

**ROUTE 23 SUSSEX BOROUGH
REALIGNMENT AND
PAPAKATING CREEK BRIDGE REPLACEMENT

TRAFFIC STUDY**

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Submitted to:

New Jersey Department of Transportation

Submitted by:

PB AMERICAS, INC.

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A. Project Background

PB Americas, Inc. (PB) has been retained by the New Jersey Department of Transportation (NJDOT) to perform environmental document preparation and design services for the Route 23 Sussex Borough Realignment and Papakating Creek Bridge Replacement project, located in Sussex Borough and Wantage Township, Sussex County, New Jersey. PB performed Final Scope Development and prepared the Environmental Assessment (EA) document to advance the Department's Initially Preferred Alternative (IPA) as selected from a Feasibility Assessment Study performed by others. The Environmental Assessment was approved by the Federal Highway Administration (FHWA) in its Finding of No Significant Impact (FONSI) issued in December 2003.

The IPA scheme was subsequently progressed by PB through the completion of the Preliminary Design phase but was halted by the Department in October 2007 given the high construction and right of way acquisition costs of the project in light of current Department funding limitations. The Department subsequently performed an internal "smart sizing" review of the project, led by the Department's Value Solutions Unit and other subject matter experts, which culminated in the identification of a new preferred alternative for the project referred to as the "Smart Solutions" scheme.

The Department's proposed Smart Solutions alternative will provide operational and safety improvements with the implementation of a one-way couple roadway system utilizing existing Route 23 for northbound only traffic and providing a new alignment for Route 23 southbound traffic. The new SB Route 23 alignment will extend from the existing intersection of Route 23 and Lower Unionville Road and will follow existing right of way of Walling Avenue to connect with and improve the intersection of Walling Avenue and Loomis Avenue (Existing Route 23). Both the NB and SB roadways will provide one 12 foot wide traffic lane, a 12 foot wide shoulder and a 6 foot wide bikeway. The project will also include the replacement of the structure carrying existing Route 23 over Papakating Creek (Str. No. 1904-154) and a new structure carrying SB Route 23 over existing wetlands. The project is designed to be bicycle/pedestrian compatible. The construction cost is estimated to be \$25 million.

The Smart Solutions scheme addresses the original problem statement but with a substantial reduction in overall costs and impacts. An Environmental Reevaluation must be submitted to FHWA to demonstrate that the original project purpose and need are met with the new Smart Solutions scheme and to reevaluate environmental impacts in order to seek continued federal funding for the project. Future Preliminary Design and Final Design efforts will be required to advance the design of the new Smart Solutions scheme.

In April 2008, the Department informed the FHWA of its intention to redesign the project and to submit an Environmental Reevaluation (ER) along with a request for FHWA approval to advance the new project design. FHWA indicated that it could not make a purpose and need determination at that time given that the project traffic data, accident records, and other analysis is not recent enough for FHWA to make a reasonable determination as to whether the Smart Solutions alternative will provide a more efficient and continuous flow of traffic along Route 23 in accordance with the original project purpose and need as stated in the approved EA.

The Department met with representatives of Sussex Borough and Sussex County and they have expressed their support for the Smart Solutions alternative and have requested the project be

advanced. The project was recently added to the Department's Tier 1 list and State Funding will be made available to advance the additional studies needed to provide the updated traffic data and environmental analysis necessary for FHWA to review the ER and issue a project purpose and need determination. These interim steps may allow the Department to request future FHWA funding to further advance the proposed project design and construction.

PB has been charged with performing additional studies—these include a traffic analysis, air & noise analysis, permits and ecology, a preliminary ROW impacts summary, and public involvement report—as to provide assistance to NJDOT in the preparation of the ER request to be prepared and submitted by the Department to the FHWA to seek buy-in that the project satisfies the original purpose and need and to seek approval of an Environmental Reevaluation. As part of this effort, PB has obtained new traffic counts; performed capacity analysis and accident analysis; updated technical environmental studies for air & noise analysis (micro-scale), permits & ecology, assessment of Preliminary ROW impacts and public involvement. In performing the studies, PB will utilize the concept plan for the Smart Solutions alternative which NJDOT prepared, and which NJDOT will provide to PB in a digital format, as the basis for all of the studies.

The project area is shown on Figure 1.

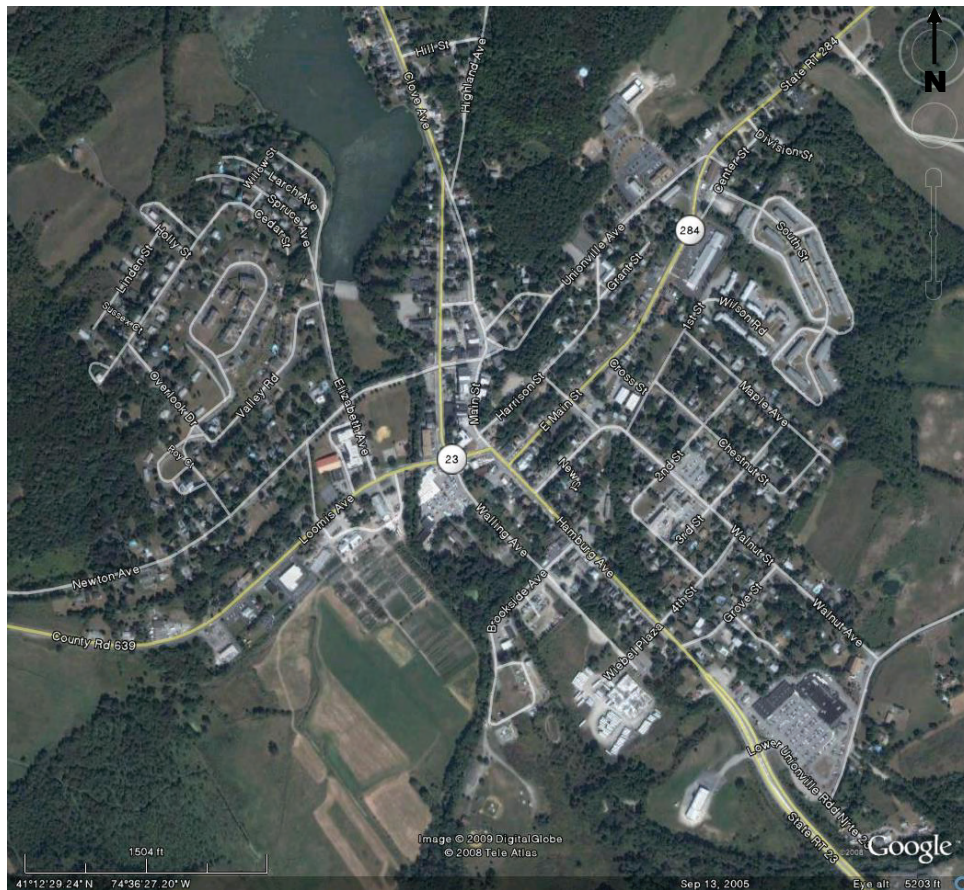


Figure 1: Project Area

B. Traffic Analysis

The NJDOT Smart Solution Alternative is a one-way couple scheme that would use the present Route 23 for NB traffic and the proposed parallel alignment to the west for SB travel. The SB roadway would utilize the current Walling Avenue alignment and continue along new right-of-way to meet the existing intersection of Route 23 and Lower Unionville Road. Both roadways would be single lane with shoulder and presumably parking to one side. Trucks traveling SB on Route 23 desiring to turn left at the intersection of Loomis Avenue to enter Main Street (Route 284)—as they do now—would be prohibited from doing so and directed by signs to head south and U-Turn at the intersection of Lower Unionville Road which will be signalized. They will also be prohibited from turning left from Route 23 SB onto local, cross streets by signing. These streets are residential in nature and narrow. As a result, PB examined the current Origin and Destination (O&D) patterns of trucks using the corridor so that a reassignment can be made to assess the impacts of such a diversion.

In this section, PB evaluates the traffic impacts of this new alternative as compared to the existing conditions. Since the traffic data and analyses performed for the Original Initially Preferred Alternative (IPA) was done over seven years ago, traffic patterns and demands have likely changed. Consequently, PB has undertaken a new traffic study of the corridor. The study involves new traffic counts, crash analysis, and highway capacity/level of service analyses to determine the viability of the Smart Solutions alternative for improving traffic operations and safety.

This section includes a new traffic study that supports a comparative assessment of the Route 23 Project Corridor under present, weekday peak hour traffic conditions and the NJDOT Smart Solutions (One-Way Couple) Alternative. The following study entails an analysis of crash data, traffic counts (both automatic traffic recorder (ATR) and manual), travel time (speed & delay), truck origin-destination (O&D) surveys, highway capacity and level of service, and traffic simulation culminating in a traffic impact report/summary.

1. Safety/Crash Analysis

PB analyzed three years of crash data (January 2005 through December 2007) provided by NJDOT's Bureau of Safety Programs. The analysis includes data for Route 23, from MP 39.10 (near CR 565) to MP 40.13 (Newton Ave), and Route 284 near the intersection with Route 23 (MP 0.0 to 0.10). During the three year period, a total of 90 crashes were reported within the project study area. PB analyzed crash data at the three major signalized intersections within the corridor (Lower Unionville Rd, Route 284, and CR 639/Walling Ave), as well as midblock sections between intersections throughout the study corridor.

The project area includes two distinct roadway cross sections. Between just north of Lower Unionville Road (MP 39.60) and south of CR 565 (MP 39.10), Route 23's cross-section consists of two lanes with a shoulder. Through this segment, Route 23 experienced a crash rate of 1.92 crashes per million vehicle miles (crashes/mvm), which falls below the 2007 statewide average crash rate of 2.90 crashes/mvm for that cross section type. From north of Lower Unionville Rd (MP 39.60) through Newton Ave (MP 40.13), Route 23's cross-section is two lanes without a shoulder. This portion of the study area experienced a crash rate of 6.28 crashes/mvm, which is greater than the 2007 statewide average of 4.34 crashes/mvm for similar cross-sections.

Most of the crashes (56.7 percent) within the study corridor were same-direction rear-end, which exceeds the statewide average of 45.7 percent for this crash type. Other crash type overrepresentations included angle collisions (15.6 percent actual, 11.1 percent statewide average), encroachment (7.8 percent actual, 0.30 percent statewide average), animal (3.3 percent actual, 3.0 percent statewide average), and backing (3.3 percent actual, 0.8 percent statewide average).

The bulk of all crashes occurred near the 'dogleg' portion of Route 23, between Munson Street and Newton Avenue (MP 39.90 – MP 40.13). This portion of the study area accounted for 57 percent of the total crashes (51 crashes). There was a decreasing trend in same-direction, rear-end crashes through this section over the three year period. There were 11 such crashes in 2005, nine in 2006, and four in 2007. Simultaneously, there was an increasing trend in turning movement crashes (right angle, angle, and encroachment): one in 2005, eight in 2006, and eight in 2007.

South of Munson Street, outside of the 'dogleg' portion noted above, 26 of the 38 crashes that occurred (68 percent) were same-direction rear-end, which exceeds the 2007 statewide average for this type (45.7 percent). The signalized intersection at Lower Unionville Road, the other major intersection in the study area, experienced relatively few crash incidents. Two crashes occurred at or near this intersection in 2005, four in 2006, and two in 2007. At this intersection, four crashes were same-direction, rear-end, one crash was head-on, and one crash involved an animal in the roadway.

Overall the data indicate the bulk of the crashes are of the same-direction rear end and angle types and that these rates were higher than the statewide average for each type. These types of crashes are often related to vehicles having stopped and waiting to turn left against opposing traffic.

Crash diagrams and summary tables can be found in Appendix A of this report.

2. Intersection Turning Movement and Pedestrian/Bike Counts

Manual intersection turning movement counts and pedestrian/bike counts were performed at three intersections in the project study area on Tuesday, October 21, 2008 between 6:00 AM and 6:00 PM. The weather on this day was seasonal for late October with periods of scattered showers that occurred several times throughout the overall 12 hour count period. No special events, holidays, or unusual traffic conditions were noted. Some minor queueing was noted in the 'dogleg' section of Route 23, but nothing of particular note and nothing out of the ordinary for the study area. Manual turning movement counts were conducted at the following intersections:

Site 1 – Route 23 & Loomis Avenue/Main Street

Site 2 – Route 23 & Route 284

Site 3 – Route 23 & Lower Unionville Road

From the data, the peak hours were determined to be 8:00–9:00 for the AM peak hour; 11:45 AM–12:45 PM for the midday peak hour; and 4:15–5:15 for the PM peak hour.

3. Automatic Traffic Recorder Counts

Automatic traffic recorder (ATR) counts, which count roadway traffic volumes and vehicle types at a single point (or station) along a roadway, were initially performed at four (4) locations in the project area over a 7-day period between Friday, October 17, 2008 and Friday, October 24, 2008. These locations include:

- Site 1 – Route 23, south of Newton Avenue and south of Loomis Avenue
- Site 2 – Route 284, south of Liberty Street
- Site 3 – Route 23, north of Lower Unionville Road and south of Grove Street
- Site 4 – Loomis Avenue (CR 639), west of Route 23

During the initial 7-day ATR count, the ATR unit at Site 3—Route 23 north of Lower Unionville Road—failed. None of the data from this location was usable. Consequently, ATR counts were redone at all four (4) stations the following week, between Thursday, October 30, 2008 and Thursday, November 6, 2008 in order to work from a consistent set of data collected during the same time frame. However, a similar failure occurred during the second data collection effort. The ATR machine at Site 3 again failed to produce reliable data for the collection period. It was decided to use the three ATRs (Sites 1, 2, and 4) from the second data collection period (10/30–11/06/2008). Peak hours for the ATR data were determined to be the same as those from the manual count data from Tuesday, October 21: 8:00–9:00 for the AM peak hour; 11:45 AM–12:45 PM for the midday peak hour; and 4:15–5:15 for the PM peak hour. Full ATR data can be found in Appendix B of this report.

Weather during the two one-week ATR count periods was seasonal for late October/ early November; light rain fell on the afternoon of Tuesday, October 21 and rain was noted on Wednesday and Thursday, November 5 and 6. No special events or unusual traffic conditions were noted. One holiday occurred - Election Day - on Tuesday, November 4, 2008; Halloween was Friday, October 31.

PB compared the traffic data from the two sources – the manual and ATR counts. Minor differences were noted between intersections, and adjustments to individual turning movements were made. This process seeks to flow, or balance, point-to-point traffic volumes to reflect on-ground traffic conditions and the impact of mid-block turning movements on the net through-movement data collected by the different sources. Traffic queues may also create differences between adjacent ATR and manual counts. Volumes for each of these peak hours in the 2008 existing year are shown on Figure 2 through Figure 4.

PB examined the ATR data to evaluate the impact of truck traffic. Overall, heavy trucks accounted for about two percent of all vehicles counted at the ATR locations for the full seven day data collection period. Only small differences were noted among the individual ATR locations, and the northbound and southbound percentages were roughly equivalent. Buses accounted for about one % of the total volumes and the vast majority consisted of cars and light trucks

Approximate AADT traffic volumes (total for both directions) at the ATR sites were: 8,650 at site 1/NJ 23, 5,900 at site 2/NJ 284, and 8,000 at site 4/Loomis Avenue. Small directional differences were noted between northbound and southbound traffic.

Figure 2: 2008 Existing AM Peak Hour Flowed Volumes (No Build)

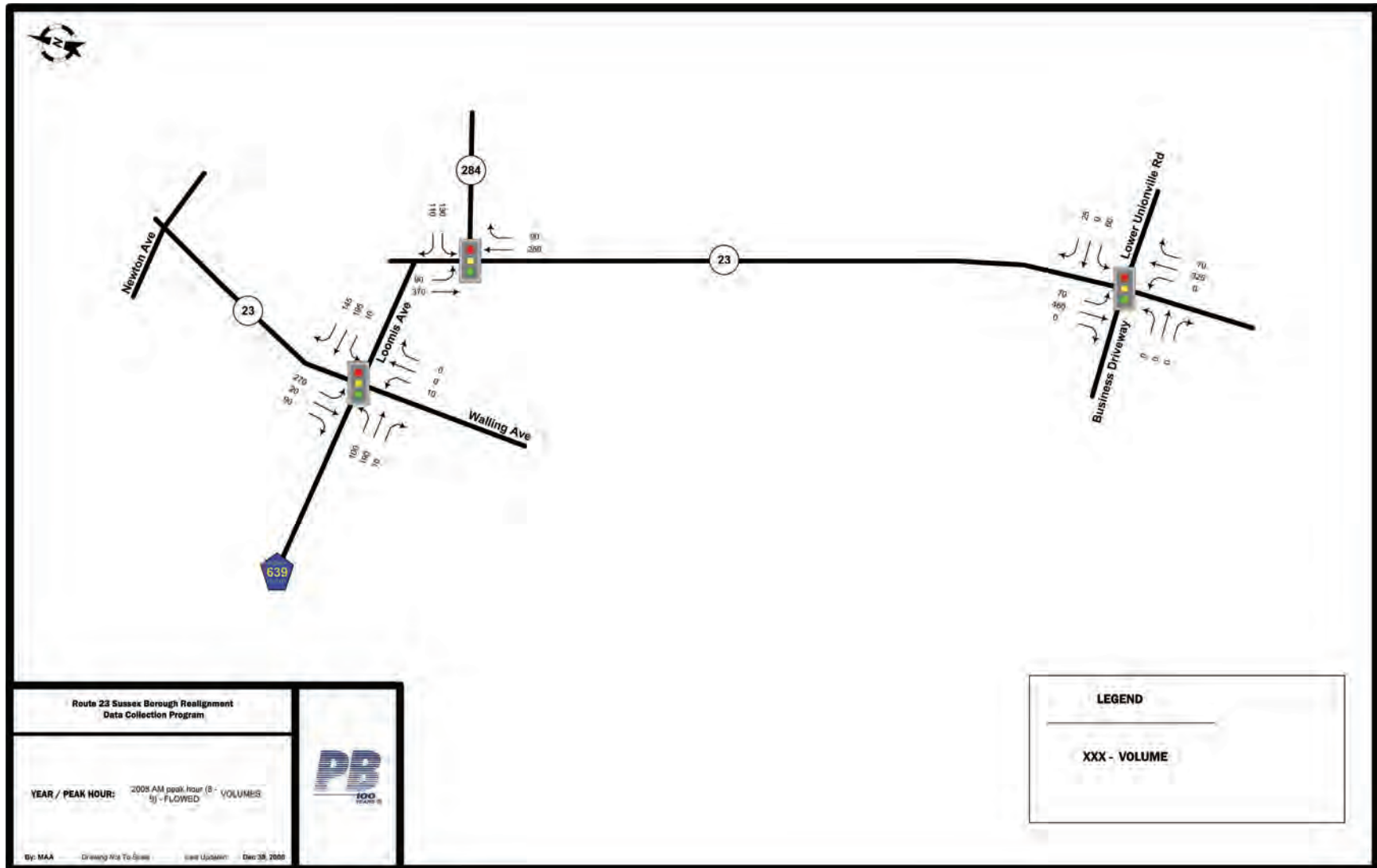


Figure 3: 2008 Existing Midday Peak Hour Flowed Volumes (No Build)

