



Implementation Plan

Traffic Engineering Services:
Van Aken District
Signal Study

May 30, 2018

PREPARED FOR

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TABLE OF CONTENTS

Introduction.....	1
Background.....	1
Methodology.....	1
Recommendations.....	5
Warrensville Center Road/Shaker Boulevard Westbound & Warrensville Center Road/ Shaker Boulevard Eastbound – Short-Term Countermeasures.....	5
Warrensville Center Road/Shaker Boulevard Westbound – Long-Term Countermeasures.....	9
Warrensville Center Road/Shaker Boulevard Eastbound – Long-Term Countermeasures.....	11
Warrensville Center Road/South Woodland Road.....	15
Warrensville Center Road/Farnsleigh Road.....	24
Chagrin Boulevard/Lynnfield Road.....	24
Farnsleigh Road/Van Aken Boulevard/Shaker Plaza Drive.....	26
Estimated Costs.....	28

LIST OF TABLES

Table 1: Peak Hour by Intersection.....	2
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LIST OF FIGURES

Figure 1: Levels of Service.....	3
Figure 2: Optimized Short-Term AM Peak Hour Levels of Service (Shaker Blvd. EB & WB).....	6
Figure 3: Optimized Short-Term Midday Peak Hour Levels of Service (Shaker Blvd. EB & WB).....	7
Figure 4: Optimized Short-Term PM Peak Hour Levels of Service (Shaker Blvd. EB & WB).....	8
Figure 5: Long-Term Countermeasures (Warrensville Center Rd./Shaker Blvd. WB).....	10
Figure 6: Long-Term Countermeasures (Warrensville Center Rd./Shaker Blvd. EB).....	12
Figure 7: Long-Term Countermeasure AM Peak Hour Levels of Service (Shaker Blvd. WB & EB).....	13
Figure 8: Long-Term Countermeasure PM Peak Hour Levels of Service (Shaker Blvd. EB & WB).....	14
Figure 9: Optimized Short-Term AM Peak Hour Levels of Service (S Woodland Rd.).....	17
Figure 10: Optimized Short-Term Midday Peak Hour Levels of Service (S Woodland Rd.).....	18
Figure 11: Optimized Short-Term PM Peak Hour Levels of Service (S Woodland Rd.).....	19
Figure 12: Long-Term Countermeasures (Warrensville Center Rd./S Woodland Blvd.).....	20

Figure 13: Long-Term Countermeasures (S Woodland Blvd. Approaches)..... 21

Figure 14: Long-Term Countermeasure AM Peak Hour Levels of Service (S Woodland Rd.) 22

Figure 15: Long-Term Countermeasure PM Peak Hour Levels of Service (S Woodland Rd.)..... 23

Figure 16: Countermeasures (Warrensville Center Rd./Farnsleigh Rd.) 25

Figure 17: Countermeasures (Farnsleigh Rd./Van Aken Blvd./Shaker Plaza) 27

APPENDICES

Appendix A:..... 9-Hour Traffic Counts

Appendix B:..... Signal Warrant Analysis

Appendix C:..... Adjusted Peak Hour Volumes

Appendix D:.....Short-Term Optimized Condition Synchro Results

Appendix E: Recommended Countermeasures Synchro Results

Appendix F: Cost Estimates

Synchro analysis files available electronically.

1. INTRODUCTION

The City of Shaker Heights retained HNTB to evaluate measures to improve traffic operations for several intersections surrounding the Van Aken District:

- Warrensville Center Road/Shaker Boulevard Westbound/South Park Boulevard/Chesterton Road/Claythorne Road
- Warrensville Center Road/Shaker Boulevard Eastbound/Falmouth Road/Fayette Road
- Warrensville Center Road/South Woodland Road/West Byron Road/Somerset Drive
- Warrensville Center Road/Farnsleigh Road
- Chagrin Boulevard/Lynnfield Road
- Farnsleigh Road/Van Aken Boulevard/Shaker Plaza drive

These intersections have various geometric and traffic operational issues that negatively affect travel for motorists, pedestrians and cyclists. This implementation plan recommends a set of countermeasures to improve operations at each location.

2. BACKGROUND

The City of Shaker Heights is undergoing extensive changes that are altering traffic patterns and flow along Warrensville Center Road and the intersecting street network. The City recently completed a project to reconfigure the Warrensville Center Road/Chagrin Boulevard/Van Aken Boulevard intersections and relocate Northfield Road. The Farnsleigh Road streetscape project – scheduled to be completed in June 2018 – will install a 10-foot sidewalk to accommodate pedestrians and cyclists and add landscaping and street trees along Farnsleigh Road between Warrensville Center Road and Van Aken Boulevard. The Van Aken District is a phased private development that will include a mix of residential, retail and office space in the area generally bounded by Farnsleigh Road, Warrensville Center Road and Chagrin Boulevard. The development will also include an internal road network that will connect to Farnsleigh Road, Warrensville Center Road, and Chagrin Boulevard via new intersections. Phase I of the Van Aken District is scheduled to open in June 2018. Phase II is scheduled to open in 2028. A Traffic Impact and Shared Parking Study (Wells+Associates) was prepared for the Van Aken District in December 2015. The purpose of this *Implementation Plan* is to provide an up-to-date picture of current traffic patterns, evaluate traffic operations and recommend ways to optimize traffic flow within the roadway network.

3. METHODOLOGY

TMS Engineers, Inc. collected 9-hour turning movement counts (including trucks, buses, pedestrians and bicycles) at the following intersections:

- Warrensville Center Road/Shaker Boulevard Westbound/S Park Boulevard/Chesterton Road/Claythorne Road (November 2017)

- Warrensville Center Road/Shaker Boulevard Eastbound/Falmouth Road/Fayette Boulevard (November 2017)
- Warrensville Center Road/S Woodland Road/W Byron Road/Somerset Drive (November 2017)
- Chagrin Boulevard/Lynnfield Road (September 2017)
- Warrensville Center Road/Northfield Connector (November 2017)
- Chagrin Boulevard /Norwood Road (September 2017)

The 9-hour count data was adjusted for daily and seasonal variations to estimate the average daily traffic (ADT) at each location (see Appendix A). The traffic counts were analyzed to determine three peak travel periods for each intersection, which are shown in Table 1. Variations are inherent to collecting data during different days and months. Because they are in the same signal system, the traffic volumes at the Warrensville Center Road intersections with Shaker Boulevard Westbound, Shaker Boulevard Eastbound, and South Woodland Road were adjusted to balance the number of vehicles traveling between intersections. The balanced peak hour volumes for these intersections are shown in Appendix C. TMS Engineers, Inc. provided 2016 traffic count data collected as part of a separate project for the remaining intersections in the study area.

Table 1: Peak Hour by Intersection

Intersection	AM Peak Hour	Midday Peak Hour	PM Peak Hour
Warrensville Center Rd/Shaker Blvd WB	7:30 am	12:30 pm	5:00 pm
Warrensville Center Rd/Shaker Blvd EB	7:30 am	12:30 pm	5:00 pm
Warrensville Center Rd/S Woodland Blvd	7:30 am	12:30 pm	5:00 pm
Warrensville Center Rd/Farnsleigh Rd	8:00 am	12:00 pm	5:00 pm
Chagrin Blvd/Lynnfield	7:45 am	1:00 pm	4:30 pm
Warrensville Center Rd/Northfield Connector*	8:00 am	12:00 pm	5:00 pm
Chagrin Blvd/Norwood Rd*	8:00 am	12:00 pm	5:00 pm

* Although traffic counts were collected at these intersections, based on coordination with the City, no additional traffic operational analysis was performed at these locations.

Level of Service (LOS) is a way of describing the amount of traffic congestion on a roadway by “grading” it on a letter scale from A (best) to F (worst). LOS A represents near ideal traffic flow, while LOS F represents a breakdown of the traffic flow (see Figure 1). The target level of service for urban areas like Shaker Heights is LOS D. The levels of service at the studied intersections were determined using Synchro traffic analysis software. SimTraffic – a traffic simulation tool – was used to evaluate traffic queues in the corridor. Existing timing plans and record signal plans were also utilized to accurately model traffic operations in the study area.

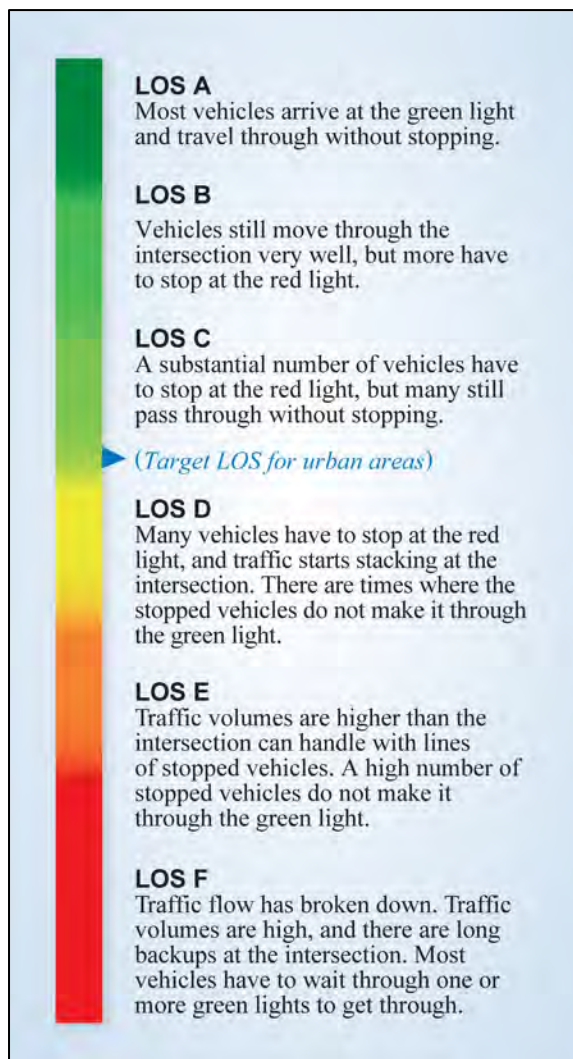
Countermeasures were evaluated to address the unique traffic operational problems at each intersection. At many locations, a series of iterative analyses were conducted, and interim concepts and results were discussed with City staff during project progress meetings. The recommended countermeasures presented in this *Implementation Plan* were developed based on the iterative analyses and feedback from City staff. Specific methodologies for developing and evaluating countermeasures at each location are described in the following sections.

Warrensville Center Rd./Shaker Blvd. Westbound & Warrensville Center Rd./Shaker Blvd. Eastbound

Field observations indicated the existing signals at the Warrensville Center Road/Shaker Boulevard Westbound and the Warrensville Center Road/Shaker Boulevard Eastbound intersections are not currently coordinated. Furthermore, the existing “flashing don’t walk” times are not sufficient. Short-term countermeasures were developed by using Synchro to optimize the signal timing at these intersections, provide pedestrian clearance intervals that meet current standards, and to coordinate progression along Warrensville Center Road.

The existing number of side streets and pedestrian clearance times required for the current intersection configurations limit the traffic operational improvements that can be achieved by the short-term countermeasures. Therefore, long-term countermeasures were developed to evaluate ways to reduce the number of side street movements and pedestrian clearance times to further optimize traffic flow. Because the traffic volumes for the midday peak hour were substantially less, only the AM and PM peak hours were analyzed for the long-term countermeasures.

Figure 1: Levels of Service



Cost estimates were developed for the recommended long-term countermeasures. These estimates are based on the scope of work; quantities measured from aerial mapping; unit costs derived from ODOT's historic contract bid tabulations and the bid tabulation for the city's recent Farnsleigh Road improvements; and HNTB's recent project experience.

Warrensville Center Road/South Woodland Road

Short-term countermeasures were developed by using Synchro to optimize the signal timing and provide pedestrian clearance intervals that meet current standards. These changes would provide immediate improvements to traffic flow. However, the existing number of side street and turning movements, lane use on South Woodland Road, and capabilities of the existing signal controller limit the operational improvements that can be achieved by the short-term countermeasures. Therefore, long-term countermeasures were developed to evaluate ways to reduce the number of side street movements and change the lane use within the existing pavement area on South Woodland Road to further optimize traffic flow. Because the traffic volumes for the midday peak hour were substantially less, only the AM and PM peak hours were analyzed for the long-term countermeasures. Cost estimates were also developed for the recommended long-term countermeasures.

Warrensville Center Road/Farnsleigh Road

The Van Aken District development includes a new internal road – Tuttle Road – that will intersect Farnsleigh Road approximately 270 feet west of Warrensville Center Road. In addition, the City desires to provide on-street parking on Farnsleigh Road east of Warrensville Center Road. The projected trip generation and distribution from the approved Van Aken District *Traffic Impact and Shared Parking Study* (Wells+Associates, 2015) were applied to the current (2016) traffic counts provided by TMS Engineers, Inc. to analyze the potential for traffic queues to negatively affect traffic flow along Farnsleigh Road and Warrensville Center Road. The PM peak hour was analyzed because it represents the highest traffic volumes for Warrensville Center Road, Farnsleigh Road and the Van Aken District development. Four potential lane configurations were analyzed on Farnsleigh Road approaches to Warrensville Center Road with the goal of minimizing traffic queues and accommodating on-street parking along Farnsleigh Road:

- One left turn, one thru, and one right turn lane on the west approach (existing condition) with parking along the south side of Farnsleigh Road to the east
- Dual left turn lanes and a shared thru/right lane on the west approach with no parking along Farnsleigh Road to the east
- One left turn, one shared left/thru, and one right turn lane on the west approach with parking along the south side of Farnsleigh Road to the east
- Two lanes in each direction with one left and one shared thru/right lane on the west approach and one shared left/thru and one shared right/thru lane and parking along the south side on the east approach

Additional low-cost countermeasures were also considered to minimize traffic queues and prevent intersection blocking within the Van Aken District development roadway network.

Chagrin Boulevard/Lynnfield Road

A traffic signal was historically located at the Chagrin Boulevard/Lynnfield Road intersection but removed prior to the Chagrin Boulevard/Warrensville Center Road/Van Aken Boulevard roadway reconfiguration. A signal warrant analysis was conducted in accordance with the *Ohio Manual of Uniform Traffic Control Devices* (OMUTCD) using current (2017) traffic counts to determine if the signal should be reinstalled based on current traffic patterns. The following warrants were investigated:

- Warrant 1 - Eight-Hour Vehicular Volume
- Warrant 2 - Four-Hour Vehicular Volume
- Warrant 3 - Peak-Hour Vehicular Volume
- Warrant 7 – Crash Hazard

Copies of the signal warrant analyses are included in Appendix B.

Farnsleigh Road/Van Aken Boulevard/Shaker Plaza Drive

The City recently revised the lane use at the Farnsleigh Road/Van Aken Boulevard Eastbound intersection to provide improved access to Shaker Plaza, a commercial development located east of Farnsleigh Road. These improvements have reduced problems related to driver confusion and conflicts with vehicles entering the Shaker Plaza development. The countermeasures developed at this location focused on further modifying the signing and pavement markings to be consistent with the revised lane use.

4. RECOMMENDATIONS

The countermeasures for each intersection were developed through a series of iterative analyses and refined based on feedback from City staff. The following sections present the recommended short- and long-term countermeasures at each location.

Warrensville Center Road/Shaker Boulevard Westbound & Warrensville Center Road/Shaker Boulevard Eastbound – Short-Term Countermeasures

In the short-term, traffic operations at the Warrensville Center Road intersections with Shaker Boulevard Westbound and Shaker Boulevard Eastbound can be improved by reprogramming the existing controllers to provide optimized signal timing and pedestrian clearance intervals that meet current standards. Synchro reports showing the recommended short-term signal timing plans for the AM peak, PM peak and Midday (off peak) hours are included in Appendix D. The optimized levels of service for the recommended short-term countermeasures are shown in Figure 2, Figure 3 and Figure 4.

Figure 2: Optimized Short-Term AM Peak Hour Levels of Service (Shaker Blvd. EB & WB)

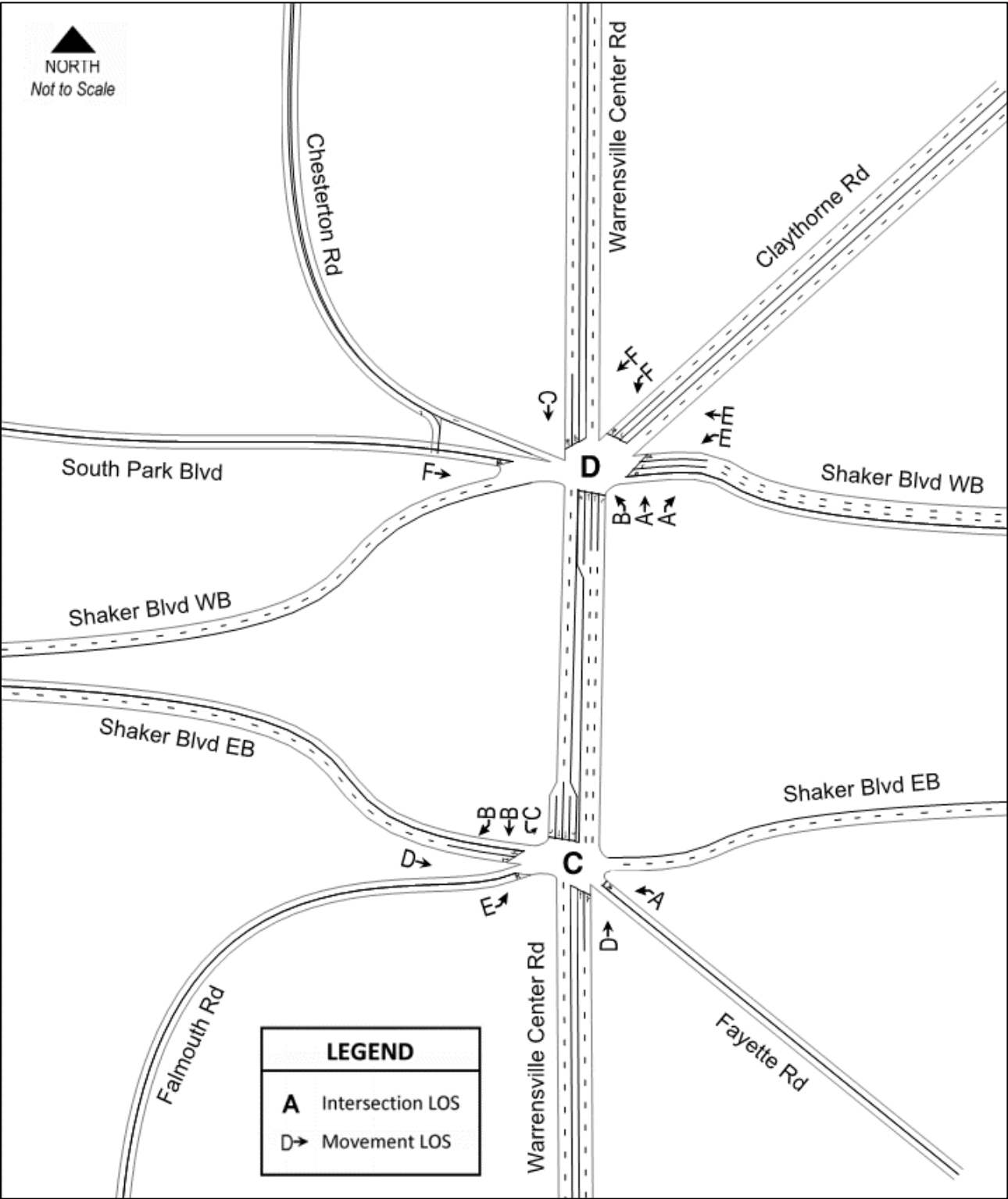


Figure 3: Optimized Short-Term Midday Peak Hour Levels of Service (Shaker Blvd. EB & WB)

