during periods of low demand and charging higher rates during peak periods.

Similar to airplane seats or hotel room nights, spa service is a perishable product that comes with certain inventory limitations, i.e. a fixed number of treatment rooms available. Once a treatment hour has passed, the opportunity to sell this treatment room has been lost, meaning missed revenue potential for the business.

For this reason, successful spas are increasingly adopting yield management strategies, implementing variable price points on weekdays and weekends, during high and low occupancy periods, and depending on whether a treatment was booked in advance or by a walk-in customer.

Treatment Room Utilisation

Treatment Room Utilisation (TRU) is an alternative to occupancy in a hotel. TRU is calculated by dividing the total treatment hours sold by the number of total treatment hours available (in all treatment rooms per day). For instance, consider a 10-treatment-room spa that sells, on average, 45 treatments per day. Assuming that a maximum of 10 treatments can be performed in one treatment room on a daily basis, TRU for this facility would average 45%.

This metric allows assessing actual demand for spa services against the maximum available inventory and can be measured on a monthly, daily, or even on an hourly basis. Most successful spas operate at treatment room utilisation of between 40% and 60%. It is noteworthy, however, that for most spa facilities (except those at dedicated wellness retreats), mornings are low-demand periods, with most treatments being sold from late afternoon until closing.

Therapist Utilisation

Calculated as a ratio of performed service hours over available therapist hours, therapist utilisation is another metric that can be used to measure demand in a spa. A high (over 75%) therapist utilisation may signal that current staffing levels are not sufficient and guests are being turned away. Therapists require sufficient time in between treatments to take breaks, refresh, clean and set up the rooms; this means that therapist utilisation of anywhere above 80% would not allow the staff any downtime, eventually leading to a drop in service standards.

A low therapist utilisation (below 50%) may indicate overstaffing, which has a significant impact on spa labour costs and thereby profitability. Optimal therapist utilisation should mean that therapists are working at capacity, which is achieved through effective scheduling and sales efforts. It is important to note, however, that this metric may vary depending on positioning and type of the spa. For instance, in a luxury hotel spa extra time may be allocated for a complimentary pre- and post-treatment consultation. While this may lower therapist utilisation, such value-added services ensure high guest satisfaction and add incremental value to the spa facility.

Another aspect that hotel spa management needs to consider is utilisation and cost allocation associated with the property's fitness facilities, which have a different pattern of attendance and staffing requirements. Unlike spas that see most of their demand after lunchtime hours, fitness centres are open early. They require naming earlier on during the day, which should be taken into account in the assessment of overall staff utilisation and facility usage.

Revenue per Available Treatment Room

Having a similar function as a hotel's Revenue per Available Room (RevPAR), Revenue per Available Treatment Room (RevPATR) is used to evaluate how much revenue has been generated within a given period of time and can help to manage time effectively, optimise spa pricing strategy, and compare the spa to the competition. Those businesses that do not rely on treatment rooms as a primary revenue driver (e.g. health clubs, wellness centres, onsen or hot spring spas) may also benchmark their performance on a membership basis or based on ancillary revenue per guest (i.e. admission fees, food and beverage, retail, etc.).

Spa Revenue per Guest

As the name states, revenue per guest is used to evaluate the average spend per guest and can help identify opportunities for up- and cross-selling.

Spa Revenue per Occupied Room

In case of hotel spas, Spa Revenue per Occupied (Hotel) Room is used to measure how many of the hotel guests are using the spa. This metric helps understand the ratio between internal and external spa utilisation levels, indicate a relationship between hotel occupancy and its impact on spa performance, and identify opportunities for in-house marketing and cross-departmental promotion.

Guest Capture Rate

In the case of hotel spas, another metric that should be tracked is the capture rate, calculated as the share of hotel guests visiting the spa to the total number of guests staying at the property. At large, capture rates should be regarded as a measure of relevance – the higher the capture, the greater the role of the spa in the hotel's overall positioning and service offering.

As a rule of thumb, resort spas typically record higher hotel guest capture rates compared to urban facilities, as in resort destinations, guests travel mainly for leisure purposes and are more likely to use the spa as a way to disconnect and unwind. While the capture rate in city hotels averages typically 5% to 8%, it may go up as high as 10% to 18% for urban resorts and 20% to 35% for beach destinations. In wellness retreats, where partaking in wellness programmes is the primary reason for booking, capture rates may reach 75% to 95%.

Other statistics that can be helpful in analysing spa performance trends are summarised in the following table.

Other Spa Profitability Indicators

Overall Performance	Revenue breakdown by source (treatments, retail, memberships, gift certificates); revenue per square foot; revenue per therapist; revenue per available treatment hour (RevPATH)
Guest Demographics	Gender; age; nationality; buying power; spending habits; visit frequency; distance from place of residence
Staff Performance	Retail product sales; rebooking rates; client satisfaction rates
Financial Performance	Profit margins (per treatment, per membership)
Hotel Guest Mix	Utilisation percentage by segment, i.e. FIT, Leisure, Group or MICE
Other Factors*	Property location (central or remote); proximity of tourism demand generators

(*) In case of hotel spas, these factors impact guests' total length of stay and time spent on property, ultimately impacting utilisation of services; location may also determine the share of external demand for the spa.

While a thorough analysis of these metrics would help develop a snapshot of spa operations and deploy targeted strategies to boost spa top line and optimise expenses, the ultimate key to the success of any spa lies in the offering (treatment mix and pricing) and the quality of the therapists.

If the spa's offering is not relevant to its target markets and their preferences, applying all the other listed tactics will not be helpful.



Improving revenue

Spa location, accessibility and visibility remain among primary factors affecting facility performance. Positioning the spa as a central and easy-to-find outlet will drive higher visitation compared to an outlet that is tucked away and hardly accessible. Moreover, knowing the competitive marketplace and accurately positioning the spa to address a certain market niche will make the property stand out and attract attention from potential customers.

Offering value-added services, such as consultation or complimentary access to heat and water experiences will also support the spa's premium positioning and differentiate it from the competition.

Although traditionally treatments are perceived as the major revenue driver for a spa facility, the share of treatment revenue may vary significantly depending on the spa type. Its service platform, availability of membership programmes, food and beverage outlets, or activity offering.

For example, while in a downtown luxury hotel spa treatment revenue may make up 70% to 90% of the total spa revenue, it typically averages 30% to 40% in a standalone spa facility and may be even lower for a membership club or a thermal/mineral spring facility.

Therefore, the revenue generated from the auxiliary sources as well as from fees charged for access to the spa facilities and retail sales should not be overlooked but used as an opportunity to boost the spa's top line.

Boost Retail Sales

Averaging anywhere between 5% and 30% of spa revenue, retail sales can add meaningful value to spa financial performance. To boost product sales, operators need to maximise efficiencies in the retail space, making it an appealing high-acting outlet. Visibility, attractive design and accessibility within a spa is key. Incorporating tester stations can also make the retail experience more interactive and engaging.

Applying "educational upselling" is also crucial; the spa staff should be trained to know the products well and be able to not only recommend the best solution, but also educate guests about the product's benefits and suitability for their individual needs and concerns. Allocating sufficient time between consecutive treatments enables therapists to spend time with the guest and recommend and upsell best-suited products and services. Creating programmes, which include a therapist consultation and personalised home care recommendations can encourage consistent use of the products that can only be found at the spa.

Therapists can be incentivised through commissions or be offered complimentary products for their own use. It is also key to set measurable goals, particularly for beauticians and aestheticians, such as achieving retail revenue targets of 20% to 25% of total treatment revenue. Overall, engaging the staff, setting goals and tracking their performance can create higher product rotation and stronger retail sales growth.

Bring in More Customers

The top line can be improved by bringing in more customers through active marketing, client referral programmes, and local advertising. In the case of hotel or resort spas, both internal and external marketing strategies should be carefully considered. To boost hotel guest capture, it is crucial to identify strategic points of sale throughout the property to display the spa, such as reception, elevators, and dining outlets.

To capture guests upon arrival, the spa and its promotions should be integrated in the front office process, for instance, by sending spa offers with room booking confirmation or walking guests through the spa when accompanying them to their rooms. Additionally, having a spa phone button, including treatment menus in room compendiums, and featuring spa facilities on the hotel TV channel will ensure brand awareness among in-house guests and increase the likelihood of them visiting the facility.

Spa management should also consider creating event-based promotions and packages, which may be either calendar-related (e.g. summer promotion, Christmas or Mother's Day packages), event-related (e.g. in-town conference, sports event), or wellness or cause-related (e.g. Global Wellness Day, cancer awareness month). To further improve effectiveness of internal marketing, service offering and promotional efforts should ideally be customised according to the hotel's guest mix.

To get hotel guests acquainted with spa services and facilities, spa treatments can also be packaged into accommodation and dining to create day spa journeys or custom-designed programmes for each of the hotel's guest segments (e.g. honeymoon packages, MICE or corporate spa menus). Setting up a referral programme will encourage existing spa customers to bring or refer their friends to the spa, thereby broadening the customer pool and cultivating a word of mouth network among local guests.

Express spa sessions and demonstrations can also be organised to attract attention, both on-property and during external sales activities, such as trade shows and presentations.

Improve Customer Retention

Customer retention is considered among the top revenue drivers, yet is often overlooked. Improving customer retention is essential to growing spa sales and therefore the profit. It is cheaper to retain existing customers than acquiring new ones, and the success rate of selling services to them is much higher. Spa Executive (2018) reports that while the probability of selling to a new customer is only 5% to 20%, the probability of selling to an existing customer averages 60% to 70%. Therefore, just 20% of the existing customer base can generate up to 80% of future spa profits. Launching a loyalty programme, encouraging re-booking, personalising the guest experience, providing value-add offers, and rewarding and recognising staff can help improve repeat guest ratios. Empowering therapists to offer product testers, loyalty cards, and upgrade time of services for new customers will further support guest retention efforts.

Up- and Cross-Sell

Up-selling refers to a sales technique whereby the seller introduces the customer to services or products which add value to the client. Up-selling can lead to more premium and expensive items or items of higher quality, upgrades or other add-ons being bought in addition to the original purchase. Cross-selling refers to a technique whereby the seller introduces the customer to service or products which add value to the client apart from the original buying intention. Cross-selling may include purchasing an additional spa treatment, home care spa products, purchasing food and beverage items or meals in between treatments, and others.

To capitalise on this sales strategy, it is crucial to train the spa staff to up- and cross-sell, set realistic yet stimulating goals, and evaluate individual performance on a regular basis. It is also recommended for the spa team to have a customised "cheat sheet" of all services and products that complement, support and add benefits to all treatments on the menu. It would allow therapists to upgrade guests' experience with targeted add-ons or products, for instance, by offering special masks or serums during a facial treatment or upselling a muscle-relaxing gel or roll-on to guests suffering from muscle aches and pain.



Leverage the Use of Technology

Investing in spa software facilitates the management and assessment of the spa facility, offering a variety of tools to run and grow the business. A spa software allows to control bookings and scheduling, track customers' spending patterns, advertise open appointments to fill slow periods, manage inventory, facilitate reporting, drive email campaigns, communicate special offers to customers and many others in one place, making it a worthwhile investment for many industry players. Spa software will also help compute key performance indicators (as discussed earlier), allowing the spa management to remain up-to-date with the facility performance and adopt active revenue management strategies accordingly.

Strategise Sales and Marketing Efforts

In order to attract customers' attention, the spa needs to have a well-designed marketing and promotions plan in place to help reach the target audience and attract new clients. The marketing plan should include clear, realistic, and measurable targets that are monitored and used to track performance on a regular basis. Considering the objectives of the chosen sales and marketing strategy, the marketing plan should be as specific as possible, which would help to narrow down management options and follow the budget. The optimal spa marketing strategy should include social media and client promotions as key parts of the plan.

The spas should have a tracking system in place that would help identify potential sales opportunities and empower receptionists to upsell treatments and apply revenue maximisation strategies during low demand periods or in case of last-minute bookings (i.e. similar to airlines).

Consider Spa Configuration

At the development stage, square footage allocation to various uses within the spa should be carefully considered. In case of traditional spas, as the primary revenue-generating space, treatment rooms are the most important (in terms of their number and size). However, other facilities such as fitness and heat and water experiences should also be taken into account, especially if the spa intends to offer membership programmes or charge a fee for facility usage. As standalone day spas are catching up with hotel spas by offering high-quality services yet at a lower price point, unique heat and water experiences remain among the key points of differentiation a hotel spa can offer.

Controlling expenses

Careful assessment of the spa's actual performance may reveal that low profitability is not caused by low revenue, but rather by an inefficient cost structure. Unreasonable expense allocations may undermine the viability of some of the most demanded spas. Therefore, to achieve desirable profit margins, it is crucial to monitor and control costs. Spas may also consider engaging a specialised consulting company, which could help ensure appropriate assessment of performance, help with cost management, and provide innovative conceptual ideas and standards for implementation.

Payroll and Related Expenses

As a general benchmark, labour costs represent the highest share of spa expenses, accounting for anywhere between 30% and 60% of spa revenue and approximately 40% of total spa expenses. Therefore, managing payroll and related expenses by adjusting staffing levels, employee satisfaction, and turnover, is likely to have the most significant impact on spa profitability. As in any service industry, spa staff is the "heart and soul" of the business. Thus, all strategies implemented to minimise staff-related costs should not compromise employee satisfaction and thereby the guest experience. The spa should encourage a healthy working environment and guest communication to ensure high quality of service and high guests' satisfaction with their treatment of choice.