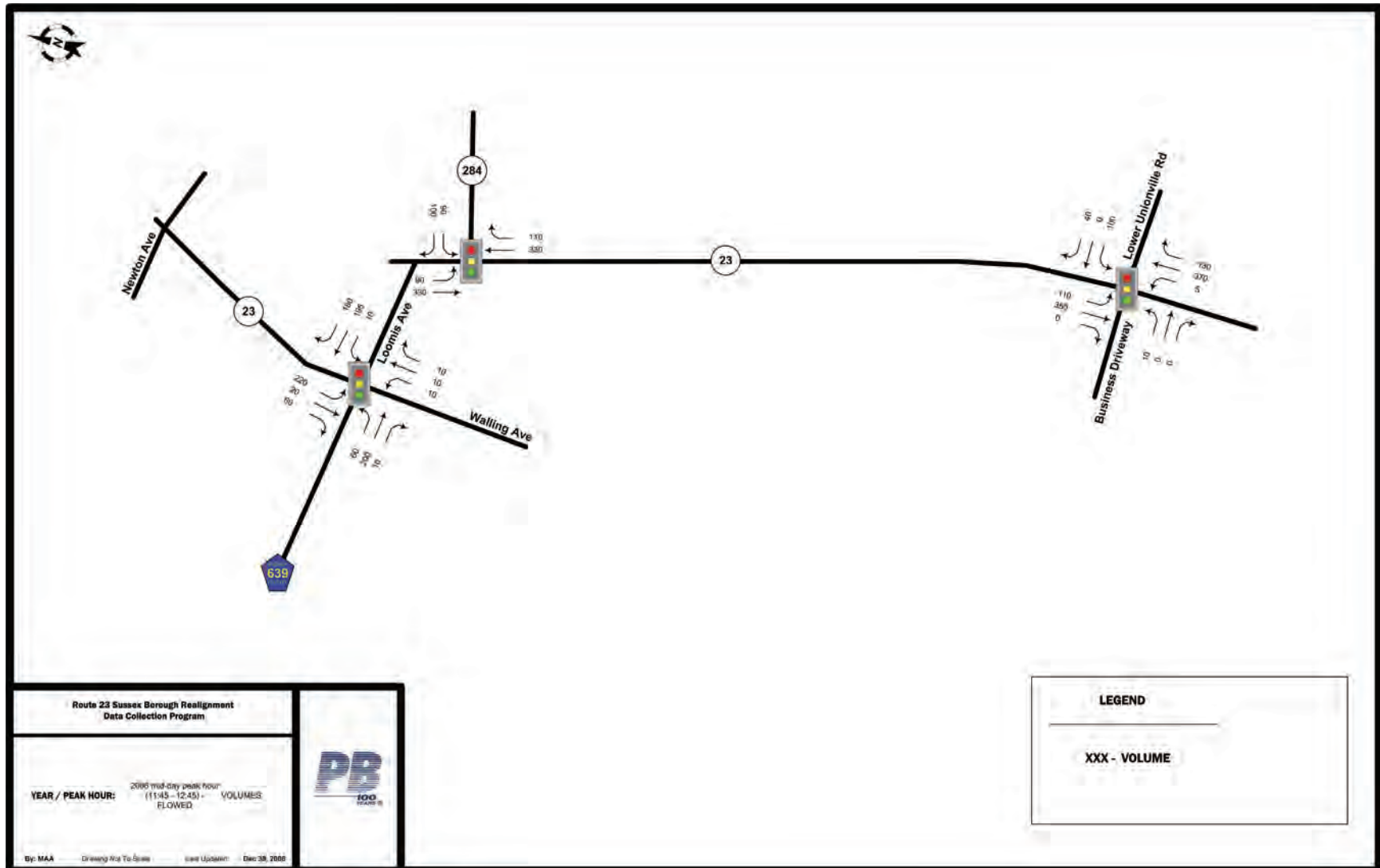
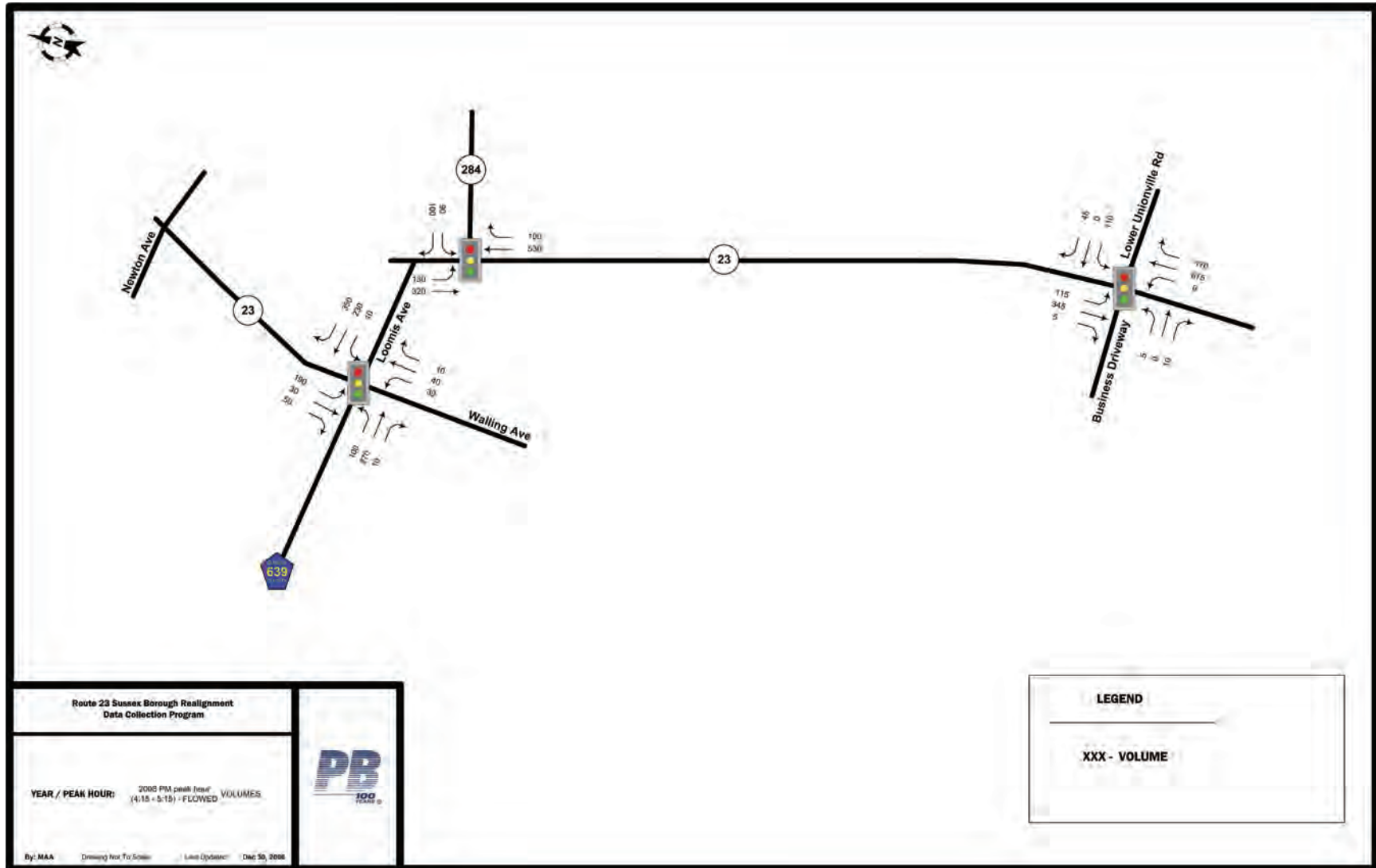


Figure 4: 2008 Existing PM Peak Hour Flowed Volumes (No Build)



4. Heavy Truck Origin-Destination (O&D) Survey

On Tuesday, October 21, 2008, a heavy truck origin-destination (O-D) survey was conducted along the dogleg portion of Route 23 (Loomis Avenue) between Route 284 and Mill Street; this was the same day as the manual traffic counts. As noted, the weather on this day was seasonal for late October with periods of scattered showers that occurred several times throughout the overall 12 hour count period. No special events, holidays, or unusual traffic conditions were noted. Some minor queueing was noted in the ‘dogleg’ section of Route 23, but nothing of particular note and nothing out of the ordinary for the study area.

O-D movements by heavy trucks were tracked and counted by PB staff over a 12-hour period from 6:00 AM to 6:00 PM. Six (6) O-D moves were counted at this location, including:

- 1 – Route 23 SB via Loomis Avenue to Route 23 SB
- 2 – Route 23 SB via Loomis Avenue to Route 284 NB
- 3 – Route 23 NB via Loomis Avenue to Route 23 NB
- 4 – Route 23 NB to Route 284 NB
- 5 – Route 284 SB to Route 23 SB
- 6 – Route 284 SB via Loomis Avenue to Route 23 NB

During the AM period (6AM – 12PM), the number of heavy trucks moving through the Loomis Avenue section of Route 23 was relatively small, with just 115 total moves, see Table 1 below. A percent breakdown of moves by origin and destination during the AM period is provided below. More detailed data by 15-minute interval is shown in Table 3 on the following pages.

Table 1: Heavy Truck Origin Destination Summary, AM Period

Origin-Destination (O-D) Pair	AM Moves Counted	% of Total
1 – Route 23 SB via Loomis Avenue to Route 23 SB	27	24%
2 – Route 23 SB via Loomis Avenue to Route 284 NB	4	3%
3 – Route 23 NB via Loomis Avenue to Route 23 NB	26	23%
4 – Route 23 NB to Route 284 NB	28	24%
5 – Route 284 SB to Route 23 SB	20	17%
6 – Route 284 SB via Loomis Avenue to Route 23 NB	10	9%
Total	115	

The table above demonstrates that heavy truck movements are split fairly evenly among most O-D pairs during the AM period. The exception to this is the number of heavy truck movements between Route 23 SB and Route 284 NB, as well as Route 284 SB and Route 23 NB, which is nominal (both legs run in a general north-south pattern towards the state line).

During the PM period (12PM-6PM), the number of heavy trucks moving through the Loomis Avenue section of Route 23 is less than the AM period, with 55 total moves (between 2:00 and 2:30 PM, no data was counted due to technical error). A percent breakdown of moves by origin and destination during the PM period is provided below in Table 2. More detailed data by 15-minute intervals is shown in Table 4 on the following pages.

Table 2: Heavy Truck Origin Destination Summary, PM Period

Origin-Destination (O-D) Pair	PM Moves Counted	% of Total
1 – Route 23 SB via Loomis Avenue to Route 23 SB	10	18%
2 – Route 23 SB via Loomis Avenue to Route 284 NB	1	2%
3 – Route 23 NB via Loomis Avenue to Route 23 NB	17	31%
4 – Route 23 NB to Route 284 NB	13	24%
5 – Route 284 SB to Route 23 SB	12	22%
6 – Route 284 SB via Loomis Avenue to Route 23 NB	2	4%
Total	55	

The most popular movement, Route 23 NB to Route 23 NB (Hamburg Avenue to Mill Street via Loomis Avenue), accounts for 31 percent of all heavy truck moves. Similarly, through movements on Route 23 SB account for 18 percent of heavy truck moves. Together, northbound and southbound movements on Route 23 (from Hamburg Avenue to Mill Street, and vice versa) account for nearly half of all heavy truck movements through Loomis Avenue. Movements from Route 23 NB to Route 284 NB, and Route 284 SB to Route 23 SB account for 24 percent and 22 percent of all moves during the PM period respectively.

Based on the data, the majority of heavy trucks were observed to be traveling fully through the area along both northbound and southbound Route 23. Diversions in either direction to Route 284 were minimal, as less than 3% overall were counted traveling southbound Route 23 to Route 284. This is the significant finding, as this route will require a southbound to northbound U-turn at North Unionville Road to provide access to Route 284 under the Smart Solutions build alternative. Therefore only a very small percentage of heavy trucks can be expected to travel south on Route 23, then north on Route 23 to Route 284 with a one-way pair implementation.

Table 3: AM Heavy Truck Origin-Destination Patterns

Time	From Rt. 23				From Rt. 284		Int. Total
	Rt. 23 SB to Loomis to Rt. 284 NB	Rt. 23 NB to Loomis to Route 23 NB	Rt. 23 NB to Rt. 284 NB	Rt. 23 SB to Loomis to Rt. 23 SB	Rt. 284 SB to Loomis to Rt. 23 NB	Rt. 284 SB to Rt. 23 SB	
6:00 AM	0	0	0	4	0	0	4
6:15 AM	0	1	1	0	0	1	3
6:30 AM	0	1	2	1	0	2	6
6:45 AM	0	0	0	4	1	0	5
Total	0	2	3	9	1	3	18
7:00 AM	0	2	0	3	0	0	5
7:15 AM	0	1	0	1	0	0	2
7:30 AM	0	2	2	0	0	0	4
7:45 AM	0	4	0	1	2	1	8
Total	0	9	2	5	2	1	19
8:00 AM	0	1	0	0	2	2	5
8:15 AM	1	0	2	0	0	2	5
8:30 AM	1	0	1	4	1	2	9
8:45 AM	0	0	4	0	1	0	5
Total	2	1	7	4	4	6	24
9:00 AM	0	0	0	0	1	0	1
9:15 AM	0	1	1	1	1	2	6
9:30 AM	0	1	0	0	0	1	2
9:45 AM	0	3	1	1	0	1	6
Total	0	5	2	2	2	4	15
10:00 AM	0	1	1	0	0	0	2
10:15 AM	0	0	3	3	1	0	7
10:30 AM	1	5	0	1	0	2	9
10:45 AM	0	3	3	0	0	1	7
Total	1	9	7	4	1	3	25
11:00 AM	1	0	1	0	0	1	3
11:15 AM	0	0	2	2	0	1	5
11:30 AM	0	0	1	1	0	1	3
11:45 AM	0	0	3	0	0	0	3
Total	1	0	7	3	0	3	14
Grand Total	4	26	28	27	10	20	115
Approach %	4.7	30.6	32.9	31.8	33.3	66.7	
Total %	3.5	22.6	24.3	23.5	8.7	17.4	

Table 4: PM Heavy Truck Origin-Destination Patterns

Time	From Rt. 23				From Rt. 284		Int. Total
	Rt. 23 SB to Loomis to Rt. 284 NB	Rt. 23 NB to Loomis to Route 23 NB	Rt. 23 NB to Rt. 284 NB	Rt. 23 SB to Loomis to Rt. 23 SB	Rt. 284 SB to Loomis to Rt. 23 NB	Rt. 284 SB to Rt. 23 SB	
12:00 PM	0	2	2	1	1	0	6
12:15 PM	0	0	2	0	0	1	3
12:30 PM	0	1	1	1	0	5	8
12:45 PM	0	2	2	0	1	0	5
Total	0	5	7	2	2	6	22
1:00 PM	1	2	2	0	0	0	5
1:15 PM	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0
Total	1	2	2	0	0	0	5
2:00 PM	-	-	-	-	-	-	-
2:15 PM	-	-	-	-	-	-	-
2:30 PM	0	1	1	1	0	1	4
2:45 PM	0	0	1	3	0	3	7
Total	0	1	2	4	0	4	11
3:00 PM	0	3	0	1	0	0	4
3:15 PM	0	1	1	1	0	0	3
3:30 PM	0	2	0	0	0	0	2
3:45 PM	0	1	0	1	0	1	3
Total	0	7	1	3	0	1	12
4:00 PM	0	0	1	0	0	0	1
4:15 PM	0	0	0	1	0	0	1
4:30 PM	0	1	0	0	0	0	1
4:45 PM	0	0	0	0	0	1	1
Total	0	1	1	1	0	1	4
5:00 PM	0	1	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	1
Grand Total	1	17	13	10	2	12	55
Approach %	2.4	41.5	31.7	24.4	14.3	85.7	
Total %	1.8	30.9	23.6	18.2	3.6	21.8	

NOTE: - = not counted

5. Speed and Delay (S&D) Survey

Total vehicle delay, based on the posted study area speed, is a good indicator of an underperforming roadway segment and/or intersection. PB conducted a survey of typical AM, midday, and PM peak period travel time, speed, and delay on Route 23 within the study area conducted on Monday, November 3, 2008. Typical travel time, speed, and delay along Route 23 were computed from an average of five runs during each peak period, for a total of 15 surveys. Weather during the data collection was seasonal for early November, with no precipitation. No special events or unusual traffic conditions were noted. ATR data was examined to compare the Monday data to data from the rest of the week, in order to evaluate the correlation between Monday travel conditions and those of the typical weekday. PB found that Monday ATR hourly data generally fell among the middle range for each individual hour and that the both the AM and PM peak hours were also consistent with those of the other weekdays. PB therefore finds that the Speed and Delay data from Monday, November 3, 2008, is suitable to represent typical weekday travel conditions for the study area.

During the AM peak hour, which is between 8:00 AM and 9:00 AM, total delay on Route 23 is greater in the southbound direction than the northbound direction. In the northbound direction, total delay is 45.6 seconds, while in the southbound direction total delay is 73.2 seconds, or 1 minute, 13 seconds. In the northbound direction, the greatest delay—26.8 seconds—occurs between Route 284 and Walling Avenue/Mill Street (i.e. the dogleg Loomis Avenue segment) (see Table 5). In the following tables, average speed between key intersections on Route 23 is expressed in miles per hour (mph), while travel time and total delay experienced between those intersections (or nodes) is expressed in seconds

In the southbound direction, delay during the AM peak is greatest between Newton Avenue and Walling Avenue/Mill Street (the southbound approach to Loomis Avenue); delay in this segment is 33.8 seconds (see Table 6).

Table 5: Route 23 Northbound 8:00–9:00AM Speed-Delay Summary

Node #	Length	Node	Travel Time (sec)	# of Stops	Avg Speed (mph)	Total Delay (sec)	Time <= 0 MPH (sec)	Time <= 7 MPH (sec)	Time <= 35 MPH (sec)
1	0	Lewisberg Rd.							
2	1659	Lower Unionville rd.	30.2	0.2	37.5	1.4	0.2	1.0	3.6
3	993	Wiebel Plaza/4th St.	19.0	0.0	35.6	0.0	0.0	0.0	5.6
4	1355	Route 284	40.4	0.8	22.9	13.6	3.8	8.6	28.2
5	393	Walling Ave./Mill St.	34.8	1.0	7.7	26.8	14.8	19.4	34.8
6	584	Newton Ave.	15.4	0.0	25.9	3.6	0.0	0.0	15.4
7	303	Spring St.	6.4	0.0	32.3	0.2	0.0	0.0	6.0
Total	5,287		146.2	2.0	24.7	45.6	18.8	29.0	93.6

Stats based on 5 BEFORE runs.