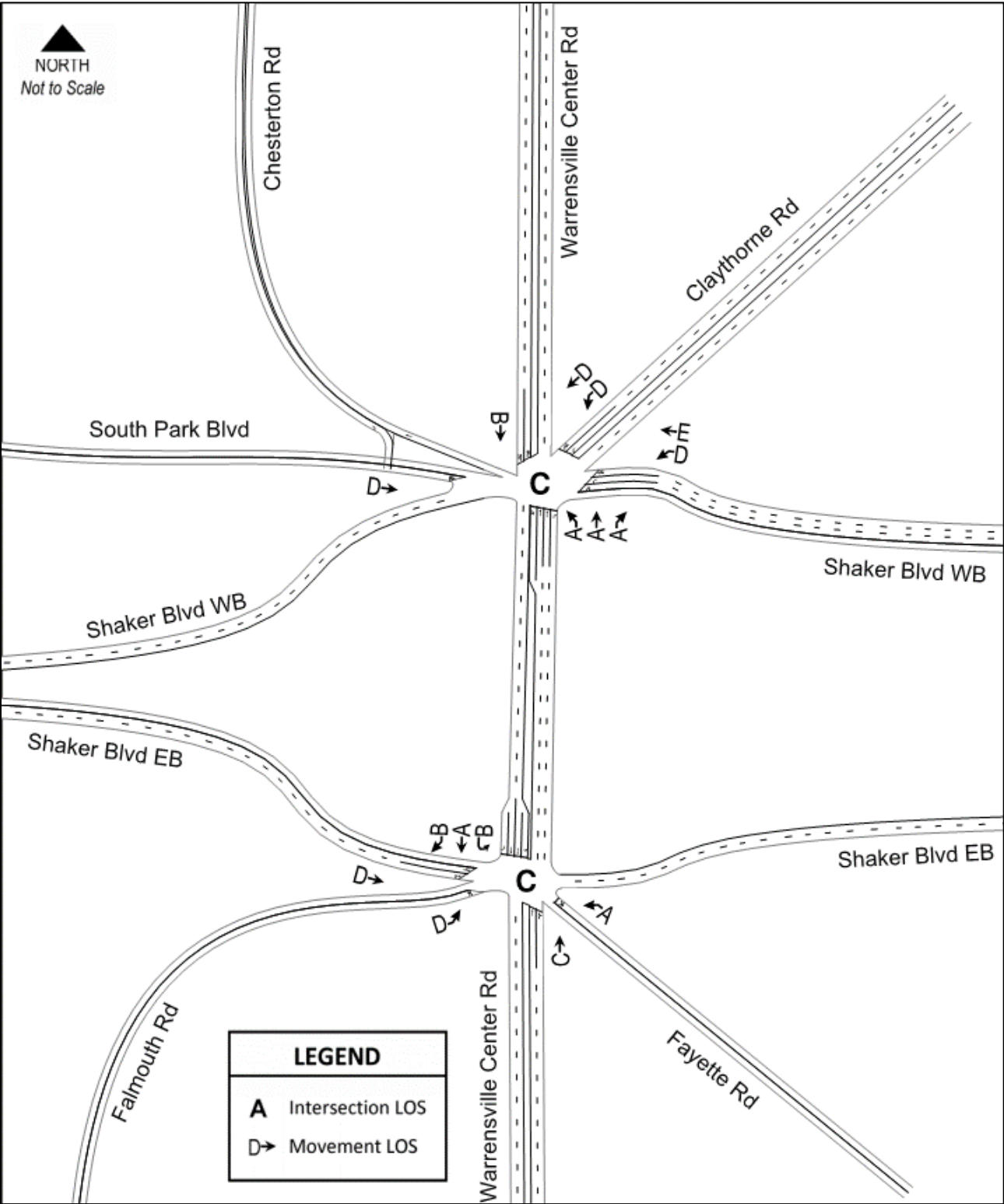
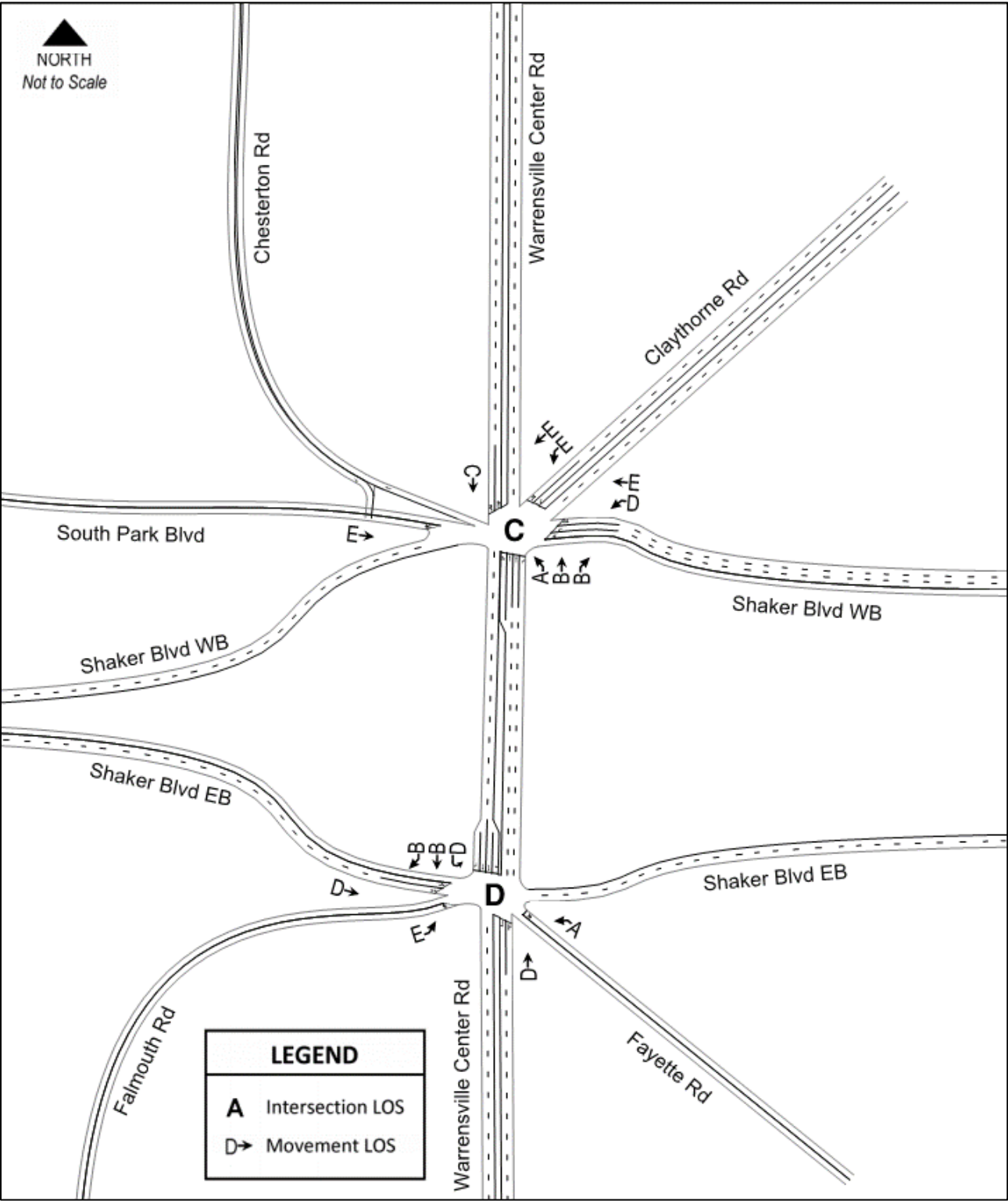


Figure 4: Optimized Short-Term PM Peak Hour Levels of Service (Shaker Blvd. EB & WB)



Warrensville Center Road/Shaker Boulevard Westbound – Long-Term Countermeasures

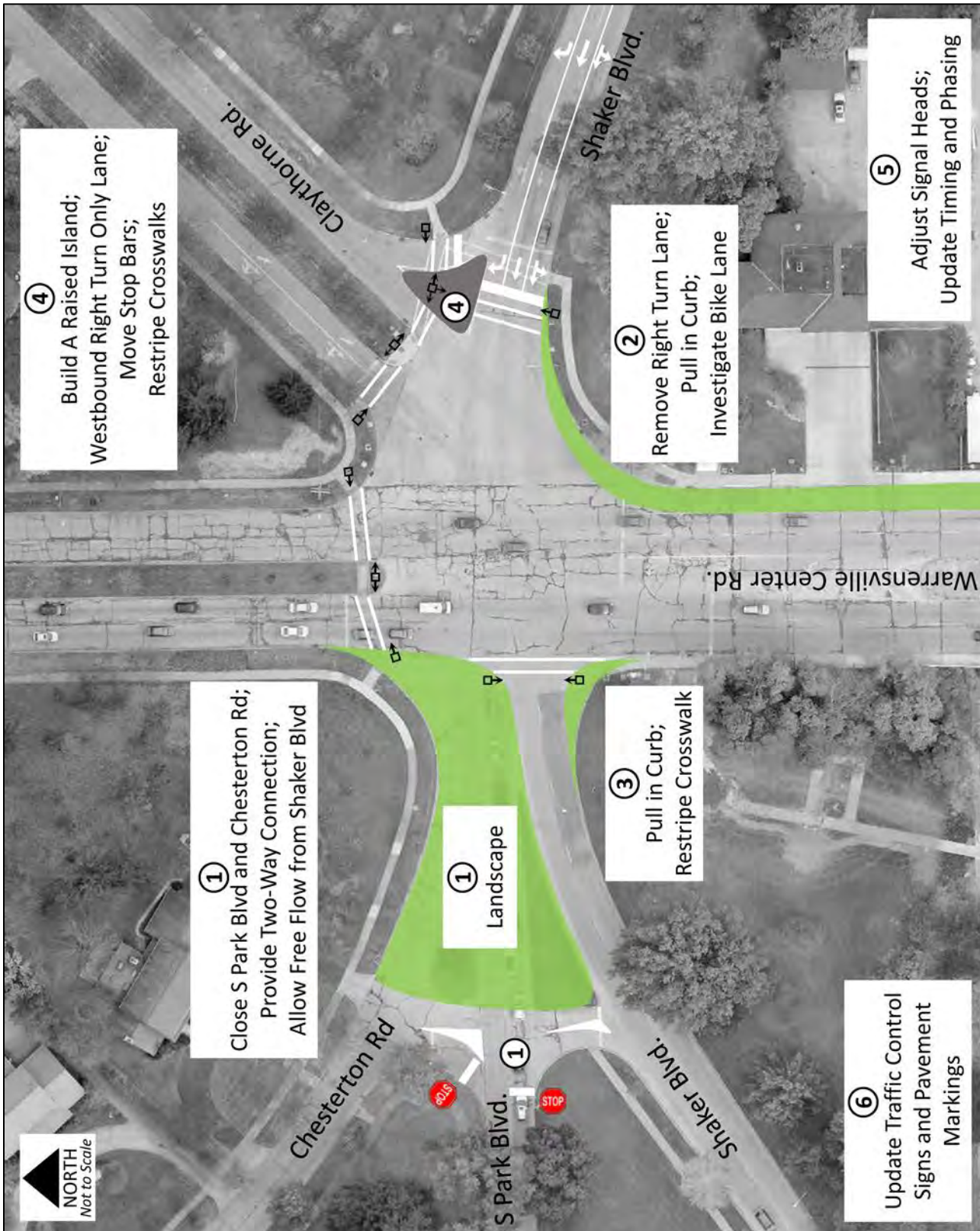
The recommended long-term countermeasures are summarized below:

1. Close South Park Boulevard and Chesterton Road west of Warrensville Center Road and maintain access via a two-way connector with Shaker Boulevard Westbound.
 - Landscape the existing paved areas.
 - Convert the existing connection between Shaker Boulevard Westbound and South Park Boulevard to provide two-way operation.
 - Install stop signs on the South Park Boulevard and Chesterton Road approaches to allow free-flow movements from Shaker Boulevard Westbound.
2. Remove the northbound right turn lane on Warrensville Center Road and pull in the curb on the southeast quadrant. Investigate the option of providing a bike lane at this location.
3. Pull in the curb on the southwest quadrant and restripe the crosswalk.
4. Build an enlarged raised island where Claythorne Road intersects Shaker Boulevard Westbound.
 - Provide one lane for traffic from Warrensville Center Road and one lane for traffic from Shaker Boulevard Westbound. Merge the lanes to the existing two-lane section north of the intersection.
 - Convert the northernmost lane on Shaker Boulevard Westbound to a right turn only lane.
 - Move the stop bar for the Shaker Boulevard Westbound to Claythorne Road movement.
 - Restripe the crosswalks across Claythorne Road.
 - Move the stop bar and crosswalk on the Shaker Boulevard approach further west.
5. Adjust the signal head configurations and update the timing and phasing plans.
6. Update the ground mounted signs, overhead traffic control signs and pavement markings.

A conceptual drawing of the recommended long-term countermeasures is provided in Figure 5. The Synchro analyses show that the Warrensville Center Road corridor will operate better if the South Woodland Road intersection is not coordinated with the Shaker Boulevard intersections. The master signal controller is currently at South Woodland Road. The City may choose to move the master controller to the Shaker Boulevard Westbound intersection so that it is located at one of the coordinated intersections.

The recommended long-term countermeasures will improve operations for motorists, pedestrians and cyclists. Closing South Park Boulevard and Chesterton Road will decrease delays by reducing the number of signal phases and the required cycle length. In addition, the closures will reduce driver confusion and improve safety for all users by creating a more conventional intersection geometry. Building a raised island at Claythorne Road, removing the northbound right turn lane, pulling in curb returns and landscaping existing paved areas will reduce the overall intersection area, shortening both pedestrian and bicycle clearance times. The revised geometry will provide an overall intersection LOS C, and all the individual movements will operate at LOS D or better.

Figure 5: Long-Term Countermeasures (Warrensview Center Rd./Shaker Blvd. WB)



IMPLEMENTATION PLAN

Warrensville Center Road/Shaker Boulevard Eastbound – Long-Term Countermeasures

The recommended long-term countermeasures are summarized below:

1. Close Falmouth Road west of Warrensville Center Road and maintain access via a two-way connector with Shaker Boulevard Eastbound.
 - Maintain access to existing residential driveways and landscape the existing paved areas.
 - Convert the existing connection between Shaker Boulevard Eastbound and Falmouth Road to provide two-way operation, providing access to and from Shaker Boulevard.
2. Remove the southbound right turn lane and recovery taper on Warrensville Center Road.
 - Landscape the existing paved areas.
 - Restripe the crosswalks across the north Warrensville Center road and Falmouth Road approaches.
3. Extend the median on the south Warrensville Center Road approach to provide a pedestrian refuge and restripe the crosswalk.
4. Adjust the signal head configurations and update the timing and phasing to accommodate the new intersection geometry.
5. Update the traffic control signs and pavement markings to reflect the revised intersection configuration.

A conceptual drawing of the recommended long-term countermeasures is provided in Figure 6.

The countermeasures listed above will improve operations for motorists, pedestrians and cyclists. Closing Falmouth Road will reduce the number of signal phases and the required cycle length, which will reduce vehicular delays. In addition, the closure will reduce driver confusion and improve safety for all users by creating a more conventional intersection geometry. Removing the southbound right turn lane, extending the Warrensville Center Road median and landscaping existing paved areas will reduce the overall intersection area, shortening both pedestrian walk times and the time required for cyclists to traverse the intersection. The revised geometry will provide LOS C or better for both the overall intersection and the individual movements.

It should be noted that, while they can be constructed as stand-alone improvements, the recommended long-term countermeasures will operate best when implemented in conjunction with the recommended countermeasures at the Warrensville Center Road/Shaker Boulevard Westbound intersection. When South Park Boulevard and Chesterton Road are closed west of Warrensville Center Road, traffic that currently uses these roads to reach Warrensville Center Road and Claythorne Road will be re-routed to the Warrensville Center Road/Shaker Boulevard Eastbound intersection. These increased traffic volumes will increase delays for the existing intersection configuration. The redistributed traffic volumes for both intersections are shown in Appendix C. The proximity of these two intersections also requires that they operate at the same cycle length to provide coordinated traffic progression along Warrensville Center Road. If the countermeasures at either intersection are not implemented, a longer cycle length will be required, resulting in slightly longer delays at both locations. The levels of service for the recommended long-term countermeasures are shown Figure 7 and Figure 8. Results of the Synchro analyses are included in Appendix E.

Figure 6: Long-Term Countermeasures (Warrensville Center Rd./Shaker Blvd. EB)

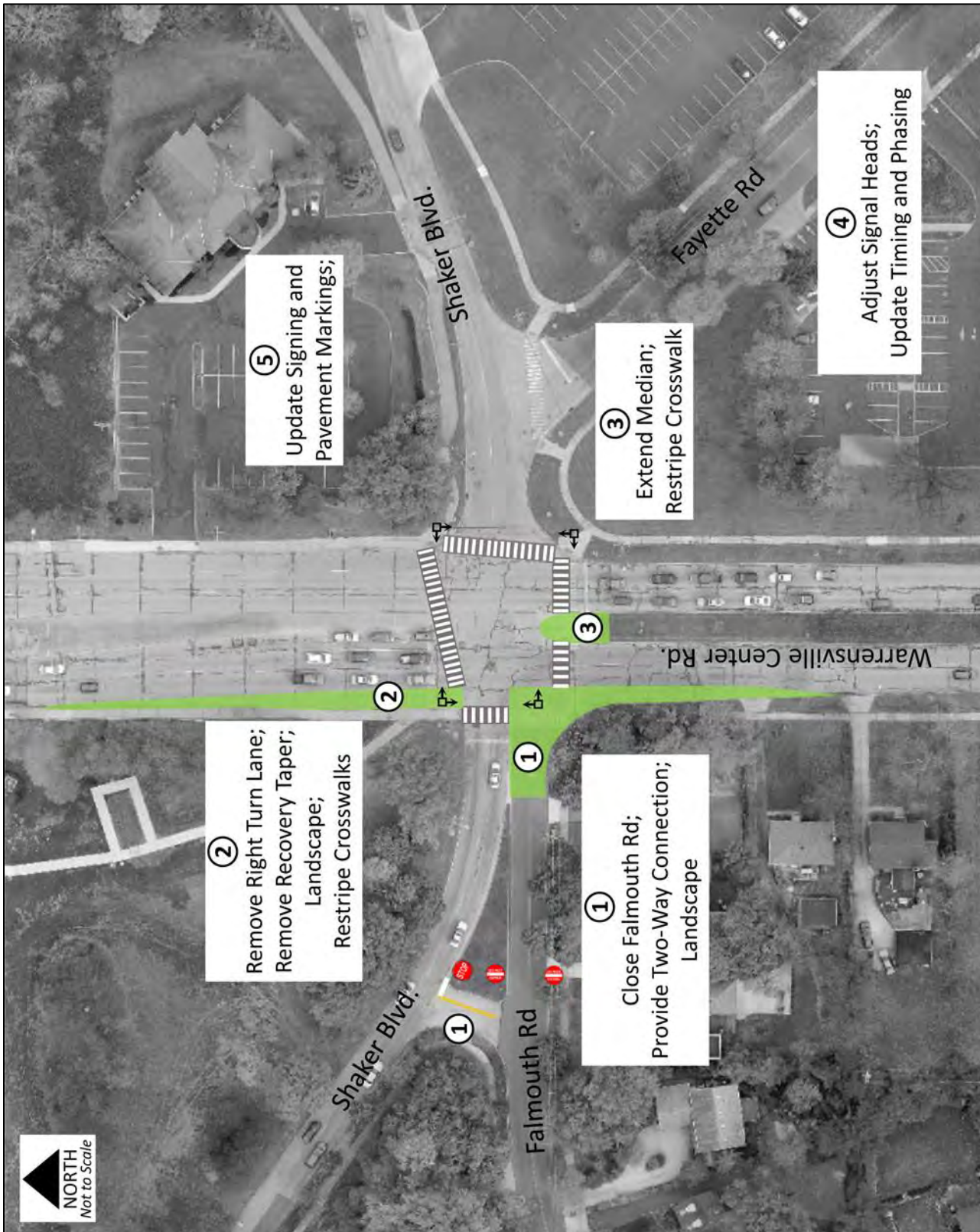


Figure 7: Long-Term Countermeasure AM Peak Hour Levels of Service (Shaker Blvd. WB & EB)