Another crucial factor (and often a challenge faced by Spa Directors) is employee retention and education. As good therapists can be difficult to find and difficult to keep, an extra amount of attention and guidance needs to be put in making sure that employees feel empowered, motivated, and maintain a sense of ownership in their work.

To reduce payroll costs, spa management should consider:

- (i) maximising staff productivity with the use of up-to-date technology and proper training;
- (ii) cross-training the staff to increase each employee's intrinsic value for the business, helping with coverage in case of sick leaves and unexpected departures; and,
- (iii) optimising scheduling through an accurate demand forecast to avoid under- and overstaffing. Typically, senior therapists should be made responsible for training an average of two to three new team members per year.

Overall, in high-cost countries, spa departmental profit margins range between 35% and 40%, whilst in low-cost countries, the margins may average 40% to 75%. In the United States, for instance, although base salaries may be low, therapists are entitled to a share of treatment sales. Such compensation strategy is directly linked to the therapist's level of experience, seniority, complexity of treatments performed, as well as operational know-how. The latter would commonly depend on the licenses therapists hold (e.g. anatomy training, training in body and/or facial treatments), which broadens the selection of treatments they can provide.

Engage a Specialised Consultant

To ensure that the spa reaches its potential and to avoid poor asset performance in the long run, spa operators and developers may consider seeking assistance from a specialised spa consulting and management company. It can help monitor facility performance, implement appropriate standard operating procedures and regular training, and improve spa positioning by analysing the competitive marketplace and reviewing conceptual and design solutions.

Both concept and design can make or break the success of a spa and, therefore, must be well thought through and professionally executed. A specialist spa consulting team can help create the concept that is unique and geared towards specific market segments and make sure the facility is designed, marketed, and staffed accordingly. Unlike other areas within the hotel, the design of the spa must focus on the ultimate guest journey and experience, ensuring proper flow and functional set up of various facilities, while also supporting the efficiency of operation.

Horwath HTL Health & Wellness specialises in a wide range of consulting services for hotel and day spas, medical spas, as well as lifestyle and wellness centres. The multidisciplinary team of spa experts will assess, explore, and make detailed recommendations on how to improve spa business performance while evaluating the internal processes against the regional benchmarks. Commencing with a "diagnostic" review of the facility, Horwath HTL Health and Wellness will provide on-going support to the spa management team focusing on strategic planning, financial performance, budgeting, product and service improvement to ensure the potential of the spa facility is maximised.

Authors



Ingo Schweder
Managing Director
Horwath HTL Thailand
Health & Wellness
ischweder@horwathhtl.com

Injecting fresh ideas and professional management into the rapidly expanding wellness hospitality sector, Ingo Schweder brings together more than 30 years of experience in the spa and hospitality industries. He leads the multidisciplinary teams at GOCO Hospitality and Horwath HTL Health and Wellness to strategise, conceptualise, design and manage the latest wellness developments for the world's top hospitality and real estate brands. From individual hotel spas to dedicated wellness resorts and master-planned mixed-use developments, Ingo's experience and insights have taken over 400 projects worth more than \$3.5 billion across upwards of 42 countries from initial idea to profitable realisation and on-going management.

The company manages GOCO-branded spas in Greece and the UAE and owns the Glen Ivy Hot Springs in Southern California, the United States' oldest and highest-grossing spa. GOCO Hospitality is currently developing several GOCO Retreats in strategic spots around the world. Ingo Schweder currently sits on the Advisory Board of AMAALA – one of the largest wellness projects in the world – and was formerly a board member of Mandarin Oriental and earlier Corporate Director of Operations for Oberoi Hotels & Resorts. Under his guidance, Ananda in the Himalayas, the globally recognised destination spa, was established.



Fabian Modena
Manager
Horwath HTL Thailand
Health & Wellness
fmodena@horwathhtl.com

As the Manager of Horwath HTL Health & Wellness, Fabian directs the market research, development strategies, and feasibility studies – along with concept development – for

bespoke wellness-centric hospitality and mixed-use real estate developments. Before joining Horwath HTL, Fabian worked as the Assistant Manager - Hotel Development with Orascom Hotels & Development and was involved in the development of international luxury hotels and resorts in Oman, Montenegro, Morocco, Egypt, and Switzerland. Prior to his engagement in the development industry, Fabian began his hospitality career with the Ritz-Carlton Hotels in China and Thailand. Having graduated with two Bachelor's degrees in International Hospitality Management and Finance from Glion Institute of Higher Education and Les Roches-Gruyere University of Applied Science, Switzerland, and with a Certification in Hotel Real Estate Investments & Asset Management from Cornell University, USA, as well as a Swiss Restaurant License, Fabian brings multidisciplinary experience as an operator, developer, and researcher to his work.



Krystyna Stadnyk
Consultant
Horwath HTL Thailand
Health & Wellness
kstadnyk@horwathhtl.com

As a Consultant of Horwath HTL Health and Wellness, Krystyna is primarily responsible for the development of market research and feasibility studies, business plans, and client presentations for wellness-centric hospitality projects and mixed-use real estate developments. Before joining Horwath HTL in Bangkok, Krystyna worked in international hotels and resorts in Europe and the Middle East. Krystyna holds a BA in Hospitality Management with Real Estate Finance and Revenue Management from Glion Institute of Higher Education, Switzerland, and anticipates completion of MSc in Real Estate from Lucerne University of Applied Sciences and Arts, Switzerland, by September 2020. Krystyna has a Certificate in Hotel Industry Analytics from the American Hotel and Lodging Association and is a member of Eta Sigma Delta International Hospitality and Tourism Management Honour Society.



Horwath HTL
Hotel, Tourism and Leisure

AFRICA

Ivory Coast
Rwanda
South Africa

ASIA PACIFIC

Australia
China
Hong Kong
India
Indonesia
Japan
Malaysia
New Zealand
Singapore
Thailand

EUROPE

Andorra
Austria
Croatia
Cyprus
France
Germany
Greece
Hungary
Ireland
Italy
Netherlands
Norway
Poland
Portugal
Serbia
Spain
Switzerland
Turkey
United Kingdom

MIDDLE EAST

UAE & Oman

NORTH AMERICA

Atlanta
Denver
Miami
Montreal
New York
Norfolk
Orlando
Toronto

LATIN AMERICA

Argentina
Brazil
Dominican Republic
Mexico

Mirbeau Spa Trip Generation

2/14/2013

	enter	exit	peak hr
6:30 AM	3	0	13
6:45 AM	3	1	12
7:00 AM	1	0	15
7:15 AM	3	2	18
7:30 AM	1	1	27
7:45 AM	5	2	
8:00 AM	4	0	
8:15 AM	8	6	
Pk Sum	18	9	
Double	36	18	

2/15/2013

	enter	exit	peak hr
4:30 PM	8	5	40
4:45 PM	4	5	32
5:00 PM	3	7	29
5:15 PM	3	5	23
5:30 PM	2	3	26
5:45 PM	4	2	
6:00 PM	3	1	
6:15 PM	5	6	
Pk Sum	18	22	
Double	36	44	

2/16/2013

	enter	exit	peak hr
11:30 AM	4	4	38
11:45 AM	5	3	42
12:00 PM	2	10	49
12:15 PM	3	7	51
12:30 PM	6	6	51
12:45 PM	6	9	
1:00 PM	5	9	
1:15 PM	3	7	
Pk Sum	20	31	
Double	40	62	

Banquet Hall Traffic Generation Survey Results							
<i>Location</i>	<i>Survey Period</i>	<i>Banquet Type</i>	<i>Attendance (persons)</i>	<i>Peak Hour Traffic Generation</i>	<i>% in</i>	<i>% out</i>	<i>Trip Rate</i>
Site 1	Friday afternoon & evening	Chinese New Year	110	45	11%	89%	0.41
Site 2	Friday afternoon & evening	Wedding	390	103	99%	1%	0.26
Site 2	Saturday midday	Conference Lunch	600	160	98%	2%	0.27
Site 3	Saturday afternoon	Wedding	190	56	96%	4%	0.29

Figure:

3

Num of yrs
5

4

5

•

7

Location Number	Intersection	2024 Collected Volumes	No-Build Volumes 0.75%	Hudson West	Dock Road	Total No-Build Volumes	Trip Generation and Distribution				Total Site Trips	Full Build Volumes
							Enter Dist. %	Exit Dist. %	Trips IN 87	Trips OUT 63		
1	Old Indian Road at US-9W/South Road			41 enter 24 exit	34 enter 24 exit	41 enter 24 exit						
	SR	37	38			38	10%		8.7		9	47
	ST	845	877	13	11	901					901	4
	SL	4	4			4						
	WR	2	2			2						2
	WL	5	5			5						5
	NR	1	1			1						1
	NT	745	773	8	8	789					789	4
	NL	4	4			4						
2	ER	9	9			9					9	
	ET	1	1			1		10%			1	
	EL	34	35			35			6.3	6	41	
	Old Indian Road at Ridge Road											
	SR											
	ST											
	SL											
	WR											
	WT	30	31			31	8%		7.0	7	38	
3	WL	11	11			11	2%		1.7	2	13	
	NR	10	10			10		2%		1	11	
	NT											
	NL	16	17			17		4%	2.5	3	20	
	ER	11	11			11	4%	8%	3.5	3	14	
	ET	34	35			35			5.0	5	40	
	EL											
	Old Indian Road at Lattintown Road											
	SR											
4	ST											
	SL											
	WR	25	26			26		4%	2.5	3	29	
	WT	10	10			10	8%			7	17	
	WL	12	12			12		8%	5.0	5	17	
	NR											
	NT											
	NL	81	84			84		16%	10.1	10	94	
	ER	84	87			87	16% 4%		13.9 3.5	14 3	101 27	
5	ET	23	24			24						
	EL											
	Old Indian Road at Lattintown Road/Sonny Weed's Dwy											
	SR	5	5			5					5	
	ST											
	SL	98	102			102	20%		17.4	17	119	
	WR	96	100			100		20%		13	113	
	WT	7	7			7			12.6	7	1	
	WL	1	1			1					1	
6	NR	1	1			1						
	NT											
	NL											
	ER											
	ET	7	7			7					7	
	EL	1	1			1					1	
	Lattintown Road at St. Hubert's Lodge											
	SR											
	ST	93	97			97	24%		20.9	21	97	
7	SL	1	1			1		24%		15	22	
	WR											
	WT	1	1			1		24%	15.1	35	16	
	WL							56%	35.3	49	35	
	NR											
	NT	93	97			97	56%		48.7	49	49	
	NL										97	
	ER											
	ET											
8	EL											
	Ridge Road at Proposed Driveway											
	SR											
	ST	22	23			23	6%		5.2	5	5	
	SL										23	
	WR											
	WT											
	WL											
	NR											
9	NT	26	27			27	14%		12.2	12	27	
	NL										12	
	ER											
	ET							14%	8.8	9	9	
	EL							6%	3.8	4	4	

Project: **Marlborough Resort**
Location: **Town of Marlborough, NY**
Peak Hour: **Weekday PM**
Condition: **Proposed Action**

7	Lattintown Road at Plattekill Road											
	SR	21	22			22		5%		3.2	3	25
	ST	68	71			71		51%		32.1	32	103
	SL	19	20			20						20
	WR	22	23			23						23
	WT	47	49			49						49
	WL											
	NR											
	NT	64	66			66	51%		44.4		44	110
	NL	6	6			6						6
8	ER	7	7			7						7
	ET	31	32			32						32
	EL	24	25			25	5%		4.4		5	30
	Plattekill Road at Plattekill Road Bend											
	SR											
	ST											
	SL											
	WR											
	WT	69	72			72						72
	WL	45	47			47						47
9	NR	41	43			43						43
	NT											
	NL											
	ER											
	ET	50	52			52						52
	EL											
	Lattintown Road at Plattekill Road Bend											
	SR											
	ST	75	78			78		51%		32.1	32	110
	SL											
10	WR											
	WT											
	WL	45	47			47						47
	NR	41	43			43						43
	NT	70	73			73	51%		44.4		44	117
	NL											
	ER											
	ET											
	EL											
	US-9W at Western Avenue											
11	SR	183	190	3	4	197						197
	ST	740	768	11	11	790						790
	SL											
	WR											
	WT											
	WL											
	NR											
	NT	747	775	25	20	820						820
	NL	90	93			93	13%		11.3		11	104
	ER											
12	ET											
	EL											
	US-9W at King Street											
	SR	69	72			72		13%		8.2	8	80
	ST - King Street											
	SL	83	86	6	5	97						97
	WR											
	WT - US-9W	740	768	11	11	790						790
	WL											
	NR											
12	NT - US-9W	754	783	19	15	817	13%		11.3		11	828
	NL											
	ER											
	ET											
	EL											
	US-9W at Lattintown Road											
	SR	46	48			48						48
	ST	839	871	11	11	893		13%		8.2	8	901
	SL											
	WR											
12	WT											
	WL											
	NR											
	NT	871	904	19	15	938	13%		11.3		11	949
	NL	71	74			74	52%		45.2		45	119
	ER	30	31			31		52%		32.8	33	64
	ET											
	EL	23	24			24						24

Figure:

3

Num of yrs
5

4

5

6

7

Location Number	Intersection	2024 Collected Volumes	No-Build Volumes 0.75%	Hudson West	Dock Road	Total No-Build Volumes	Trip Generation and Distribution				Total Site Trips	Full Build Volumes
							Enter Dist. %	Exit Dist. %	Trips IN 113	Trips OUT 92		
1	Old Indian Road at US-9W/South Road			23 enter 20 exit	33 enter 36 exit	41 enter 24 exit						
	SR ST SL	35 538 4	36 558 4	7	11	36 576 4	10%		11.3		11	47 576 4
	WR WT WL	2 4	2 4			2 4						2 4
	NR NT NL	744	772	6	12	790						790
	ER ET EL	1 29	1 30			1 30		10%		9.2	9	1 39
2	Old Indian Road at Ridge Road											
	SR ST SL											
	WR WT WL	27 13	28 13			28 13	8% 2%		9.0 2.3		9 2	37 15
	NR NT NL	9 10	9 10			9 10		2% 4%		1.8 3.7	2 4	11 14
	ER ET EL	2 32	2 33			2 33	4% 8%		4.5 7.4		5 7	7 40
3	Old Indian Road at Lattintown Road											
	SR ST SL											
	WR WT WL	20 18	21 19			21 19	8% 4%	4% 8%	9.0 7.4	3.7 7.4	4 9 7	25 28 27
	NR NT NL	19 67	20 70			20 70		16% 16%		14.7	15	85
	ER ET EL	72 8	75 8			75 8	16% 4%		18.1 4.5		18 5	93 13
4	Old Indian Road at Lattintown Road/Sonny Weed's Dwy											
	SR ST SL	4 75	4 78			4 78	20%		22.6		23	4 101
	WR WT WL	82 4 1	85 4 1			85 4 1		20%	18.4		18	103 4 1
	NR NT NL	1	1			1						1
	ER ET EL	1 6 6	1 6 6			1 6 6						1 6 6
5	Lattintown Road at St. Hubert's Lodge											
	SR ST SL	91	94			94	24%		27.1		27	94 27
	WR WT WL	1	1			1		24% 56%	27.1 51.5	22.1	22	23
	NR NT NL	86	89			89	56%		63.3		63	63 89
	ER ET EL											
6	Ridge Road at Proposed Driveway											
	SR ST SL	15	16			16	6%		6.8		7	7 16
	WR WT WL											
	NR NT NL	19	20			20	14%		15.8		16	20 16
	ER ET EL							14% 6%	15.8 5.5	12.9	13 6	13 6

Project: **Marlborough Resort**
Location: **Town of Marlborough, NY**
Peak Hour: **Saturday Midday**
Condition: **Proposed Action**

7	Lattintown Road at Plattekill Road											
	SR	21	22			22		5%		4.6	4	26
	ST	62	64			64		51%		46.9	47	111
	SL	17	18			18						18
	WR	15	16			16						16
	WT	28	29			29						29
	NR											
	NT	101	105			105	51%		57.6		58	163
	NL	2	2			2						2
	ER	1	1			1						1
	ET	30	31			31						31
	EL	20	21			21	5%		5.7		6	27
8	Plattekill Road at Plattekill Road Bend											
	SR											
	ST											
	SL											
	WR											
	WT	43	45			45						45
	WL	29	30			30						30
	NR	27	28			28						28
	NT											
	NL											
	ER											
	ET	47	49			49						49
9	Lattintown Road at Plattekill Road Bend											
	SR											
	ST											
	SL	63	65			65		51%		46.9	47	112
	WR											
	WT	29	30			30						30
	WL	27	28			28						28
	NR	103	107			107	51%		57.6		58	165
	NT											
	NL											
	ER											
	ET											
EL												
10	US-9W at Western Avenue											
	SR	115	119	3	5	127						127
	ST	455	472	9	16	497						497
	SL											
	WR											
	WT											
	WL											
	NR											
	NT	750	779	14	20	813						813
	NL	67	70			70	13%		14.7		15	85
	ER											
	ET											
EL												
11	US-9W at King Street											
	SR	70	73			73		13%		12.0	12	85
	ST - King Street	86	89	4	5	98						98
	SL											
	WR											
	WT - US-9W	455	472	9	16	497						497
	WL											
	NR											
	NT - US-9W	731	759	10	15	784	13%		14.7		15	799
	NL											
	ER											
	ET											
EL												
12	US-9W at Lattintown Road											
	SR	27	28			28						28
	ST	636	660	9	16	685		13%		12.0	12	697
	SL											
	WR											
	WT											
	WL											
	NR											
	NT	795	825	10	15	850						865
	NL	75	78			78	13%		14.7		15	137
	ER	42	44			44	52%		58.8		59	92
	ET											
EL	12	12			12		52%		47.8	48	12	

Guideline for determining left-turn Lane at a two-way stop-controlled intersection
TWO LANE ROADWAY

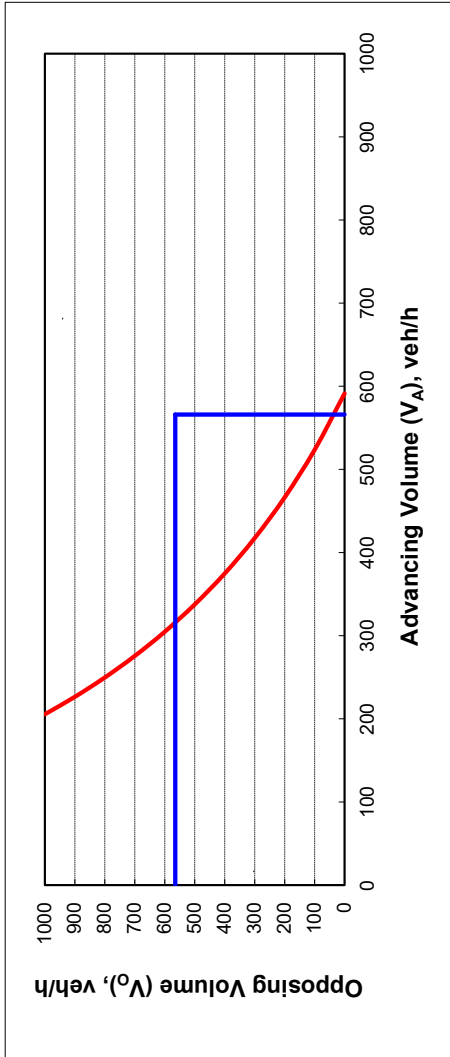
INPUT

Variable	Value
Major Approach	Harris Hill Road @ Prop. Driveway
Approach	Southbound (AM Peak Hour)
Design Speed Limit - MPH	35
Percent of left-turns in advancing volume (V_A), %:	11%
Advancing volume (V_A), veh/h:	566
Opposing volume (V_O), veh/h:	565

CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

PLOT - LINE 1	PLOT - LINE 2
0	565
566	566
	0
	565



OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	316
Guidance for determining the need for a major-road left-turn bay: Southbound (AM Peak Hour) Left-turn treatment warranted at Harris Hill Road @ Prop. Driveway Interse	

P 0.0225
 f = 0.79
Wait Time 2.594 s
Service Rate 809 veh/h
Arrival Rate 316 veh/h

V_O	Time tw	V_O	Serv. rate
0	0.0	0	1200
100	0.4	100	1121
200	0.8	200	1046
300	1.2	300	976
400	1.7	400	910
500	2.2	500	848
600	2.8	600	789
700	3.5	700	735
800	4.2	800	683
900	5.0	900	635
1000	5.8	1000	590

% LT veh.	11%	10%	15%	20%	40%
V_O	V_A	V_A	V_A	V_A	V_A
0	591	616	517	462	377
100	524	545	458	409	334
200	466	485	408	364	297
300	417	434	365	326	266
400	375	390	328	293	239
500	338	351	295	264	215
600	305	317	267	238	194
700	276	287	241	215	176
800	250	260	218	195	159
900	226	236	198	177	144
1000	206	214	180	160	131

Guideline for determining left-turn Lane at a two-way stop-controlled intersection
TWO LANE ROADWAY

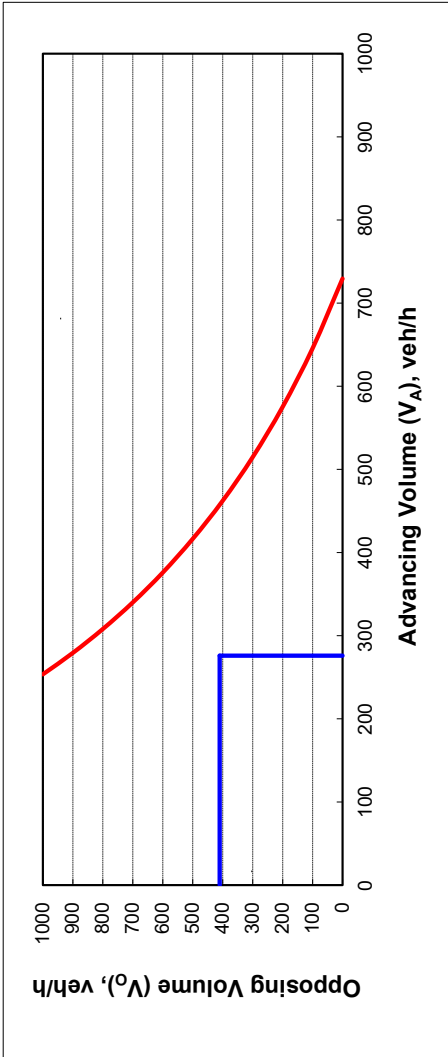
INPUT

Variable	Value
Major Approach	Harris Hill Road @ Prop. Driveway
Approach	Southbound (MD Peak Hour)
Design Speed Limit - MPH	35
Percent of left-turns in advancing volume (V_A), %:	7%
Advancing volume (V_A), veh/h:	276
Opposing volume (V_O), veh/h:	410

CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

PLOT - LINE 1	PLOT - LINE 2
0	410
276	410
	0
	410



OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	457
Guidance for determining the need for a major-road left-turn bay: Southbound (MD Peak Hour) Left-turn treatment NOT warranted at Harris Hill Road @ Prop. Driveway In	

P 0.0225
 f = 0.79
Wait Time 1.737 s
Service Rate 903 veh/h
Arrival Rate 457 veh/h

V_O	Time tw	Serv. rate
0	0.0	0
100	0.4	100
200	0.8	200
300	1.2	300
400	1.7	400
500	2.2	500
600	2.8	600
700	3.5	700
800	4.2	800
900	5.0	900
1000	5.8	1000

% LT veh.	7%	10%	15%	20%	40%
V_O	V_A	V_A	V_A	V_A	V_A
0	729	616	517	462	377
100	646	545	458	409	334
200	575	485	408	364	297
300	515	434	365	326	266
400	462	390	328	293	239
500	416	351	295	264	215
600	376	317	267	238	194
700	340	287	241	215	176
800	308	260	218	195	159
900	279	236	198	177	144
1000	254	214	180	160	131

Guideline for determining left-turn Lane at a two-way stop-controlled intersection
TWO LANE ROADWAY

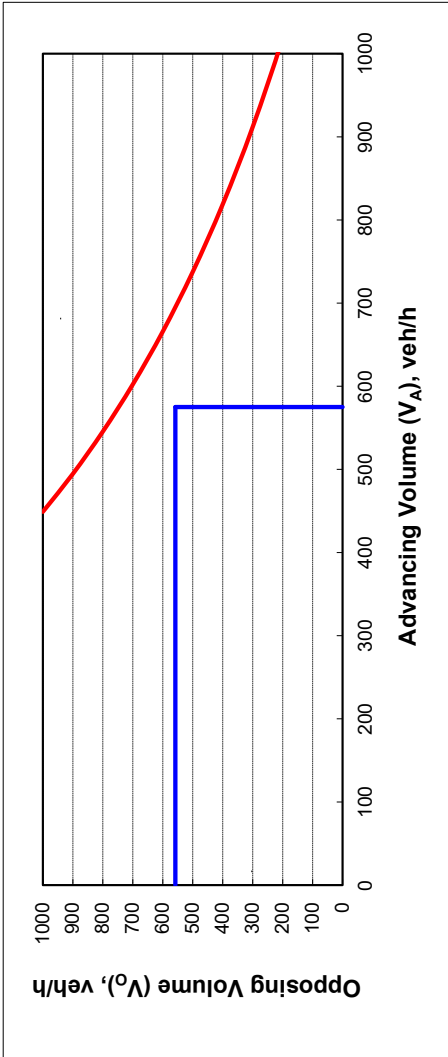
INPUT

Variable	Value
Major Approach	Harris Hill Road @ Prop. Driveway
Approach	Southbound (PM Peak Hour)
Design Speed Limit - MPH	35
Percent of left-turns in advancing volume (V_A), %:	2%
Advancing volume (V_A), veh/h:	575
Opposing volume (V_O), veh/h:	558

CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

PLOT - LINE 1	PLOT - LINE 2
0	575
575	558



OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	695
Guidance for determining the need for a major-road left-turn bay: Southbound (PM Peak Hour) Left-turn treatment NOT warranted at Harris Hill Road @ Prop. Driveway In	

P 0.0225
 f = 0.79
Wait Time 2.552 s
Service Rate 813 veh/h
Arrival Rate 695 veh/h