Stops based on a Stop Speed of 5 MPH.

Total Delay based on a Normal Speed of 35 MPH.

Table 6: Route 23 Southbound 8:00–9:00 AM Speed-Delay Summary

Node #	Length	Node	Travel Time (sec)	# of Stops	Avg Speed (mph)	Total Delay (sec)	Time <= 0 MPH (sec)	Time <= 7 MPH (sec)	Time <= 35 MPH (sec)
1	0	Spring St.							
2	434	Newton Ave.	12.0	0.0	24.7	3.0	0.0	0.6	11.4
3	550	Walling Ave./Mill St.	44.8	1.0	8.4	33.8	20.2	26.2	44.8
4	419	Route 284	38.8	0.8	7.4	30.0	17.6	21.8	38.8
5	1378	Wiebel Plaza/4th St.	27.6	0.0	34.0	0.4	0.0	0.0	13.6
6	986	Lower Unionville rd.	24.8	0.4	27.1	6.0	2.8	4.4	13.6
7	1503	Lewisberg Rd.	25.4	0.0	40.3	0.0	0.0	0.0	2.6
Total	5,270		173.4	2.2	20.7	73.2	40.6	53.0	124.8

Stats based on 5 BEFORE runs.
 Stops based on a Stop Speed of 5 MPH.
 Total Delay based on a Normal Speed of 35 MPH.

During the midday peak hour, which is between 11:45 AM and 12:45 PM, total delay on Route 23 in the southbound direction is more than double that in the northbound direction. In the northbound direction, total delay is 35.6 seconds, while in the southbound direction total delay is 80 seconds or 1 minute, 20 seconds. In northbound direction, the greatest delay—14.2 seconds—occurs in the dogleg segment between Route 284 and Walling Avenue (see Table 7). In the southbound direction, delay during the midday peak is greatest between Newton Avenue and Walling Avenue/Mill Street (the SB approach to Loomis Avenue); delay in this segment is 48.4 seconds (see 8).

Table 7: Route 23 Northbound 11:45 AM–12:45 PM Speed-Delay Summary

Node #	Length	Node	Travel Time (sec)	# of Stops	Avg Speed (mph)	Total Delay (sec)	Time <= 0 MPH (sec)	Time <= 7 MPH (sec)	Time <= 35 MPH (sec)
1	0	Lewisberg Rd.							
2	1626	Lower Unionville rd.	38.6	0.4	28.7	9.8	7.4	9.2	14.2
3	1019	Wiebel Plaza/4th St.	19.4	0.0	35.8	0.0	0.0	0.0	7.8
4	1363	Route 284	33.4	0.2	27.8	6.8	2.0	3.6	27.2
5	387	Walling Ave./Mill St.	22.2	0.4	11.9	14.2	4.8	7.0	22.2
6	580	Newton Ave.	14.6	0.0	27.1	3.2	0.0	0.0	14.6
7	295	Spring St.	7.8	0.0	25.8	1.6	0.0	0.0	7.2
Total	5,270		136.0	1.0	26.4	35.6	14.2	19.8	93.2

Stats based on 5 BEFORE runs.
 Stops based on a Stop Speed of 5 MPH.
 Total Delay based on a Normal Speed of 35 MPH.

Table 8: Route 23 Southbound 11:45 AM – 12:45 PM Speed-Delay Summary

Node #	Length	Node	Travel Time (sec)	# of Stops	Avg Speed (mph)	Total Delay (sec)	Time <= 0 MPH (sec)	Time <= 7 MPH (sec)	Time <= 35 MPH (sec)
1	0	Spring St.							
2	434	Newton Ave.	9.4	0.0	30.0	0.6	0.0	0.0	8.2
3	550	Walling Ave./Mill St.	59.4	1.2	6.6	48.4	29.6	40.6	59.4
4	419	Route 284	20.8	0.2	13.6	12.6	0.8	3.2	20.8
5	1378	Wiebel Plaza/4th St.	30.6	0.0	30.3	3.4	0.0	0.0	26.8
6	986	Lower Unionville rd.	34.8	0.8	19.3	15.0	7.6	11.2	29.6
7	1503	Lewisberg Rd.	25.2	0.0	40.3	0.0	0.0	0.0	4.4
Total	5,270		180.2	2.2	19.8	80.0	38.0	55.0	149.2

Stats based on 5 BEFORE runs.
 Stops based on a Stop Speed of 5 MPH.
 Total Delay based on a Normal Speed of 35 MPH.

During the PM peak hour, which is between 4:15 PM and 5:15 PM, total delay on Route 23 in the northbound and southbound direction are nearly equal (49 and 46 seconds respectively). In the northbound direction, the greatest delay—23.8 seconds total—occurs between Wiebel Plaza/4th Street and Route 284 (see Table 9). The Loomis Avenue dogleg segment (Route 284 to Walling Avenue/Mill Street) experiences 14.8 seconds of delay during the PM peak hour. In the southbound direction, total delay experienced by motorists is greatest in the segment between Newton Avenue and Walling Avenue/Mill Street (just north of the dogleg segment). Delays are significantly lower on the other segments during this time period (see 10).

Table 9: Route 23 Northbound 4:15 – 5:15 PM Speed-Delay Summary

Node #	Length	Node	Travel Time (sec)	# of Stops	Avg Speed (mph)	Total Delay (sec)	Time <= 0 MPH (sec)	Time <= 7 MPH (sec)	Time <= 35 MPH (sec)
1	0	Lewisberg Rd.							
2	1628	Lower Unionville rd.	34.4	0.2	32.3	5.6	3.0	5.4	11.6
3	1010	Wiebel Plaza/4th St.	21.4	0.0	32.2	1.8	0.0	0.0	11.8
4	1362	Route 284	50.8	0.8	18.3	23.8	8.4	15.4	49.8
5	392	Walling Ave./Mill St.	22.8	0.4	11.7	14.8	4.6	8.0	22.8
6	597	Newton Ave.	14.4	0.0	28.3	2.4	0.0	0.0	14.4
7	277	Spring St.	6.0	0.0	31.5	0.4	0.0	0.0	2.6
Total	5,266		149.8	1.4	24.0	48.8	16.0	28.8	113.0

Stats based on 5 BEFORE runs.
 Stops based on a Stop Speed of 5 MPH.
 Total Delay based on a Normal Speed of 35 MPH.

Table 10: Route 23 Southbound 4:15 – 5:15 PM Speed-Delay Summary

Node #	Length	Node	Travel Time (sec)	# of Stops	Avg Speed (mph)	Total Delay (sec)	Time <= 0 MPH (sec)	Time <= 7 MPH (sec)	Time <= 35 MPH (sec)
1	0	Spring St.							
2	418	Newton Ave.	9.2	0.0	31.0	0.8	0.0	0.0	6.4
3	573	Walling Ave./Mill St.	42.2	1.0	9.3	30.8	17.6	24.8	42.2
4	409	Route 284	16.2	0.2	17.2	8.0	0.0	0.6	16.2
5	1369	Wiebel Plaza/4th St.	28.8	0.0	32.4	2.0	0.0	0.0	16.2
6	1003	Lower Unionville rd.	23.2	0.4	29.5	4.8	1.2	3.6	10.0
7	1487	Lewisberg Rd.	24.0	0.0	42.2	0.0	0.0	0.0	1.4
Total	5,259		143.6	1.6	25.0	46.4	18.8	29.0	92.4

Stats based on 5 BEFORE runs.

Stops based on a Stop Speed of 5 MPH.

Total Delay based on a Normal Speed of 35 MPH.

Based on these data, all of the observed travel delay in the study area, except for one time period, consistently occurs in the “dogleg” Loomis Avenue segment of Route 23 in both the northbound and southbound directions. The lone exception to this trend was the PM northbound data.

6. Existing/Future Traffic Analysis

The previous traffic analysis for the study area examined traffic counts from the year 2000 using a growth rate of 2% per year. This rate was developed by examining a series of data sources to project conditions for the future build year. For the current analysis of the Smart Solutions build alternative, PB reexamined these data sources, and also compared the 2000 traffic data with the newly collected 2008 data. The new traffic counts indicate an overall decrease in total traffic in the study area during the three peak hours (AM, Midday, and PM). The net change over the 8 year period was about 5% for the three study area intersections, with the most significant drop noted at the intersection of Route 23 with Lower Unionville Road.

NJDOT’s annual background growth rate (growth in peak hour trips) for rural principal arterials in Sussex County—these include roads such as Route 23 and 284—is 2.25%. This rate was obtained from the NJDOT Access Permit Annual Background Growth Rate Table shown in Appendix C. In contrast, population and employment growth in both Sussex Borough and Sussex County as a whole are not expected to be significant between 2010 and 2030, with compound annual growth rates well below this rate. These population and employment forecasts are shown in Table 11 and 12.. The NJTPA demographic data indicate a composite growth rate among local and region much closer to 1% or less per year, with a local growth rate in Sussex Boro significantly lower than 0.5% per year.

Table 11: NJTPA Population Forecast by County and Municipality 2010-2030

	2010 Population	2030 Population	2010-2030 Compound Annual Growth Rate (CAGR)
Sussex Borough	2,360	2,500	0.29%
Sussex County Total	161,900	190,600	0.82%

Table 12: NJTPA Employment Forecast by County and Municipality 2010-2030

	2010 Employment	2030 Employment	2010-2030 Compound Annual Growth Rate (CAGR)
Sussex Borough	1,300	1,410	0.41%
Sussex County Total	45,700	61,500	1.50%

After reviewing these various data sources, PB chose to use a composite rate of ½ percent growth in traffic per year over the 20-year existing vs. future analysis period. PB applied this rate and developed a series of traffic diversions for the Smart Solutions Build Alternative, to project 2028 traffic conditions for the no-build and build alternatives.

The resulting traffic projections and build scenarios are depicted in the following figures:

- Figures 5,6,7: AM, Midday, and PM peak data for 2028 No-Build
- Figures 8, 9, and 10: AM, Midday, and PM peak flowed data, 2028 Smart Solutions Build Alternative

Figure 5: 2028 AM Peak Hour Volumes (No Build)

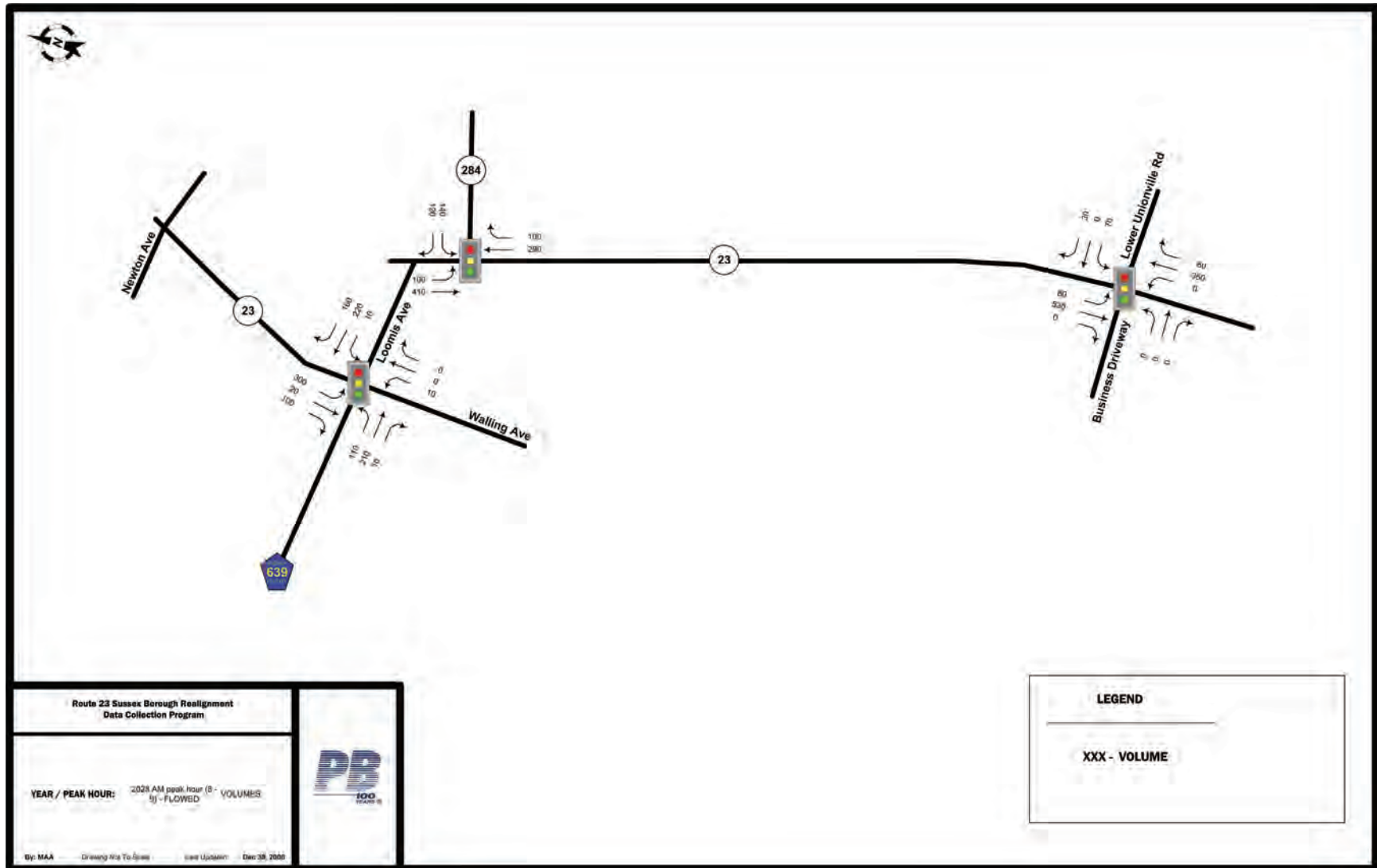


Figure 6: 2028 Midday Peak Hour Volumes (No Build)

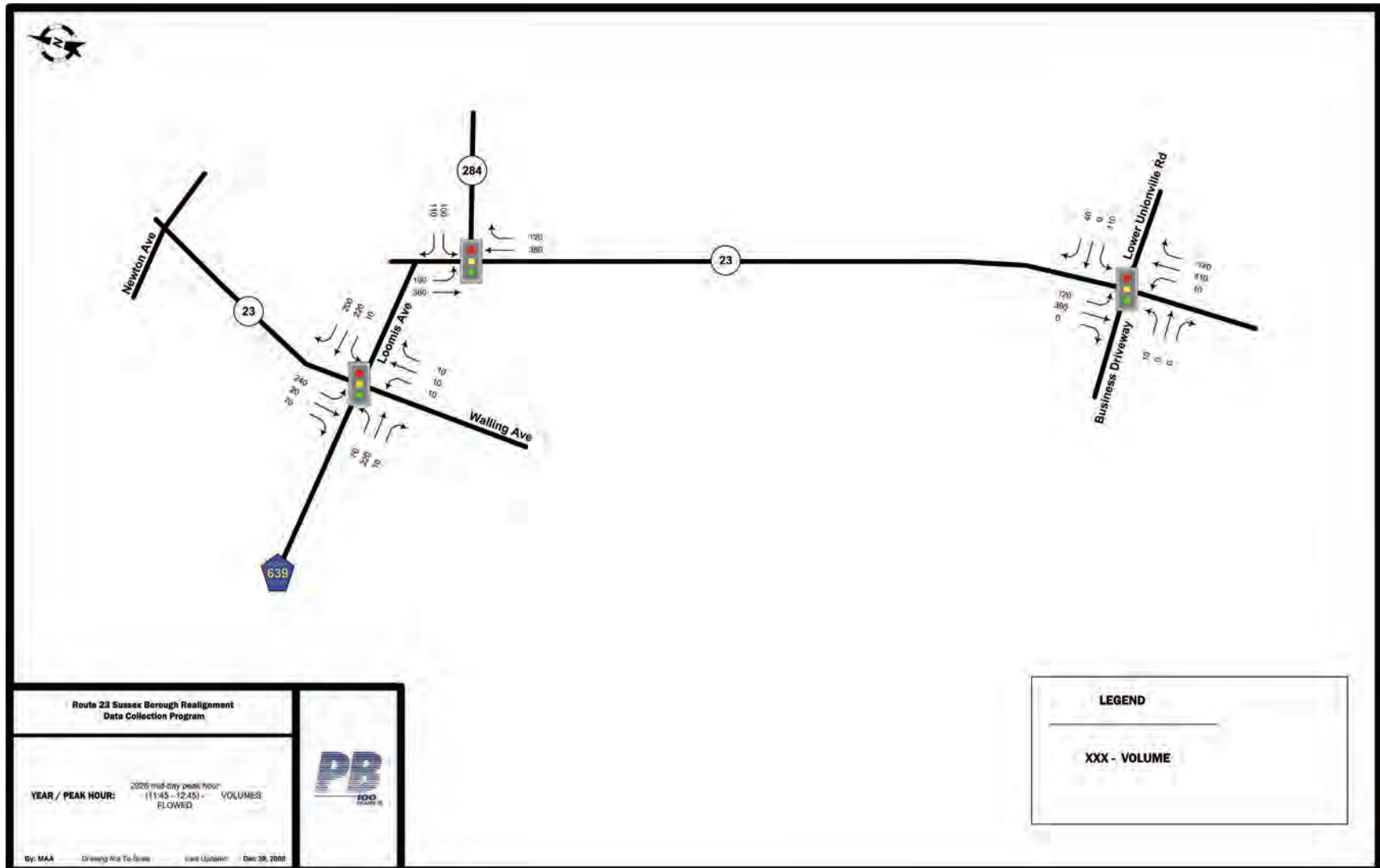


Figure 7: 2028 PM Peak Hour Volumes (No Build)