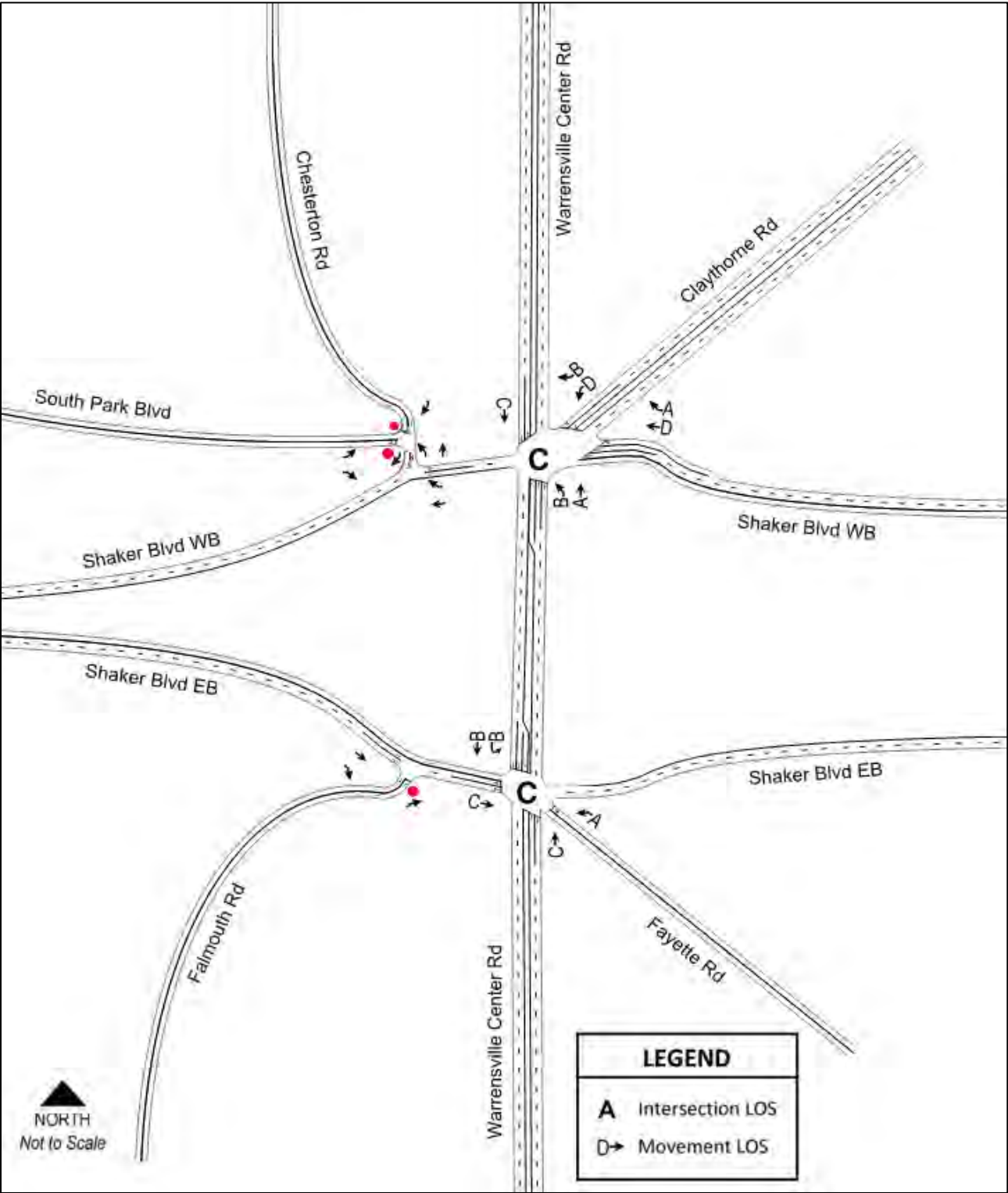
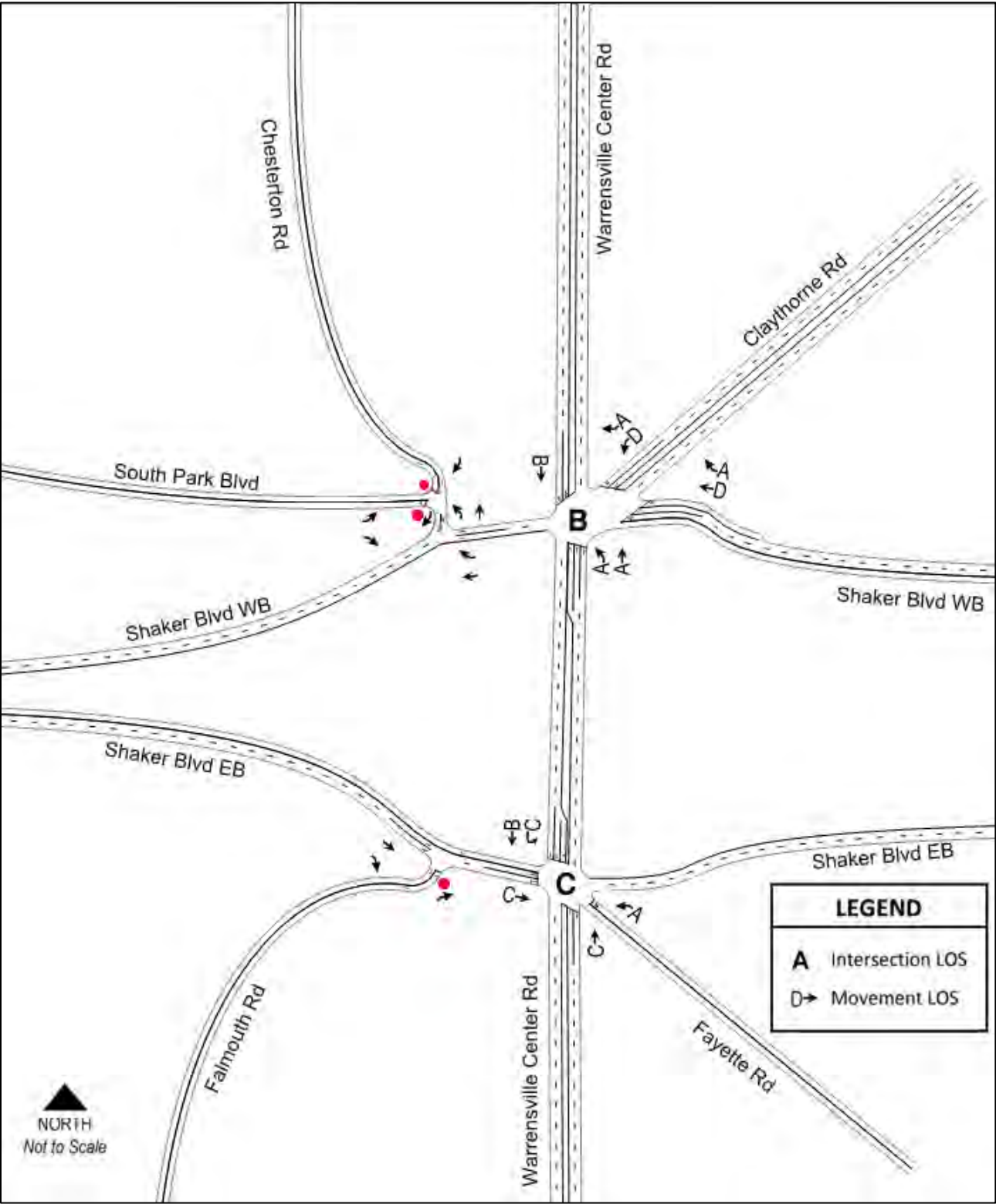


Figure 8: Long-Term Countermeasure PM Peak Hour Levels of Service (Shaker Blvd. EB & WB)



Warrensville Center Road/South Woodland Road

In the short-term, traffic operations at the Warrensville Center Road/South Woodland Road intersection can be improved by reprogramming the existing controller to provide optimized signal timing and pedestrian clearance intervals that meet current standards. Synchro reports showing the recommended short-term signal timing plans for the AM peak, PM peak, and Midday (off peak) hours are included in Appendix D. The optimized levels of service for the recommended short-term countermeasures are shown in Figure 9, Figure 10 and Figure 11.

The recommended long-term countermeasures are summarized below:

1. Restripe South Woodland Road to provide two westbound through lanes and one left turn lane.
 - Revise the lane configuration within the existing pavement footprint.
 - Provide four 10-foot lanes (three westbound and one eastbound).
 - Provide 420 feet of storage the westbound left turn lane.
 - Provide 205 feet of taper and transition to the existing 30-foot section east of Warrensville Center Road.
 - Cut new detector loops and tie into an existing pull box.
2. Restripe South Woodland Road to provide one eastbound through lane and one left turn lane.
 - Revise the lane configuration within the existing pavement footprint.
 - Provide four 10-foot lanes (two westbound and two eastbound).
 - Provide 350 feet of storage for the eastbound left turn lane.
 - Match the existing 30-foot section west of Warrensville Center Road.
 - Cut new detector loops and tie into an existing pull box.
3. Convert Somerset Drive to one-way at Warrensville Center Road.
 - Close Somerset Drive to vehicles entering the intersection. The cost estimate for these countermeasures assumes the complete removal of the Somerset Drive pavement. An option that would be both less costly and less permanent is to close Somerset Drive by installing delineators and pavement markings.
 - Maintain access for vehicles entering Somerset Drive from the intersection.
 - Pull in the curb on the southeast quadrant and restripe the crosswalk.
 - Install advance signing in the surrounding neighborhood to notify drivers of the access restriction and allow the option to select alternate routes.

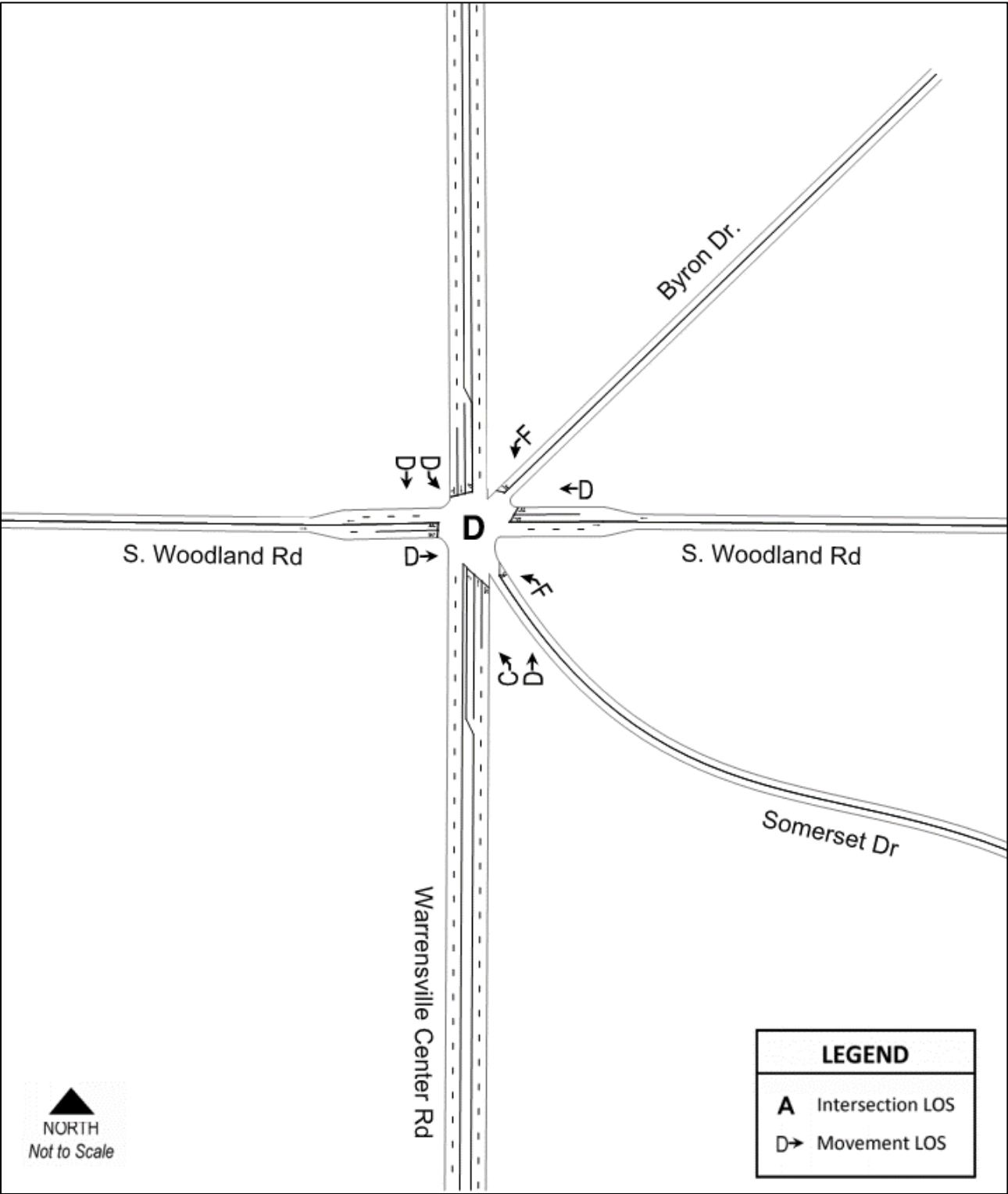
4. Install a new signal controller.
 - Install a new signal controller, Type 2070 with Wapiti software and configured for a minimum of nine vehicular phases.
 - Install a new cabinet, Type 332 (with 18 load switches).
 - Adjust the signal head configurations to accommodate the new intersection geometry.
 - Update the signal timing and phasing to reflect the new intersection geometry, fully-actuated left-turn and side street movements, and provide lead-left phasing on South Woodland Road.
5. Remove the crosswalk on the north leg of Warrenville Center Road.
 - Remove crosswalk pavement makings, pedestrian signals and push buttons.
 - Rebuild the curbs to remove the curb ramps.
 - Add “No Pedestrian Crossing” signs.
 - As an option, the crosswalk could be striped straight across Warrensville Center Road to terminate between Byron Drive and South Woodland Road. With this configuration, the crosswalk would be about 25 feet longer than the existing north crosswalk and about 10 feet longer than the existing south crosswalk, which could negatively affect signal operations.
6. Update traffic control signs and pavement markings to reflect the revised intersection configuration.

Conceptual drawings of the recommended long-term countermeasures are provided in Figure 12 and Figure 13.

The countermeasures listed above will improve operations at the Warrensville Center Road/South Woodland Road intersection. Converting Somerset Drive to one-way at Warrensville Center Road will reduce the number of signal phases and the required cycle length, which will reduce vehicle delays. Installing a new controller capable of supporting nine phases will allow the intersection to operate in a fully-actuated mode, which will improve the overall operational efficiency and further reduce delays. Restriping the South Woodland approaches to provide exclusive left turn lanes and providing actuated, lead-left phasing will address problems with through-traveling traffic being blocked by turning vehicles. Providing two through lanes in the westbound direction will maximize the existing intersection capacity and reduce queue lengths for the heaviest direction of travel. Finally, pedestrian safety will be improved by eliminating the north crosswalk and rerouting pedestrians to crosswalks that are more visible to oncoming traffic.

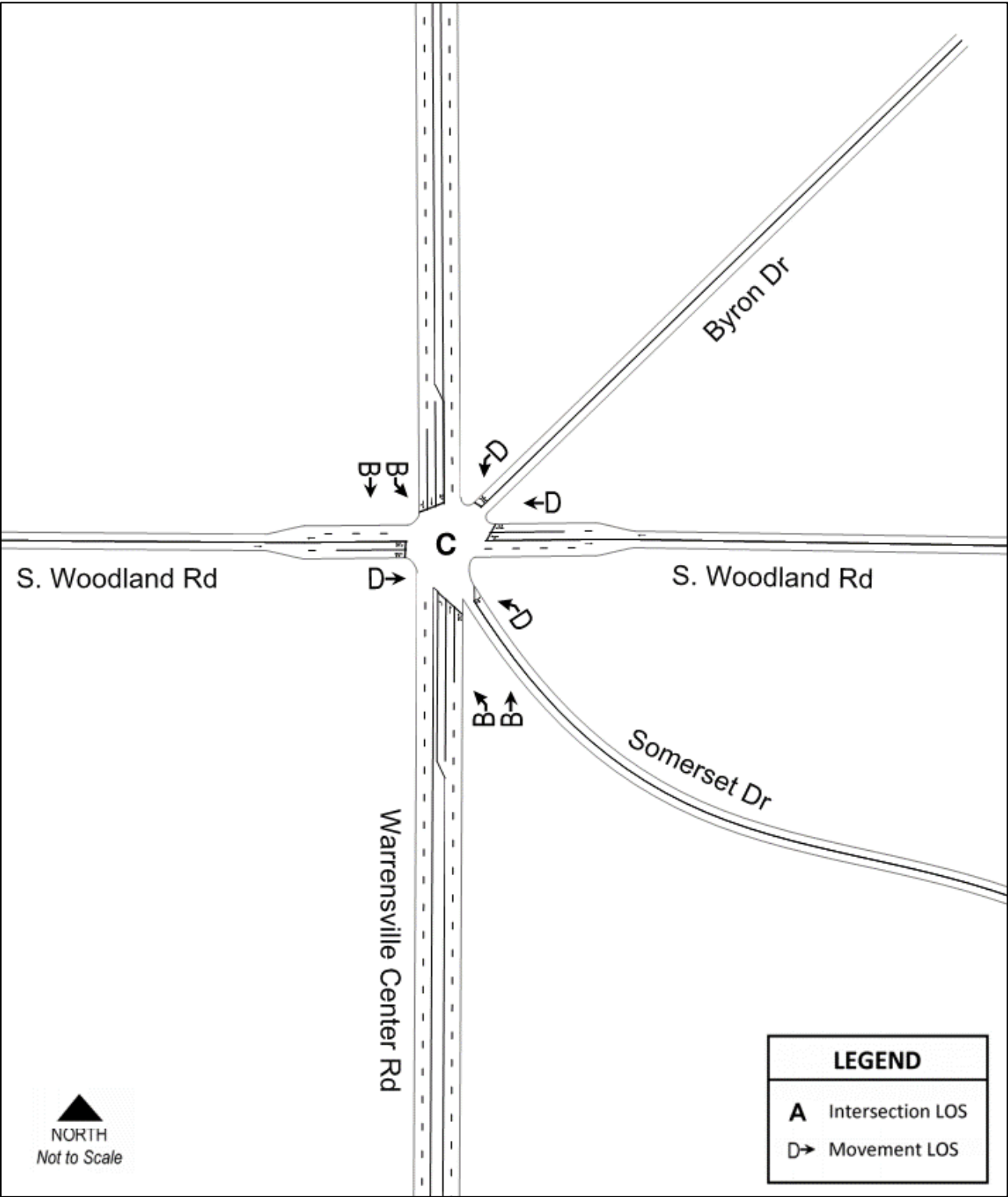
The recommended long-term countermeasures will provide LOS D or better both for the overall intersection and most of the individual movements. The only exception is the Byron Drive movements, which will operate at LOS E in the AM and PM peak hours. However, under the existing condition, this movement operates at LOS F in the AM peak hour and LOS E in the PM peak hour. Additional operational improvements at this intersection would require further street closures – which would impede access to the Shaker Heights Middle School – or capacity improvements – which would require additional right-of-way. The levels of service for the recommended long-term countermeasures are shown in Figure 14 and Figure 15. Results of the Synchro analyses are included in Appendix E.

Figure 9: Optimized Short-Term AM Peak Hour Levels of Service (S Woodland Rd.)



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Figure 10: Optimized Short-Term Midday Peak Hour Levels of Service (S Woodland Rd.)



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Figure 11: Optimized Short-Term PM Peak Hour Levels of Service (S Woodland Rd.)