V_O	Time tw	V_O	Serv. rate
0	0.0	0	1200
100	0.4	100	1121
200	0.8	200	1046
300	1.2	300	976
400	1.7	400	910
500	2.2	500	848
600	2.8	600	789
700	3.5	700	735
800	4.2	800	683
900	5.0	900	635
1000	5.8	1000	590

% LT veh.	2%	10%	15%	20%	40%
V_O	V_A	V_A	V_A	V_A	V_A
0	1292	616	517	462	377
100	1144	545	458	409	334
200	1019	485	408	364	297
300	912	434	365	326	266
400	819	390	328	293	239
500	738	351	295	264	215
600	666	317	267	238	194
700	602	287	241	215	176
800	545	260	218	195	159
900	495	236	198	177	144
1000	449	214	180	160	131

APPENDIX C: LOS CALCULATIONS – EXISTING CONDITIONS

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	34	1	9	5	0	2	4	745	1	4	845	37
Future Vol, veh/h	34	1	9	5	0	2	4	745	1	4	845	37
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, %	-	-5	-	-	9	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	6	0	0	0	0	0	25	4	0	0	5	0
Mvmt Flow	37	1	10	5	0	2	4	801	1	4	909	40

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1346	1748	474	1274	1767	401	948	0	0	802	0	0
Stage 1	937	937	-	810	810	-	-	-	-	-	-	-
Stage 2	409	811	-	463	957	-	-	-	-	-	-	-
Critical Hdwy	6.62	5.5	6.4	9.3	8.3	7.8	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	5.62	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.62	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.56	4	3.3	3.5	4	3.3	2.45	-	-	2.2	-	-
Pot Cap-1 Maneuver	154	141	579	67	35	547	594	-	-	830	-	-
Stage 1	359	449	-	230	264	-	-	-	-	-	-	-
Stage 2	649	496	-	439	210	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	151	139	579	64	34	547	594	-	-	830	-	-
Mov Cap-2 Maneuver	151	139	-	64	34	-	-	-	-	-	-	-
Stage 1	357	446	-	227	262	-	-	-	-	-	-	-
Stage 2	641	491	-	427	208	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v32.55		50.99	0.16	0.1
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	19	-	-	177	86	15	-
HCM Lane V/C Ratio	0.007	-	-	0.267	0.088	0.005	-
HCM Control Delay (s/veh)	11.1	0.1	-	32.5	51	9.4	0.1
HCM Lane LOS	B	A	-	D	F	A	A
HCM 95th %tile Q(veh)	0	-	-	1	0.3	0	-

HCM 7th TWSC
2: Ridge Road & Old Indian Road

2024 Existing Weekday (Thursday)
06/19/2024

Intersection						
Int Delay, s/veh	2.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	34	11	11	30	16	10
Future Vol, veh/h	34	11	11	30	16	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	10	-	-	-5	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	3	9	0	0	25	0
Mvmt Flow	44	14	14	39	21	13

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	58	0	119
Stage 1	-	-	-	-	51
Stage 2	-	-	-	-	68
Critical Hdwy	-	-	4.1	-	6.65
Critical Hdwy Stg 1	-	-	-	-	5.65
Critical Hdwy Stg 2	-	-	-	-	5.65
Follow-up Hdwy	-	-	2.2	-	3.725
Pot Cap-1 Maneuver	-	-	1558	-	825
Stage 1	-	-	-	-	916
Stage 2	-	-	-	-	900
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1558	-	817
Mov Cap-2 Maneuver	-	-	-	-	817
Stage 1	-	-	-	-	916
Stage 2	-	-	-	-	892

Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.97	9.23
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	885	-	-	483	-
HCM Lane V/C Ratio	0.038	-	-	0.009	-
HCM Control Delay (s/veh)	9.2	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	1	93	0	1	93
Future Vol, veh/h	0	1	93	0	1	93
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	90	90	90	90	90	90
Heavy Vehicles, %	0	100	5	0	0	7
Mvmt Flow	0	1	103	0	1	103

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	209	103	0	0	103
Stage 1	103	-	-	-	-
Stage 2	106	-	-	-	-
Critical Hdwy	6.4	7.2	-	-	4.1
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	4.2	-	-	2.2
Pot Cap-1 Maneuver	784	740	-	-	1501
Stage 1	926	-	-	-	-
Stage 2	924	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	783	740	-	-	1501
Mov Cap-2 Maneuver	783	-	-	-	-
Stage 1	926	-	-	-	-
Stage 2	923	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	9.87	0	0.08
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	740	19
HCM Lane V/C Ratio	-	-	0.002	0.001
HCM Control Delay (s/veh)	-	-	9.9	7.4
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

Intersection

Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	31	7	0	47	22	6	64	0	19	68	21
Future Vol, veh/h	24	31	7	0	47	22	6	64	0	19	68	21
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	0	13	0	0	0	12	0	3	0	11	6	0
Mvmt Flow	26	33	7	0	50	23	6	68	0	20	72	22
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, s/veh	7.8	7.6	7.8	8.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	39%	0%	18%
Vol Thru, %	91%	50%	68%	63%
Vol Right, %	0%	11%	32%	19%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	70	62	69	108
LT Vol	6	24	0	19
Through Vol	64	31	47	68
RT Vol	0	7	22	21
Lane Flow Rate	74	66	73	115
Geometry Grp	1	1	1	1
Degree of Util (X)	0.09	0.081	0.086	0.141
Departure Headway (Hd)	4.355	4.421	4.215	4.41
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	825	813	852	818
Service Time	2.368	2.435	2.228	2.41
HCM Lane V/C Ratio	0.09	0.081	0.086	0.141
HCM Control Delay, s/veh	7.8	7.8	7.6	8.1
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.3	0.3	0.3	0.5

HCM 7th TWSC
8: Plattekill Road Bend & Plattekill Road

2024 Existing Weekday (Thursday)
06/19/2024

Intersection						
Int Delay, s/veh	3.4					
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	50	0	45	69	0	41
Future Vol, veh/h	50	0	45	69	0	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	12	0	4	2	0	2
Mvmt Flow	53	0	48	73	0	44

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	53	0	222	53
Stage 1	-	-	-	-	53	-
Stage 2	-	-	-	-	169	-
Critical Hdwy	-	-	4.14	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.236	-	3.5	3.318
Pot Cap-1 Maneuver	-	-	1540	-	770	1014
Stage 1	-	-	-	-	974	-
Stage 2	-	-	-	-	865	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1540	-	745	1014
Mov Cap-2 Maneuver	-	-	-	-	745	-
Stage 1	-	-	-	-	974	-
Stage 2	-	-	-	-	837	-

Approach	EB	WB	NE
HCM Control Delay, s/v	0	2.93	8.71
HCM LOS			A

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1014	-	-	711	-
HCM Lane V/C Ratio	0.043	-	-	0.031	-
HCM Control Delay (s/veh)	8.7	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

HCM 7th TWSC
9: Lattintown Road & Plattekill Road Bend

2024 Existing Weekday (Thursday)
06/19/2024

Intersection

Int Delay, s/veh 1.9

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	70	41	0	75	45	0
Future Vol, veh/h	70	41	0	75	45	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	0	0	5	4	0
Mvmt Flow	74	44	0	80	48	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	118
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1483
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1483
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	NB	SB	SW
HCM Control Delay, s/v	0	0	9.73
HCM LOS			A

Minor Lane/Major Mvmt	NBT	NBR	SBL	SBT	SWLn1
Capacity (veh/h)	-	-	1483	-	809
HCM Lane V/C Ratio	-	-	-	-	0.059
HCM Control Delay (s/veh)	-	-	0	-	9.7
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0.2

Intersection						
Int Delay, s/veh	5					
Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑	↑		↓	↓
Traffic Vol, veh/h	0	754	740	0	83	69
Future Vol, veh/h	0	754	740	0	83	69
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	5	0	0	2
Mvmt Flow	0	794	779	0	87	73

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	-	0	-	0	1573 779
Stage 1	-	-	-	-	779 -
Stage 2	-	-	-	-	794 -
Critical Hdwy	-	-	-	-	6.4 6.22
Critical Hdwy Stg 1	-	-	-	-	5.4 -
Critical Hdwy Stg 2	-	-	-	-	5.4 -
Follow-up Hdwy	-	-	-	-	3.5 3.318
Pot Cap-1 Maneuver	0	-	-	0	123 396
Stage 1	0	-	-	0	456 -
Stage 2	0	-	-	0	449 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	123 396
Mov Cap-2 Maneuver	-	-	-	-	123 -
Stage 1	-	-	-	-	456 -
Stage 2	-	-	-	-	449 -

Approach	NB	SB	SE
HCM Control Delay, s/v	0	0	54.44
HCM LOS			F

Minor Lane/Major Mvmt	NBT	SELn1	SELn2	SBT
Capacity (veh/h)	-	123	396	-
HCM Lane V/C Ratio	-	0.713	0.183	-
HCM Control Delay (s/veh)	-	86.3	16.1	-
HCM Lane LOS	-	F	C	-
HCM 95th %tile Q(veh)	-	3.9	0.7	-

Intersection						
Int Delay, s/veh	2.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	30	71	871	839	46
Future Vol, veh/h	23	30	71	871	839	46
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	94	94	94	94	94	94
Heavy Vehicles, %	0	9	1	3	4	4
Mvmt Flow	24	32	76	927	893	49

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1995	917	941	0	-	0
Stage 1	917	-	-	-	-	-
Stage 2	1078	-	-	-	-	-
Critical Hdwy	6.4	6.29	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.381	2.209	-	-	-
Pot Cap-1 Maneuver	67	320	732	-	-	-
Stage 1	393	-	-	-	-	-
Stage 2	330	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	53	320	732	-	-	-
Mov Cap-2 Maneuver	53	-	-	-	-	-
Stage 1	309	-	-	-	-	-
Stage 2	330	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	79.46	0.79	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	136	-	100	-	-
HCM Lane V/C Ratio	0.103	-	0.562	-	-
HCM Control Delay (s/veh)	10.5	0	79.5	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	2.6	-	-

Intersection												
Int Delay, s/veh	0.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	29	1	0	4	0	2	0	744	0	4	538	35
Future Vol, veh/h	29	1	0	4	0	2	0	744	0	4	538	35
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, %	-	-5	-	-	9	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	2	0
Mvmt Flow	32	1	0	4	0	2	0	809	0	4	585	38

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1017	1421	311	1110	1440	404	623	0	0	809	0	0
Stage 1	612	612	-	809	809	-	-	-	-	-	-	-
Stage 2	404	809	-	302	632	-	-	-	-	-	-	-
Critical Hdwy	6.5	5.5	6.4	9.3	8.3	7.8	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.5	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.5	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	258	204	721	96	65	544	968	-	-	826	-	-
Stage 1	535	577	-	230	265	-	-	-	-	-	-	-
Stage 2	671	496	-	592	348	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	256	203	721	94	65	544	968	-	-	826	-	-
Mov Cap-2 Maneuver	256	203	-	94	65	-	-	-	-	-	-	-
Stage 1	532	573	-	230	265	-	-	-	-	-	-	-
Stage 2	668	496	-	587	346	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	21.3		34.08		0		0.12	
HCM LOS	C		D					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	968	-	-	253 130	23	-	-
HCM Lane V/C Ratio	-	-	-	0.129 0.05	0.005	-	-
HCM Control Delay (s/veh)	0	-	-	21.3 34.1	9.4	0.1	-
HCM Lane LOS	A	-	-	C D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4 0.2	0	-	-

HCM 7th TWSC
2: Ridge Road & Old Indian Road

2024 Existing Weekend (Saturday)
06/19/2024

Intersection

Int Delay, s/veh 2.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	32	2	13	27	10	9
Future Vol, veh/h	32	2	13	27	10	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	10	-	-	-5	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	50	0	4	0	0
Mvmt Flow	37	2	15	31	12	10

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	40
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1583
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1583
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	2.37	8.85
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	958	-	-	585	-
HCM Lane V/C Ratio	0.023	-	-	0.01	-
HCM Control Delay (s/veh)	8.8	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 7th TWSC
5: Lattintown Road & St. Hubert's Lodge

2024 Existing Weekend (Saturday)
06/19/2024

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	1	86	0	0	91
Future Vol, veh/h	0	1	86	0	0	91
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	90	90	90	90	90	90
Heavy Vehicles, %	0	0	2	0	0	1
Mvmt Flow	0	1	96	0	0	101

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	197	96	0	0	96
Stage 1	96	-	-	-	-
Stage 2	101	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2
Pot Cap-1 Maneuver	797	966	-	-	1511
Stage 1	933	-	-	-	-
Stage 2	928	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	797	966	-	-	1511
Mov Cap-2 Maneuver	797	-	-	-	-
Stage 1	933	-	-	-	-
Stage 2	928	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	8.73	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	966	1511
HCM Lane V/C Ratio	-	-	0.001	-
HCM Control Delay (s/veh)	-	-	8.7	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	30	1	0	28	15	2	101	0	17	62	21
Future Vol, veh/h	20	30	1	0	28	15	2	101	0	17	62	21
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	5	10	100	0	0	0	0	0	0	0	2	5
Mvmt Flow	24	37	1	0	34	18	2	123	0	21	76	26
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, s/veh	8.1	7.6	8.1	7.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	2%	39%	0%	17%
Vol Thru, %	98%	59%	65%	62%
Vol Right, %	0%	2%	35%	21%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	103	51	43	100
LT Vol	2	20	0	17
Through Vol	101	30	28	62
RT Vol	0	1	15	21
Lane Flow Rate	126	62	52	122
Geometry Grp	1	1	1	1
Degree of Util (X)	0.15	0.08	0.063	0.143
Departure Headway (Hd)	4.298	4.657	4.31	4.208
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	838	771	833	855
Service Time	2.309	2.674	2.327	2.219
HCM Lane V/C Ratio	0.15	0.08	0.062	0.143
HCM Control Delay, s/veh	8.1	8.1	7.6	7.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.3	0.2	0.5