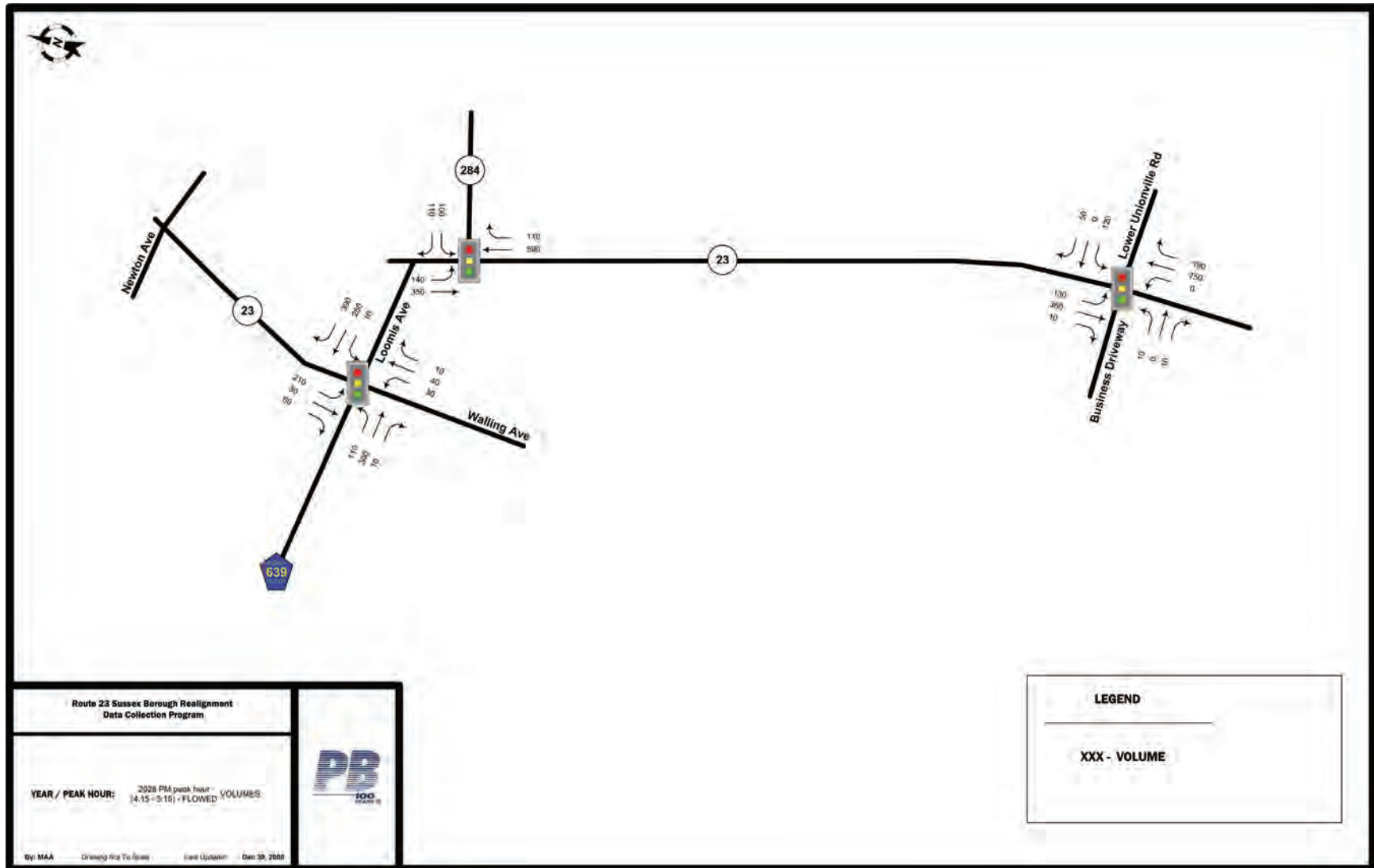


Figure 8: 2028 AM Peak Hour Diverted Volumes (Build)

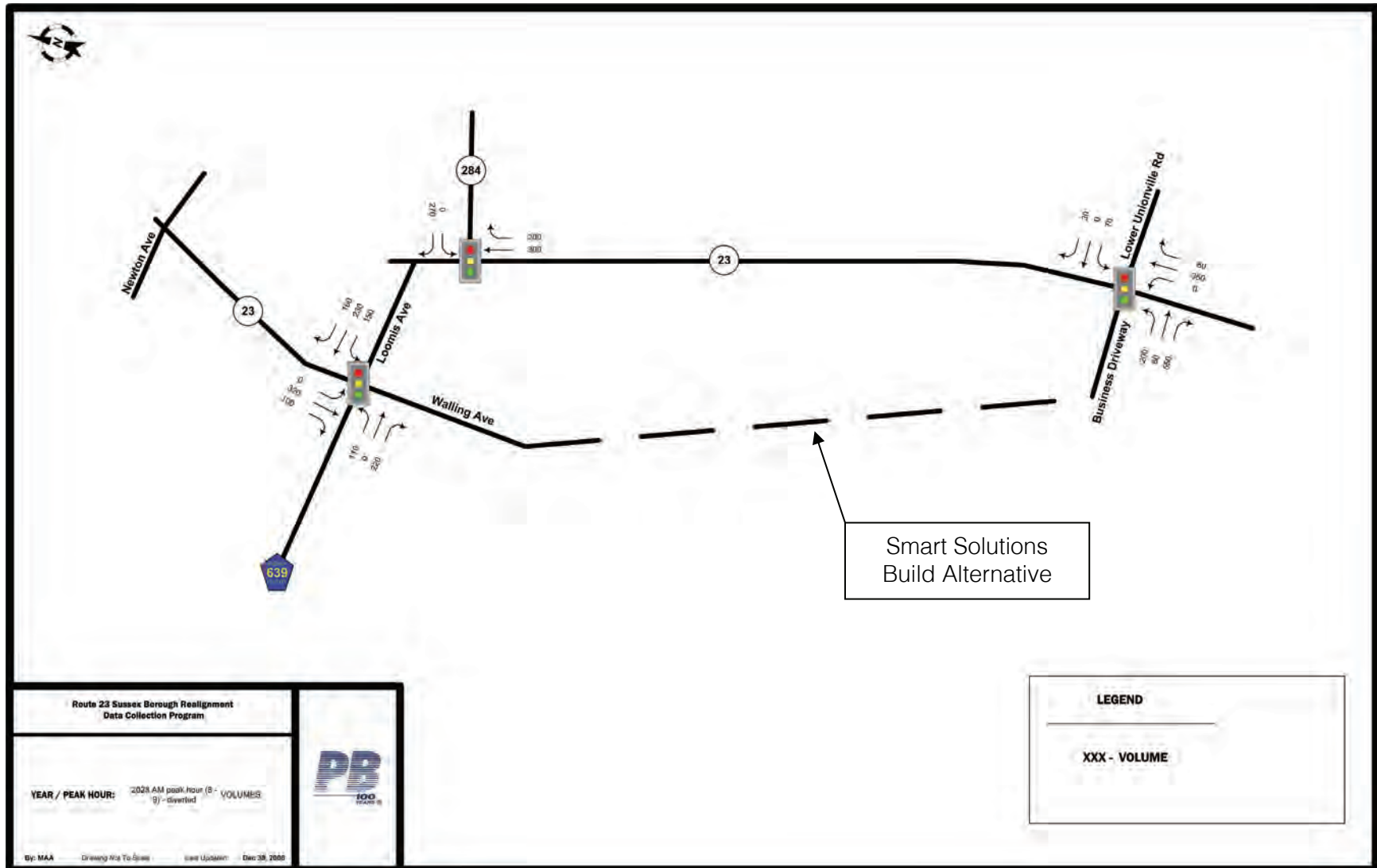


Figure 9: 2028 Midday Peak Hour Diverted Volumes (Build)

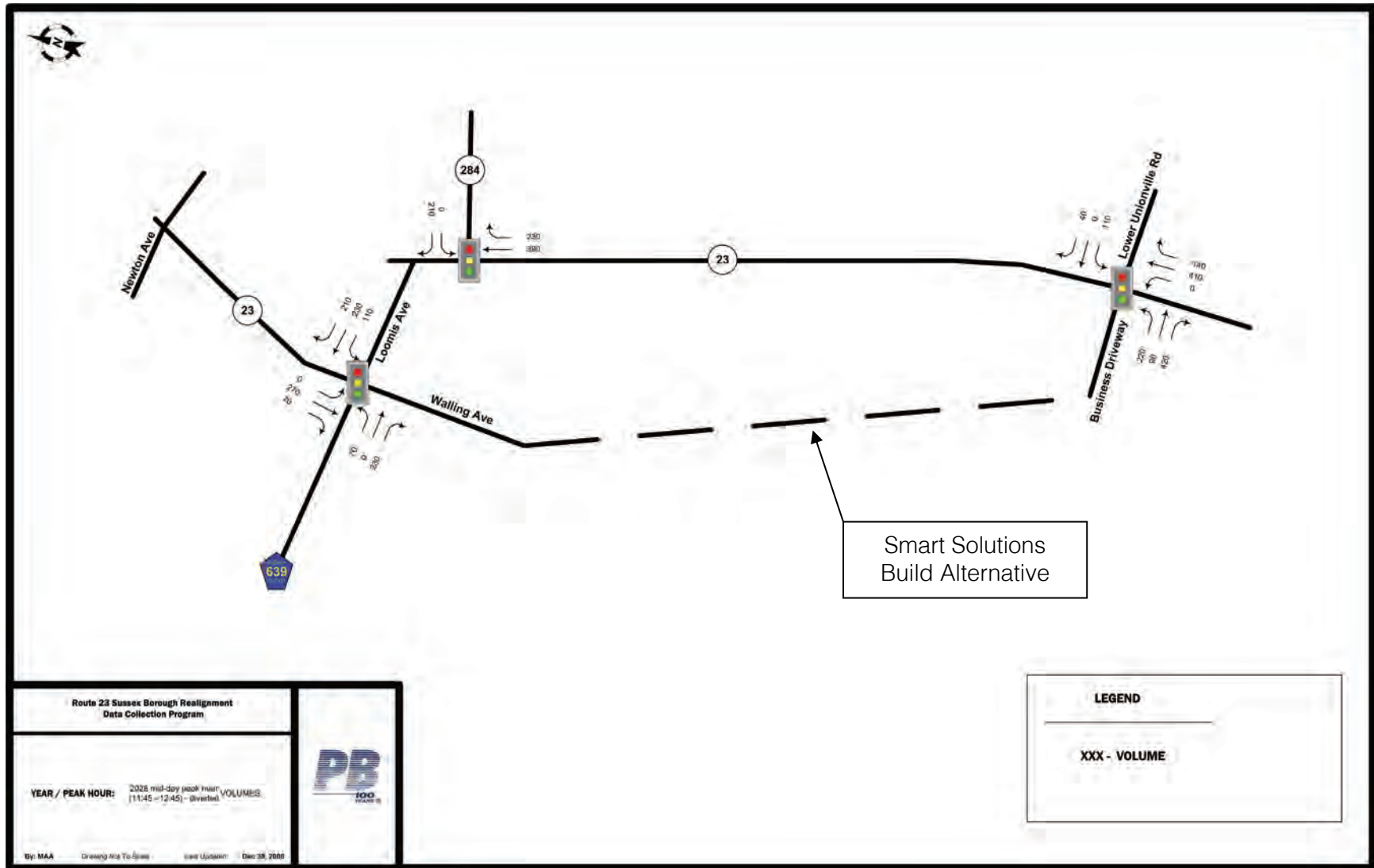
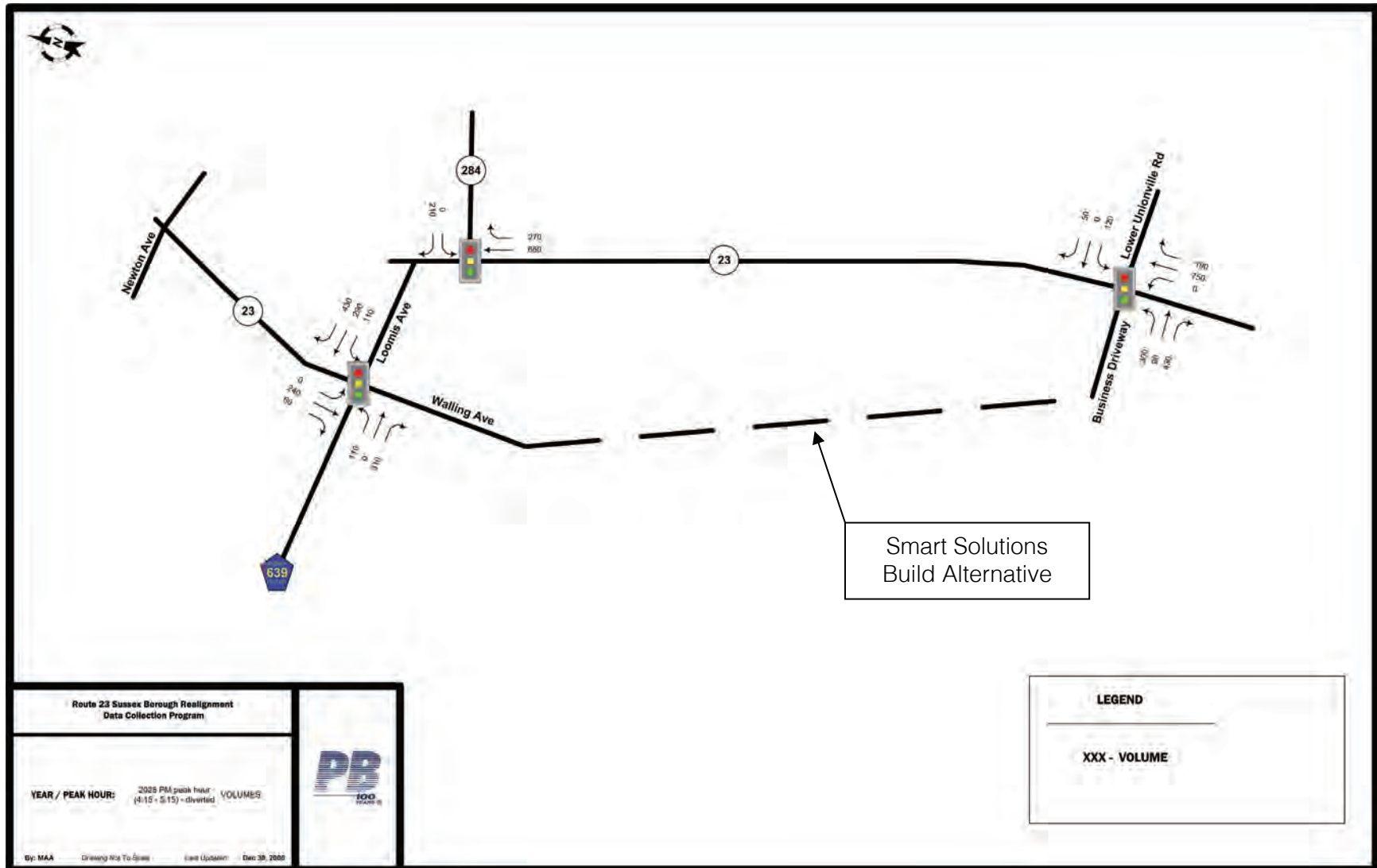


Figure 10: 2028 PM Peak Hour Diverted Volumes (Build)



7. Existing/Future Intersection Capacity Analysis

In the following section, existing (2008) and future (2028) intersection levels of service (LOS) for the no build and build scenarios are broken down by intersection. Each intersection corresponds with the tables shown in Figure 11, which shows the LOS results for each analysis years and both the no build and build scenarios.

PB utilized SYNCHRO Version 7, which emulates the latest release of the Highway Capacity Manual (HCM), as updated in 2000, to calculate intersection level of service (LOS). The standard performance measure for intersections is the LOS criteria. LOS has been defined in the HCM as a “qualitative measure describing conditions within a traffic stream, and their perception by motorists and/or passengers”. LOS is divided into six categories, ranging from LOS ‘A’ (free-flow traffic) to LOS ‘F’ (traffic flows break down over capacity volume conditions).

The capacity of a signalized intersection was determined for individual turning movements at the intersection and for the overall intersection. The HCM defines level of service for a signalized intersection based on control delay. Control Delay is a measure of motorist delay due to the presence of the intersection and includes slowing, stopping, and starting time. The level of service criteria for signalized intersections is shown in Table 1 below.

**Table 1
LOS Criteria for Signalized Intersections***

Level of Service	Control Delay per Vehicle (sec)
A	≤10.0
B	>10.0 and <20.0
C	≥20.0 and <35.0
D	≥35.0 and 55.0≤
E	≥55.0 and ≤80.0
F	>80.0

*Source: HCM2000, TRB, 2000

Route 23/Walling Avenue and Loomis Avenue

At Route 23/Walling Avenue and Loomis Avenue, overall intersection delay under the no build scenario is expected to increase between 2008 and 2028 during the AM, midday, and PM peak hours. The greatest increase in overall intersection delay will be experienced during the PM peak hour, with an increase of nearly 10 seconds. Under the no build scenario, level-of-service (LOS) at the eastbound and westbound Loomis Avenue approaches is expected to degrade from LOS B and LOS A (respectively) to LOS C during the PM peak hour. Conditions at the other approaches will remain relatively unchanged.

Under the build scenario, which includes the diversion of Route 23 southbound traffic to Walling Avenue, overall intersection delay would be cut by more than half, allowing the problematic Loomis Avenue approaches to achieve LOS A during all three peak hours.

Route 23 and Route 284

At Route 23 and Route 284, overall intersection delay under the no build scenario is expected to degrade slightly during the AM and midday peak hours, and significantly during the PM peak hour. The greatest increase in overall intersection delay will be experienced during the PM peak hour at the Route 23 southbound approach; delay will be 128 seconds greater by 2028, and the approach level-of-service will degenerate from LOS B to LOS F. This condition is related to the increasing traffic in the southbound direction and the difficulty in making left turns from Route 23 to Route 284. Future decreases in level-of-service are expected to be less drastic at the other approaches. However, as a result of the failing Route 23 SB approach (Loomis), overall intersection level-of-service will diminish from LOS C to LOS E, with an increase in delay of 51 seconds altogether. Under the no build, Route 23 at Route 284 will become the worst performing intersection in the study area.

Under the build scenario, which includes the diversion of Route 23 southbound traffic to Walling Avenue, conditions will improve significantly. Overall intersection delay is expected to be reduced by 84 percent—from 71 seconds to 11 seconds (LOS E to LOS B); this is a result of eliminating the problematic southbound approach entirely, thereby freeing up green time for the other approaches. Under the 2028 build scenario, overall intersection level-of-service would increase to LOS B during the PM peak hour; conditions during AM and midday periods, which are currently acceptable, would improve.

Route 23 and Lower Unionville Road

With or without the diversion, the Route 23 and Lower Unionville Road intersection will perform acceptably now and in the future. Overall intersection delay under the no build scenario is not expected to worsen significantly during the AM, midday, and PM peak hours. The greatest increase in delay under the no build—about 6 seconds—will occur on the Route 23 northbound approach. Increases in delay at other approaches are negligible; with most performing at better than LOS C now and in the future (the Lower Unionville Road westbound approach is expected to degrade to LOS D under the no build). During the PM peak hour, overall intersection delay will increase from 15.4 seconds to 19.2 seconds; intersection delay during the AM and midday peak hours is not expected to increase significantly under the no build scenario.