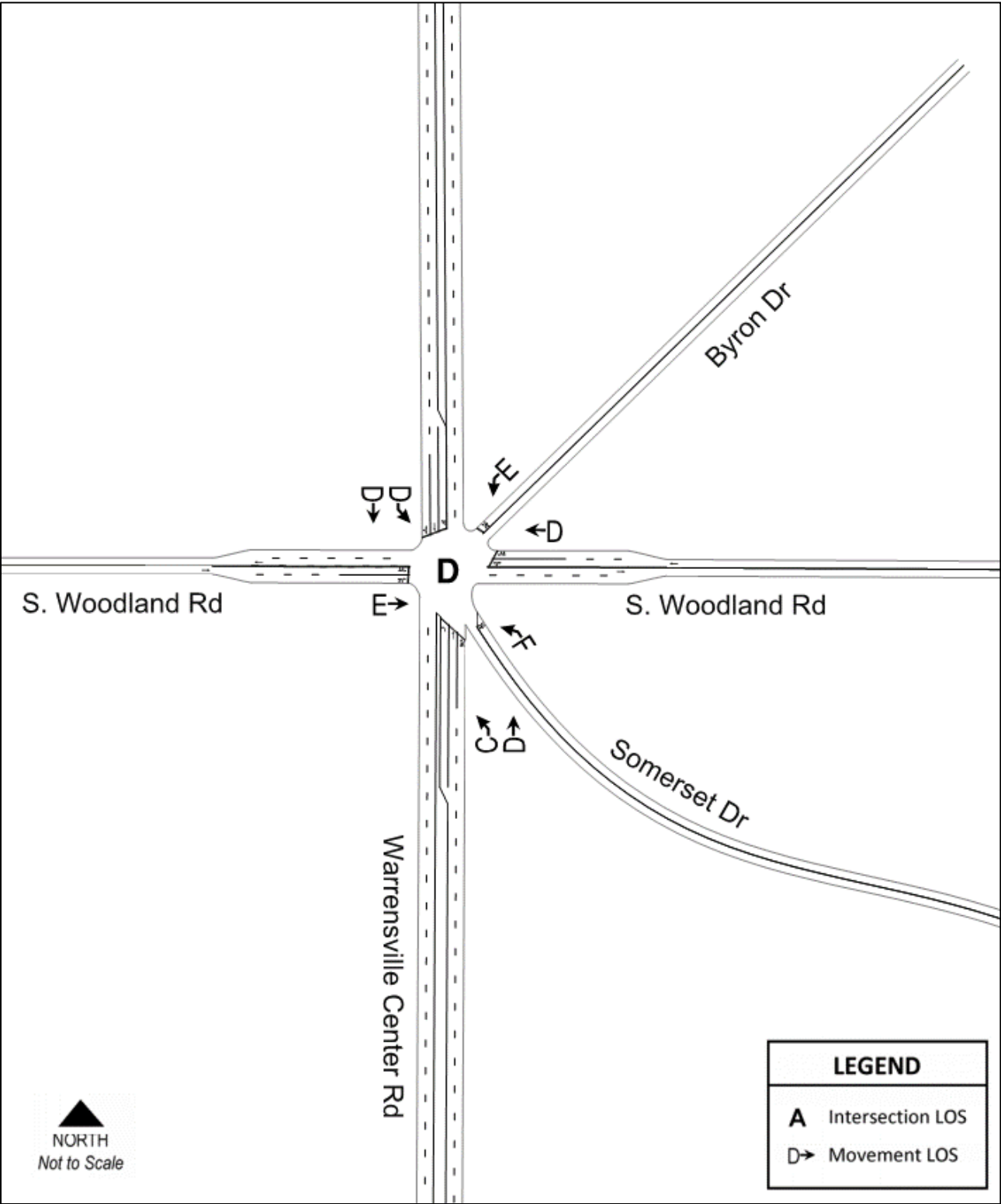


Figure 12: Long-Term Countermeasures (Warrensville Center Rd./S Woodland Blvd.)

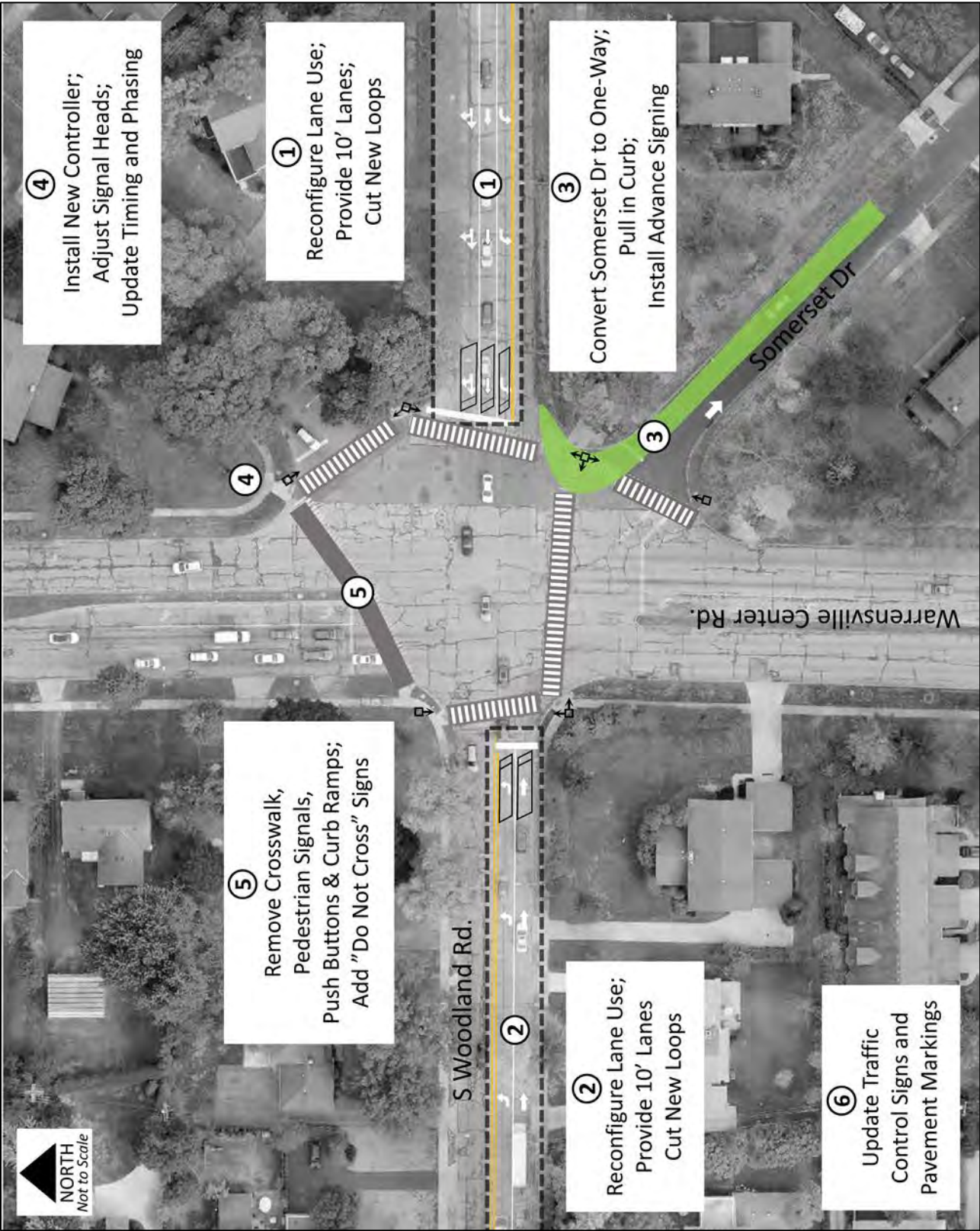


Figure 13: Long-Term Countermeasures (S Woodland Blvd. Approaches)



Figure 14: Long-Term Countermeasure AM Peak Hour Levels of Service (S Woodland Rd.)

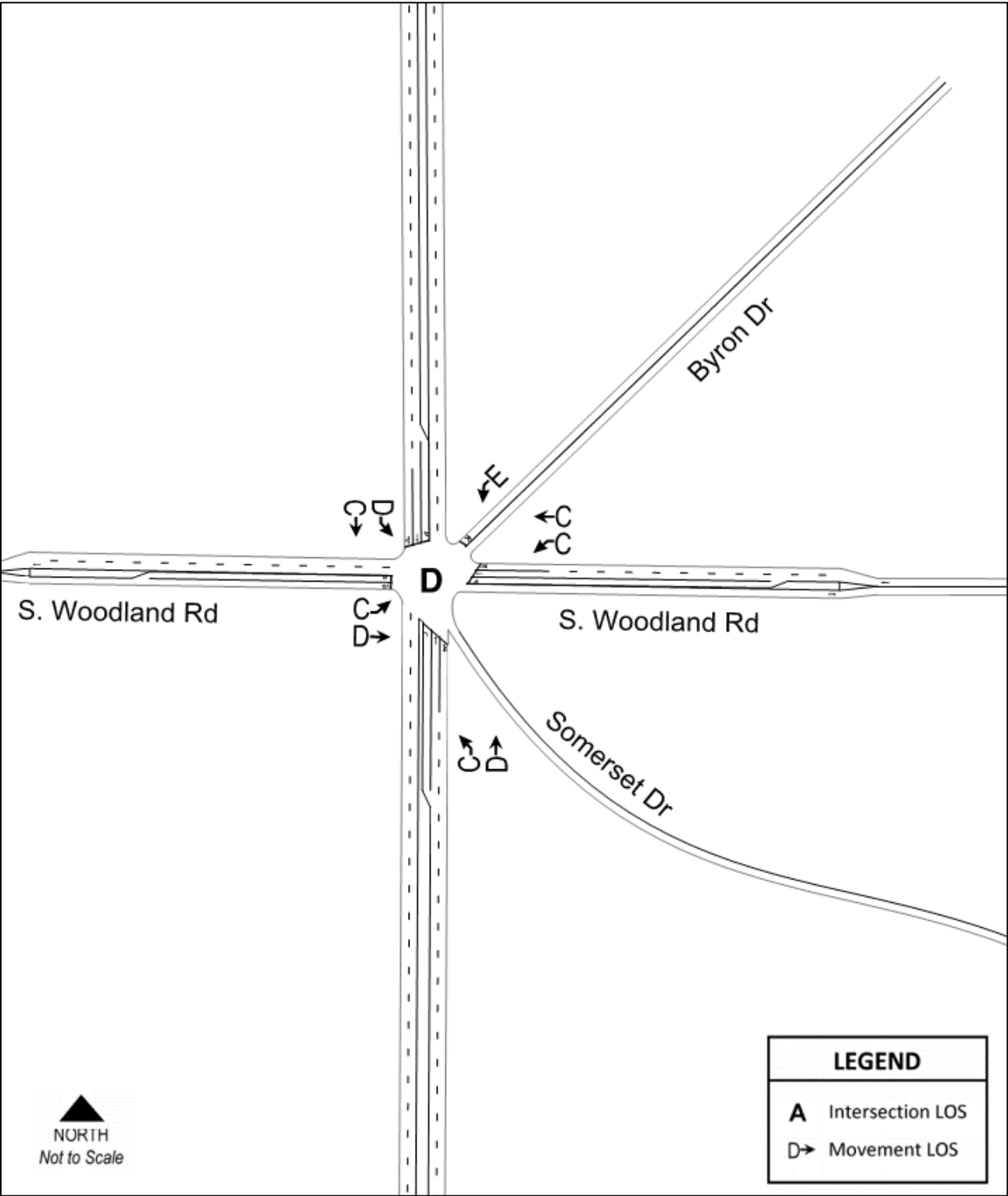
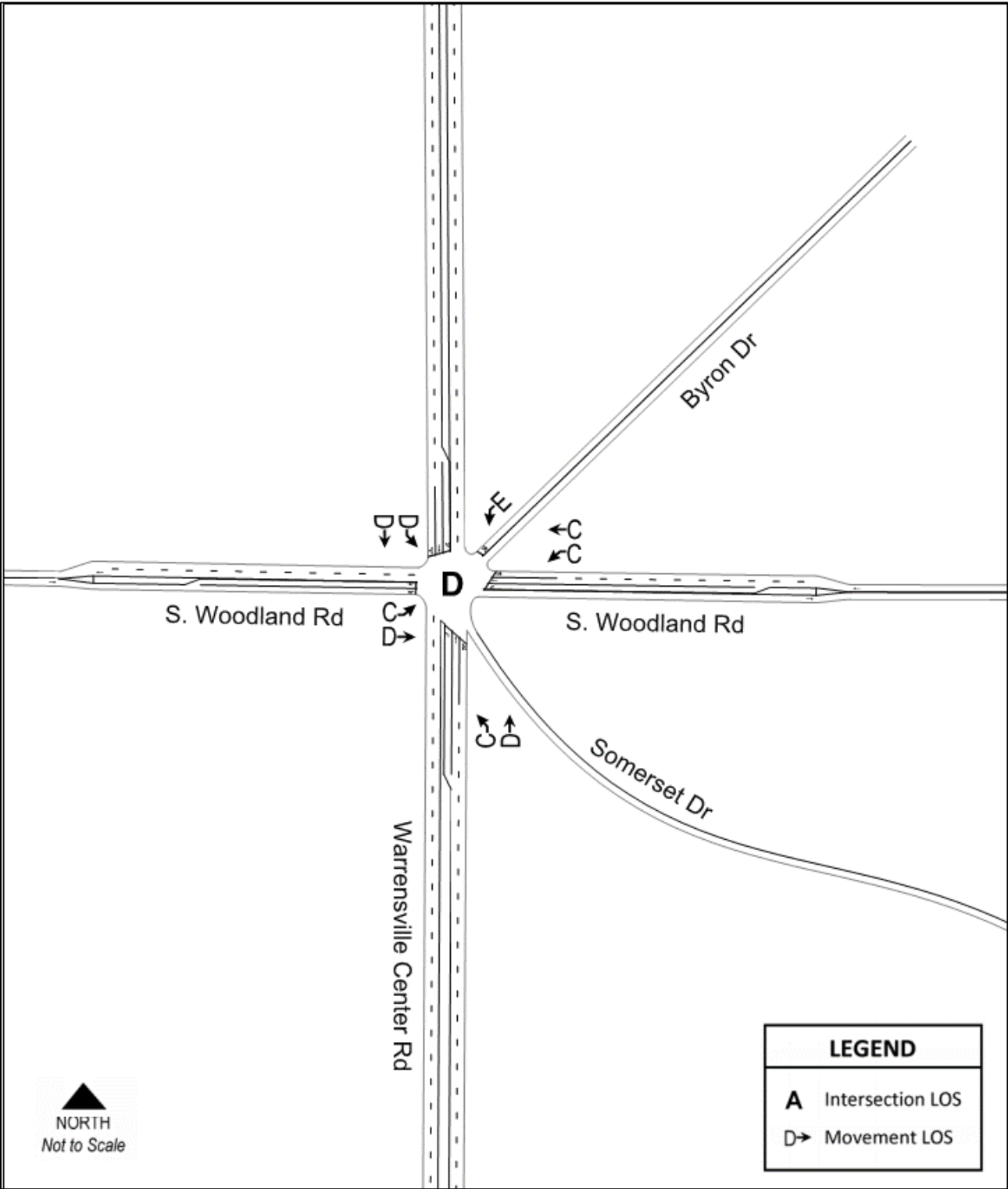


Figure 15: Long-Term Countermeasure PM Peak Hour Levels of Service (S Woodland Rd.)



IMPLEMENTATION PLAN

Warrensville Center Road/Farnsleigh Road

The Van Aken District development includes a new internal road – called Tuttle Road – that will connect to Farnsleigh Road within the queuing area for traffic on the eastbound approach to Warrensville Center Road. All the options for restriping Farnsleigh Road showed some eastbound queuing extending beyond Tuttle Road. However, none of the westbound queues extended back to Warrensville Road. Therefore, the recommended countermeasures at this intersection retain the existing lane use, which will allow for on-street parking on the south side of Farnsleigh Road east of Warrensville Center Road. The following additional countermeasures are recommended:

1. Paint diagonal cross hatching in the eastbound Farnsleigh Road lanes in front of Tuttle Road to alert drivers not to block the intersection area.
2. Place a stop bar in advance of the hatching. At the stop bar, install a “Do Not Block Driveway” sign.
3. Once the development opens, it may be beneficial to make field adjustments to the signal timing after the traffic patterns become established. If queueing is observed, adjusting the minimum gap/vehicle extension time, sometimes called the passage time, to three seconds for the Farnsleigh movements would allow a few more cars to clear the intersection during the side street phases and would slightly reduce the queues on Farnsleigh Road.

The countermeasures listed above will discourage motorists from blocking the new intersection and will alleviate concerns that a blocked intersection will cause vehicles to back up to Warrensville Center Road. The proposed countermeasures at this intersection are shown in Figure 16.

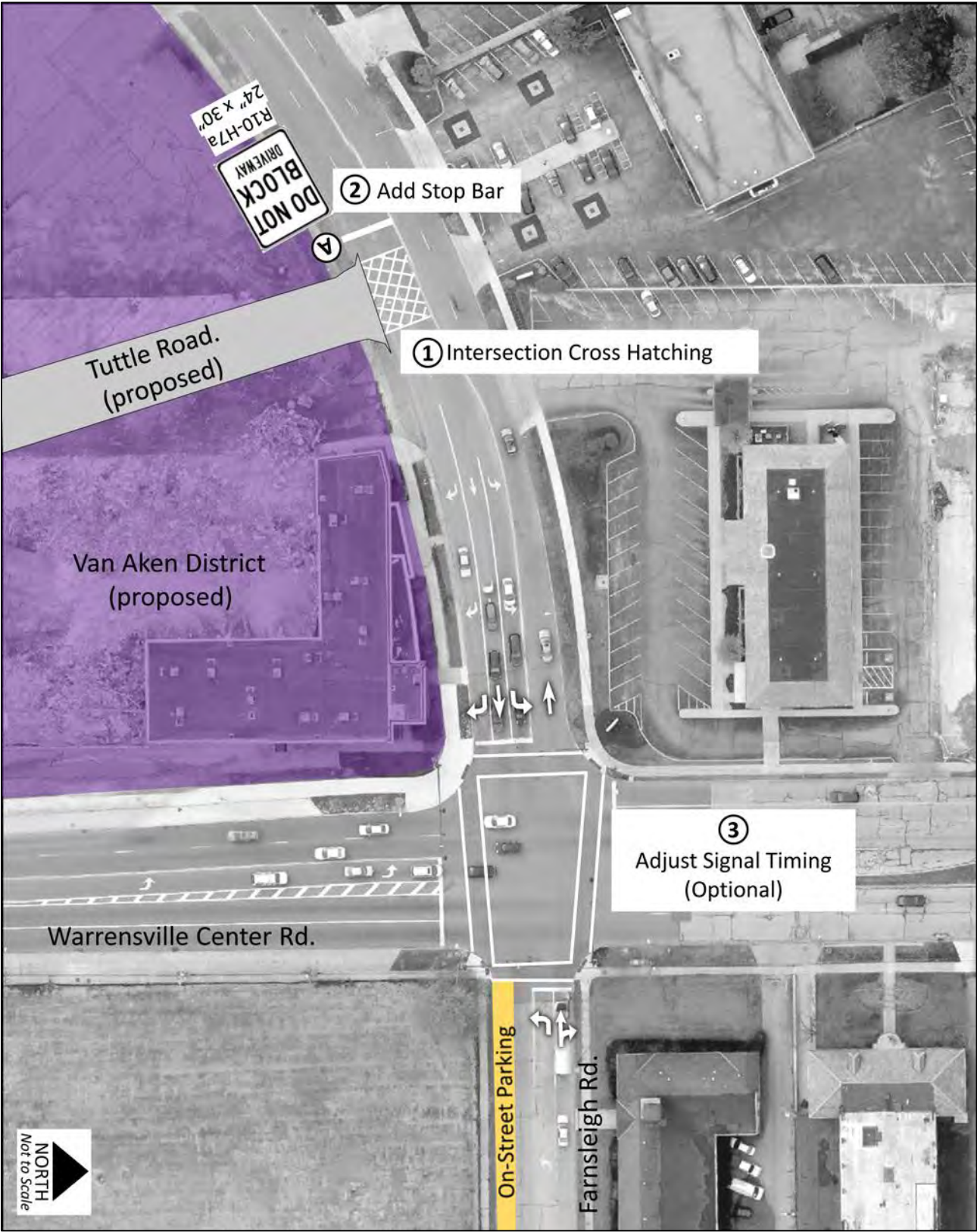
Chagrin Boulevard/Lynnfield Road

The signal warrant analysis showed that only one warrant (Peak Hour Warrant) was met by one car during the PM peak hour for the Chagrin Boulevard/Lynnfield Road intersection. A query of crash data available in ODOT’s Transportation Information and Mapping System (TIMS) did not indicate enough crashes at this location to warrant a signal based on safety.

Currently, there are not striped crosswalks on Chagrin Boulevard at Lynnfield Road, although there are no signs specifically prohibiting crossing Chagrin Boulevard at this intersection. The traffic counts did not record enough pedestrian traffic to warrant installing a signal based on pedestrian volumes alone. Schoolchildren may cross Chagrin Boulevard to reach St. Dominic School and/or Lomond Elementary School, but there are signalized crossings of Chagrin Boulevard at Norwood Road and Palmerston Road that also serve these movements.

Based on the above, installing a signal at this intersection is not recommended at this time. Instead, the intersection should continue to be monitored and reevaluated for signalization, particularly once the Van Aken District development is open. The City may also consider installing signs at the Chagrin Boulevard/Lynnfield Road intersection directing pedestrians to the signalized crossing at Norwood Road.