Intersection						
Int Delay, s/veh	3.1					
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	47	0	29	43	0	27
Future Vol, veh/h	47	0	29	43	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	6	0	3	0	0	4
Mvmt Flow	57	0	35	52	0	33
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	57	0	180	57
Stage 1	-	-	-	-	57	-
Stage 2	-	-	-	-	123	-
Critical Hdwy	-	-	4.13	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.227	-	3.5	3.336
Pot Cap-1 Maneuver	-	-	1541	-	814	1003
Stage 1	-	-	-	-	970	-
Stage 2	-	-	-	-	907	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1541	-	794	1003
Mov Cap-2 Maneuver	-	-	-	-	794	-
Stage 1	-	-	-	-	970	-
Stage 2	-	-	-	-	886	-
Approach	EB		WB		NE	
HCM Control Delay, s/v	0		2.98		8.71	
HCM LOS	A					
Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	1003	-	-	725	-	
HCM Lane V/C Ratio	0.033	-	-	0.023	-	
HCM Control Delay (s/veh)	8.7	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-	

HCM 7th TWSC
9: Lattintown Road & Plattekill Road Bend

2024 Existing Weekend (Saturday)
06/19/2024

Intersection

Int Delay, s/veh 1.3

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	103	27	0	63	29	0
Future Vol, veh/h	103	27	0	63	29	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	4	0	3	3	0
Mvmt Flow	126	33	0	77	35	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	159
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1433
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1433
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	NB	SB	SW
HCM Control Delay, s/v	0	0	9.92
HCM LOS			A

Minor Lane/Major Mvmt	NBT	NBR	SBL	SBT	SWLn1
Capacity (veh/h)	-	-	1433	-	767
HCM Lane V/C Ratio	-	-	-	-	0.046
HCM Control Delay (s/veh)	-	-	0	-	9.9
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Intersection

Int Delay, s/veh 3

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑	↑		↓	↓
Traffic Vol, veh/h	0	731	455	0	86	70
Future Vol, veh/h	0	731	455	0	86	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	2	2	0	1
Mvmt Flow	0	761	474	0	90	73

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	-	0	0 1235 474
Stage 1	-	-	- 474 -
Stage 2	-	-	- 761 -
Critical Hdwy	-	-	- 6.4 6.21
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	-	-	- 3.5 3.309
Pot Cap-1 Maneuver	0	-	0 197 593
Stage 1	0	-	0 631 -
Stage 2	0	-	0 465 -
Platoon blocked, %	-	-	
Mov Cap-1 Maneuver	-	-	- 197 593
Mov Cap-2 Maneuver	-	-	- 197 -
Stage 1	-	-	- 631 -
Stage 2	-	-	- 465 -

Approach	NB	SB	SE
HCM Control Delay, s/v	0	0	26.19
HCM LOS			D

Minor Lane/Major Mvmt	NBT	SELn1	SELn2	SBT
Capacity (veh/h)	-	197	593	-
HCM Lane V/C Ratio	-	0.456	0.123	-
HCM Control Delay (s/veh)	-	37.8	11.9	-
HCM Lane LOS	-	E	B	-
HCM 95th %tile Q(veh)	-	2.2	0.4	-

Intersection

Int Delay, s/veh 1.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	42	75	795	636	27
Future Vol, veh/h	12	42	75	795	636	27
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	97	97	97	97	97	97
Heavy Vehicles, %	8	0	0	2	3	7
Mvmt Flow	12	43	77	820	656	28

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1644	670	684
Stage 1	670	-	-
Stage 2	974	-	-
Critical Hdwy	6.48	6.2	4.1
Critical Hdwy Stg 1	5.48	-	-
Critical Hdwy Stg 2	5.48	-	-
Follow-up Hdwy	3.572	3.3	2.2
Pot Cap-1 Maneuver	106	461	919
Stage 1	498	-	-
Stage 2	357	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	90	461	919
Mov Cap-2 Maneuver	90	-	-
Stage 1	421	-	-
Stage 2	357	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v24.47		0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	155	-	240	-	-
HCM Lane V/C Ratio	0.084	-	0.232	-	-
HCM Control Delay (s/veh)	9.3	0	24.5	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.9	-	-

3: Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	All
Movements Served	TR	LT	LR	
Denied Delay (hr)				0.0
Denied Del/Veh (s)				0.1
Total Delay (hr)	0.0	0.1	0.1	0.2
Total Del/Veh (s)	1.2	6.2	3.7	2.9
Stop Delay (hr)	0.0	0.0	0.1	0.1
Stop Del/Veh (s)	0.2	2.6	2.1	1.3

4: Sonny Weed's/Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Delay (hr)					0.0
Denied Del/Veh (s)					0.1
Total Delay (hr)	0.0	0.1	0.0	0.1	0.2
Total Del/Veh (s)	5.8	1.8	2.0	3.9	2.9
Stop Delay (hr)	0.0	0.0	0.0	0.1	0.1
Stop Del/Veh (s)	2.8	0.3	2.2	2.1	1.2

10: US-9W & Western Avenue Performance by lane

Lane	NB	SB	All
Movements Served	LT	TR	
Denied Delay (hr)			0.2
Denied Del/Veh (s)			0.5
Total Delay (hr)	2.4	0.8	3.2
Total Del/Veh (s)	10.2	3.1	6.4
Stop Delay (hr)	1.5	0.0	1.5
Stop Del/Veh (s)	6.6	0.0	3.1

Total Zone Performance

Denied Delay (hr)	0.3
Denied Del/Veh (s)	0.8
Total Delay (hr)	3.5
Total Del/Veh (s)	747.4
Stop Delay (hr)	1.7
Stop Del/Veh (s)	358.7

Queuing and Blocking Report
2024 Existing Weekday (Thursday)

06/19/2024

Intersection: 3: Lattintown Road & Old Indian Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	63	56
Average Queue (ft)	23	29
95th Queue (ft)	52	45
Link Distance (ft)	992	630
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Sonny Weed's/Lattintown Road & Old Indian Road

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	57	14	64
Average Queue (ft)	9	1	31
95th Queue (ft)	35	7	52
Link Distance (ft)	542	545	944
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: US-9W & Western Avenue

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (ft)	229	24
Average Queue (ft)	158	2
95th Queue (ft)	271	13
Link Distance (ft)	216	634
Upstream Blk Time (%)	7	
Queuing Penalty (veh)	57	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 57

3: Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	All
Movements Served	TR	LT	LR	
Denied Delay (hr)				0.0
Denied Del/Veh (s)				0.1
Total Delay (hr)	0.0	0.1	0.1	0.2
Total Del/Veh (s)	1.0	5.8	3.3	2.8
Stop Delay (hr)	0.0	0.0	0.0	0.1
Stop Del/Veh (s)	0.2	2.7	2.0	1.4

4: Sonny Weed's/Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Delay (hr)					0.0
Denied Del/Veh (s)					0.1
Total Delay (hr)	0.0	0.0	0.0	0.1	0.1
Total Del/Veh (s)	5.0	1.6	2.0	3.6	2.8
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.1
Stop Del/Veh (s)	2.6	0.2	2.2	2.0	1.2

10: US-9W & Western Avenue Performance by lane

Lane	NB	SB	All
Movements Served	LT	TR	
Denied Delay (hr)			0.1
Denied Del/Veh (s)			0.2
Total Delay (hr)	0.5	0.2	0.8
Total Del/Veh (s)	2.4	1.4	2.0
Stop Delay (hr)	0.2	0.0	0.2
Stop Del/Veh (s)	0.8	0.0	0.5

Total Zone Performance

Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.4
Total Delay (hr)	1.1
Total Del/Veh (s)	223.5
Stop Delay (hr)	0.3
Stop Del/Veh (s)	68.1

Queuing and Blocking Report

2024 Existing Weekend (Saturday)

06/19/2024

Intersection: 3: Lattintown Road & Old Indian Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	49	54
Average Queue (ft)	24	28
95th Queue (ft)	49	43
Link Distance (ft)	992	630
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Sonny Weed's/Lattintown Road & Old Indian Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	30	4	15	60
Average Queue (ft)	11	0	1	27
95th Queue (ft)	34	3	8	46
Link Distance (ft)	542	912	545	944
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 10: US-9W & Western Avenue

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (ft)	178	28
Average Queue (ft)	57	1
95th Queue (ft)	146	11
Link Distance (ft)	216	634
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	1	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 1

APPENDIX D: LOS CALCULATIONS – BACKGROUND CONDITIONS

Intersection												
Int Delay, s/veh	1.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	35	1	9	5	0	2	4	789	1	4	901	38
Future Vol, veh/h	35	1	9	5	0	2	4	789	1	4	901	38
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, %	-	-5	-	-	9	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	6	0	0	0	0	0	25	4	0	0	5	0
Mvmt Flow	38	1	10	5	0	2	4	848	1	4	969	41

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1431	1856	505	1351	1876	425	1010	0	0	849	0	0
Stage 1	998	998	-	858	858	-	-	-	-	-	-	-
Stage 2	433	858	-	494	1018	-	-	-	-	-	-	-
Critical Hdwy	6.62	5.5	6.4	9.3	8.3	7.8	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	5.62	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.62	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.56	4	3.3	3.5	4	3.3	2.45	-	-	2.2	-	-
Pot Cap-1 Maneuver	136	125	555	56	28	525	559	-	-	797	-	-
Stage 1	335	428	-	210	245	-	-	-	-	-	-	-
Stage 2	632	478	-	415	191	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	133	123	555	54	28	525	559	-	-	797	-	-
Mov Cap-2 Maneuver	133	123	-	54	28	-	-	-	-	-	-	-
Stage 1	333	425	-	208	243	-	-	-	-	-	-	-
Stage 2	624	473	-	404	189	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v37.92		60.31	0.17	0.11
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	18	-	-	157 73	14	-	-
HCM Lane V/C Ratio	0.008	-	-	0.309 0.104	0.005	-	-
HCM Control Delay (s/veh)	11.5	0.1	-	37.9 60.3	9.5	0.1	-
HCM Lane LOS	B	A	-	E F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.2 0.3	0	-	-

Intersection						
Int Delay, s/veh	2.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	35	11	11	31	17	10
Future Vol, veh/h	35	11	11	31	17	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	10	-	-	-5	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	3	9	0	0	25	0
Mvmt Flow	45	14	14	40	22	13

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	60	0	121
Stage 1	-	-	-	-	53
Stage 2	-	-	-	-	69
Critical Hdwy	-	-	4.1	-	6.65
Critical Hdwy Stg 1	-	-	-	-	5.65
Critical Hdwy Stg 2	-	-	-	-	5.65
Follow-up Hdwy	-	-	2.2	-	3.725
Pot Cap-1 Maneuver	-	-	1557	-	822
Stage 1	-	-	-	-	914
Stage 2	-	-	-	-	899
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1557	-	814
Mov Cap-2 Maneuver	-	-	-	-	814
Stage 1	-	-	-	-	914
Stage 2	-	-	-	-	890

Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.92	9.26
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	880	-	-	471	-
HCM Lane V/C Ratio	0.04	-	-	0.009	-
HCM Control Delay (s/veh)	9.3	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	1	97	0	1	97
Future Vol, veh/h	0	1	97	0	1	97
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	90	90	90	90	90	90
Heavy Vehicles, %	0	100	5	0	0	7
Mvmt Flow	0	1	108	0	1	108

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	218	108	0
Stage 1	108	-	-
Stage 2	110	-	-
Critical Hdwy	6.4	7.2	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	4.2	-
Pot Cap-1 Maneuver	775	735	-
Stage 1	922	-	-
Stage 2	920	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	774	735	-
Mov Cap-2 Maneuver	774	-	-
Stage 1	922	-	-
Stage 2	919	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	9.9	0	0.08
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	735	18
HCM Lane V/C Ratio	-	-	0.002	0.001
HCM Control Delay (s/veh)	-	-	9.9	7.4
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	25	32	7	0	49	23	6	66	0	20	71	22
Future Vol, veh/h	25	32	7	0	49	23	6	66	0	20	71	22
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	0	13	0	0	0	12	0	3	0	11	6	0
Mvmt Flow	27	34	7	0	52	24	6	70	0	21	76	23
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, s/veh	7.9	7.7	7.8	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	39%	0%	18%
Vol Thru, %	92%	50%	68%	63%
Vol Right, %	0%	11%	32%	19%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	72	64	72	113
LT Vol	6	25	0	20
Through Vol	66	32	49	71
RT Vol	0	7	23	22
Lane Flow Rate	77	68	77	120
Geometry Grp	1	1	1	1
Degree of Util (X)	0.093	0.084	0.09	0.148
Departure Headway (Hd)	4.375	4.447	4.237	4.427
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	822	808	848	815
Service Time	2.388	2.461	2.25	2.427
HCM Lane V/C Ratio	0.094	0.084	0.091	0.147
HCM Control Delay, s/veh	7.8	7.9	7.7	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.3	0.3	0.3	0.5