Under the build scenario, which includes the diversion of Route 23 southbound traffic to Walling Avenue, conditions at the Route 23 and Lower Unionville Road intersection are not expected to change significantly, except during the 2008 and 2028 AM peak hour, during which overall delay will actually increase by about 10 seconds. This change is due to the conversion of the intersection to a fully functioning four-legged intersection with some U-turns along Route 23 from SB to NB. Despite this, intersection performance will be within an acceptable range (LOS B) under the build scenario.

Figure 11: Existing/Future Intersection Capacity Analysis

2008 EXISTING								2028 NO BUILD						2028 BUILD						
Location	Approach	2008 AM Peak Hour		2008 MID Peak Hour		2008 PM Peak Hour		2028 AM Peak Hour		2028 MID Peak Hour		2028 PM Peak Hour		2028 AM Peak Hour		2028 MID Peak Hour		2028 PM Peak Hour		
		Average Delay (sec)	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS	
Route 23/Walling Ave. & Loomis Ave.	<i>Route23/Walling Ave.</i>								<i>Route23/Walling Ave.</i>						<i>Route23/Walling Ave.</i>					
	Northbound	16.1	B	18.8	B	19.8	B	15.2	B	17.6	B	19	B	29.6	C	29.9	C	29.7	C	
	Southbound	39.5	D	36.8	D	36.5	D	44	D	37.4	D	38.2	D							
	<i>Loomis Ave.</i>								<i>Loomis Ave.</i>						<i>Loomis Ave.</i>					
	Eastbound	14.7	B	9.9	A	13.5	B	19	B	12.2	B	24.2	C	6.4	A	5.6	A	5.5	A	
	Westbound	13.2	B	12.5	B	7.9	A	14.6	B	14.7	B	21.6	C	4.2	A	4.4	A	9.1	A	
Overall Intersection	23	C	19.4	B	16.4	B	27	C	20.9	C	25.5	C	13	B	12	B	12.1	B		
Route 23 & Route 284	<i>Route 23</i>								<i>Route 23</i>						<i>Route 23</i>					
	Northbound	15.1	B	15.8	B	18.9	B	16.5	B	10.4	B	29.4	C	6.1	A	5.9	A	6.5	A	
	Southbound	6.8	A	7.9	A	17.7	B	8	A	17.2	B	145.9	F							
	<i>Route 284</i>								<i>Route 284</i>						<i>Route 284</i>					
Westbound	32.8	C	31.4	C	31.3	C	34.1	C	31.5	C	31.5	C	33.6	C	32.8	C	28.7	C		
Overall Intersection	16	B	15.8	B	20.4	C	17	B	17.1	B	71.2	E	16	B	12.7	B	10.6	B		
Route 23 & Lower Unionville Rd.	<i>Route23</i>								<i>Route 23</i>						<i>Route 23</i>					
	Northbound	6.3	A	11.7	B	14.0	B	6.9	A	10.7	B	20.4	C	8.5	A	8.5	A	19.0	B	
	Southbound	7.6	A	11.5	B	11.4	B	8.2	A	12.6	B	12	B							
	<i>Lower Unionville Rd.</i>								<i>Lower Unionville Rd.</i>						<i>Lower Unionville Rd.</i>					
	Eastbound	0.0	A	32.3	C	31.8	C	0	A	32	C	31.6	C	24.9	C	17	B	15.7	B	
	Westbound	35.4	D	33.9	C	33.8	C	35.4	D	33.8	C	33.7	C	19.8	B	21	C	18.4	B	
Overall Intersection	9.3	A	14.5	B	15.4	B	10	A	14.4	B	19.2	B	19.2	B	14.2	B	17.5	B		

8. Traffic Impact Report – Summary

Key findings of the traffic analysis include the following:

- NJDOT data indicate the bulk of the crashes are of the same-direction, rear-end and angle types and that these rates are higher than the statewide average for each type. With the proposed Smart Solutions build alternative, the daily traffic volume on present Route 23 will be reduced by about half with opposing traffic confronted by left turning vehicles being eliminated and thereby reducing the potential for rear end and angle crashes.
- The conversion of the existing Route 23 roadway to one-way, coupled northbound and southbound pairs eliminates many left-turn conflicts and simplifies intersection operations in most cases by freeing up green time for the remaining approaches.
- The elimination of the opposing left-turn conflicts will prove particularly beneficial in the “dogleg” section of Route 23 between Route 284 and Walling Avenue, where more than one-half of all crashes occurred in the study area for the years that were examined. Conversion of the dogleg to one-way operations will provide more room for vehicles to negotiate the dogleg by eliminating opposing traffic and help to reduce the incidence of crashes.
- The introduction of a wide shoulder should also enhance safety for both turning traffic and for vehicles entering the travel-way from adjacent driveways and side streets.
- The proposed Smart Solutions build alternative can be expected to have minimal impact on truck traffic through the study area because the majority of heavy trucks were observed to be traveling fully through the study area along both northbound and southbound Route 23. Diversions in either direction to Route 284 were minimal and, in particular, less than 3% overall were counted traveling southbound Route 23 to Route 284. This is the significant movement, as this route will require a southbound to northbound U-turn at Lower Unionville Road to provide access to Route 284 under the build alternative. Therefore, only a very small percentage of heavy trucks can be expected to travel south on Route 23, then north on Route 23 to Route 284 if the one-way pair alternative is implemented.
- Based on the speed-and-delay data, the bulk of the observed travel delay in the study area consistently occurs in the “dogleg” Loomis Avenue segment of Route 23 in both the northbound and southbound directions. This finding is consistent across the AM, midday, and PM peak periods. Conversion of the dogleg to one-way operations should reduce delay in this section.
- The worst performing traffic movement under the no-build condition is the southbound approach of Route 23 at Route 284. This movement is projected to degrade to LOS F and overall intersection to LOS E by 2028. Under the build

scenario the southbound move at this intersection will be eliminated and operating conditions can be expected to improve significantly. Overall intersection delay is expected to be reduced by 84 percent—from 71 seconds to 11 seconds (LOS E to LOS B); this would happen by eliminating the problematic southbound approach entirely, thereby freeing up green time for the other approaches. Under the 2028 build scenario, overall intersection level-of-service would improve to LOS B during the PM peak hour; conditions during AM and midday periods, which are currently acceptable, would be improved as well.

Appendix A: 2005 – 2007 Crash Diagrams and Summaries



**PARSONS BRINCKERHOFF
CRASH SUMMARY SHEET**

Subject : 52043 CM6 - Route 23 Sussex Borough Realignment

PLA 52043 CM6

Made By : R. Sibley

Date : 12/9/2008

Checked By : M. Adams

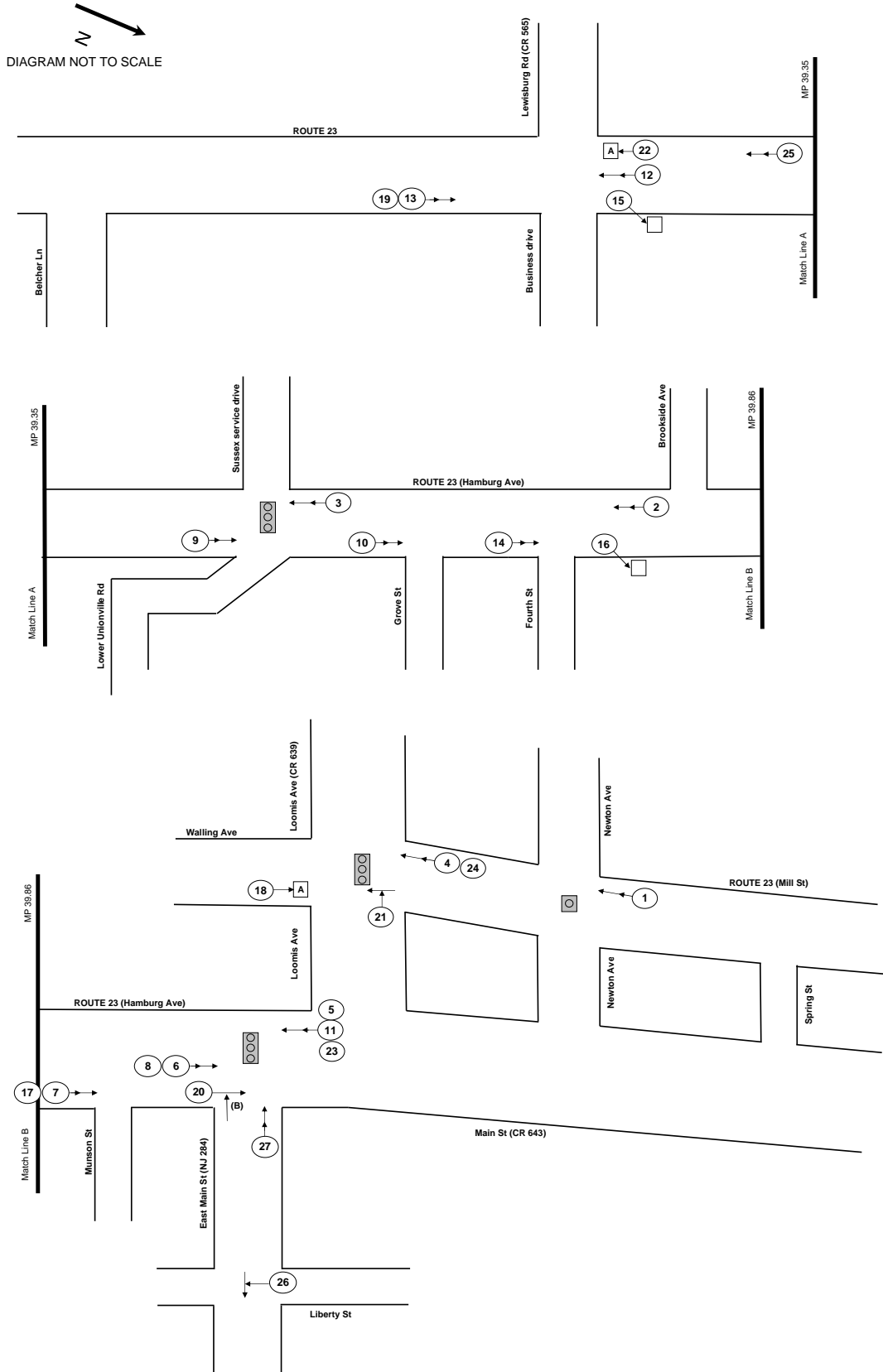
Date : 12/11/08

Location: Route 23 (MP 39.10 - MP 40.13)
Municipality: Sussex Borough
County: Sussex
Time Period: 1/1 to 12/31/2005

No.	Date	Day	Time	No. Injured	Surface Condition	Weather	Light Conditions	Collision Type	Misc.
1	1/9/2005	SUN	12:26	0	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
2	2/7/2005	MON	8:50	1	WET	CLEAR	DAY	SAME DIR - REAR	SBSB
3	2/9/2005	WED	9:48	1	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
4	2/19/2005	SAT	12:21	0	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
5	2/22/2005	TUE	13:03	2	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
6	4/10/2005	SUN	9:40	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
7	4/11/2005	MON	8:26	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
8	4/26/2005	TUE	9:53	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
9	5/11/2005	WED	8:41	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
10	5/22/2005	SUN	10:15	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
11	6/8/2005	WED	7:30	1	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
12	6/12/2005	SUN	15:27	1	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
13	6/16/2005	THR	12:16	0	WET	RAIN	DAY	SAME DIR - REAR	NBNB
14	6/16/2005	THR	17:33	0	WET	RAIN	DAY	SAME DIR - REAR	NBNB
15	6/22/2005	WED	3:26	1	DRY	CLEAR	DARK	FIXED OBJECT	NB
16	7/16/2005	SAT	17:42	1	DRY	CLEAR	DAY	FIXED OBJECT	NB
17	7/21/2005	THR	18:05	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
18	8/8/2005	MON	12:06	0	DRY	CLEAR	DAY	ANIMAL	NB
19	10/2/2005	SUN	17:01	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
20	10/26/2005	WED	11:13	0	DRY	CLEAR	DAY	BACKING	NBEB
21	10/29/2005	SAT	22:00	0	DRY	CLEAR	DARK	RIGHT ANGLE	WBSSB
22	11/14/2005	MON	?	0	DRY	CLEAR	DARK	ANIMAL	SB
23	11/29/2005	TUE	13:00	0	WET	RAIN	DAY	SAME DIR - REAR	SBSB
24	12/14/2005	WED	18:10	0	DRY	CLEAR	DARK	SAME DIR - REAR	SBSB
25	12/22/2005	THR	20:24	0	DRY	CLEAR	DARK	SAME DIR - REAR	SBSB
26	4/1/2005	FRI	15:40	0	DRY	CLEAR	DAY	RIGHT ANGLE	SBEB
27	6/24/2005	FRI	16:35	2	DRY	CLEAR	DAY	SAME DIR - REAR	WBWB

CRASH SUMMARY					
	DAYLIGHT	NIGHT	TOTALS	PAVEMENT CONDITIONS	
CLASSIFICATION BY TYPES				23	DRY
SAME DIRECTION (REAR-END)	18	2	20	4	WET
SAME DIRECTION (SIDESWIPE)			0	0	SNOW
ANGLE/RIGHT ANGLE	1	1	2	0	SLEET/ICE
LEFT TURN			0	0	OTHER
HEAD-ON			0	ACCIDENT LOCATIONS:	
BACKING	1	0	1	13	AT INTERSECTIONS
ENCROACHMENT			0	14	BETWEEN INTERSECTIONS
PEDESTRIAN ACCIDENTS			0	NUMBER OF ACCIDENTS WITH:	
FIXED OBJECT ACCIDENTS	1	1	2	0	PROPERTY DAMAGE ONLY
ANIMAL	1	1	2	8	INJURIES
OTHER ACCIDENTS			0	0	FATALITIES
TOTALS	22	5	27		

DIAGRAM NOT TO SCALE



LEGEND

- | | | | |
|------------------------------|--|------------------------|--|
| Path of Moving Motor Vehicle | | Out of Control Vehicle | |
| Pedestrian Path | | Overturned Vehicle | |
| Parked Vehicle | | Sideswiped Vehicle | |
| Animal | | Fixed Object | |
| Backing | | Encroachment | |



**PARSONS BRINCKERHOFF
CRASH SUMMARY SHEET**

Subject : 52043 CM6 - Route 23 Sussex Borough Realignment

PLA 52043 CM6

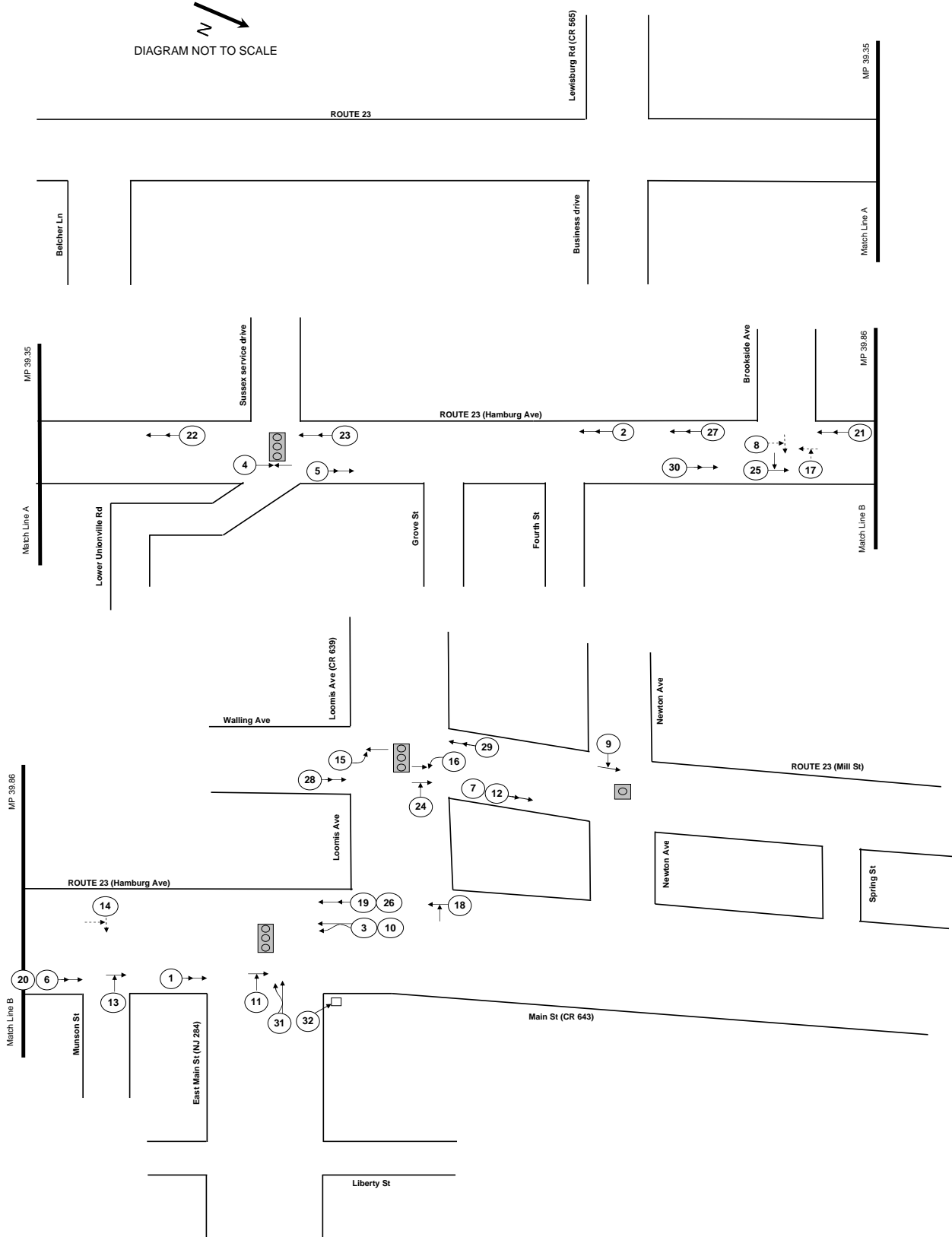
Made By : R. Sibley
Date : 12/9/2008
Checked By : M. Adams
Date : 12/11/08

Location: Route 23 (MP 39.10 - MP 40.13)
Municipality: Sussex Borough
County: Sussex
Time Period: 1/1 to 12/31/2006