Figure 16: Countermeasures (Warrensville Center Rd./Farnsleigh Rd.)



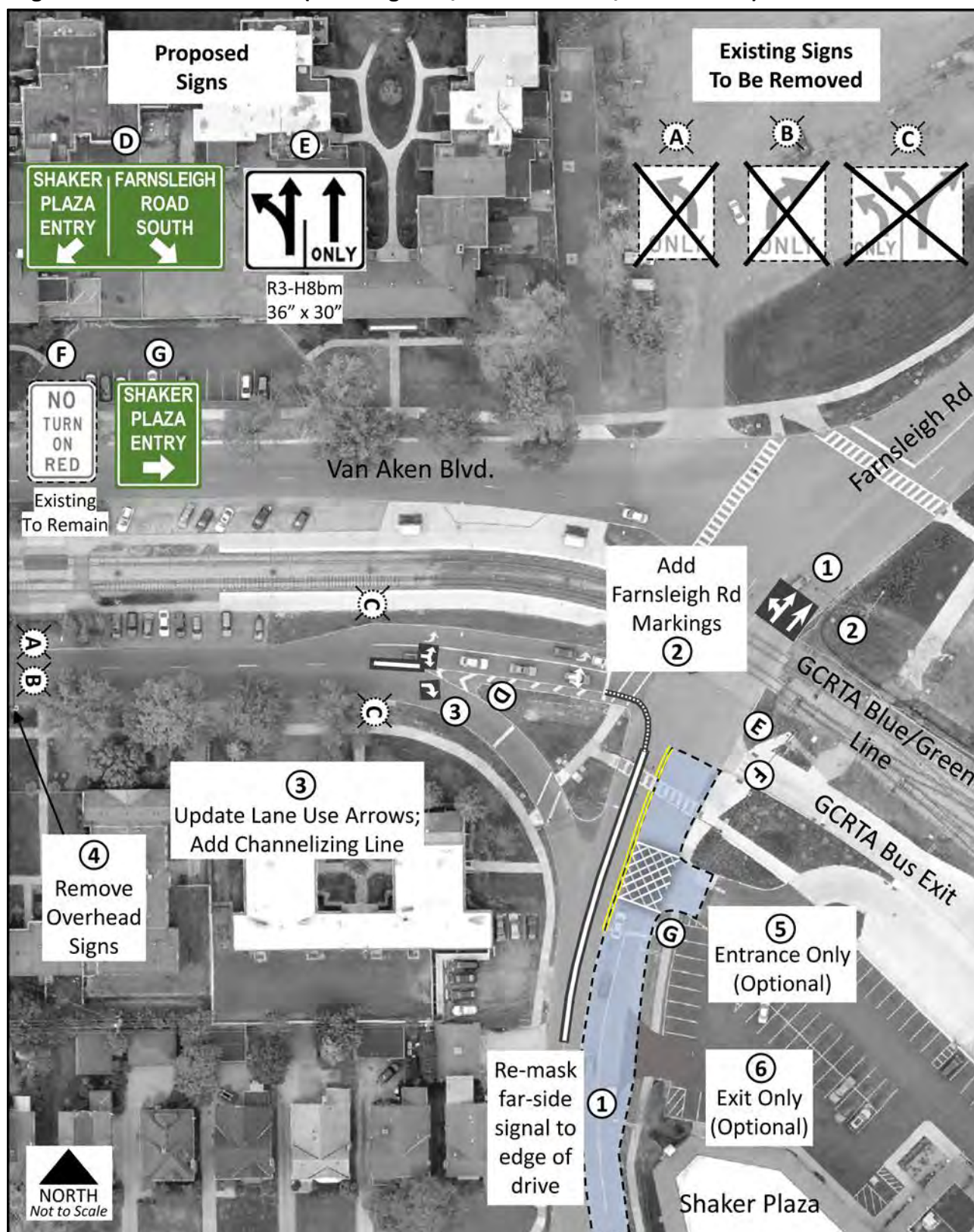
Farnsleigh Road/Van Aken Boulevard/Shaker Plaza Drive

The recommended countermeasures for the Farnsleigh Road/Van Aken Boulevard/Shaker Plaza Drive are summarized below:

1. Re-mask the south-facing signal heads at the Farnsleigh Road/Van Aken Boulevard Westbound intersection to improve visibility.
2. Add signing and pavement markings on Farnsleigh Road.
 - Add a ground mounted lane use sign and pavement markings for the northbound approach to the Farnsleigh Road/Van Aken Boulevard Westbound intersection.
 - Extend the Farnsleigh Road centerline north to the GCRTA Bus Exit, skipping the crosswalk.
 - Paint diagonal cross hatching on northbound Farnsleigh Road in front of the Shaker Plaza driveway.
 - Add a “Shaker Plaza Entry” sign for northbound Farnsleigh Road.
 - Add a 4-inch dotted line to direct traffic turning right from the Van Aken Boulevard Eastbound intersection into the inside lane on southbound Farnsleigh Road.
 - Stripe a solid white line on southbound Farnsleigh Road to avoid conflicts between vehicles turning right from the Van Aken Boulevard Eastbound intersection and the flared eastbound right turn lane.
3. Install additional signs and pavement markings on the eastbound approach.
 - Revise the pavement markings to add a right turn arrow to the flared right turn movement from eastbound Van Aken Boulevard to southbound Farnsleigh Road.
 - Add a channelizing line on the eastbound approach between the shared left/right lane and the flared right turn movement.
 - Remove the advance ground mounted lane use signs.
 - Add a “Shaker Plaza Entry” sign in the raised median area.
4. Remove the overhead advance lane use signs on the eastbound approach.
5. Another option for improving access and operations at this location would be to restrict the existing Shaker Plaza drive to entrance only. This option would need to be developed further in conjunction with the property owner and tenants.
6. In conjunction with converting the existing drive to entrance only, a new exit only drive could be created to the south. This would allow vehicles to exit in advance of, rather than between, the traffic signals for the Van Aken Boulevard one-way pairs. Similarly, this option would need to be developed further in conjunction with the property owner and tenants.
7. A countermeasure to improve access and operations for the long term would be to remove the flared right turn movement to southbound Farnsleigh Road and accommodate all the eastbound movements at the traffic light. Reconfiguring the eastbound approach could be accomplished with some minor re-work and possibly all within the existing pavement.

The recommended countermeasures are shown in Figure 17 and will provide consistency for all the traffic control features in the intersection area and will reduce driver confusion.

Figure 17: Countermeasures (Farnsleigh Rd./Van Aken Blvd./Shaker Plaza)



5. ESTIMATED COSTS

The costs to implement the recommended long-term countermeasures were estimated as follows:

- Warrensville Center Road/Shaker Boulevard Westbound: \$183,200
- Warrensville Center Road/Shaker Boulevard Eastbound: \$130,400
- Warrensville Center Road/S. Woodland Road: \$125,500

HNTB's estimate accounts for several factors that elevate the costs. The scope of work is relatively small, which limits the economies of scale that can be present on larger projects. Some equipment will only be needed for a short duration (i.e., to remove a signal support), but the mobilization costs will be the same. In addition, the work will likely require a team of different contractors (i.e., one to complete the traffic control items; one to construct pavement, sidewalk and curbs; and one to set up and maintain lane closures), which increases costs. Finally, staging the construction in a small project area with high traffic volumes could also increase costs. The goal of incorporating these issues was to provide the city with conservative cost estimates to aid in the planning, budgeting, and programming of the recommended countermeasures. The detailed cost estimates are included in Appendix F.

APPENDIX A:
9-HOUR TRAFFIC COUNTS

9-Hour Traffic Count Summary

Municipality: Shaker Heights
 Date: 9/5/2017
 Day: Tuesday
 Weather: Clear

Intersection: Chagrin Boulevard & Lynnfield Road

Start Time	Chagrin Boulevard Eastbound						Chagrin Boulevard Westbound						Lynnfield Road Northbound						Lynnfield Road Southbound					
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus
07:00 AM	0	71	1	72	4	1	5	79	6	90	1	1	4	5	1	10	0	1	3	4	2	9	0	0
07:15 AM	2	97	2	101	2	1	6	86	8	100	3	2	6	10	6	22	0	1	6	3	1	10	0	0
07:30 AM	1	109	5	115	2	4	3	89	6	98	4	2	1	11	3	15	1	0	13	3	1	17	0	0
07:45 AM	6	123	3	132	3	1	6	92	9	107	2	2	2	17	5	24	0	0	14	12	4	30	0	0
08:00 AM	2	120	0	122	6	1	4	108	8	120	5	3	4	11	3	18	0	1	12	16	7	35	0	2
08:15 AM	3	130	3	136	4	1	4	100	7	111	5	1	2	10	7	19	0	2	15	7	1	23	0	0
08:30 AM	2	129	3	134	3	5	2	94	3	99	4	3	3	11	4	18	0	0	8	16	5	29	0	1
08:45 AM	3	106	5	114	4	2	4	98	5	107	0	2	0	6	3	9	0	0	8	9	4	21	0	0
09:00 AM	1	124	7	132	1	2	10	83	4	97	4	1	2	10	5	17	0	0	12	12	1	25	0	1
09:15 AM	1	99	7	107	5	0	7	99	4	110	2	3	2	9	3	14	0	0	4	13	1	18	0	1
09:30 AM	2	121	6	129	5	5	5	91	0	96	5	0	4	4	4	12	0	1	10	9	2	21	0	0
09:45 AM	0	95	4	99	1	2	5	86	2	93	4	2	2	6	5	13	0	0	6	2	0	8	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	3	104	8	115	7	2	2	112	2	116	5	1	2	4	9	15	5	0	7	5	1	13	0	0
11:15 AM	3	115	4	122	4	2	2	101	2	105	6	0	0	3	3	6	0	0	9	6	5	20	1	0
11:30 AM	1	119	8	128	5	0	7	101	4	112	6	2	2	5	4	11	0	0	9	7	3	19	0	0
11:45 AM	3	99	5	107	2	3	4	108	1	113	5	2	1	4	2	7	0	0	4	7	1	12	0	0
12:00 PM	4	100	6	110	1	1	8	105	1	114	10	1	4	2	3	9	0	0	8	10	7	25	1	0
12:15 PM	6	97	4	107	3	2	6	123	0	129	4	2	1	9	3	13	0	0	5	8	2	15	0	1
12:30 PM	4	132	6	142	5	0	3	113	0	116	2	0	0	4	6	10	0	0	8	4	3	15	0	0
12:45 PM	1	109	4	114	4	1	3	104	2	109	4	1	1	1	1	3	0	0	5	9	1	15	0	0
01:00 PM	3	126	3	132	9	2	6	98	3	107	1	2	5	6	3	14	0	0	7	9	1	17	0	0
01:15 PM	2	90	3	95	3	1	7	124	2	133	1	4	4	2	4	10	0	0	5	4	4	13	0	0
01:30 PM	0	132	2	134	3	1	8	122	4	134	0	0	2	4	0	6	0	0	4	4	1	9	0	0
01:45 PM	3	121	7	131	0	2	6	106	5	117	4	2	0	1	4	5	0	0	11	6	4	21	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	3	106	5	114	1	1	11	133	8	152	1	3	4	5	5	14	0	0	7	20	5	32	0	3
03:15 PM	2	117	5	124	2	1	13	136	3	152	5	2	1	6	7	14	0	0	12	14	3	29	0	1
03:30 PM	5	140	5	150	3	3	5	115	4	124	3	2	3	13	9	25	0	1	12	24	2	38	0	0
03:45 PM	5	143	7	155	0	3	3	125	2	130	2	0	2	8	6	16	0	2	13	24	2	39	0	1
04:00 PM	7	128	9	144	2	0	12	136	3	151	5	3	1	6	6	13	0	1	10	23	2	35	1	1
04:15 PM	2	120	9	131	0	4	10	132	3	145	1	0	4	4	7	15	0	1	9	19	2	30	2	0
04:30 PM	3	133	8	144	3	2	10	164	5	179	1	2	6	3	9	18	0	0	9	22	6	37	0	0
04:45 PM	3	154	4	161	2	2	14	150	5	169	3	1	1	4	4	9	0	0	9	9	6	24	2	0
05:00 PM	5	129	6	140	0	1	13	149	2	164	2	0	0	5	5	10	0	0	18	23	5	46	0	0
05:15 PM	8	125	8	141	0	2	11	134	3	148	1	2	1	4	7	12	0	0	9	19	8	36	1	0
05:30 PM	4	142	11	157	2	1	12	134	5	151	0	2	3	5	7	15	0	0	12	24	3	39	0	0
05:45 PM	1	136	1	138	3	2	7	138	6	151	1	1	3	6	2	11	0	0	7	17	4	28	0	0
Totals	104	4241	184	4529	104	64	244	4068	137	4449	112	57	83	224	165	472	6	11	320	423	110	853	8	12
ADT	153	6246	271	6670	153	94	359	5991	202	6552	165	84	122	330	243	695	9	16	471	623	162	1256	12	18

Hourly Factor: 1.689

Monthly Factor: 0.87

Combined Factor: 1.47

9-Hour Traffic Count Summary

Municipality: Shaker Heights

Intersection: Chagrin Boulevard & Norwood Road

Date: 9/5/2017

Day: Tuesday

Weather: Clear

Start Time	Chagrin Boulevard Eastbound						Chagrin Boulevard Westbound						Norwood Road Northbound						Norwood Road Southbound					
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus
07:00 AM	1	76	1	78	4	1	0	74	1	75	1	0	4	6	0	10	0	0	4	0	1	5	0	0
07:15 AM	0	106	0	106	3	3	0	85	4	89	2	2	3	4	4	11	0	0	4	0	1	5	0	0
07:30 AM	1	129	0	130	3	3	0	96	4	100	3	2	5	16	3	24	0	0	5	0	1	6	0	1
07:45 AM	3	128	1	132	2	1	0	95	10	105	2	2	9	21	1	31	0	1	6	0	4	10	0	0
08:00 AM	1	126	0	127	6	1	0	96	5	101	3	3	8	22	1	31	1	1	3	0	2	5	1	1
08:15 AM	4	155	0	159	4	1	0	94	7	101	5	2	11	14	6	31	0	1	6	0	2	8	0	0
08:30 AM	8	121	0	129	3	3	0	100	7	107	2	2	6	24	4	34	0	0	6	0	3	9	0	0
08:45 AM	0	112	0	112	4	2	0	100	1	101	0	2	5	7	4	16	0	0	9	0	2	11	0	0
09:00 AM	2	107	0	109	0	1	0	91	8	99	4	0	2	6	5	13	0	0	3	0	1	4	0	0
09:15 AM	0	85	0	85	4	0	0	82	4	86	1	1	7	5	3	15	1	0	2	0	5	7	0	0
09:30 AM	0	91	0	91	0	3	0	64	1	65	3	1	3	4	1	8	0	0	2	0	0	2	0	0
09:45 AM	1	104	0	105	1	2	0	78	2	80	4	1	3	7	2	12	0	0	3	0	1	4	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	126	0	126	6	2	0	116	4	120	6	1	2	5	1	8	0	0	0	0	0	0	0	0
11:15 AM	0	123	0	123	3	2	0	111	2	113	5	1	0	2	0	2	0	0	3	0	0	3	0	0
11:30 AM	1	107	0	108	4	0	0	103	1	104	5	1	6	2	1	9	1	0	0	0	0	0	0	0
11:45 AM	0	100	1	101	1	3	0	108	3	111	6	2	5	3	3	11	1	0	4	0	0	4	0	0
12:00 PM	0	110	0	110	3	1	0	109	2	111	8	1	2	9	1	12	1	0	1	0	3	4	0	0
12:15 PM	1	107	0	108	1	1	0	124	3	127	5	2	4	7	2	13	0	0	3	0	2	5	0	0
12:30 PM	0	136	0	136	5	0	0	119	4	123	1	0	6	1	3	10	0	0	6	0	1	7	0	0
12:45 PM	0	107	0	107	2	1	0	105	3	108	5	1	3	5	1	9	0	0	3	0	0	3	0	0
01:00 PM	2	139	0	141	7	1	0	120	6	126	0	2	0	4	0	4	0	0	3	0	1	4	0	0
01:15 PM	1	50	6	57	1	0	0	85	4	89	0	1	1	1	2	4	0	0	2	0	0	2	0	0
01:30 PM	1	110	1	112	3	1	0	108	2	110	0	1	1	2	2	5	0	0	4	0	0	4	0	0
01:45 PM	3	124	0	127	0	1	0	136	2	138	5	1	6	1	1	8	1	0	2	0	1	3	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	104	0	104	1	1	0	128	2	130	0	3	3	7	0	10	0	0	3	0	1	4	0	0
03:15 PM	4	126	0	130	2	3	0	152	4	156	5	2	0	6	0	6	0	0	4	0	4	8	0	0
03:30 PM	1	150	0	151	3	2	0	131	3	134	4	2	1	4	1	6	0	0	12	0	5	17	0	0
03:45 PM	3	144	0	147	0	2	0	118	2	120	3	1	5	7	2	14	0	0	9	0	5	14	0	0
04:00 PM	6	126	0	132	3	1	0	154	2	156	4	3	7	4	3	14	1	0	12	0	10	22	0	0
04:15 PM	2	141	0	143	3	4	0	135	5	140	0	1	6	9	5	20	1	0	8	0	2	10	0	0
04:30 PM	0	132	0	132	2	3	0	181	0	181	1	2	6	6	2	14	0	0	10	0	3	13	2	0
04:45 PM	6	147	0	153	3	1	0	168	3	171	2	1	1	8	2	11	0	0	11	0	7	18	0	0
05:00 PM	1	128	0	129	0	1	0	162	3	165	1	1	2	9	5	16	0	0	9	0	9	18	0	1
05:15 PM	3	119	0	122	1	2	0	152	7	159	1	0	8	8	1	17	0	0	10	0	3	13	0	0
05:30 PM	4	143	0	147	1	1	0	154	8	162	0	2	5	15	3	23	0	0	6	0	2	8	0	0
05:45 PM	0	140	1	141	3	2	0	144	8	152	2	1	3	13	5	21	0	0	2	0	9	11	0	0
Total	60	4279	11	4350	92	57	0	4178	137	4315	99	51	149	274	80	503	8	3	180	0	91	271	3	3
ADT	88	6302	16	6407	135	84	0	6153	202	6355	146	75	219	404	118	741	12	4	265	0	134	399	4	4