HCM 7th TWSC
8: Plattekill Road Bend & Plattekill Road

2029 Background Weekday (Thursday)

07/16/2024

Intersection						
Int Delay, s/veh	3.4					
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	52	0	47	72	0	43
Future Vol, veh/h	52	0	47	72	0	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	12	0	4	2	0	2
Mvmt Flow	55	0	50	77	0	46

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	55	0	232	55
Stage 1	-	-	-	-	55	-
Stage 2	-	-	-	-	177	-
Critical Hdwy	-	-	4.14	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.236	-	3.5	3.318
Pot Cap-1 Maneuver	-	-	1537	-	761	1011
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	859	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1537	-	735	1011
Mov Cap-2 Maneuver	-	-	-	-	735	-
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	830	-

Approach	EB	WB	NE
HCM Control Delay, s/v	0	2.93	8.73
HCM LOS			A

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1011	-	-	711	-
HCM Lane V/C Ratio	0.045	-	-	0.033	-
HCM Control Delay (s/veh)	8.7	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection						
Int Delay, s/veh	1.9					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	73	43	0	78	47	0
Future Vol, veh/h	73	43	0	78	47	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	0	0	5	4	0
Mvmt Flow	78	46	0	83	50	0
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	123	0	184	101
Stage 1	-	-	-	-	101	-
Stage 2	-	-	-	-	83	-
Critical Hdwy	-	-	4.1	-	6.44	6.2
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.2	-	3.536	3.3
Pot Cap-1 Maneuver	-	-	1476	-	801	960
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	935	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1476	-	801	960
Mov Cap-2 Maneuver	-	-	-	-	801	-
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	935	-
Approach	NB	SB		SW		
HCM Control Delay, s/v	0	0		9.79		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBR	SBL	SBT	SWLn1	
Capacity (veh/h)	-	-	1476	-	801	
HCM Lane V/C Ratio	-	-	-	-	0.062	
HCM Control Delay (s/veh)	-	-	0	-	9.8	
HCM Lane LOS	-	-	A	-	A	
HCM 95th %tile Q(veh)	-	-	0	-	0.2	

Intersection						
Int Delay, s/veh	9.5					
Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑	↑		↑	↑
Traffic Vol, veh/h	0	817	790	0	97	72
Future Vol, veh/h	0	817	790	0	97	72
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	5	0	0	2
Mvmt Flow	0	860	832	0	102	76
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	-	0	-	0	1692	832
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	860	-
Critical Hdwy	-	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	0	-	-	0	104	369
Stage 1	0	-	-	0	431	-
Stage 2	0	-	-	0	418	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	-	104	369
Mov Cap-2 Maneuver	-	-	-	-	104	-
Stage 1	-	-	-	-	431	-
Stage 2	-	-	-	-	418	-
Approach	NB	SB		SE		
HCM Control Delay, s/v	0	0		99.54		
HCM LOS				F		
Minor Lane/Major Mvmt	NBT	SELn1	SELn2	SBT		
Capacity (veh/h)	-	104	369	-		
HCM Lane V/C Ratio	-	0.985	0.205	-		
HCM Control Delay (s/veh)	-	160.6	17.3	-		
HCM Lane LOS	-	F	C	-		
HCM 95th %tile Q(veh)	-	6.1	0.8	-		

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	24	31	74	938	893	48
Future Vol, veh/h	24	31	74	938	893	48
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	94	94	94	94	94	94
Heavy Vehicles, %	0	9	1	3	4	4
Mvmt Flow	26	33	79	998	950	51
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	2131	976	1001	0	-	0
Stage 1	976	-	-	-	-	-
Stage 2	1155	-	-	-	-	-
Critical Hdwy	6.4	6.29	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.381	2.209	-	-	-
Pot Cap-1 Maneuver	55	296	696	-	-	-
Stage 1	369	-	-	-	-	-
Stage 2	303	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	41	296	696	-	-	-
Mov Cap-2 Maneuver	41	-	-	-	-	-
Stage 1	275	-	-	-	-	-
Stage 2	303	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/veh	25.53	0.79		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	132	-	80	-	-	
HCM Lane V/C Ratio	0.113	-	0.732	-	-	
HCM Control Delay (s/veh)	10.8	0	125.5	-	-	
HCM Lane LOS	B	A	F	-	-	
HCM 95th %tile Q(veh)	0.4	-	3.5	-	-	

Intersection												
Int Delay, s/veh	0.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	30	1	0	4	0	2	0	790	0	4	576	36
Future Vol, veh/h	30	1	0	4	0	2	0	790	0	4	576	36
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, %	-	-5	-	-	9	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	2	0
Mvmt Flow	33	1	0	4	0	2	0	859	0	4	626	39

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1084	1513	333	1181	1533	429	665	0	0	859	0	0
Stage 1	654	654	-	859	859	-	-	-	-	-	-	-
Stage 2	429	859	-	322	674	-	-	-	-	-	-	-
Critical Hdwy	6.5	5.5	6.4	9.3	8.3	7.8	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.5	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.5	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	235	184	701	82	55	521	934	-	-	791	-	-
Stage 1	512	559	-	209	245	-	-	-	-	-	-	-
Stage 2	653	477	-	570	326	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	233	183	701	81	54	521	934	-	-	791	-	-
Mov Cap-2 Maneuver	233	183	-	81	54	-	-	-	-	-	-	-
Stage 1	508	555	-	209	245	-	-	-	-	-	-	-
Stage 2	650	477	-	565	324	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v23.27		38.96	0	0.12
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	934	-	-	231 112	22	-	-
HCM Lane V/C Ratio	-	-	-	0.146 0.058	0.005	-	-
HCM Control Delay (s/veh)	0	-	-	23.3 39	9.6	0.1	-
HCM Lane LOS	A	-	-	C E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.5 0.2	0	-	-

HCM 7th TWSC
2: Ridge Road & Old Indian Road

2029 Background Weekend (Saturday)
07/16/2024

Intersection						
Int Delay, s/veh	2.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	33	2	13	28	10	9
Future Vol, veh/h	33	2	13	28	10	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	10	-	-	-5	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	50	0	4	0	0
Mvmt Flow	38	2	15	33	12	10
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	41	0	102	40
Stage 1	-	-	-	-	40	-
Stage 2	-	-	-	-	63	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1582	-	901	1038
Stage 1	-	-	-	-	988	-
Stage 2	-	-	-	-	965	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1582	-	892	1038
Mov Cap-2 Maneuver	-	-	-	-	892	-
Stage 1	-	-	-	-	988	-
Stage 2	-	-	-	-	956	-
Approach	EB	WB		NB		
HCM Control Delay, s/v	0	2.31		8.86		
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	956	-	-	571	-	
HCM Lane V/C Ratio	0.023	-	-	0.01	-	
HCM Control Delay (s/veh)	8.9	-	-	7.3	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

HCM 7th TWSC
5: Lattintown Road & St. Hubert's Lodge

2029 Background Weekend (Saturday)
07/16/2024

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	1	89	0	0	94
Future Vol, veh/h	0	1	89	0	0	94
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	90	90	90	90	90	90
Heavy Vehicles, %	0	0	2	0	0	1
Mvmt Flow	0	1	99	0	0	104

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	203	99	0	0	99
Stage 1	99	-	-	-	-
Stage 2	104	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2
Pot Cap-1 Maneuver	790	962	-	-	1507
Stage 1	930	-	-	-	-
Stage 2	925	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	790	962	-	-	1507
Mov Cap-2 Maneuver	790	-	-	-	-
Stage 1	930	-	-	-	-
Stage 2	925	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	8.74	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	962	1507
HCM Lane V/C Ratio	-	-	0.001	-
HCM Control Delay (s/veh)	-	-	8.7	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	31	1	0	29	16	2	105	0	18	64	22
Future Vol, veh/h	21	31	1	0	29	16	2	105	0	18	64	22
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	5	10	100	0	0	0	0	0	0	0	2	5
Mvmt Flow	26	38	1	0	35	20	2	128	0	22	78	27
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, s/veh	8.1	7.7	8.1	8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	2%	40%	0%	17%
Vol Thru, %	98%	58%	64%	62%
Vol Right, %	0%	2%	36%	21%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	107	53	45	104
LT Vol	2	21	0	18
Through Vol	105	31	29	64
RT Vol	0	1	16	22
Lane Flow Rate	130	65	55	127
Geometry Grp	1	1	1	1
Degree of Util (X)	0.156	0.084	0.066	0.149
Departure Headway (Hd)	4.317	4.686	4.335	4.228
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	834	767	829	851
Service Time	2.328	2.701	2.35	2.238
HCM Lane V/C Ratio	0.156	0.085	0.066	0.149
HCM Control Delay, s/veh	8.1	8.1	7.7	8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.3	0.2	0.5

HCM 7th TWSC
8: Plattekill Road Bend & Plattekill Road

2029 Background Weekend (Saturday)

07/16/2024

Intersection						
Int Delay, s/veh	3.1					
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	49	0	30	45	0	28
Future Vol, veh/h	49	0	30	45	0	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	6	0	3	0	0	4
Mvmt Flow	60	0	37	55	0	34
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	60	0	188	60
Stage 1	-	-	-	-	60	-
Stage 2	-	-	-	-	128	-
Critical Hdwy	-	-	4.13	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.227	-	3.5	3.336
Pot Cap-1 Maneuver	-	-	1537	-	806	1000
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	903	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1537	-	786	1000
Mov Cap-2 Maneuver	-	-	-	-	786	-
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	881	-
Approach	EB		WB		NE	
HCM Control Delay, s/v	0		2.96		8.73	
HCM LOS	A					
Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	1000	-	-	720	-	
HCM Lane V/C Ratio	0.034	-	-	0.024	-	
HCM Control Delay (s/veh)	8.7	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-	

Intersection						
Int Delay, s/veh	1.3					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	107	28	0	65	30	0
Future Vol, veh/h	107	28	0	65	30	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	4	0	3	3	0
Mvmt Flow	130	34	0	79	37	0
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	165	0	227	148
Stage 1	-	-	-	-	148	-
Stage 2	-	-	-	-	79	-
Critical Hdwy	-	-	4.1	-	6.43	6.2
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.2	-	3.527	3.3
Pot Cap-1 Maneuver	-	-	1426	-	759	905
Stage 1	-	-	-	-	878	-
Stage 2	-	-	-	-	941	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1426	-	759	905
Mov Cap-2 Maneuver	-	-	-	-	759	-
Stage 1	-	-	-	-	878	-
Stage 2	-	-	-	-	941	-
Approach	NB	SB		SW		
HCM Control Delay, s/v	0	0		9.98		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBR	SBL	SBT	SWLn1	
Capacity (veh/h)	-	-	1426	-	759	
HCM Lane V/C Ratio	-	-	-	-	0.048	
HCM Control Delay (s/veh)	-	-	0	-	10	
HCM Lane LOS	-	-	A	-	A	
HCM 95th %tile Q(veh)	-	-	0	-	0.2	

Intersection						
Int Delay, s/veh	4.2					
Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑	↑		↓	↓
Traffic Vol, veh/h	0	784	497	0	98	73
Future Vol, veh/h	0	784	497	0	98	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	2	2	0	1
Mvmt Flow	0	817	518	0	102	76
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	-	0	-	0	1334	518
Stage 1	-	-	-	-	518	-
Stage 2	-	-	-	-	817	-
Critical Hdwy	-	-	-	-	6.4	6.21
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	3.309
Pot Cap-1 Maneuver	0	-	-	0	171	560
Stage 1	0	-	-	0	602	-
Stage 2	0	-	-	0	438	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	171	560
Mov Cap-2 Maneuver	-	-	-	-	171	-
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	438	-
Approach	NB		SB		SE	
HCM Control Delay, s/v	0		0		35.7	
HCM LOS					E	
Minor Lane/Major Mvmt	NBT		SELn1	SELn2	SBT	
Capacity (veh/h)	-		171	560	-	
HCM Lane V/C Ratio	-		0.596	0.136	-	
HCM Control Delay (s/veh)	-		53	12.4	-	
HCM Lane LOS	-		F	B	-	
HCM 95th %tile Q(veh)	-		3.2	0.5	-	

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	44	78	850	685	28
Future Vol, veh/h	12	44	78	850	685	28
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	97	97	97	97	97	97
Heavy Vehicles, %	8	0	0	2	3	7
Mvmt Flow	12	45	80	876	706	29

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1758	721	735	0	-	0
Stage 1	721	-	-	-	-	-
Stage 2	1037	-	-	-	-	-
Critical Hdwy	6.48	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	90	431	879	-	-	-
Stage 1	471	-	-	-	-	-
Stage 2	333	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	74	431	879	-	-	-
Mov Cap-2 Maneuver	74	-	-	-	-	-
Stage 1	387	-	-	-	-	-
Stage 2	333	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v28.24		0.8	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	151	-	212	-	-
HCM Lane V/C Ratio	0.091	-	0.272	-	-
HCM Control Delay (s/veh)	9.5	0	28.2	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.3	-	1.1	-	-

3: Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	All
Movements Served	TR	LT	LR	
Denied Delay (hr)				0.0
Denied Del/Veh (s)				0.1
Total Delay (hr)	0.0	0.1	0.1	0.2
Total Del/Veh (s)	1.3	6.3	3.7	3.0
Stop Delay (hr)	0.0	0.0	0.1	0.1
Stop Del/Veh (s)	0.2	2.7	2.1	1.3