No.	Date	Day	Time	No. Injured	Surface Condition	Weather	Light Conditions	Collision Type	Misc.
1	1/4/2006	WED	16:04	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
2	1/17/2006	TUE	8:27	1	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
3	1/24/2006	TUE	15:30	0	DRY	CLEAR	DAY	SAME DIR - SIDE	SBSB
4	2/21/2006	TUE	16:12	3	DRY	CLEAR	DAY	OPP HEAD-ON	SBNB
5	4/2/2006	SUN	11:08	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
6	4/6/2006	THR	15:34	0	WET	CLEAR	DAY	SAME DIR - REAR	NBNB
7	4/20/2006	THR	15:28	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
8	5/3/2006	WED	15:28	0	DRY	CLEAR	DAY	ENCROACHMENT	NBEB
9	5/26/2006	FRI	15:53	0	DRY	CLEAR	DAY	RIGHT ANGLE	NBEB
10	5/29/2006	MON	15:40	0	DRY	CLEAR	DAY	SAME DIR - SIDE	SBSB
11	6/12/2006	MON	21:12	0	DRY	CLEAR	DARK	RIGHT ANGLE	WBWB
12	6/18/2006	SUN	11:26	1	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
13	7/11/2006	TUE	8:51	0	DRY	CLEAR	DAY	RIGHT ANGLE	WBWB
14	8/3/2006	THR	19:23	0	DRY	CLEAR	DAY	ENCROACHMENT	NBEB
15	8/14/2006	MON	20:44	0	DRY	CLEAR	DARK	LEFT/U TURN	SBNB
16	8/25/2006	FRI	17:04	0	DRY	CLEAR	DAY	LEFT/U TURN	NBSB
17	8/26/2006	SAT	17:58	0	DRY	CLEAR	DAY	ENCROACHMENT	WBSB
18	8/31/2006	THR	9:30	1	DRY	CLEAR	DAY	RIGHT ANGLE	WBWB
19	9/15/2006	FRI	17:38	0	WET	RAIN	DAY	SAME DIR - REAR	SBSB
20	9/19/2006	TUE	17:47	0	WET	OVERCAST	DUSK	SAME DIR - REAR	NBNB
21	9/23/2006	SAT	17:07	0	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
22	10/7/2006	SAT	2:40	0	DRY	CLEAR	DARK	SAME DIR - REAR	SBSB
23	10/22/2006	SUN	18:58	0	DRY	CLEAR	DARK	SAME DIR - REAR	SBSB
24	10/23/2006	MON	6:52	0	DRY	CLEAR	DAY	ANGLE	NBWB
25	10/27/2006	FRI	7:10	0	DRY	CLEAR	DAY	RIGHT ANGLE	NBEB
26	11/22/2006	WED	18:40	0	DRY	CLEAR	DARK	SAME DIR - REAR	SBSB
27	12/2/2006	SAT	12:47	0	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
28	12/27/2006	WED	14:05	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
29	12/27/2006	WED	21:09	0	DRY	CLEAR	DARK	SAME DIR - REAR	SBSB
30	12/28/2006	THR	15:21	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
31	1/11/2006	WED	6:54	0	DRY	CLEAR	DAWN	SAME DIR - SIDE	SBSB
32	12/18/2006	MON	14:21	0	DRY	CLEAR	DAY	FIXED OBJECT	SB

CRASH SUMMARY					
	DAYLIGHT	NIGHT	TOTALS	PAVEMENT CONDITIONS	
CLASSIFICATION BY TYPES				29	DRY
SAME DIRECTION (REAR-END)	11	5	16	3	WET
SAME DIRECTION (SIDESWIPE)	2	1	3	0	SNOW
ANGLE/RIGHT ANGLE	5	1	6	0	SLEET/ICE
LEFT TURN	1	1	2	0	OTHER
HEAD-ON	1		1	ACCIDENT LOCATIONS:	
BACKING			0	23	AT INTERSECTIONS
ENCROACHMENT	3		3	9	BETWEEN INTERSECTIONS
PEDESTRIAN ACCIDENTS			0	NUMBER OF ACCIDENTS WITH:	
FIXED OBJECT ACCIDENTS	1		1		PROPERTY DAMAGE ONLY
ANIMAL			0	4	INJURIES
OTHER ACCIDENTS			0		FATALITIES
TOTALS	24	8	32		

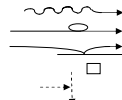
DIAGRAM NOT TO SCALE



LEGEND

Path of Moving Motor Vehicle
 Pedestrian Path
 Parked Vehicle
 Animal
 Backing

Out of Control Vehicle
 Overturned Vehicle
 Sideswiped Vehicle
 Fixed Object
 Encroachment





**PARSONS BRINCKERHOFF
CRASH SUMMARY SHEET**

Subject : 52043 CM6 - Route 23 Sussex Borough Realignment

PLA 52043 CM6

Made By : R. Sibley

Date : 12/9/2008

Checked By : M. Adams

Date : 12/11/08

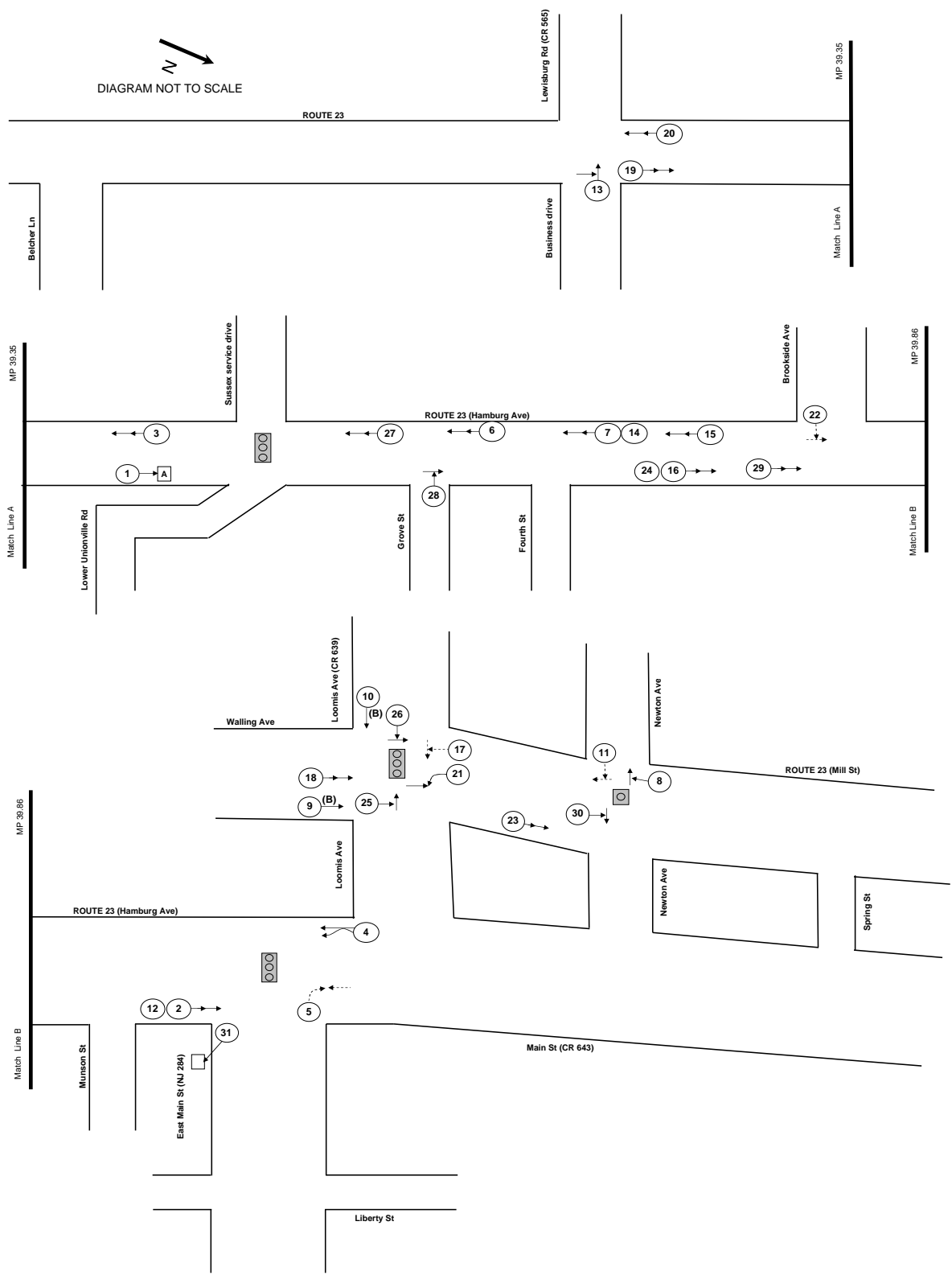
Location: Route 23 (MP 39.10 - MP 40.13)
Municipality: Sussex Borough
County: Sussex
Time Period: 1/1 to 12/31/2007

No.	Date	Day	Time	No. Injured	Surface Condition	Weather	Light Conditions	Collision Type	Misc.
1	1/6/2007	SAT	13:36	0	DRY	CLEAR	DAY	ANIMAL	NB
2	1/25/2007	THR	10:38	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
3	2/3/2007	SAT	5:21	0	DRY	CLEAR	DARK	SAME DIR - REAR	SBSB
4	2/7/2007	WED	9:05	0	DRY	CLEAR	DAY	SAME DIR - SIDE	SBSB
5	2/14/2007	WED	18:52	0	SLEET	SLEET	DARK	ENCROACHMENT	SBNB
6	2/16/2007	FRI	13:23	0	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
7	2/16/2007	FRI	17:54	0	DRY	CLEAR	DARK	SAME DIR - REAR	SBSB
8	2/16/2007	FRI	15:51	0	DRY	CLEAR	DAY	RIGHT ANGLE	SBWB
9	2/24/2007	SAT	12:18	0	DRY	CLEAR	DAY	BACKING	NBSB
10	3/8/2007	THR	16:31	0	DRY	CLEAR	DAY	BACKING	EBWB
11	3/16/2007	FRI	16:28	0	SNOW	SNOW	DAY	ENCROACHMENT	EBSB
12	3/19/2007	MON	8:36	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
13	5/25/2007	FRI	18:13	1	DRY	CLEAR	DAY	RIGHT ANGLE	WBNB
14	6/10/2007	SUN	8:44	0	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
15	6/28/2007	THR	11:08	0	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
16	7/3/2007	TUE	14:29	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
17	7/9/2007	MON	20:23	0	DRY	CLEAR	DUSK	ENCROACHMENT	SBEB
18	7/12/2007	THR	16:16	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
19	9/20/2007	THR	14:31	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
20	9/26/2007	WED	9:54	0	DRY	CLEAR	DAY	SAME DIR - REAR	SBSB
21	9/30/2007	SUN	17:30	0	DRY	CLEAR	DAY	LEFT/U TURN	SBNB
22	10/12/2007	FRI	18:29	0	DRY	CLEAR	DUSK	ENCROACHMENT	EBNB
23	10/25/2007	THR	11:58	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
24	11/6/2007	TUE	10:26	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
25	11/11/2007	SUN	17:10	0	DRY	CLEAR	DARK	RIGHT ANGLE	NBWB
26	11/11/2007	SUN	19:22	0	DRY	CLEAR	DARK	RIGHT ANGLE	EBNB
27	11/26/2007	MON	14:57	2	WET	RAIN	DAY	SAME DIR - REAR	SBSB
28	11/28/2007	WED	20:37	0	DRY	CLEAR	DARK	RIGHT ANGLE	WBNB
29	11/29/2007	THR	15:06	0	DRY	CLEAR	DAY	SAME DIR - REAR	NBNB
30	12/8/2007	SAT	21:10	0	DRY	CLEAR	DARK	RIGHT ANGLE	NBEB
31	1/20/2007	SAT	13:51	0	DRY	CLEAR	DAY	FIXED OBJECT	NB

CRASH SUMMARY

	DAYLIGHT	NIGHT	TOTALS	PAVEMENT CONDITIONS
CLASSIFICATION BY TYPES				28 DRY
SAME DIRECTION (REAR-END)	13	2	15	1 WET
SAME DIRECTION (SIDESWIPE)	1		1	1 SNOW
ANGLE/RIGHT ANGLE	2	4	6	1 SLEET/ICE
LEFT TURN	1		1	0 OTHER
HEAD-ON			0	
ACCIDENT LOCATIONS:				
BACKING	2		2	21 AT INTERSECTIONS
ENCROACHMENT	1	3	4	10 BETWEEN INTERSECTIONS
PEDESTRIAN ACCIDENTS			0	
NUMBER OF ACCIDENTS WITH:				
FIXED OBJECT ACCIDENTS	1		1	PROPERTY DAMAGE ONLY
ANIMAL	1		1	2 INJURIES
OTHER ACCIDENTS			0	FATALITIES
TOTALS	22	9	31	

DIAGRAM NOT TO SCALE



LEGEND

- Path of Moving Motor Vehicle
- Pedestrian Path
- Parked Vehicle
- Animal
- Backing
- Out of Control Vehicle
- Overturned Vehicle
- Sideswiped Vehicle
- Fixed Object
- Encroachment



**PARSONS BRINCKERHOFF
CRASH SUMMARY SHEET**

Subject : 52043 CM6 - Route 23 Sussex Borough Realignment

PLA 52043 CM6	
Made By : R. Sibley
Date : 12/9/2008
Checked By : M. Adams
Date : 12/11/08

Location: Route 23 (MP 39.10 - MP 40.13)
Municipality: Sussex Borough
County: Sussex
Time Period:

Number of Crashes				Percentage (%)	
1/1 to 12/31/2005	1/1 to 12/31/2006	1/1 to 12/31/2007	Total	of Total Crashes	
Injury Category					
			0	0.0%	Fatal
8	4	2	14	15.6%	Injury
			0	0.0%	Property Damage
			14	15.6%	
Direction					
20	16	15	51	56.7%	Same Direction Rear-End
0	3	1	4	4.4%	Same Direction Sideswipe
2	6	6	14	15.6%	Angle/Right Angle
0	2	1	3	3.3%	Left-Turn
0	1	0	1	1.1%	Head-On
1	0	2	3	3.3%	Backing
0	3	4	7	7.8%	Encroachment
			0	0.0%	Overtaken
0	0	0	0	0.0%	Pedestrian
2	1	1	4	4.4%	Fixed Object:
			0	0.0%	
			0	0.0%	
2	0	1	3	3.3%	Animal
			0	0.0%	Parked Vehicle
0	0	0	0	0.0%	Other Types:
			0	0.0%	
			0	0.0%	
			90	100.0%	
Location					
13	23	21	57	63.3%	At Intersections
14	9	10	33	36.7%	Between Intersections
			0	0.0%	At Railroad Crossings
			0	0.0%	Other:
			90	100.0%	
Pavement					
23	29	28	80	88.9%	Dry
4	3	1	8	8.9%	Wet Surface
0	0	1	1	1.1%	Snowy
0	0	1	1	1.1%	Icy
0	0	0	0	0.0%	Other:
			90	100.0%	
Time of Day					
22	24	22	68	75.6%	Day
5	8	9	22	24.4%	Dawn, Dusk, Dark
			90	100.0%	
Total Crashes		90			

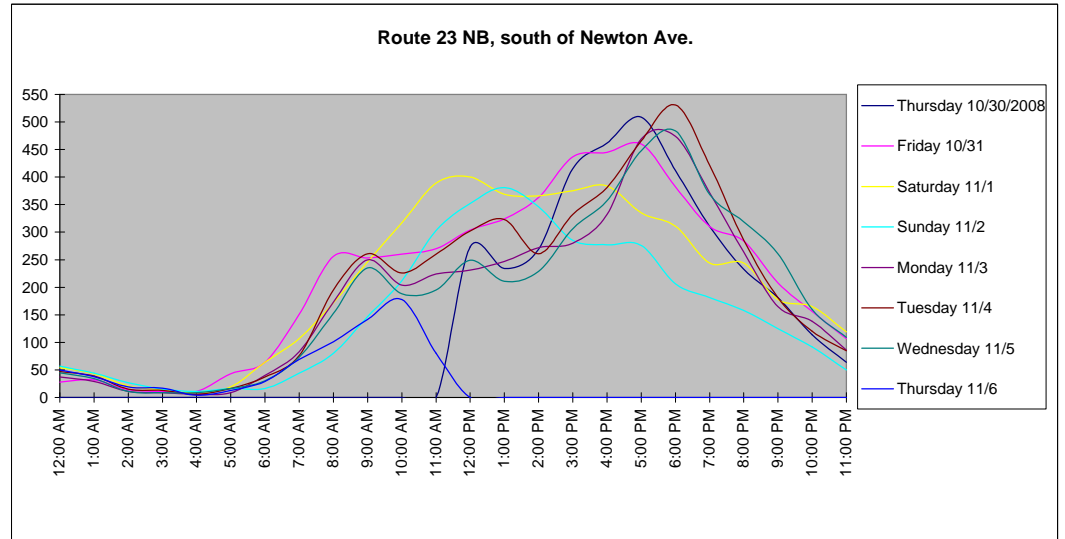
☐ = experienced rate higher than state average

	Study area	2007 statewide average
Same Direction Rear-End	56.7%	45.67%
Same Direction Sideswipe	4.4%	
Angle/Right Angle	15.56%	11.11%
Left-Turn	3.33%	3.35%
Head-On	1.11%	1.82%
Backing	3.33%	0.81%
Encroachment	7.78%	0.30%
Overtaken	0.00%	
Pedestrian	0.00%	
Fixed Object:	4.44%	less than study area
	0.00%	
	0.00%	
Animal	3.33%	3.00%
Parked Vehicle	0.00%	
Other Types:	0.00%	
	0.00%	
	0.00%	
	100.00%	
Location		
At Intersections	63.33%	28.31%
Between Intersections	36.67%	71.69%
At Railroad Crossings	0.00%	
Other:	0.00%	
	100.00%	
Pavement		
Dry	88.89%	75.21%
Wet Surface	8.89%	
Snowy	1.11%	
Icy	1.11%	
Other:	0.00%	
	100.00%	
Time of Day		
Day	75.56%	70.05%
Dawn, Dusk, Dark	24.44%	29.95%
	100.00%	

Appendix B: Automatic Traffic Recorder (ATR) Data

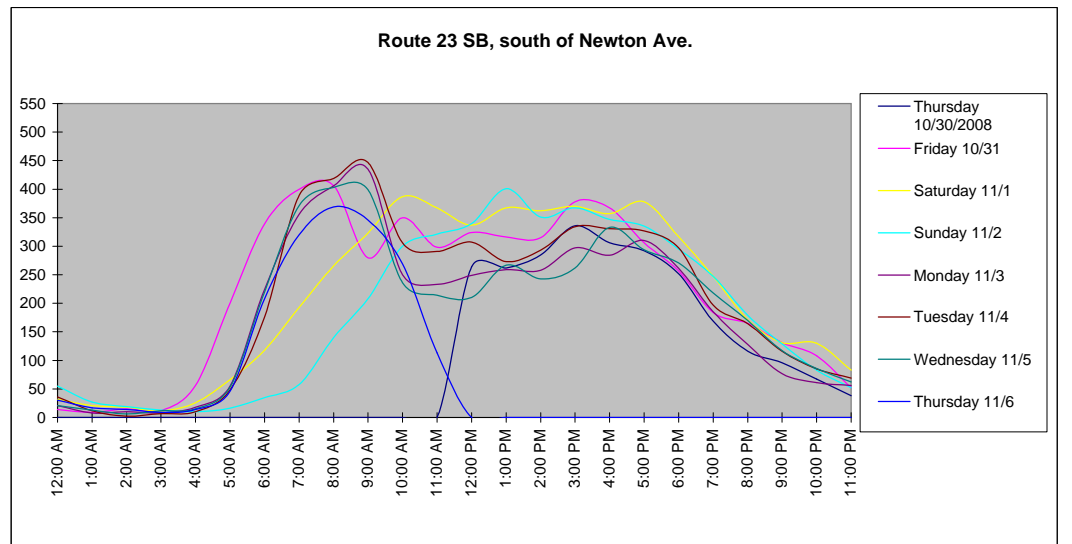
Route 23 NB, south of Newton Ave.