Hourly Factor: 1.689

Monthly Factor: 0.87

Combined Factor: 1.47

9-Hour Traffic Count Summary

Municipality: Shaker Heights

Intersection: Warrensville Center Road & Northfield Connector

Date: 11/8/2017

Day: Wednesday

Weather: Clear

Start Time	Warrensville Center Rd. Southbound						Warrensville Center Rd. Northbound						Northfield Connector Westbound						Northfield Connector Eastbound					
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus
07:00 AM	40	125	0	165	2	1	0	150	12	162	3	1	5	0	52	57	2	0	0	0	0	0	0	0
07:15 AM	21	132	0	153	2	1	0	168	11	179	7	3	5	0	55	60	0	0	0	0	0	0	0	0
07:30 AM	44	131	0	175	5	2	0	232	13	245	6	2	10	0	85	95	0	0	0	0	0	0	0	0
07:45 AM	34	168	0	202	1	2	0	172	16	188	7	3	9	0	88	97	1	1	0	0	0	0	0	0
08:00 AM	49	166	0	215	2	1	0	207	14	221	12	1	11	0	84	95	3	2	0	0	0	0	0	0
08:15 AM	58	148	0	206	4	4	0	197	18	215	1	2	11	0	86	97	3	0	0	0	0	0	0	0
08:30 AM	29	149	0	178	4	2	0	177	17	194	4	2	14	0	67	81	5	4	0	0	0	0	0	0
08:45 AM	28	158	0	186	7	2	0	180	14	194	3	3	13	0	65	78	7	0	0	0	0	0	0	0
09:00 AM	47	137	0	184	5	2	0	170	6	176	8	1	13	0	46	59	2	0	0	0	0	0	0	0
09:15 AM	30	104	0	134	4	2	0	135	9	144	6	1	23	0	61	84	2	2	0	0	0	0	0	0
09:30 AM	39	142	0	181	4	3	0	145	6	151	3	3	6	0	49	55	4	1	0	0	0	0	0	0
09:45 AM	21	104	0	125	2	0	0	159	7	166	3	2	8	0	60	68	2	1	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	4	81	0	85	0	2	3	82	1	86	11	1	12	0	25	37	0	0	0	0	0	0	0	0
11:15 AM	16	117	0	133	9	0	0	130	7	137	3	2	11	0	28	39	1	0	0	0	0	0	0	0
11:30 AM	27	167	0	194	3	4	0	102	7	109	6	1	7	0	45	52	0	0	0	0	0	0	0	0
11:45 AM	22	179	0	201	1	4	0	141	5	146	1	1	16	0	50	66	2	3	0	0	0	0	0	0
12:00 PM	35	193	0	228	3	2	0	122	2	124	5	1	11	5	184	200	2	0	0	0	0	0	0	0
12:15 PM	24	155	0	179	4	0	0	157	3	160	6	1	18	0	67	85	7	3	0	0	0	0	0	0
12:30 PM	26	129	0	155	4	1	0	124	4	128	3	2	17	0	41	58	1	0	0	0	0	0	0	0
12:45 PM	28	130	0	158	2	1	0	112	8	120	1	0	15	0	55	70	1	1	0	0	0	0	0	0
01:00 PM	30	156	0	186	5	1	0	145	4	149	2	1	21	0	58	79	0	0	0	0	0	0	0	0
01:15 PM	20	165	0	185	4	3	0	105	2	107	0	0	20	0	54	74	1	0	0	0	0	0	0	0
01:30 PM	50	132	0	182	9	2	0	125	6	131	2	1	14	0	38	52	2	0	0	0	0	0	0	0
01:45 PM	20	180	0	200	6	3	0	128	7	135	6	0	14	0	41	55	2	1	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	30	159	0	189	3	2	0	171	4	175	4	1	23	0	48	71	1	1	0	0	0	0	0	0
03:15 PM	18	174	0	192	8	1	0	184	6	190	1	0	38	0	57	95	3	2	0	0	0	0	0	0
03:30 PM	52	70	0	122	3	1	0	103	10	113	1	1	20	0	66	86	0	0	0	0	0	0	0	0
03:45 PM	55	189	0	244	4	5	0	171	4	175	3	3	45	0	87	132	2	0	0	0	0	0	0	0
04:00 PM	39	166	0	205	6	0	0	160	8	168	1	0	43	0	67	110	1	0	0	0	0	0	0	0
04:15 PM	48	128	0	176	2	3	0	162	10	172	1	2	105	0	82	187	0	1	0	0	0	0	0	0
04:30 PM	56	189	0	245	8	4	7	204	10	221	5	5	32	0	99	131	0	1	0	0	0	0	0	0
04:45 PM	61	198	0	259	5	0	0	166	7	173	3	1	56	0	128	184	4	0	0	0	0	0	0	0
05:00 PM	82	211	2	295	3	4	0	191	14	205	0	2	84	0	113	197	0	0	0	0	0	0	0	0
05:15 PM	65	227	0	292	2	0	0	234	15	249	2	1	68	0	130	198	0	0	0	0	0	0	0	0
05:30 PM	54	228	1	283	4	1	0	208	6	214	0	1	89	0	115	204	1	0	0	0	0	0	0	0
05:45 PM	67	195	0	262	5	2	3	159	15	177	0	2	69	0	153	222	1	0	0	0	0	0	0	0
Totals	1369	5582	3	6954	145	68	13	5678	308	5999	130	54	976	5	2629	3610	63	24	0	0	0	0	0	0
ADT	2185	8909	5	11099	231	109	21	9063	492	9575	207	86	1558	8	4196	5762	101	38	0	0	0	0	0	0

Hourly Factor: 1.689

Monthly Factor: 0.95

Combined Factor: 1.60

9-Hour Traffic Count Summary

Municipality: Shaker Heights

Intersection: S Woodland Rd/Warrensville Center Rd/S Byron Dr/Somerset Dr

Date: 11/9/2017

Day: Thursday

Weather: Snow

From To Start Time	Woodland Rd. Eastbound							Woodland Rd. Westbound						
	Warrensville Center Rd. NB	Byron Dr. NEB	Woodland Rd. EB	Somerset Dr. SEB	Warrensville Center Rd. SB	Total	Trk/ Bus	Somerset Dr. SEB	Warrensville Center Rd. SB	Woodland Rd. WB	Warrensville Center Rd. NB	Byron Dr. NEB	Total	Trk/ Bus
07:00 AM	4	3	43	7	10	67	5	0	2	67	11	0	80	1
07:15 AM	3	4	45	7	16	75	2	0	1	88	9	2	100	1
07:30 AM	7	16	64	18	18	123	4	1	3	111	21	4	140	2
07:45 AM	7	13	59	25	15	119	5	0	5	106	4	5	120	4
08:00 AM	13	9	56	22	21	121	1	0	7	79	4	2	92	5
08:15 AM	17	5	55	15	18	110	4	0	6	69	11	0	86	4
08:30 AM	14	7	56	17	20	114	2	0	2	54	6	1	63	7
08:45 AM	10	3	51	11	15	90	2	0	3	51	11	1	66	5
09:00 AM	24	0	68	10	17	119	2	0	0	65	9	0	74	3
09:15 AM	6	2	56	4	21	89	3	0	8	41	8	0	57	6
09:30 AM	5	1	48	12	12	78	1	0	4	48	5	1	58	1
09:45 AM	13	4	50	10	16	93	2	0	2	36	8	2	48	4
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	9	1	31	2	8	51	2	0	2	40	9	1	52	2
11:15 AM	6	0	31	4	4	45	1	1	9	24	6	2	42	1
11:30 AM	14	2	43	8	23	90	4	0	3	41	6	1	51	6
11:45 AM	6	1	36	1	10	54	1	1	5	35	2	0	43	2
12:00 PM	6	1	36	3	11	57	2	0	7	45	11	0	63	1
12:15 PM	7	3	44	6	11	71	2	0	5	49	6	0	60	1
12:30 PM	12	2	39	2	12	67	2	0	4	37	9	1	51	1
12:45 PM	8	2	32	4	13	59	5	0	4	42	6	1	53	4
01:00 PM	9	1	53	4	7	74	5	0	4	49	12	1	66	1
01:15 PM	13	3	42	3	22	83	4	0	3	32	5	0	40	1
01:30 PM	8	3	52	2	19	84	2	0	5	40	8	1	54	1
01:45 PM	5	1	49	9	27	91	5	0	7	45	12	1	65	0
02:00 PM	3	0	4	0	1	8	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	8	4	47	3	18	80	7	0	10	63	7	2	82	8
03:15 PM	15	9	65	9	21	119	3	0	1	51	15	2	69	2
03:30 PM	14	7	56	12	20	109	1	0	4	62	13	2	81	1
03:45 PM	11	8	60	10	17	106	4	0	9	54	11	4	78	0
04:00 PM	9	6	80	10	24	129	3	0	3	65	12	0	80	1
04:15 PM	15	8	77	16	23	139	4	0	9	73	14	1	97	3
04:30 PM	10	2	80	11	30	133	5	1	6	48	9	0	64	2
04:45 PM	4	1	66	9	21	101	0	0	3	68	10	2	83	0
05:00 PM	12	5	51	6	20	94	2	0	8	72	12	0	92	0
05:15 PM	8	11	65	13	21	118	0	0	7	85	16	1	109	0
05:30 PM	14	4	75	12	19	124	0	0	11	85	14	0	110	0
05:45 PM	7	4	68	14	17	110	2	0	10	91	15	2	118	3
Totals	356	156	1933	331	618	3394	99	4	182	2111	347	43	2687	84
ADT	569	249	3089	529	987	5423	158	6	291	3373	554	69	4293	134

Hourly Factor: 1.689

Monthly Factor: 0.95

Combined Factor: 1.60

9-Hour Traffic Count Summary

Municipality: Shaker Heights

Intersection: S Woodland Rd/Warrensville Center Rd/S Byron Dr/Somerset Dr

Date: 11/9/2017

Day: Thursday

Weather: Snow

Warrensville Center Northbound							Warrensville Center Southbound						
Woodland Rd. WB	Warrensville Center Rd. NB	Byron Dr. NEB	Woodland Rd. EB	Somerset Dr. SEB	Total	Trk/ Bus	Byron Dr. NEB	Woodland Rd. EB	Warrensville Center Rd. SB	Woodland Rd. WB	Somerset Dr. SEB	Total	Trk/ Bus
6	102	3	32	0	143	4	1	14	115	2	5	137	2
8	127	3	38	0	176	3	0	9	103	3	8	123	4
5	135	15	46	0	201	15	0	23	173	9	14	219	1
6	129	18	40	0	193	13	0	19	171	5	21	216	2
5	153	2	34	0	194	7	1	23	179	6	10	219	6
5	132	4	16	0	157	12	0	29	162	9	15	215	1
9	153	2	23	0	187	15	0	21	173	7	13	214	7
6	148	4	22	0	180	8	1	8	165	12	13	199	9
7	113	0	21	0	141	8	0	27	149	7	7	190	2
8	130	2	22	0	162	7	0	20	145	11	3	179	9
4	118	3	19	0	144	6	0	12	109	5	5	131	2
3	131	5	18	0	157	5	0	21	128	5	8	162	4
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	111	1	7	0	121	11	1	8	149	9	6	173	8
4	106	2	15	0	127	3	0	16	96	2	11	125	6
2	103	2	6	0	113	3	0	15	128	10	12	165	3
8	125	3	8	0	144	9	1	10	125	6	14	156	11
7	121	4	18	0	150	5	0	7	144	11	21	183	2
8	101	7	30	0	146	4	0	14	138	2	4	158	5
2	104	1	9	0	116	3	0	12	140	10	12	174	5
3	124	2	19	0	148	10	0	12	100	3	5	120	3
7	124	3	23	0	157	8	0	17	108	3	22	150	1
4	117	3	13	0	137	4	0	12	151	7	4	174	10
3	117	1	16	0	137	8	1	20	125	2	20	168	9
3	101	1	14	0	119	3	1	11	166	4	4	186	5
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	134	5	21	0	168	3	0	23	142	6	23	194	9
2	112	1	20	0	135	3	0	31	159	8	4	202	6
4	141	3	22	0	170	3	0	18	176	12	11	217	10
6	150	7	19	0	182	5	1	20	206	10	2	239	7
8	136	0	23	0	167	5	0	15	213	5	9	242	4
4	138	27	25	1	195	1	0	27	207	11	7	252	9
4	152	2	16	0	174	1	0	12	200	10	10	232	4
10	182	2	23	0	217	4	1	27	158	4	2	192	4
3	176	6	26	0	211	4	0	32	204	10	2	248	4
7	199	6	31	0	243	3	0	14	214	7	6	241	4
5	202	1	23	0	231	2	1	19	230	7	8	265	1
10	200	0	44	0	254	2	0	18	198	12	6	234	3
196	4847	151	802	1	5997	210	10	636	5649	252	347	6894	182
313	7745	241	1281	2	9582	336	16	1016	9026	403	554	11015	291

Hourly Factor: 1.689

Monthly Factor: 0.95

Combined Factor: 1.60

9-Hour Traffic Count Summary

Municipality: Shaker Heights

Intersection: S Woodland Rd/Warrensville Center Rd/S Byron Dr/Somerset Dr

Date: 11/9/2017

Day: Thursday

Weather: Snow

Somerset Dr.							Byron Dr.						
Warrensville Center Rd. SB	Woodland Rd. WB	Warrensville Center Rd. NB	Byron Dr. NEB	Woodland Rd. EB	Total	Trk/ Bus	Warrensville Center Rd. SB	Woodland Rd. WB	Warrensville Center Rd. NB	Somerset Dr. SEB	Woodland Rd. EB	Total	Trk/ Bus
0	39	3	0	0	42	0	2	1	0	0	0	3	0
0	20	2	0	0	22	0	2	3	0	0	0	5	1
0	20	4	0	0	24	1	3	8	0	0	0	11	0
1	19	3	1	0	24	3	5	22	0	0	0	27	1
2	16	5	0	0	23	0	7	10	0	0	0	17	2
0	10	3	0	0	13	0	0	3	0	0	0	3	0
0	7	3	0	0	10	0	2	2	0	0	0	4	0
0	9	7	1	0	17	1	3	6	0	0	0	9	1
0	5	3	0	0	8	1	2	0	0	0	0	2	0
0	8	2	0	0	10	0	7	4	0	0	0	11	0
0	3	2	0	0	5	1	2	3	0	0	0	5	0
0	11	3	0	0	14	0	3	3	0	0	0	6	0
0	0	0	0	0	0	0	1	0	1	1	0	3	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	6	8	0	0	14	0	5	3	0	0	1	9	1
0	9	2	0	0	11	0	7	3	1	1	0	12	0
0	3	1	0	0	4	0	3	4	0	0	1	8	1
2	10	4	0	0	16	0	5	2	0	0	0	7	0
1	3	6	0	0	10	0	2	1	0	0	0	3	0
1	9	3	0	0	13	0	2	2	1	1	0	6	0
0	7	2	0	0	9	0	0	1	0	0	1	2	0
0	5	2	0	0	7	1	1	2	0	0	0	3	1
0	4	9	0	0	13	1	9	2	0	0	0	11	1
0	4	4	0	0	8	0	4	3	0	0	0	7	1
0	11	4	0	0	15	1	5	4	0	0	0	9	0
0	7	5	1	0	13	0	1	1	0	0	0	2	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	9	5	0	0	14	0	10	10	0	0	0	20	2
0	9	4	0	0	13	0	2	4	0	0	0	6	0
0	12	3	0	2	17	0	8	7	1	1	0	17	1
0	10	6	1	0	17	1	4	12	0	0	0	16	3
0	11	1	0	1	13	0	8	9	0	0	1	18	1
0	16	8	1	0	25	1	3	6	0	0	0	9	0
0	20	6	1	0	27	0	4	8	1	1	0	14	0
0	19	9	0	0	28	0	7	5	0	0	0	12	0
1	13	12	1	0	27	1	6	5	0	0	0	11	0
0	27	14	1	0	42	1	8	5	1	1	0	15	0
0	26	11	1	0	38	1	10	11	0	0	1	22	0
0	19	10	0	0	29	0	7	7	0	0	0	14	1
8	436	179	9	3	635	15	160	182	6	6	5	359	19
13	697	286	14	5	1015	24	256	291	10	10	8	575	30

Hourly Factor: 1.689

Monthly Factor: 0.95

Combined Factor: 1.60

PEDESTRIAN & BICYCLE SUMMARY

Municipality: Shaker Heights
Date: 11/09/2017
Day: Thursday
Weather: Clear

Intersection: S Woodland Rd/Warrensville Center Rd/ S Byron Rd/Somerset Dr
Data Entry By: JJO

TIME BEGINS	Warrensville Center Rd.		Warrensville Center Rd.		S Woodland Rd.		S Woodland Rd.	
	Crosswalk across Warrensville Center N.		Crosswalk across Warrensville Center S.		Crosswalk across S Woodland E.		Crosswalk across S Woodland W.	
	PEDESTRIANS	BICYCLES	PEDESTRIANS	BICYCLES	PEDESTRIANS	BICYCLES	PEDESTRIANS	BICYCLES
7:00 AM	4	0			1	0		
8:00 AM			1	0	1	0	1	0
9:00 AM	1	1	2	0			2	0
11:00 AM					3	0		
12:00 PM	4	0	2	0	1	0	2	0
1:00 PM	3	1						
3:00 PM	7	0	2	0	3	0	2	0
4:00 PM	8	0	2	0	1	0	2	0
5:00 PM	5	3	2	0	2	0	2	0
TOTALS	32	5	11	0	12	0	11	0

9-Hour Traffic Count Summary

Municipality: Shaker Heights

Intersection: Shaker Blvd EB/Warrensville Center Rd/Falmouth Rd/Fayette Rd

Date: 11/14/2017

Day: Tuesday

Weather: Snow

From	Shaker Blvd Eastbound							Warrensville Center Northbound							Warrensville Center Southbound						
To	Warrensville Center Rd. NB	Shaker Blvd. EB	Warrensville Center Rd. SB	Fayette Rd.	Falmouth Rd.	Total	Trk/ Bus	Warrensville Center Rd. NB	Shaker Blvd. EB	Fayette Rd.	Shaker Blvd. WB	Falmouth Rd.	Total	Trk/ Bus	Shaker Blvd. EB	Warrensville Center Rd. SB	Falmouth Rd.	Shaker Blvd. WB	Fayette Rd.	Total	Trk/ Bus
Start Time																					
07:00 AM	8	24	1	0	0	33	2	104	3	0	0	0	107	4	12	108	1	0	0	121	4
07:15 AM	13	52	5	0	0	70	0	135	5	0	0	0	140	5	28	123	1	0	0	152	4
07:30 AM	17	83	8	0	0	108	3	143	1	0	0	0	144	3	59	175	3	0	0	237	8
07:45 AM	17	106	14	0	0	137	5	188	6	0	0	0	194	13	59	213	8	0	0	280	5
08:00 AM	10	72	12	0	0	94	2	158	9	0	0	0	167	7	40	167	7	0	0	214	4
08:15 AM	17	76	10	0	0	103	1	207	4	0	0	0	211	9	35	216	8	0	0	259	8
08:30 AM	6	85	14	0	0	105	2	150	3	0	0	0	153	10	39	183	3	0	0	225	6
08:45 AM	10	77	10	0	0	97	3	201	6	0	0	0	207	5	28	180	6	0	0	214	9
09:00 AM	7	67	4	0	0	78	0	192	10	0	0	0	202	2	33	144	4	0	0	181	8
09:15 AM	7	52	2	0	0	61	2	194	15	0	0	0	209	6	15	117	3	0	0	135	4
09:30 AM	5	58	5	0	0	68	1	137	8	0	0	0	145	6	18	140	3	0	0	161	6
09:45 AM	8	52	7	0	0	67	0	108	10	0	0	0	118	2	26	119	4	0	0	149	6
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	2	36	3	0	0	41	0	127	10	0	0	0	137	6	25	124	2	0	0	151	7
11:15 AM	8	32	5	0	0	45	0	149	3	0	0	0	152	6	27	135	2	0	0	164	6
11:30 AM	10	53	3	0	0	66	2	160	9	0	0	0	169	6	20	115	8	0	0	143	5
11:45 AM	6	51	7	0	0	64	3	119	5	0	0	0	124	8	24	129	3	0	0	156	7
12:00 PM	4	48	7	0	0	59	2	139	5	0	0	0	144	5	46	127	8	0	0	181	2
12:15 PM	8	46	8	0	0	62	0	170	9	0	0	0	179	9	21	142	4	0	0	167	5
12:30 PM	9	68	3	0	0	80	1	147	3	0	0	0	150	7	22	155	2	0	0	179	6
12:45 PM	14	54	8	0	0	76	1	151	8	0	0	0	159	4	26	134	7	0	0	167	7
01:00 PM	4	54	4	0	0	62	1	141	5	0	0	0	146	3	25	138	5	0	0	168	3
01:15 PM	7	64	6	0	0	77	2	160	2	0	0	0	162	4	24	116	5	0	0	145	8
01:30 PM	5	40	11	0	0	56	0	173	6	0	0	0	179	5	12	132	3	0	0	147	10
01:45 PM	6	62	5	0	0	73	2	145	4	0	0	0	149	4	19	159	4	0	0	182	8
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	15	92	8	0	0	115	2	53	11	0	0	0	64	4	46	171	4	0	0	221	5
03:15 PM	14	125	15	0	0	154	1	174	8	0	0	0	182	5	43	170	4	0	0	217	7
03:30 PM	15	118	19	0	0	152	6	215	7	0	0	0	222	2	61	226	5	0	0	292	3
03:45 PM	18	138	15	0	0	171	5	216	7	0	0	0	223	4	35	200	5	0	0	240	10
04:00 PM	17	110	17	0	0	144	3	222	13	0	0	0	235	3	43	186	4	0	0	233	4
04:15 PM	16	122	8	0	0	146	5	240	20	0	0	0	260	5	45	208	4	0	0	257	5
04:30 PM	17	142	13	0	0	172	2	246	11	0	0	1	258	5	38	193	9	0	0	240	10
04:45 PM	19	162	14	0	0	195	0	247	12	0	0	0	259	2	36	167	3	0	0	206	7
05:00 PM	15	137	16	0	0	168	1	272	9	0	0	0	281	3	52	222	11	0	0	285	2
05:15 PM	11	158	13	0	0	182	0	299	13	0	0	1	313	4	44	220	1	0	0	265	3
05:30 PM	20	153	13	0	0	186	3	294	11	0	0	0	305	1	38	201	4	0	0	243	6
05:45 PM	24	165	9	0	0	198	2	359	16	0	0	0	375	6	35	180	2	0	0	217	1
Totals	409	3034	322	0	0	3765	65	6535	287	0	0	2	6824	183	1199	5835	160	0	0	7194	209
ADT	653	4848	514	0	0	6015	104	10442	459	0	0	3	10904	292	1916	9323	256	0	0	11495	334