4: Sonny Weed's/Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Delay (hr)					0.0
Denied Del/Veh (s)					0.1
Total Delay (hr)	0.0	0.0	0.0	0.1	0.2
Total Del/Veh (s)	5.3	1.7	2.3	4.0	3.0
Stop Delay (hr)	0.0	0.0	0.0	0.1	0.1
Stop Del/Veh (s)	2.4	0.3	2.5	2.1	1.2

10: US-9W & Western Avenue Performance by lane

Lane	NB	SB	All
Movements Served	LT	TR	
Denied Delay (hr)			0.3
Denied Del/Veh (s)			0.6
Total Delay (hr)	3.2	0.9	4.1
Total Del/Veh (s)	12.9	3.4	7.9
Stop Delay (hr)	2.1	0.0	2.1
Stop Del/Veh (s)	8.6	0.0	4.1

Total Zone Performance

Denied Delay (hr)	0.3
Denied Del/Veh (s)	1.0
Total Delay (hr)	4.5
Total Del/Veh (s)	851.6
Stop Delay (hr)	2.3
Stop Del/Veh (s)	433.9

Queuing and Blocking Report
2029 Background Weekday (Thursday)

07/16/2024

Intersection: 3: Lattintown Road & Old Indian Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	69	61
Average Queue (ft)	26	30
95th Queue (ft)	55	48
Link Distance (ft)	992	630
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Sonny Weed's/Lattintown Road & Old Indian Road

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	55	19	66
Average Queue (ft)	9	1	33
95th Queue (ft)	36	7	55
Link Distance (ft)	542	545	944
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: US-9W & Western Avenue

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (ft)	230	22
Average Queue (ft)	179	2
95th Queue (ft)	292	13
Link Distance (ft)	216	634
Upstream Blk Time (%)	13	
Queuing Penalty (veh)	117	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 117

3: Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	All
Movements Served	TR	LT	LR	
Denied Delay (hr)				0.0
Denied Del/Veh (s)				0.1
Total Delay (hr)	0.0	0.1	0.1	0.2
Total Del/Veh (s)	1.0	5.9	3.6	3.0
Stop Delay (hr)	0.0	0.0	0.1	0.1
Stop Del/Veh (s)	0.2	2.7	2.1	1.5

4: Sonny Weed's/Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Delay (hr)					0.0
Denied Del/Veh (s)					0.1
Total Delay (hr)	0.0	0.0	0.0	0.1	0.1
Total Del/Veh (s)	4.8	1.6	1.2	3.6	2.6
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.1
Stop Del/Veh (s)	2.7	0.2	1.4	2.0	1.2

10: US-9W & Western Avenue Performance by lane

Lane	NB	SB	All
Movements Served	LT	TR	
Denied Delay (hr)			0.1
Denied Del/Veh (s)			0.2
Total Delay (hr)	0.8	0.3	1.1
Total Del/Veh (s)	3.1	1.7	2.5
Stop Delay (hr)	0.3	0.0	0.3
Stop Del/Veh (s)	1.2	0.0	0.7

Total Zone Performance

Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.5
Total Delay (hr)	1.4
Total Del/Veh (s)	261.6
Stop Delay (hr)	0.4
Stop Del/Veh (s)	84.1

Queuing and Blocking Report

2029 Background Weekend (Saturday)

07/16/2024

Intersection: 3: Lattintown Road & Old Indian Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	48	58
Average Queue (ft)	23	29
95th Queue (ft)	48	44
Link Distance (ft)	992	630
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Sonny Weed's/Lattintown Road & Old Indian Road

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	34	10	52
Average Queue (ft)	9	1	27
95th Queue (ft)	32	6	43
Link Distance (ft)	542	545	944
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: US-9W & Western Avenue

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (ft)	213	13
Average Queue (ft)	74	0
95th Queue (ft)	174	6
Link Distance (ft)	216	634
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	3	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 3

APPENDIX E: LOS CALCULATIONS – FULL BUILD (PROPOSED ACTION)

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	41	1	9	5	0	2	4	789	1	4	910	47
Future Vol, veh/h	41	1	9	5	0	2	4	789	1	4	910	47
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, %	-	-5	-	-	9	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	6	0	0	0	0	0	25	4	0	0	5	0
Mvmt Flow	44	1	10	5	0	2	4	848	1	4	978	51

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1445	1870	515	1356	1895	425	1029	0	0	849	0	0
Stage 1	1012	1012	-	858	858	-	-	-	-	-	-	-
Stage 2	433	858	-	498	1038	-	-	-	-	-	-	-
Critical Hdwy	6.62	5.5	6.4	9.3	8.3	7.8	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	5.62	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.62	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.56	4	3.3	3.5	4	3.3	2.45	-	-	2.2	-	-
Pot Cap-1 Maneuver	133	123	548	56	27	525	549	-	-	797	-	-
Stage 1	330	423	-	210	245	-	-	-	-	-	-	-
Stage 2	632	478	-	411	185	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	130	121	548	53	27	525	549	-	-	797	-	-
Mov Cap-2 Maneuver	130	121	-	53	27	-	-	-	-	-	-	-
Stage 1	327	420	-	208	243	-	-	-	-	-	-	-
Stage 2	623	473	-	400	184	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v42.09		60.98	0.18	0.11
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	18	-	-	150	72	14	-
HCM Lane V/C Ratio	0.008	-	-	0.365	0.105	0.005	-
HCM Control Delay (s/veh)	11.6	0.1	-	42.1	61	9.5	0.1
HCM Lane LOS	B	A	-	E	F	A	A
HCM 95th %tile Q(veh)	0	-	-	1.5	0.3	0	-

Intersection						
Int Delay, s/veh	2.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	40	14	13	38	20	11
Future Vol, veh/h	40	14	13	38	20	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	10	-	-	-5	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	3	9	0	0	25	0
Mvmt Flow	52	18	17	49	26	14
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	70	0	144	61
Stage 1	-	-	-	-	61	-
Stage 2	-	-	-	-	83	-
Critical Hdwy	-	-	4.1	-	6.65	6.2
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	-	-	2.2	-	3.725	3.3
Pot Cap-1 Maneuver	-	-	1543	-	797	1010
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	885	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1543	-	788	1010
Mov Cap-2 Maneuver	-	-	-	-	788	-
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	875	-
Approach	EB	WB		NB		
HCM Control Delay, s/v	0	1.88		9.42		
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	855	-	-	459	-	
HCM Lane V/C Ratio	0.047	-	-	0.011	-	
HCM Control Delay (s/veh)	9.4	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

Intersection						
Int Delay, s/veh	2.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	16	97	49	22	97
Future Vol, veh/h	35	16	97	49	22	97
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	90	90	90	90	90	90
Heavy Vehicles, %	0	5	5	0	0	7
Mvmt Flow	39	18	108	54	24	108

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	292	135	0
Stage 1	135	-	-
Stage 2	157	-	-
Critical Hdwy	6.4	6.25	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.345	-
Pot Cap-1 Maneuver	703	906	-
Stage 1	896	-	-
Stage 2	877	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	691	906	-
Mov Cap-2 Maneuver	691	-	-
Stage 1	896	-	-
Stage 2	861	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v10.22		0	1.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	746	333
HCM Lane V/C Ratio	-	-	0.076	0.017
HCM Control Delay (s/veh)	-	-	10.2	7.6
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1

HCM 7th TWSC
6: Ridge Road & Proposed Driveway

2029 Full Weekday (Thursday)
07/16/2024

Intersection						
Int Delay, s/veh	2.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	9	12	27	23	5
Future Vol, veh/h	4	9	12	27	23	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	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	19	9	0
Mvmt Flow	5	12	16	36	31	7
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	102	34	37	0	-	0
Stage 1	34	-	-	-	-	-
Stage 2	68	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	901	1045	1586	-	-	-
Stage 1	994	-	-	-	-	-
Stage 2	960	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	892	1045	1586	-	-	-
Mov Cap-2 Maneuver	892	-	-	-	-	-
Stage 1	983	-	-	-	-	-
Stage 2	960	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v	8.69	2.24		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	554	-	993	-	-	
HCM Lane V/C Ratio	0.01	-	0.017	-	-	
HCM Control Delay (s/veh)	7.3	0	8.7	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.1	-	-	

Intersection												
Intersection Delay, s/veh	8.3											
Intersection LOS	A											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	32	7	0	49	23	6	110	0	20	103	25
Future Vol, veh/h	30	32	7	0	49	23	6	110	0	20	103	25
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	0	13	0	0	0	12	0	3	0	11	6	0
Mvmt Flow	32	34	7	0	52	24	6	117	0	21	110	27
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, s/veh	8.2	7.9	8.3	8.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	43%	0%	14%
Vol Thru, %	95%	46%	68%	70%
Vol Right, %	0%	10%	32%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	116	69	72	148
LT Vol	6	30	0	20
Through Vol	110	32	49	103
RT Vol	0	7	23	25
Lane Flow Rate	123	73	77	157
Geometry Grp	1	1	1	1
Degree of Util (X)	0.152	0.095	0.095	0.197
Departure Headway (Hd)	4.435	4.66	4.442	4.497
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	810	769	807	798
Service Time	2.459	2.686	2.467	2.52
HCM Lane V/C Ratio	0.152	0.095	0.095	0.197
HCM Control Delay, s/veh	8.3	8.2	7.9	8.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.3	0.3	0.7

Intersection						
Int Delay, s/veh	3.4					
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	52	0	47	72	0	43
Future Vol, veh/h	52	0	47	72	0	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	12	0	4	2	0	2
Mvmt Flow	55	0	50	77	0	46

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	55	0	232	55
Stage 1	-	-	-	-	55	-
Stage 2	-	-	-	-	177	-
Critical Hdwy	-	-	4.14	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.236	-	3.5	3.318
Pot Cap-1 Maneuver	-	-	1537	-	761	1011
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	859	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1537	-	735	1011
Mov Cap-2 Maneuver	-	-	-	-	735	-
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	830	-

Approach	EB	WB	NE
HCM Control Delay, s/v	0	2.93	8.73
HCM LOS			A

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1011	-	-	711	-
HCM Lane V/C Ratio	0.045	-	-	0.033	-
HCM Control Delay (s/veh)	8.7	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection						
Int Delay, s/veh	1.5					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	117	43	0	110	47	0
Future Vol, veh/h	117	43	0	110	47	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	0	0	5	4	0
Mvmt Flow	124	46	0	117	50	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	170
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	1419
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1419
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	NB	SB	SW
HCM Control Delay, s/v	0	0	10.37
HCM LOS			B

Minor Lane/Major Mvmt	NBT	NBR	SBL	SBT	SWLn1
Capacity (veh/h)	-	-	1419	-	720
HCM Lane V/C Ratio	-	-	-	-	0.069
HCM Control Delay (s/veh)	-	-	0	-	10.4
HCM Lane LOS	-	-	A	-	B
HCM 95th %tile Q(veh)	-	-	0	-	0.2

Intersection						
Int Delay, s/veh	9.8					
Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑	↑		↘	↗
Traffic Vol, veh/h	0	828	790	0	97	80
Future Vol, veh/h	0	828	790	0	97	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	5	0	0	2
Mvmt Flow	0	872	832	0	102	84
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	-	0	-	0	1703	832
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	872	-
Critical Hdwy	-	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	0	-	-	0	~ 102	369
Stage 1	0	-	-	0	431	-
Stage 2	0	-	-	0	413	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	-	~ 102	369
Mov Cap-2 Maneuver	-	-	-	-	~ 102	-
Stage 1	-	-	-	-	431	-
Stage 2	-	-	-	-	413	-
Approach	NB	SB		SE		
HCM Control Delay, s/v	0	0		99.42		
HCM LOS				F		
Minor Lane/Major Mvmt	NBT	SELn1	SELn2	SBT		
Capacity (veh/h)	-	102	369	-		
HCM Lane V/C Ratio	-	1.002	0.228	-		
HCM Control Delay (s/veh)	-	166.9	17.6	-		
HCM Lane LOS	-	F	C	-		
HCM 95th %tile Q(veh)	-	6.2	0.9	-		
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection						
Int Delay, s/veh	11					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	24	64	119	949	901	48
Future Vol, veh/h	24	64	119	949	901	48
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	94	94	94	94	94	94
Heavy Vehicles, %	0	9	1	3	4	4
Mvmt Flow	26	68	127	1010	959	51

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	2247	984	1010	0	-	0
Stage 1	984	-	-	-	-	-
Stage 2	1263	-	-	-	-	-
Critical Hdwy	6.4	6.29	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.381	2.209	-	-	-
Pot Cap-1 Maneuver	47	292	690	-	-	-
Stage 1	365	-	-	-	-	-
Stage 2	269	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	27	292	690	-	-	-
Mov Cap-2 Maneuver	27	-	-	-	-	-
Stage 1	213	-	-	-	-	-
Stage 2	269	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v248.1		1.27	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	201	-	80	-	-
HCM Lane V/C Ratio	0.183	-	1.173	-	-
HCM Control Delay (s/veh)	11.4	0	248.1	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.7	-	6.8	-	-

Intersection												
Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	39	1	0	4	0	2	0	790	0	4	576	47
Future Vol, veh/h	39	1	0	4	0	2	0	790	0	4	576	47
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, %	-	-5	-	-	9	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	2	0
Mvmt Flow	42	1	0	4	0	2	0	859	0	4	626	51