TIME	NB							
	Thursday 10/30/2008	Friday 10/31	Saturday 11/1	Sunday 11/2	Monday 11/3	Tuesday 11/4	Wednesday 11/5	Thursday 11/6
12:00 AM	0	28	54	57	37	47	45	50
1:00 AM	0	32	43	44	29	39	34	38
2:00 AM	0	14	21	27	11	15	11	19
3:00 AM	0	11	14	15	9	13	9	17
4:00 AM	0	11	9	11	6	6	9	4
5:00 AM	0	43	19	16	9	16	16	13
6:00 AM	0	64	64	16	40	37	30	29
7:00 AM	0	151	107	44	83	76	73	69
8:00 AM	0	256	172	80	173	195	153	101
9:00 AM	0	253	246	147	250	261	235	142
10:00 AM	0	260	317	212	204	226	188	178
11:00 AM	0	270	389	303	224	260	195	80
12:00 PM	273	304	400	352	231	302	249	0
1:00 PM	234	324	369	381	247	323	211	0
2:00 PM	269	363	366	346	272	261	229	0
3:00 PM	415	437	375	285	280	332	306	0
4:00 PM	462	445	384	277	332	381	357	0
5:00 PM	509	460	335	276	469	466	448	0
6:00 PM	412	382	311	206	474	531	484	0
7:00 PM	310	310	244	181	371	421	368	0
8:00 PM	233	284	244	158	264	286	319	0
9:00 PM	181	208	178	125	165	181	261	0
10:00 PM	114	156	165	92	138	120	160	0
11:00 PM	64	107	119	50	86	85	109	0



Route 23 SB, south of Newton Ave.

TIME	SB							
	Thursday 10/30/2008	Friday 10/31	Saturday 11/1	Sunday 11/2	Monday 11/3	Tuesday 11/4	Wednesday 11/5	Thursday 11/6
12:00 AM	0	14	32	55	21	36	21	30
1:00 AM	0	9	21	27	8	12	13	17
2:00 AM	0	15	18	19	10	2	6	14
3:00 AM	0	12	11	13	8	7	12	9
4:00 AM	0	56	26	10	18	10	15	14
5:00 AM	0	200	66	16	55	48	53	46
6:00 AM	0	339	118	35	224	176	220	208
7:00 AM	0	400	193	58	356	389	371	320
8:00 AM	0	406	266	140	406	419	403	369
9:00 AM	0	280	323	208	435	447	399	346
10:00 AM	0	350	387	300	250	306	236	269
11:00 AM	0	298	367	321	233	291	214	113
12:00 PM	264	324	337	340	249	307	210	0
1:00 PM	262	316	367	401	259	273	267	0
2:00 PM	285	315	362	351	258	293	243	0
3:00 PM	336	378	370	367	297	334	262	0
4:00 PM	306	367	357	347	284	331	333	0
5:00 PM	292	306	378	335	310	327	294	0
6:00 PM	252	257	317	295	261	297	271	0
7:00 PM	169	184	247	247	185	197	218	0
8:00 PM	116	165	171	179	128	164	170	0
9:00 PM	96	131	131	129	77	116	117	0
10:00 PM	67	108	130	83	61	85	86	0
11:00 PM	38	52	83	52	56	69	62	0



Route 23 NB, south of Newton Ave.

Peak Periods from Manual Data:

AM 8 - 9
 Mid-day 11:45 - 12:45
 PM 4:15 - 5:15

	Thursday 10/30/2008		Friday 10/31/2008		Saturday 11/1/2008		Sunday 11/2/2008		Monday 11/3/2008		Tuesday 11/4/2008		Wednesday 11/5/2008		Thursday 11/6/2008		
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	
AM	8:00	0	0	50	84	37	53	16	31	32	90	29	89	22	99	22	81
	8:15	0	0	67	93	40	62	15	37	46	101	47	106	40	100	24	80
	8:30	0	0	79	120	47	82	20	31	47	116	51	111	40	105	26	107
	8:45	0	0	60	109	48	69	29	41	48	99	68	113	51	99	29	101
	period sum	0	0	256	406	172	266	80	140	173	406	195	419	153	403	101	369
Mid-day	11:45	0	0	79	60	102	90	81	88	59	35	81	76	50	54	0	0
	12:00	90	67	74	81	110	80	69	73	72	66	69	82	66	43	0	0
	12:15	65	63	77	71	90	84	88	85	47	42	77	74	58	67	0	0
	12:30	69	71	80	91	101	99	110	90	53	80	88	85	52	66	0	0
	period sum	224	201	310	303	403	353	348	336	231	223	315	317	226	230	0	0
PM	4:15	120	63	116	104	91	70	58	108	96	66	93	74	111	67	0	0
	4:30	124	78	118	87	95	103	64	88	75	81	92	99	77	101	0	0
	4:45	106	77	102	99	101	79	78	81	89	61	93	75	83	83	0	0
	5:00	135	75	109	74	103	88	68	89	108	67	122	85	118	81	0	0
	period sum	485	293	445	364	390	340	268	366	368	275	400	333	389	332	0	0

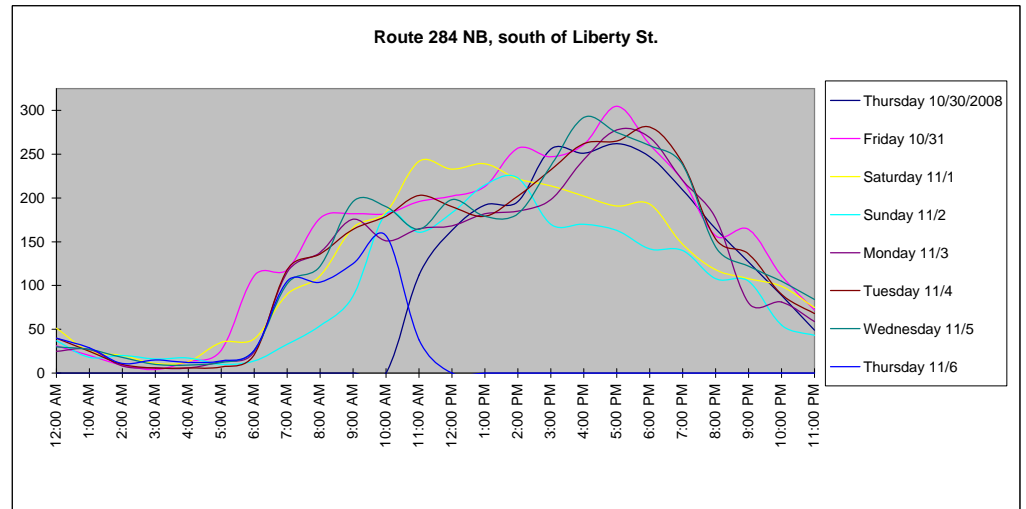
Weekday Avg:

	NB	SB
AM	176	401
Mid-day	271	268
PM	417	319

Route 284 NB, south of Liberty St.

NB

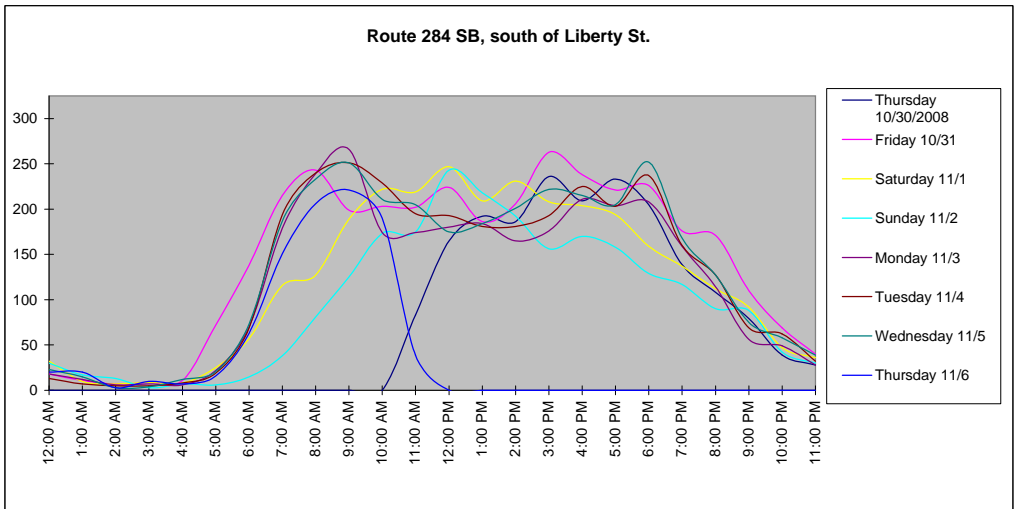
TIME	Thursday 10/30/2008	Friday 10/31	Saturday 11/1	Sunday 11/2	Monday 11/3	Tuesday 11/4	Wednesday 11/5	Thursday 11/6
12:00 AM	0	31	51	37	25	40	30	40
1:00 AM	0	20	25	18	27	25	27	29
2:00 AM	0	9	20	20	8	10	18	11
3:00 AM	0	4	11	16	6	6	10	15
4:00 AM	0	13	13	17	6	6	9	12
5:00 AM	0	26	35	10	13	7	12	14
6:00 AM	0	111	39	14	24	21	26	26
7:00 AM	0	118	90	33	115	118	102	105
8:00 AM	0	177	111	54	138	136	122	104
9:00 AM	0	182	166	88	176	164	196	125
10:00 AM	0	182	184	182	151	179	190	157
11:00 AM	112	196	242	161	165	203	164	38
12:00 PM	163	202	233	183	168	190	198	0
1:00 PM	192	213	239	215	182	179	179	0
2:00 PM	196	257	222	223	185	202	182	0
3:00 PM	256	247	214	170	198	232	237	0
4:00 PM	251	261	202	170	244	262	292	0
5:00 PM	262	305	191	163	278	265	275	0
6:00 PM	247	261	193	142	269	281	260	0
7:00 PM	209	220	147	140	220	240	238	0
8:00 PM	165	157	118	108	177	153	144	0
9:00 PM	127	164	108	105	80	136	122	0
10:00 PM	89	111	99	55	81	90	105	0
11:00 PM	49	72	75	43	59	68	84	0



Route 284 SB, south of Liberty St.

SB

TIME	Thursday 10/30/2008	Friday 10/31	Saturday 11/1	Sunday 11/2	Monday 11/3	Tuesday 11/4	Wednesday 11/5	Thursday 11/6
12:00 AM	0	18	32	30	18	13	23	20
1:00 AM	0	11	10	17	12	7	15	20
2:00 AM	0	7	7	13	6	5	3	3
3:00 AM	0	9	9	3	7	5	4	10
4:00 AM	0	11	8	7	6	8	12	7
5:00 AM	0	72	25	6	22	19	21	16
6:00 AM	0	138	57	15	70	69	73	63
7:00 AM	0	215	116	38	179	194	187	151
8:00 AM	0	243	127	81	239	240	233	206
9:00 AM	0	199	189	125	266	251	251	221
10:00 AM	0	203	222	173	174	229	211	190
11:00 AM	83	202	219	175	174	195	205	39
12:00 PM	165	224	247	243	180	193	175	0
1:00 PM	192	186	209	218	184	181	184	0
2:00 PM	186	206	231	192	165	181	201	0
3:00 PM	236	263	208	156	176	193	222	0
4:00 PM	209	238	204	170	211	225	215	0
5:00 PM	233	221	194	158	204	203	205	0
6:00 PM	205	226	159	129	208	237	252	0
7:00 PM	139	176	137	117	159	160	168	0
8:00 PM	108	171	112	90	114	127	127	0
9:00 PM	79	110	92	88	56	69	75	0
10:00 PM	39	69	47	42	49	62	58	0
11:00 PM	28	40	36	30	28	32	39	0



Route 284 NB, south of Liberty St.

Peak Periods from Manual Data:

AM 8 - 9
 Mid-day 11:45 - 12:45
 PM 4:15 - 5:15

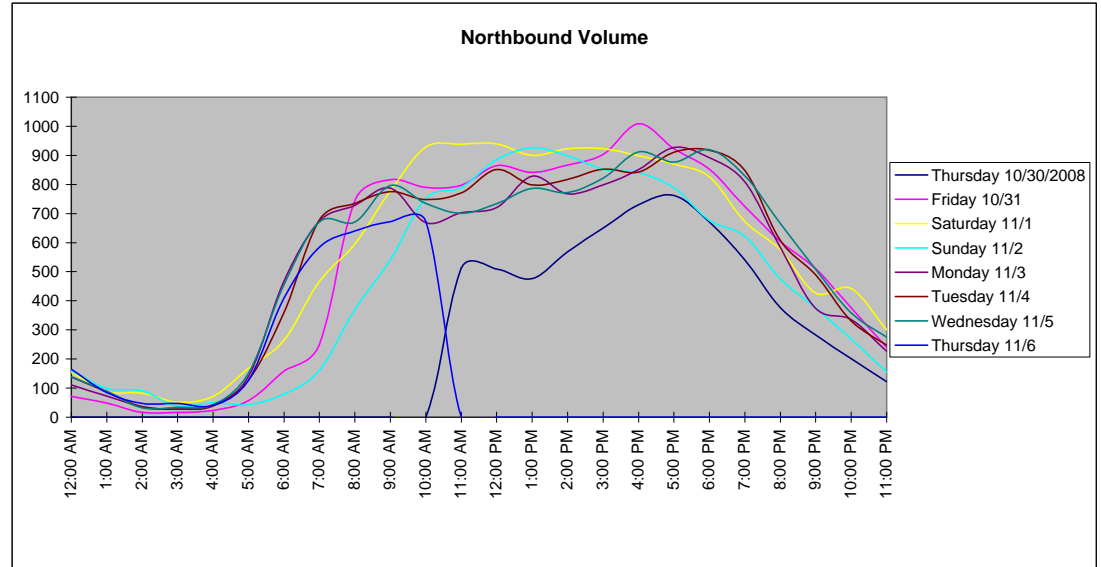
		Thursday 10/30/2008		Friday 10/31/2008		Saturday 11/1/2008		Sunday 11/2/2008		Monday 11/3/2008		Tuesday 11/4/2008		Wednesday 11/5/2008		Thursday 11/6/2008	
		NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
AM	8:00	0	0	37	54	25	24	8	14	31	60	28	68	30	66	27	36
	8:15	0	0	40	53	31	33	14	14	34	55	36	44	31	56	26	50
	8:30	0	0	45	70	33	22	12	22	25	57	38	54	31	48	29	53
	8:45	0	0	55	66	22	48	20	31	48	67	34	74	30	63	22	67
	period sum	0	0	177	243	111	127	54	81	138	239	136	240	122	233	104	206
Mid-day	11:45	55	39	41	53	58	68	43	37	41	37	66	50	48	51	0	0
	12:00	36	51	49	58	58	62	50	69	40	42	43	50	40	47	0	0
	12:15	54	35	59	51	53	59	52	53	41	47	43	51	60	42	0	0
	12:30	35	41	46	48	55	68	38	56	52	44	50	59	54	43	0	0
	period sum	180	166	195	210	224	257	183	215	174	170	202	210	202	183	0	0
PM	4:15	64	61	68	54	47	55	43	50	46	41	65	44	75	36	0	0
	4:30	74	45	65	57	50	52	48	46	66	55	57	57	69	55	0	0
	4:45	59	46	54	63	55	45	45	37	69	44	79	63	76	53	0	0
	5:00	76	49	82	59	42	53	37	32	66	50	69	51	59	59	0	0
	period sum	273	201	269	233	194	205	173	165	247	190	270	215	279	203	0	0

Weekday Avg:	NB	SB
AM	135	232
Mid-day	191	188
PM	268	208

Route 23, north of Lower Unionville Road and south of Grove Street

NB

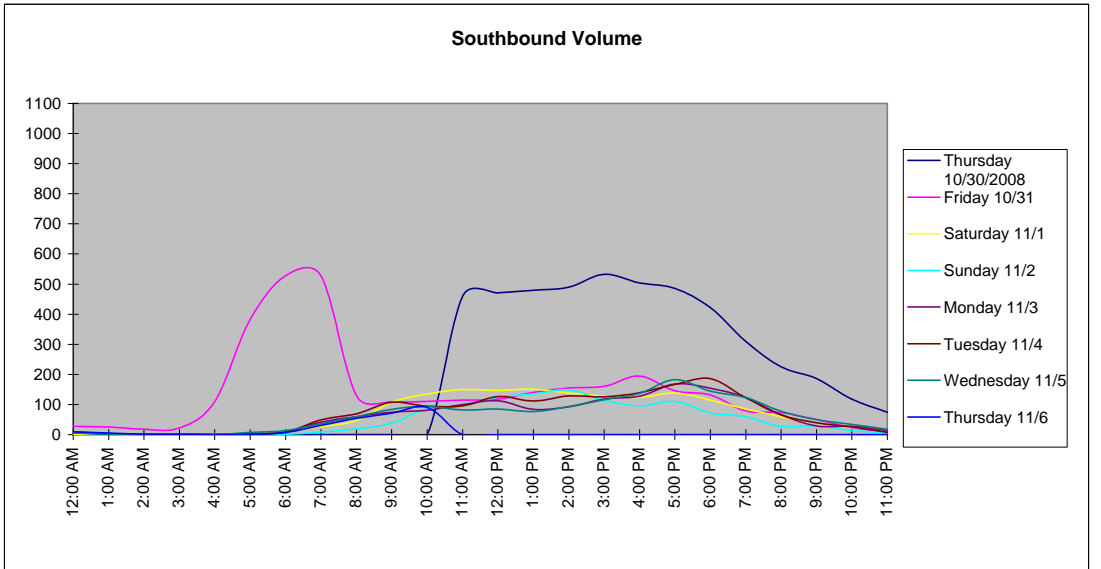
TIME	Thursday 10/30/2008	Friday 10/31	Saturday 11/1	Sunday 11/2	Monday 11/3	Tuesday 11/4	Wednesday 11/5	Thursday 11/6
12:00 AM	0	71	154	160	111	139	137	165
1:00 AM	0	48	88	99	73	87	89	85
2:00 AM	0	17	83	90	36	35	32	47
3:00 AM	0	17	52	37	27	28	34	47
4:00 AM	0	23	72	50	42	38	43	41
5:00 AM	0	57	168	43	141	128	152	128
6:00 AM	0	158	265	79	469	361	456	410
7:00 AM	0	249	466	161	673	678	671	584
8:00 AM	0	745	595	370	728	735	671	640
9:00 AM	0	816	778	541	788	776	796	672
10:00 AM	0	790	928	752	669	748	735	672
11:00 AM	514	797	938	790	703	771	701	0
12:00 PM	509	865	939	885	720	851	734	0
1:00 PM	476	842	900	926	828	799	787	0
2:00 PM	569	867	923	899	768	817	772	0
3:00 PM	650	903	923	852	799	853	822	0
4:00 PM	730	1009	899	840	851	843	912	0
5:00 PM	762	923	870	789	927	911	877	0
6:00 PM	671	852	826	677	892	917	920	0
7:00 PM	540	724	672	621	808	848	829	0
8:00 PM	376	604	575	475	583	607	666	0
9:00 PM	283	510	427	376	374	490	508	0
10:00 PM	201	376	442	269	336	331	359	0
11:00 PM	122	240	300	155	227	247	275	0