Hourly Factor: 1.689

Monthly Factor: 0.95

Combined Factor: 1.60

9-Hour Traffic Count Summary

Municipality: Shaker Heights

Intersection: Shaker Blvd EB/Warrens ville Center Rd/Falmouth Rd/Fayette Rd

Date: 11/14/2017

Day: Tuesday

Weather: Snow

Fayette Rd.							Falmouth Rd. Eastbound						
Warrens ville Center Rd. SB	Falmouth Rd.	Warrens ville Center Rd. NB	Shaker Blvd. EB	Shaker Blvd. WB	Total	Trk/ Bus	Warrens ville Center Rd. NB	Shaker Blvd. EB	Warrens ville Center Rd. SB	Falmouth Rd.	Shaker Blvd. WB	Total	Trk/ Bus
0	0	0	0	0	0	0	4	37	4	0	0	45	2
0	0	9	2	0	11	0	1	9	2	0	0	12	0
0	0	5	0	0	5	0	3	5	0	0	0	8	1
5	0	26	5	0	36	1	3	13	10	0	0	26	0
0	0	15	2	0	17	0	3	17	9	0	0	29	3
1	0	1	0	0	2	0	1	14	1	0	0	16	0
0	0	4	1	0	5	0	1	6	3	0	0	10	0
0	0	0	0	0	0	0	4	5	5	0	0	14	0
0	0	6	1	0	7	0	4	8	5	0	0	17	0
0	0	5	1	0	6	2	4	6	5	0	0	15	0
0	0	1	0	0	1	0	2	4	4	0	0	10	0
0	0	3	3	0	6	0	8	16	4	0	0	28	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	10	1	0	11	1	1	2	1	0	0	4	1
0	0	5	1	0	6	1	2	4	2	0	0	8	0
0	0	7	2	0	9	0	3	1	1	0	0	5	0
0	0	5	1	0	6	0	0	5	1	0	0	6	0
2	0	10	4	0	16	0	1	10	0	0	0	11	0
1	0	16	0	0	17	0	1	3	0	0	0	4	0
1	0	6	0	0	7	0	6	1	1	0	0	8	0
1	0	2	4	0	7	0	2	3	1	0	0	6	0
0	0	2	4	0	6	0	2	1	1	0	0	4	0
1	0	2	0	0	3	0	1	0	0	0	0	1	0
0	0	5	0	0	5	0	3	1	1	0	0	5	0
2	0	6	3	0	11	0	0	4	1	0	0	5	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	12	1	0	16	3	1	1	0	0	0	2	0
3	0	12	0	0	15	0	0	2	2	0	0	4	0
1	0	10	3	0	14	0	2	2	3	0	0	7	0
1	0	12	2	0	15	2	1	3	2	0	0	6	0
1	0	6	4	0	11	0	1	1	0	0	0	2	0
1	0	9	6	0	16	0	0	2	3	0	0	5	0
0	0	11	2	0	13	0	0	7	0	0	0	7	0
5	0	9	4	0	18	0	2	4	1	0	0	7	0
1	0	5	3	0	9	0	1	2	4	0	0	7	0
0	0	7	3	0	10	0	5	12	1	0	0	18	0
0	0	13	2	0	15	0	5	10	2	0	0	17	0
2	0	10	0	0	12	0	4	7	3	0	0	14	1
32	0	267	65	0	364	10	82	228	83	0	0	393	9
51	0	427	104	0	582	16	131	364	133	0	0	628	14

Hourly Factor: 1.689

Monthly Factor: 0.95

Combined Factor: 1.60

PEDESTRIAN & BICYCLE SUMMARY

Municipality: Shaker Heights

Date: 11/26/2017

Day: Sunday

Weather: Clear

Intersection: Shaker Blvd EB/Warrensville Center Rd/Falmouth Rd/Fayette Rd

Data Entry By: JJO

TIME BEGINS	Warrensville Center Rd.		Warrensville Center Rd.		Falmouth Rd.		Shaker Blvd.		Fayette Rd.	
	Crosswalk across Warrensville Center N.		Crosswalk across Warrensville Center S.		Crosswalk across Falmouth		Crosswalk across Shaker		Fayette Rd. Crosswalk	
	PEDESTRIANS	BICYCLES	PEDESTRIANS	BICYCLES	PEDESTRIANS	BICYCLES	PEDESTRIANS	BICYCLES	PEDESTRIANS	BICYCLES
7:00 AM	4	1	40	1	1	0	3	0	1	0
8:00 AM	8	2	8	1	5	0			2	0
9:00 AM	3	0	2	0	4	0			1	0
11:00 AM	4	1	3	1					2	2
12:00 PM	4	0							1	0
1:00 PM	6	0	2	2	1	0				
3:00 PM	10	0	22	2						
4:00 PM	8	0	17	3	4	1			1	1
5:00 PM	9	1	6	1						
TOTALS	56	5	100	11	15	1	3	0	8	3

9-Hour Traffic Count Summary

Municipality: Shaker Heights
 Date: 11/14/2017
 Day: Tuesday
 Weather: Snow

Intersection: Shaker Blvd WB/Warrensville Center Rd/South Park Blvd/Chesterton Rd/Claythorne Rd

From	South Park Blvd Eastbound						Shaker Blvd Westbound								Warrensville Center Northbound						
To	Warrensville Center Rd. NB	Claythorne Rd.	Warrensville Center Rd. SB	Shaker Blvd WB	Total	Trk/Bus	Warrensville Center Rd. SB	Shaker Blvd WB	South Park Blvd. WB	Warrensville Center Rd. NB	Claythorne Rd.	Total	Trk/Bus	Shaker Blvd WB	South Park Blvd. WB	Warrensville Center Rd. NB	Claythorne Rd.	Total	Trk/Bus		
Start Time																					
07:00 AM	0	1	8	0	9	0	8	87	50	2	1	148	0	6	15	98	5	124	3		
07:15 AM	0	8	17	1	26	0	15	121	87	5	0	228	1	7	17	97	14	135	5		
07:30 AM	0	6	25	1	32	1	19	125	90	3	0	237	1	3	16	133	20	172	10		
07:45 AM	3	13	37	0	53	3	35	114	64	10	2	225	4	7	19	161	22	209	10		
08:00 AM	1	5	22	1	29	3	23	140	58	10	0	231	1	9	13	131	9	162	9		
08:15 AM	1	2	15	0	18	2	25	146	50	10	1	232	5	9	10	132	6	157	9		
08:30 AM	3	1	10	1	15	0	25	114	51	7	0	197	5	7	9	142	8	166	6		
08:45 AM	2	0	3	1	6	1	22	104	32	13	1	172	7	6	14	149	10	179	2		
09:00 AM	5	0	8	0	13	0	23	74	32	9	0	138	6	7	6	139	5	157	5		
09:15 AM	1	1	3	0	5	0	18	72	39	6	3	138	3	3	8	142	2	155	8		
09:30 AM	0	1	10	0	11	1	19	49	32	6	0	106	2	4	8	111	3	126	6		
09:45 AM	0	0	1	1	2	0	14	51	19	11	0	95	0	7	6	131	2	146	7		
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
11:00 AM	3	1	11	0	15	0	13	32	28	2	1	76	2	4	4	125	3	136	5		
11:15 AM	1	1	11	0	13	0	12	34	23	8	0	77	1	3	7	124	3	137	5		
11:30 AM	0	0	9	0	9	1	13	41	27	11	0	92	0	5	6	119	1	131	9		
11:45 AM	0	1	6	0	7	1	10	40	25	9	1	85	0	2	7	122	0	131	3		
12:00 PM	0	1	5	1	7	1	11	39	27	12	2	91	1	4	9	136	8	157	8		
12:15 PM	2	2	8	2	14	0	14	39	17	9	1	80	0	11	4	134	3	152	6		
12:30 PM	0	3	11	0	14	0	19	39	24	5	0	87	1	5	12	125	3	145	4		
12:45 PM	1	2	4	0	7	0	15	40	15	10	0	80	1	6	8	109	4	127	3		
01:00 PM	2	1	6	0	9	0	15	30	17	6	1	69	4	3	3	104	4	114	3		
01:15 PM	0	2	4	0	6	1	12	42	21	12	2	89	1	2	8	165	2	177	7		
01:30 PM	0	0	8	0	8	1	7	41	15	14	0	77	2	2	9	123	4	138	4		
01:45 PM	1	1	12	0	14	0	14	37	15	7	0	73	6	3	5	137	1	146	2		
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
03:00 PM	2	2	13	2	19	2	14	55	44	9	5	127	2	2	8	150	6	166	6		
03:15 PM	3	4	38	0	45	2	26	51	37	16	0	130	3	4	10	162	9	185	2		
03:30 PM	6	4	44	0	54	1	20	62	36	14	2	134	4	5	7	172	17	201	5		
03:45 PM	2	1	17	3	23	0	30	66	27	13	0	136	4	7	6	172	18	203	6		
04:00 PM	2	1	29	0	32	1	23	53	33	15	2	126	2	1	7	175	16	199	3		
04:15 PM	4	5	21	0	30	1	30	62	44	13	2	151	3	5	4	203	10	222	7		
04:30 PM	3	7	21	1	32	1	21	50	28	11	1	111	2	5	9	192	14	220	2		
04:45 PM	2	2	18	0	22	0	32	65	24	8	0	129	1	5	11	194	10	220	2		
05:00 PM	3	3	26	3	35	0	32	65	39	14	0	150	0	2	6	200	11	219	5		
05:15 PM	1	2	24	0	27	0	17	78	49	23	1	168	0	11	4	218	12	245	1		
05:30 PM	2	1	27	1	31	0	19	65	46	14	0	144	0	5	9	206	8	228	5		
05:45 PM	4	1	22	0	27	0	24	73	48	17	2	164	1	9	10	207	12	238	2		
Totals	60	86	554	19	719	24	689	2396	1313	364	31	4793	76	186	314	5340	285	6125	185		
ADT	96	137	885	30	1148	38	1101	3828	2098	582	50	7659	121	297	502	8532	455	9786	296		

Hourly Factor: 1.689

Monthly Factor: 0.95

Combined Factor: 1.60

9-Hour Traffic Count Summary

Municipality: Shaker Heights
 Date: 11/14/2017
 Day: Tuesday
 Weather: Snow

Intersection: Shaker Blvd WB/Warrensville Center Rd/South Park Blvd/Chesterton Rd/Claythorne Rd

Warrensville Center Southbound						Claythorne Blvd					
Warrensville Center Rd. SB	Shaker Blvd WB	South Park Blvd. WB	Claythorne Rd.	Total	Trk/ Bus	Warrensville Center Rd. SB	Shaker Blvd WB	South Park Blvd. WB	Warrensville Center Rd. NB	Total	Trk/ Bus
123	10	0	0	133	4	5	3	1	1	10	0
146	11	1	0	158	4	19	15	6	0	40	2
164	8	0	0	172	3	14	13	12	1	40	12
158	7	0	0	165	2	41	24	15	2	82	2
149	8	0	0	157	3	25	8	13	3	49	1
179	7	2	0	188	6	9	1	0	0	10	0
197	13	1	0	211	3	7	6	1	0	14	0
153	7	1	0	161	8	5	2	0	3	10	1
154	6	1	0	161	5	5	2	1	1	9	0
119	7	1	0	127	5	2	1	0	0	3	0
132	4	1	0	137	5	1	2	2	1	6	0
132	4	0	0	136	3	5	2	1	1	9	1
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
125	3	3	1	132	5	4	2	1	1	8	2
149	3	1	0	153	5	5	0	0	1	6	0
118	3	3	0	124	4	5	1	3	1	10	1
148	8	1	0	157	7	1	2	1	1	5	0
152	3	1	0	156	2	2	0	0	1	3	0
161	8	1	1	171	3	5	1	1	0	7	1
145	5	1	0	151	6	2	0	0	1	3	0
152	4	2	0	158	7	2	1	0	0	3	0
140	8	1	0	149	4	6	0	1	1	8	0
140	6	3	0	149	4	0	0	0	0	0	0
146	13	0	0	159	8	1	1	0	0	2	0
169	5	3	0	177	7	2	1	1	1	5	1
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
150	10	1	0	161	3	16	1	5	2	24	0
171	1	1	0	173	7	32	9	14	6	61	6
199	5	0	0	204	2	14	3	2	4	23	1
184	13	1	0	198	12	8	1	2	1	12	1
199	7	1	0	207	1	14	5	1	3	23	1
170	7	4	0	181	4	8	3	0	1	12	0
202	8	1	0	211	8	10	1	0	1	12	0
177	5	2	0	184	4	3	1	1	0	5	1
212	10	3	2	227	1	12	2	0	1	15	0
211	9	1	0	221	3	8	2	0	1	11	1
203	10	0	0	213	4	6	7	0	2	15	0
140	7	4	0	151	1	4	2	1	4	11	0
5769	253	47	4	6073	163	308	125	86	47	566	35
9218	404	75	6	9703	260	492	200	137	75	904	56

Hourly Factor: 1.689

Monthly Factor: 0.95

Combined Factor: 1.60

PEDESTRIAN & BICYCLE SUMMARY

Municipality: Shaker Heights
Date: 11/26/2017
Day: Sunday
Weather: Clear

Intersection: Shaker Blvd WB/Warrensville Center Rd/South Park Blvd/Chesterton Rd/Claythorne Rd
Data Entry By: JJO

TIME BEGINS	Warrensville Center Rd.		Warrensville Center Rd.		Claythorne Rd.		Shaker Blvd.	
	Crosswalk across Warrensville Center N.		Crosswalk across Shaker/S.Park/Chesterton		Crosswalk across Claythorne Rd.		Crosswalk across Shaker	
	PEDESTRIANS	BICYCLES	PEDESTRIANS	BICYCLES	PEDESTRIANS	BICYCLES	PEDESTRIANS	BICYCLES
7:00 AM	3	0	3	1			1	0
8:00 AM	2	0	5	2			4	0
9:00 AM	3	0	1	0			3	0
11:00 AM	2	0					8	0
12:00 PM	3	0	3	0	1	0	5	0
1:00 PM	3	0					7	0
3:00 PM	8	1	5	0			3	0
4:00 PM	5	0	2	1			8	0
5:00 PM	3	0	4	0	1	1	8	0
TOTALS	32	1	23	4	2	1	47	0

APPENDIX B: SIGNAL WARRANT ANALYSIS

APPENDIX B: SIGNAL WARRANT ANALYSIS

		ADJUSTED HOURLY VOLUMES			WARRANT #1A				WARRANT #1B			
CONDITION	NO. LANE	MAJOR ST. 2-WAY	MINOR ST. 1-WAY	MINOR ST. 1-WAY	100%		80%		100%		80%	
					MAJ	MIN	MAJ	MIN	MAJ	MIN	MAJ	MIN
* NORM	1	X	X	X	500	150	400	120	750	75	600	60
	2+				600	200	480	160	900	100	720	80
	1	X	X	X	350	105	280	84	525	53	420	42
* 70%	2+				420	140	336	112	630	70	504	56
12:00 AM												
1:00 AM												
2:00 AM												
3:00 AM												
4:00 AM												
5:00 AM												
6:00 AM												
7:00 AM		815	71	66	X		X		X		X	X
8:00 AM		943	64	108	X		X		X	X	X	X
9:00 AM		863	56	72	X		X		X		X	X
10:00 AM												
11:00 AM		918	39	64	X		X		X		X	X
12:00 PM		941	35	70	X		X		X		X	X
1:00 PM		983	35	60	X		X		X		X	X
2:00 PM												
3:00 PM		1101	69	138	X		X	X	X	X	X	X
4:00 PM		1224	55	126	X		X	X	X	X	X	X
5:00 PM		1190	48	149	X		X	X	X	X	X	X
6:00 PM												
7:00 PM												
8:00 PM												
9:00 PM												
10:00 PM												
11:00 PM												
HOURS MET					<8		<8		<8		9	
WARRANT SATISFIED?					NO		NO		NO		YES	

Warrants numbered 1A and 1B are each met at the 80% level: YES - NO

* CONDITION IS DETERMINED BY ENVIRONMENT: USE 70% VALUES IF 85 PERCENTILE SPEED EXCEEDS 40MPH ON THE MAJOR APPROACH OR IF LOCATION IS IN THE BUILT-UP AREA OF AN ISOLATED COMMUNITY WITH A POPULATION OF LESS THAN 10,000.

** MAY BE USED IF PEDESTRIAN SPEED IS LESS THAN 4 FT/SEC

WARRANT #5 (SCHOOL CROSSING) - NOT EVALUATED

On approved school route? YES - NO

Gap analysis made during period from _____ to _____

Number of vehicles during analysis period:

Pedestrian crossing time (1):

Number of gaps greater than (1) during period:

Approximate vehicular speed:

Number of children crossing during period:

Warrant Satisfied? YES - NO

WARRANT #6 (COORDINATED SIGNAL SYSTEM) - NOT EVALUATED

Major street is: 1 WAY - 2 WAY

Distance to nearest signal in each direction on major street: _____ and _____

Time space diagram (attached) shows that this location can be implemented into a system: YES - NO

Warrant Satisfied? YES - NO

WARRANT #7 (CRASH HAZARD)

Adequate trial of less restrictive measures: NOT EVALUATED

Number of accidents per year of a type which could be prevented by signalization: 2

80% of warrant #1 and #2 satisfied: YES NO

Will signalization disrupt progressive movement? YES NO

Warrant Satisfied? YES NO

WARRANT #8 (ROADWAY NETWORK) - NOT EVALUATED

Both streets are considered major routes: YES - NO

At least 800 VPH during weekday peak hour: YES - NO

At least 800 VPH for any 5 hrs. on a Saturday or Sunday: YES - NO

Warrant Satisfied? YES - NO

INTERSECTION: _____ Chagrin Blvd AND _____ Lynnfield Rd

LOCATED IN CITY/VILLAGE/RURAL: _____ City of Shaker Heights

NO. OF LANES PER APPROACH: N: _____ 1 S: _____ 1 E: _____ 1 W: _____ 1

PRESENTLY SIGNALIZED? _____ NO DOES 70% WARRANT APPLY? _____ NO

MAINTAINING AGENCY: _____ City of Shaker Heights

CO. CUY RTE. 422 SECT. _____

CONSULTANT: HNTB

CALC. BY: TYF CHCKD BY: RAW

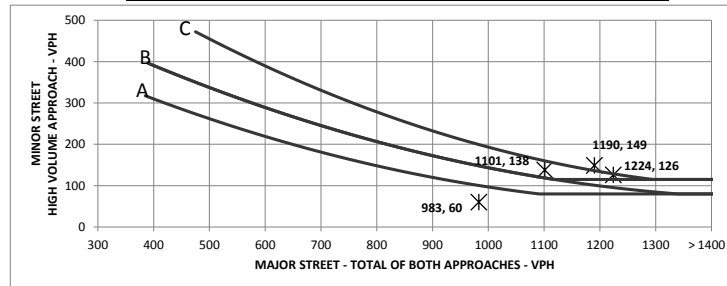
INTERSECTION: <u>Chagrin Blvd</u> AND <u>Lynnfield Rd</u>		CO. <u>CUY</u> RTE. <u>422</u> SECT. <u></u>
LOCATED IN CITY/VILLAGE/RURAL: <u>City of Shaker Heights</u>		CONSULTANT: <u>HNTB</u>
NO. OF LANES PER APPROACH: N: <u>1</u> S: <u>1</u> E: <u>1</u> W: <u>1</u>		CALC BY: <u>TVF</u> CHCKD BY: <u>RAW</u>
PRESENTLY SIGNALIZED? <u>NO</u> DOES 70% WARRANT APPLY? <u>NO</u>		
MAINTAINING AGENCY: <u>City of Shaker Heights</u>		

WARRANT #2 FOUR HOUR VOLUME

☒
☐
☐

A= 1 LANE & 1 LANE
 B= 2 OR MORE LANES & 1 LANE
 C= 2 OR MORE LANES & 2 OR MORE LANES

WARRANT SATISFIED?	NO
--------------------	----



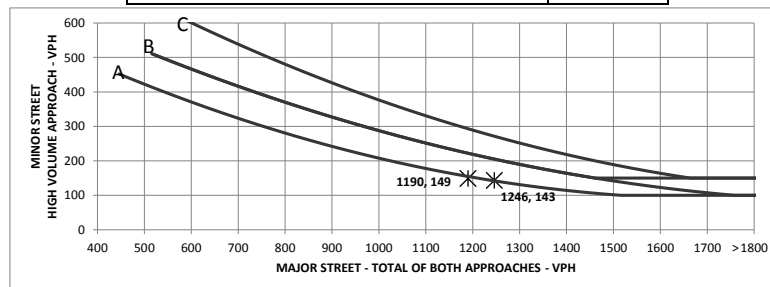
* NOTE: 115 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES.
 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH ONE LANE.