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1090	1519	339	1181	1545	429	677	0	0	859	0	0
Stage 1	660	660	-	859	859	-	-	-	-	-	-	-
Stage 2	429	859	-	322	686	-	-	-	-	-	-	-
Critical Hdwy	6.5	5.5	6.4	9.3	8.3	7.8	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.5	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.5	4.5	-	8.3	7.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	233	183	695	82	53	521	924	-	-	791	-	-
Stage 1	508	556	-	209	245	-	-	-	-	-	-	-
Stage 2	653	477	-	570	320	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	231	182	695	81	53	521	924	-	-	791	-	-
Mov Cap-2 Maneuver	231	182	-	81	53	-	-	-	-	-	-	-
Stage 1	505	553	-	209	245	-	-	-	-	-	-	-
Stage 2	650	477	-	565	318	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v24.36		38.97	0	0.12
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	924	-	-	229 112	21	-	-
HCM Lane V/C Ratio	-	-	-	0.19 0.058	0.005	-	-
HCM Control Delay (s/veh)	0	-	-	24.4 39	9.6	0.1	-
HCM Lane LOS	A	-	-	C E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.7 0.2	0	-	-

HCM 7th TWSC
2: Ridge Road & Old Indian Road

2029 Full Weekend (Saturday)
07/16/2024

Intersection						
Int Delay, s/veh	2.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	40	7	15	37	14	11
Future Vol, veh/h	40	7	15	37	14	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	10	-	-	-5	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	12	0	4	0	0
Mvmt Flow	47	8	17	43	16	13
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	55	0	128	51
Stage 1	-	-	-	-	51	-
Stage 2	-	-	-	-	78	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1563	-	871	1023
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	950	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1563	-	861	1023
Mov Cap-2 Maneuver	-	-	-	-	861	-
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	939	-
Approach	EB		WB		NB	
HCM Control Delay, s/v	0		2.11		9.02	
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	925	-	-	519	-	
HCM Lane V/C Ratio	0.031	-	-	0.011	-	
HCM Control Delay (s/veh)	9	-	-	7.3	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

Intersection						
Int Delay, s/veh	2.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	51	23	89	63	27	94
Future Vol, veh/h	51	23	89	63	27	94
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	90	90	90	90	90	90
Heavy Vehicles, %	0	0	2	0	0	1
Mvmt Flow	57	26	99	70	30	104

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	298	134	0
Stage 1	134	-	-
Stage 2	164	-	-
Critical Hdwy	6.4	6.2	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	-
Pot Cap-1 Maneuver	697	921	-
Stage 1	897	-	-
Stage 2	870	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	682	921	-
Mov Cap-2 Maneuver	682	-	-
Stage 1	897	-	-
Stage 2	850	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v10.46		0	1.69
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	741	402
HCM Lane V/C Ratio	-	-	0.111	0.021
HCM Control Delay (s/veh)	-	-	10.5	7.6
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1

HCM 7th TWSC
6: Ridge Road & Proposed Driveway

2029 Full Weekend (Saturday)
07/16/2024

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	13	16	20	16	7
Future Vol, veh/h	6	13	16	20	16	7
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	0	6	0
Mvmt Flow	7	15	19	23	19	8

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	83	23	27	0	-	0
Stage 1	23	-	-	-	-	-
Stage 2	60	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	924	1060	1600	-	-	-
Stage 1	1005	-	-	-	-	-
Stage 2	967	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	913	1060	1600	-	-	-
Mov Cap-2 Maneuver	913	-	-	-	-	-
Stage 1	993	-	-	-	-	-
Stage 2	967	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	8.65	3.23	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	800	-	1009	-	-
HCM Lane V/C Ratio	0.012	-	0.022	-	-
HCM Control Delay (s/veh)	7.3	0	8.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection												
Intersection Delay, s/veh	8.7											
Intersection LOS	A											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	27	31	1	0	29	16	2	163	0	18	111	26
Future Vol, veh/h	27	31	1	0	29	16	2	163	0	18	111	26
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	5	10	100	0	0	0	0	0	0	0	2	5
Mvmt Flow	33	38	1	0	35	20	2	199	0	22	135	32
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, s/veh	8.6	8	8.9	8.7
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	46%	0%	12%
Vol Thru, %	99%	53%	64%	72%
Vol Right, %	0%	2%	36%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	165	59	45	155
LT Vol	2	27	0	18
Through Vol	163	31	29	111
RT Vol	0	1	16	26
Lane Flow Rate	201	72	55	189
Geometry Grp	1	1	1	1
Degree of Util (X)	0.247	0.1	0.071	0.229
Departure Headway (Hd)	4.417	5.006	4.653	4.353
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	813	715	769	826
Service Time	2.442	3.039	2.688	2.378
HCM Lane V/C Ratio	0.247	0.101	0.072	0.229
HCM Control Delay, s/veh	8.9	8.6	8	8.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1	0.3	0.2	0.9

Intersection						
Int Delay, s/veh	3.1					
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	49	0	30	45	0	28
Future Vol, veh/h	49	0	30	45	0	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	6	0	3	0	0	4
Mvmt Flow	60	0	37	55	0	34

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	60	0	188	60
Stage 1	-	-	-	-	60	-
Stage 2	-	-	-	-	128	-
Critical Hdwy	-	-	4.13	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.227	-	3.5	3.336
Pot Cap-1 Maneuver	-	-	1537	-	806	1000
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	903	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1537	-	786	1000
Mov Cap-2 Maneuver	-	-	-	-	786	-
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	881	-

Approach	EB	WB	NE
HCM Control Delay, s/v	0	2.96	8.73
HCM LOS			A

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1000	-	-	720	-
HCM Lane V/C Ratio	0.034	-	-	0.024	-
HCM Control Delay (s/veh)	8.7	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

HCM 7th TWSC
9: Lattintown Road & Plattekill Road Bend

2029 Full Weekend (Saturday)
07/16/2024

Intersection						
Int Delay, s/veh	1					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	165	28	0	112	30	0
Future Vol, veh/h	165	28	0	112	30	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	4	0	3	3	0
Mvmt Flow	201	34	0	137	37	0
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	235	0	355	218
Stage 1	-	-	-	-	218	-
Stage 2	-	-	-	-	137	-
Critical Hdwy	-	-	4.1	-	6.43	6.2
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.2	-	3.527	3.3
Pot Cap-1 Maneuver	-	-	1344	-	641	827
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	887	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1344	-	641	827
Mov Cap-2 Maneuver	-	-	-	-	641	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	887	-
Approach	NB	SB		SW		
HCM Control Delay, s/v	0	0		10.95		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBR	SBL	SBT	SWLn1	
Capacity (veh/h)	-	-	1344	-	641	
HCM Lane V/C Ratio	-	-	-	-	0.057	
HCM Control Delay (s/veh)	-	-	0	-	11	
HCM Lane LOS	-	-	A	-	B	
HCM 95th %tile Q(veh)	-	-	0	-	0.2	

Intersection						
Int Delay, s/veh	4.4					
Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑	↑		↓	↓
Traffic Vol, veh/h	0	799	497	0	98	85
Future Vol, veh/h	0	799	497	0	98	85
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	2	2	0	1
Mvmt Flow	0	832	518	0	102	89
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	-	0	-	0	1350	518
Stage 1	-	-	-	-	518	-
Stage 2	-	-	-	-	832	-
Critical Hdwy	-	-	-	-	6.4	6.21
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	3.309
Pot Cap-1 Maneuver	0	-	-	0	168	560
Stage 1	0	-	-	0	602	-
Stage 2	0	-	-	0	430	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	-	168	560
Mov Cap-2 Maneuver	-	-	-	-	168	-
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	430	-
Approach	NB	SB		SE		
HCM Control Delay, s/v	0	0		35.46		
HCM LOS	E					
Minor Lane/Major Mvmt	NBT SELn1		SELn2	SBT		
Capacity (veh/h)	-		168	560	-	
HCM Lane V/C Ratio	-		0.609	0.158	-	
HCM Control Delay (s/veh)	-		55.3	12.6	-	
HCM Lane LOS	-		F	B	-	
HCM 95th %tile Q(veh)	-		3.3	0.6	-	

Intersection						
Int Delay, s/veh	2.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	92	137	865	697	28
Future Vol, veh/h	12	92	137	865	697	28
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	97	97	97	97	97	97
Heavy Vehicles, %	8	0	0	2	3	7
Mvmt Flow	12	95	141	892	719	29

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1907	733	747	0	-	0
Stage 1	733	-	-	-	-	-
Stage 2	1174	-	-	-	-	-
Critical Hdwy	6.48	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	73	424	870	-	-	-
Stage 1	465	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	49	424	870	-	-	-
Mov Cap-2 Maneuver	49	-	-	-	-	-
Stage 1	315	-	-	-	-	-
Stage 2	286	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	34.62	1.36	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	246	-	226	-	-
HCM Lane V/C Ratio	0.162	-	0.475	-	-
HCM Control Delay (s/veh)	9.9	0	34.6	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.6	-	2.3	-	-

3: Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	All
Movements Served	TR	LT	LR	
Denied Delay (hr)				0.0
Denied Del/Veh (s)				0.1
Total Delay (hr)	0.0	0.1	0.1	0.3
Total Del/Veh (s)	1.3	6.2	4.2	3.3
Stop Delay (hr)	0.0	0.0	0.1	0.1
Stop Del/Veh (s)	0.2	2.7	2.3	1.5

4: Sonny Weed's/Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Delay (hr)					0.0
Denied Del/Veh (s)					0.1
Total Delay (hr)	0.0	0.1	0.0	0.1	0.2
Total Del/Veh (s)	5.8	1.9	2.2	4.2	3.0
Stop Delay (hr)	0.0	0.0	0.0	0.1	0.1
Stop Del/Veh (s)	2.7	0.3	2.4	2.2	1.2

10: US-9W & Western Avenue Performance by lane

Lane	NB	SB	All
Movements Served	LT	TR	
Denied Delay (hr)			0.4
Denied Del/Veh (s)			0.7
Total Delay (hr)	3.6	1.0	4.6
Total Del/Veh (s)	14.3	3.7	8.7
Stop Delay (hr)	2.4	0.0	2.4
Stop Del/Veh (s)	9.6	0.0	4.5

Total Zone Performance

Denied Delay (hr)	0.4
Denied Del/Veh (s)	1.1
Total Delay (hr)	5.1
Total Del/Veh (s)	1519.3
Stop Delay (hr)	2.6
Stop Del/Veh (s)	777.4

Queuing and Blocking Report

2029 Full Weekday (Thursday)

07/16/2024

Intersection: 3: Lattintown Road & Old Indian Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	66	76
Average Queue (ft)	26	34
95th Queue (ft)	53	58
Link Distance (ft)	992	630
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Sonny Weed's/Lattintown Road & Old Indian Road

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	54	20	65
Average Queue (ft)	9	1	34
95th Queue (ft)	37	8	55
Link Distance (ft)	542	545	944
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: US-9W & Western Avenue

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (ft)	231	29
Average Queue (ft)	189	4
95th Queue (ft)	290	21
Link Distance (ft)	216	634
Upstream Blk Time (%)	15	
Queuing Penalty (veh)	135	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 135

3: Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	All
Movements Served	TR	LT	LR	
Denied Delay (hr)				0.0
Denied Del/Veh (s)				0.1
Total Delay (hr)	0.0	0.1	0.1	0.2
Total Del/Veh (s)	1.1	5.7	3.7	3.1
Stop Delay (hr)	0.0	0.0	0.1	0.1
Stop Del/Veh (s)	0.2	2.7	2.1	1.5

4: Sonny Weed's/Lattintown Road & Old Indian Road Performance by lane

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Delay (hr)					0.0
Denied Del/Veh (s)					0.1
Total Delay (hr)	0.0	0.0	0.0	0.1	0.2
Total Del/Veh (s)	5.1	1.5	1.6	3.9	2.8
Stop Delay (hr)	0.0	0.0	0.0	0.1	0.1
Stop Del/Veh (s)	2.9	0.2	1.8	2.0	1.2

10: US-9W & Western Avenue Performance by lane

Lane	NB	SB	All
Movements Served	LT	TR	
Denied Delay (hr)			0.1
Denied Del/Veh (s)			0.3
Total Delay (hr)	0.9	0.3	1.2
Total Del/Veh (s)	3.7	1.7	2.9
Stop Delay (hr)	0.4	0.0	0.4
Stop Del/Veh (s)	1.5	0.0	0.9

Total Zone Performance

Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.5
Total Delay (hr)	1.6
Total Del/Veh (s)	288.7
Stop Delay (hr)	0.5
Stop Del/Veh (s)	98.6

Queuing and Blocking Report 2029 Full Weekend (Saturday)

07/16/2024

Intersection: 3: Lattintown Road & Old Indian Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	55	54
Average Queue (ft)	27	29
95th Queue (ft)	47	42
Link Distance (ft)	992	630
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Sonny Weed's/Lattintown Road & Old Indian Road

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	34	10	55
Average Queue (ft)	12	1	28
95th Queue (ft)	36	7	42
Link Distance (ft)	542	545	944
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: US-9W & Western Avenue

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (ft)	222	21
Average Queue (ft)	79	1
95th Queue (ft)	185	12
Link Distance (ft)	216	634
Upstream Blk Time (%)	1	
Queuing Penalty (veh)	6	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 6