Route 23, north of Lower Unionville Road and south of Grove Street

SB

TIME	Thursday 10/30/2008	Friday 10/31	Saturday 11/1	Sunday 11/2	Monday 11/3	Tuesday 11/4	Wednesday 11/5	Thursday 11/6
12:00 AM	0	28	1	6	10	6	6	10
1:00 AM	0	25	3	1	1	2	1	5
2:00 AM	0	18	2	2	0	2	1	1
3:00 AM	0	22	0	0	1	0	1	1
4:00 AM	0	109	3	0	1	0	0	0
5:00 AM	0	383	4	0	4	2	7	0
6:00 AM	0	528	13	1	8	8	14	7
7:00 AM	0	528	27	8	41	49	36	31
8:00 AM	0	130	47	19	60	69	60	54
9:00 AM	0	109	107	38	74	107	84	71
10:00 AM	0	111	135	86	81	95	93	90
11:00 AM	460	115	150	97	100	96	82	0
12:00 PM	471	118	147	124	113	127	85	0
1:00 PM	479	140	151	135	84	112	76	0
2:00 PM	490	155	138	149	92	129	94	0
3:00 PM	532	161	128	114	118	125	116	0
4:00 PM	504	194	123	96	128	139	137	0
5:00 PM	486	146	138	111	168	167	183	0
6:00 PM	422	132	115	72	154	186	145	0
7:00 PM	309	79	85	59	123	122	123	0
8:00 PM	225	73	59	27	66	66	78	0
9:00 PM	186	50	29	29	29	39	50	0
10:00 PM	118	23	24	14	28	25	34	0
11:00 PM	74	8	15	6	14	7	18	0



Route 23, north of Lower Unionville Road and south of Grove Street

Peak Periods from Manual Data:

AM 8 - 9
 Mid-day 11:45 - 12:45
 PM 4:15 - 5:15

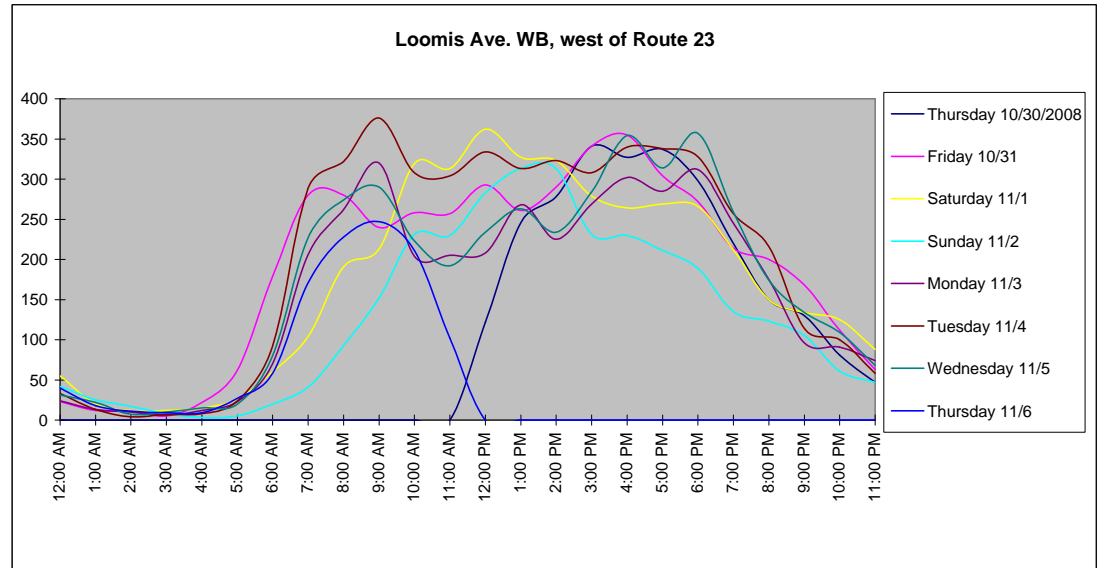
		Thursday 10/30/2008		Friday 10/31/2008		Saturday 11/1/2008		Sunday 11/2/2008		Monday 11/3/2008		Tuesday 11/4/2008		Wednesday 11/5/2008		Thursday 11/6/2008	
		NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
AM	8:00	0	0	134	58	134	8	68	2	158	15	165	13	151	11	127	8
	8:15	0	0	197	21	137	7	84	1	179	13	173	18	184	13	168	11
	8:30	0	0	215	26	157	12	101	5	203	14	188	13	155	13	166	15
	8:45	0	0	199	25	167	20	117	11	188	18	209	25	181	23	179	20
	period sum	0	0	745	130	595	47	370	19	728	60	735	69	671	60	640	54
Mid-day	11:45	136	109	212	28	220	37	198	17	176	28	200	31	184	22	0	0
	12:00	137	124	195	18	244	37	214	21	182	39	212	26	172	17	0	0
	12:15	123	106	228	36	215	36	220	37	161	20	211	33	188	26	0	0
	12:30	126	111	218	29	235	28	240	33	199	30	214	36	196	18	0	0
	period sum	522	450	853	111	914	138	872	108	718	117	837	126	740	83	0	0
PM	4:15	179	121	264	43	230	34	210	25	207	32	195	30	223	29	0	0
	4:30	194	127	225	40	230	26	206	23	214	33	206	44	237	30	0	0
	4:45	171	135	251	51	231	32	201	23	222	33	219	32	233	39	0	0
	5:00	193	138	247	30	203	34	191	34	205	30	241	42	216	33	0	0
	period sum	737	521	987	164	894	126	808	105	848	128	861	148	909	131	0	0

Weekday Avg:	NB	SB
AM	704	75
Mid-day	734	177
PM	868	218

Loomis Ave. WB, west of Route 23

WB

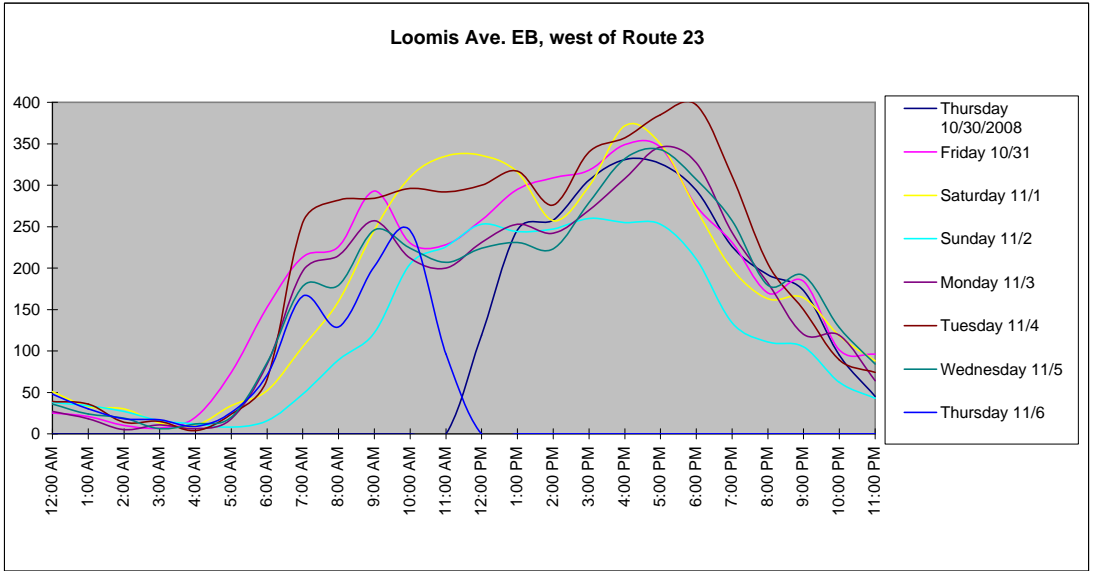
TIME	Thursday 10/30/2008	Friday 10/31	Saturday 11/1	Sunday 11/2	Monday 11/3	Tuesday 11/4	Wednesday 11/5	Thursday 11/6
12:00 AM	0	23	55	42	24	33	31	40
1:00 AM	0	12	20	25	13	13	22	18
2:00 AM	0	11	12	17	10	4	7	11
3:00 AM	0	5	12	8	6	7	10	9
4:00 AM	0	22	15	3	12	8	15	9
5:00 AM	0	62	26	5	23	24	20	27
6:00 AM	0	179	60	20	70	92	80	58
7:00 AM	0	280	104	41	206	289	227	171
8:00 AM	0	280	191	93	262	322	274	228
9:00 AM	0	240	213	152	320	376	290	247
10:00 AM	0	258	319	231	204	308	223	211
11:00 AM	0	257	313	230	205	304	192	102
12:00 PM	122	293	362	283	208	334	234	0
1:00 PM	246	261	327	313	268	313	263	0
2:00 PM	278	290	323	313	225	323	234	0
3:00 PM	341	341	279	231	269	308	284	0
4:00 PM	327	355	264	230	302	340	354	0
5:00 PM	337	304	269	211	285	338	314	0
6:00 PM	298	272	266	189	312	328	357	0
7:00 PM	220	214	212	135	245	257	259	0
8:00 PM	150	200	150	123	175	216	174	0
9:00 PM	130	168	134	105	96	114	134	0
10:00 PM	81	112	125	61	91	100	109	0
11:00 PM	47	63	88	47	74	58	68	0



Loomis Ave. EB, west of Route 23

EB

TIME	Thursday 10/30/2008	Friday 10/31	Saturday 11/1	Sunday 11/2	Monday 11/3	Tuesday 11/4	Wednesday 11/5	Thursday 11/6
12:00 AM	0	25	51	38	27	39	36	48
1:00 AM	0	21	33	34	18	36	24	30
2:00 AM	0	10	30	27	5	14	19	18
3:00 AM	0	7	13	16	11	15	6	17
4:00 AM	0	20	10	12	6	4	12	9
5:00 AM	0	74	34	8	18	24	20	26
6:00 AM	0	153	52	16	84	66	86	71
7:00 AM	0	213	105	48	196	255	178	166
8:00 AM	0	226	160	89	215	282	179	129
9:00 AM	0	293	246	122	257	284	246	202
10:00 AM	0	230	310	205	212	296	224	245
11:00 AM	0	228	335	226	200	292	207	96
12:00 PM	119	258	336	253	231	300	224	0
1:00 PM	246	295	316	244	253	317	231	0
2:00 PM	258	309	257	247	242	276	223	0
3:00 PM	306	318	299	260	270	340	279	0
4:00 PM	331	349	372	255	308	357	332	0
5:00 PM	326	346	350	253	346	385	343	0
6:00 PM	294	275	271	211	327	397	307	0
7:00 PM	226	231	199	134	243	311	257	0
8:00 PM	192	170	163	111	182	205	179	0
9:00 PM	173	184	164	105	120	150	191	0
10:00 PM	95	101	118	62	119	89	128	0
11:00 PM	45	96	88	43	64	74	84	0



Loomis Ave. WB, west of Route 23

Peak Periods from Manual Data:

AM 8 - 9
 Mid-day 11:45 - 12:45
 PM 4:15 - 5:15

		Thursday 10/30/2008		Friday 10/31/2008		Saturday 11/1/2008		Sunday 11/2/2008		Monday 11/3/2008		Tuesday 11/4/2008		Wednesday 11/5/2008		Thursday 11/6/2008	
		WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
AM	8:00	0	0	56	55	40	32	19	19	68	52	91	60	83	35	52	26
	8:15	0	0	53	54	52	40	20	14	68	43	71	58	61	50	47	31
	8:30	0	0	82	73	49	30	22	17	69	50	81	79	62	56	63	29
	8:45	0	0	89	44	50	58	32	39	57	70	79	85	68	38	66	43
	period sum	0	0	280	226	191	160	93	89	262	215	322	282	274	179	228	129
Mid-day	11:45	0	0	70	48	76	75	56	67	44	55	65	86	38	65	0	0
	12:00	0	0	70	67	87	97	64	64	53	71	96	69	54	52	0	0
	12:15	0	0	73	69	90	82	51	59	41	47	79	73	71	48	0	0
	12:30	68	58	81	70	94	85	79	60	69	60	84	85	57	66	0	0
	period sum	68	58	294	254	347	339	250	250	207	233	324	313	220	231	0	0
PM	4:15	89	81	91	78	67	83	72	62	88	79	77	96	84	86	0	0
	4:30	79	83	94	96	65	108	58	59	80	69	97	62	95	82	0	0
	4:45	72	96	97	92	62	106	55	65	54	79	86	109	86	87	0	0
	5:00	79	88	82	91	79	98	49	72	70	87	95	80	83	94	0	0
	period sum	319	348	364	357	273	395	234	258	292	314	355	347	348	349	0	0

Weekday Avg:	WB	EB
AM	273	206
Mid-day	261	258
PM	336	343

Appendix C: Annual Background Growth Rate Table

Issued: April 2007



New Jersey Department of Transportation

NJDOT ACCESS PERMIT

ANNUAL BACKGROUND GROWTH RATE TABLE

Valid for NJDOT Access Permits submitted April 2007 – April 2009

COUNTY	Functional Classification											
	RURAL						URBAN					
	Interstate	Other Principal Arterial	Minor Arterial	Major Collector	Minor Collector	Local	Interstate	Freeway	Principal Arterial	Minor Arterial	Collector	Local
Atlantic	N/A	2.00%	2.25%	2.50%	2.00%	2.25%	N/A	1.75%	2.50%	2.25%	2.25%	2.00%
Bergen	N/A	N/A	N/A	N/A	N/A	N/A	2.50%	2.00%	2.25%	2.00%	2.00%	2.25%
Burlington	2.50%	2.25%	2.00%	2.00%	2.25%	2.25%	2.00%	2.00%	2.25%	2.00%	2.25%	2.00%
Camden	N/A	2.50%	2.25%	2.00%	1.25%	2.00%	2.00%	2.25%	2.00%	2.00%	2.00%	1.75%
Cape May	N/A	2.25%	2.25%	2.00%	3.00%	1.50%	N/A	2.00%	2.00%	2.00%	1.75%	2.25%
Cumberland	N/A	2.00%	2.25%	2.00%	2.00%	2.25%	N/A	2.25%	2.25%	2.25%	2.25%	2.25%
Essex	N/A	N/A	N/A	N/A	N/A	N/A	2.25%	2.00%	2.00%	2.00%	2.00%	2.25%
Gloucester	2.25%	2.25%	2.25%	3.00%	2.50%	2.00%	2.25%	2.00%	2.25%	2.00%	2.00%	2.25%
Hudson	N/A	N/A	N/A	N/A	N/A	N/A	1.75%	2.25%	2.25%	2.00%	2.25%	2.00%
Hunterdon	2.50%	2.00%	2.00%	2.00%	2.50%	3.00%	2.25%	1.00%	2.25%	2.50%	2.00%	2.75%
Mercer	2.25%	1.75%	2.00%	2.25%	3.00%	2.00%	2.50%	2.00%	2.25%	2.00%	2.00%	2.00%
Middlesex	2.25%	N/A	2.50%	2.25%	3.00%	1.00%	2.25%	1.75%	2.00%	2.25%	2.00%	2.00%
Monmouth	2.50%	2.25%	2.25%	2.00%	2.00%	2.50%	2.25%	2.25%	2.00%	2.00%	2.00%	1.75%
Morris	N/A	2.25%	2.00%	2.25%	2.50%	2.50%	2.25%	2.25%	2.25%	2.00%	2.25%	2.25%
Ocean	2.50%	2.25%	2.25%	2.25%	2.00%	3.00%	N/A	2.00%	2.00%	2.50%	2.00%	2.25%
Passaic	N/A	N/A	N/A	N/A	N/A	N/A	2.50%	2.25%	2.00%	2.25%	2.50%	2.50%
Salem	2.25%	2.00%	2.25%	2.00%	2.25%	2.25%	2.25%	2.00%	2.00%	2.25%	2.00%	2.00%
Somerset	2.50%	2.00%	2.00%	2.75%	2.00%	2.25%	2.00%	N/A	2.00%	2.00%	2.00%	2.25%
Sussex	2.75%	2.25%	2.00%	2.00%	2.25%	2.25%	N/A	N/A	2.25%	2.25%	2.50%	2.50%
Union	N/A	N/A	N/A	N/A	N/A	N/A	2.75%	2.25%	2.00%	2.25%	2.00%	2.00%
Warren	3.00%	2.00%	2.00%	2.25%	2.00%	2.50%	2.25%	N/A	2.25%	2.25%	2.00%	2.25%

NOTE: For use in short term (within 1-3 years) background growth ONLY.

Example: Assume existing condition is 1,500 peak hour trips and the applicable growth rate is 2%. The multiplication factor for 2% compounded for 3 years is 1.0612. The three-year peak hour forecast is 1,591.8, or 1,592 peak hour trips. [1592 = 1500(1 + 0.02)³ = 1500(1.0612)]

$$\text{Future Growth (compounded)} = \text{Present Growth} * (1 + \text{Growth Rate})^{\# \text{ of years}}$$