WARRANT #3 PEAK HOUR VOLUME

☒
☐
☐

A= 1 LANE & 1 LANE
 B= 2 OR MORE LANES & 1 LANE
 C= 2 OR MORE LANES & 2 OR MORE LANES

WARRANT SATISFIED?	YES
--------------------	-----

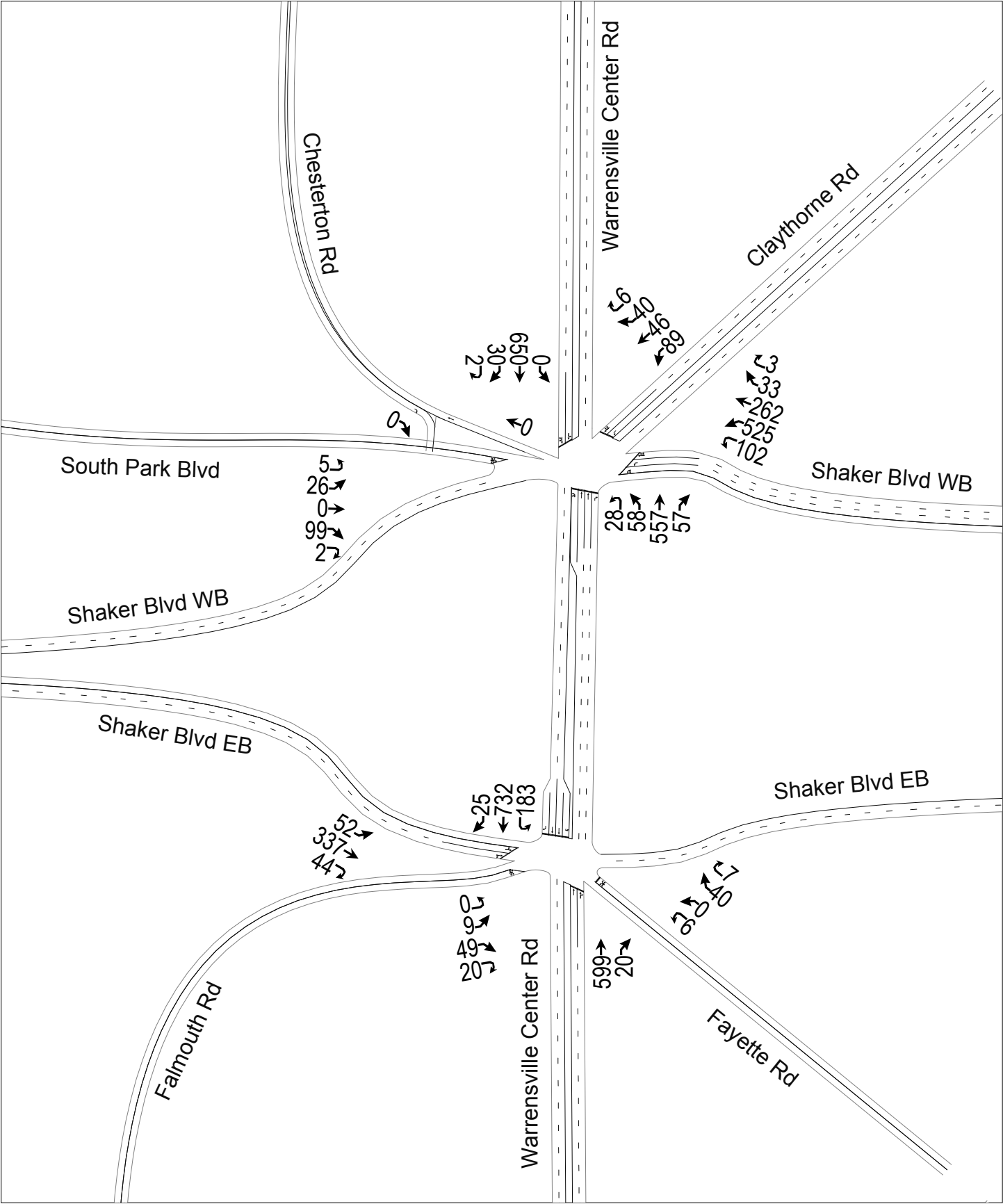


* NOTE: 115 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES.
 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH ONE LANE.

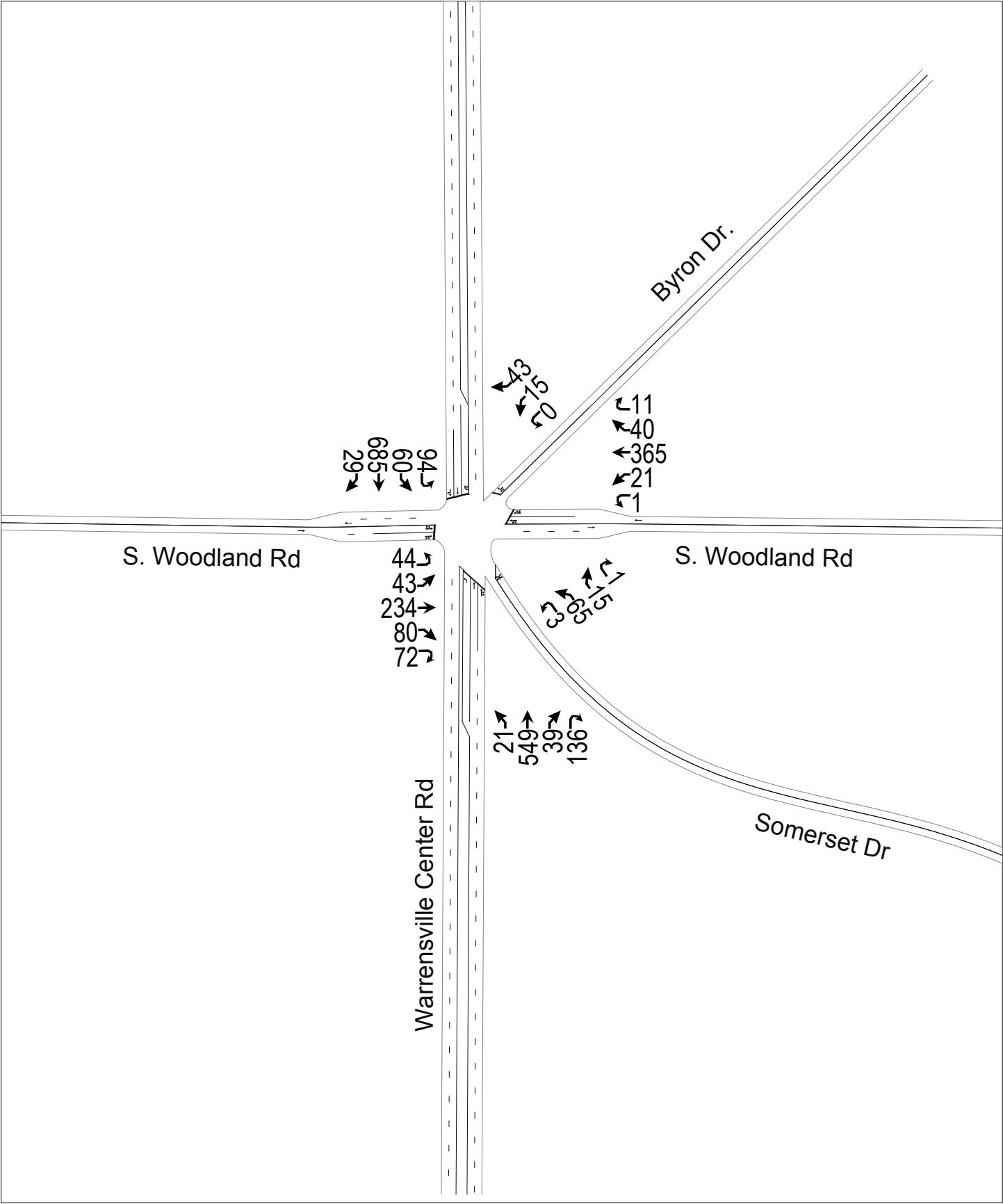
Peak hour occurs from 4:30 PM to 5:30 PM

APPENDIX C:
ADJUSTED PEAK HOUR VOLUMES

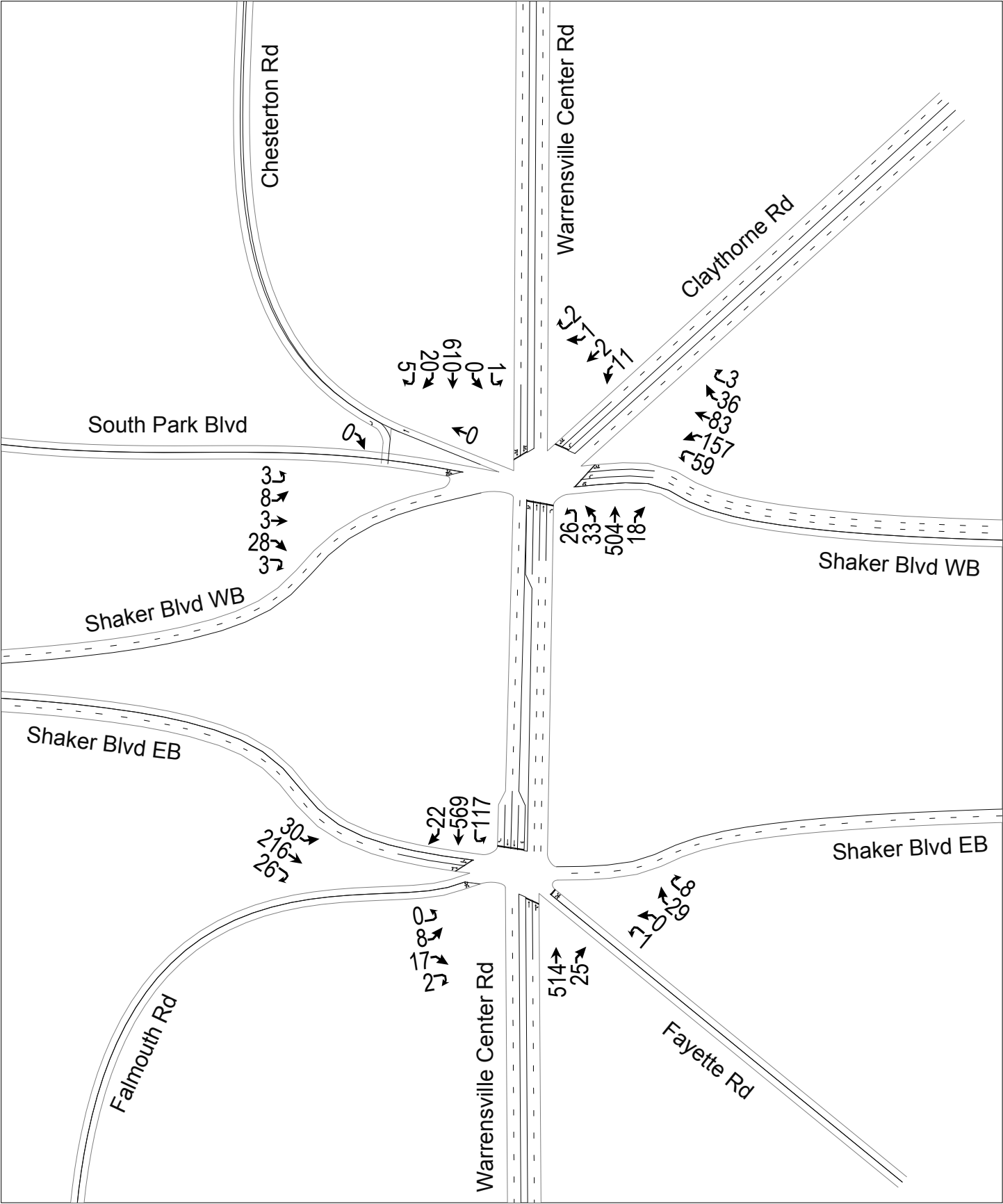
Existing (Balanced) AM Peak Hour Volumes



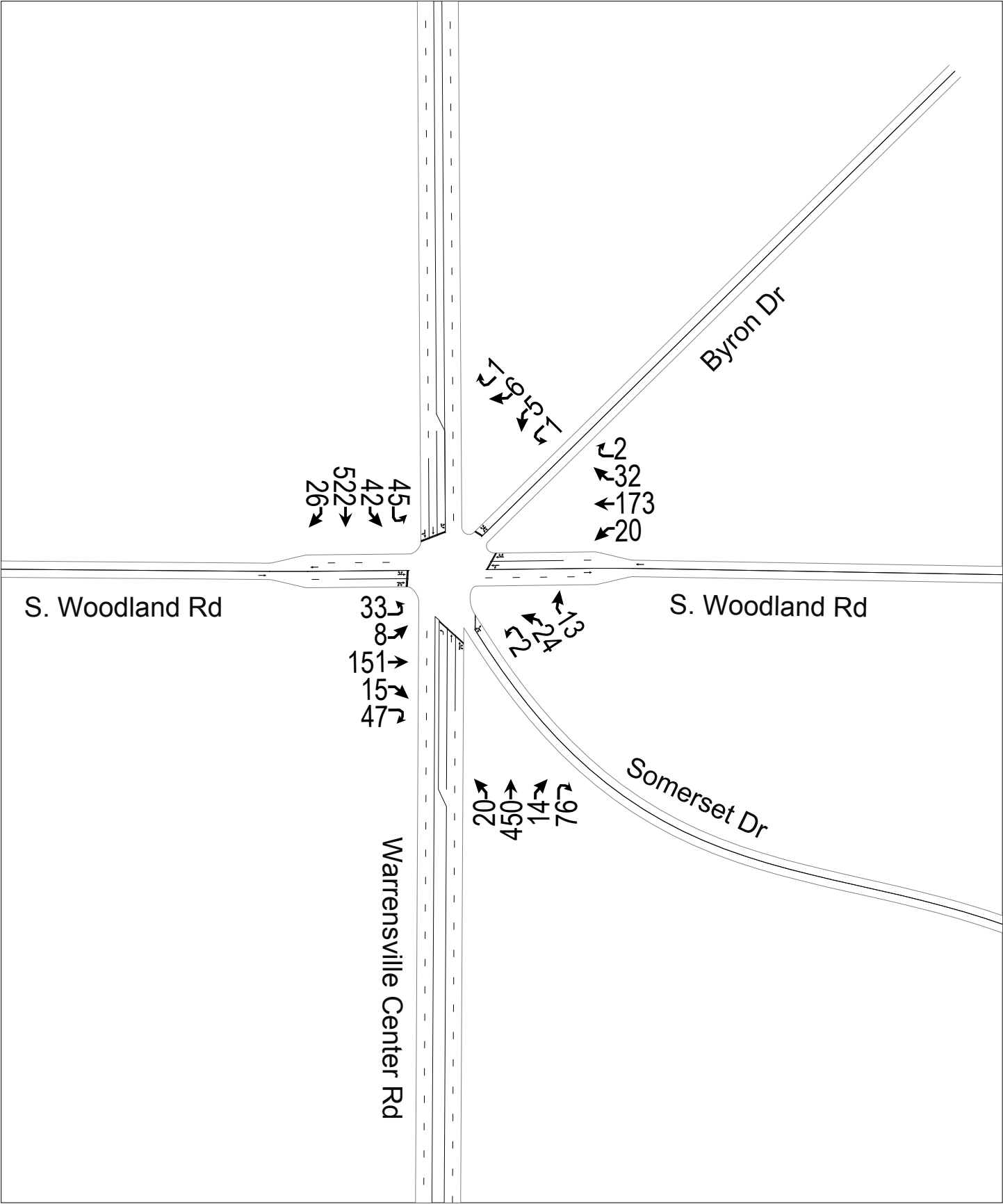
Existing (Balanced) AM Peak Hour Volumes



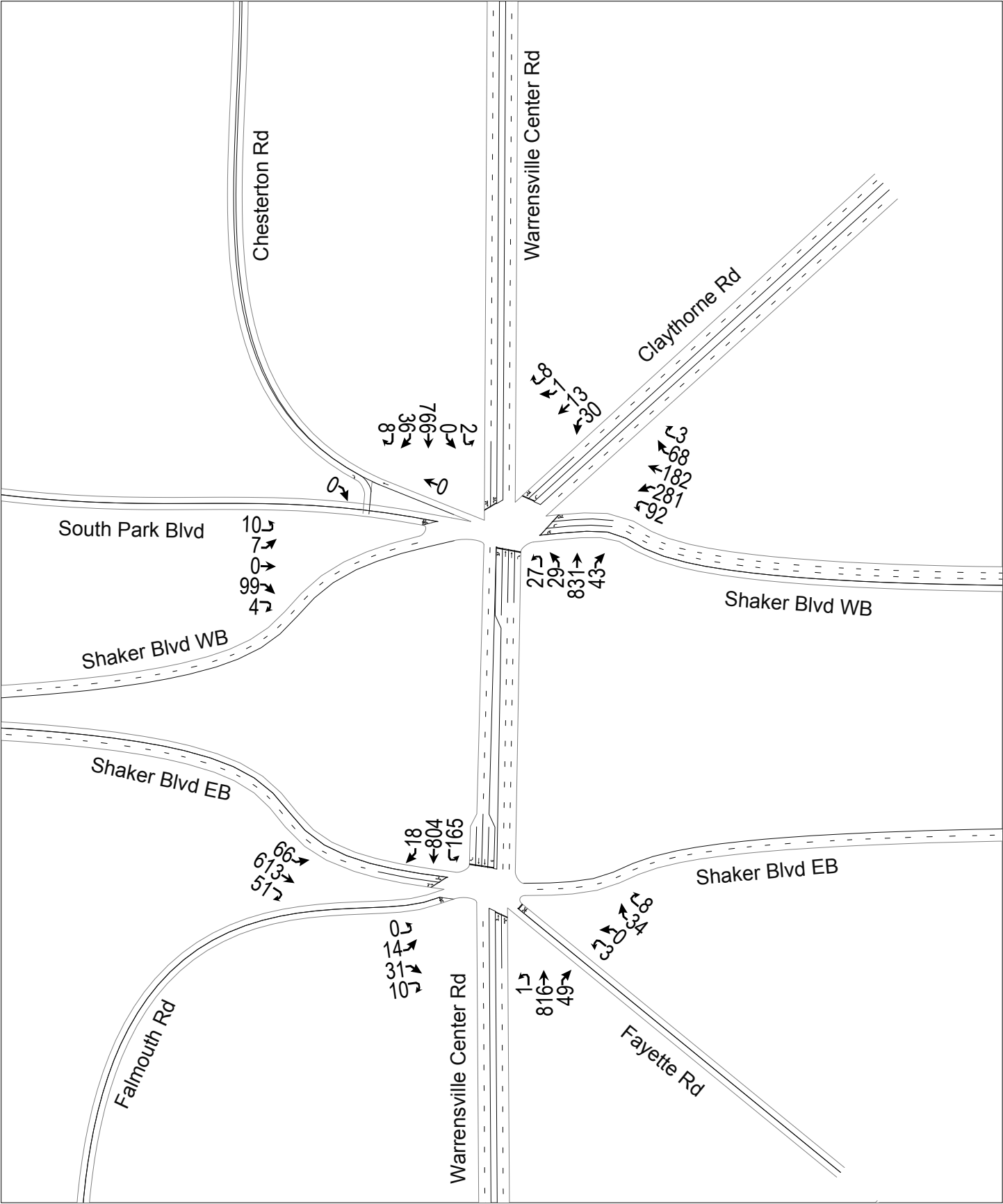
Existing (Balanced) Midday Peak Hour Volumes



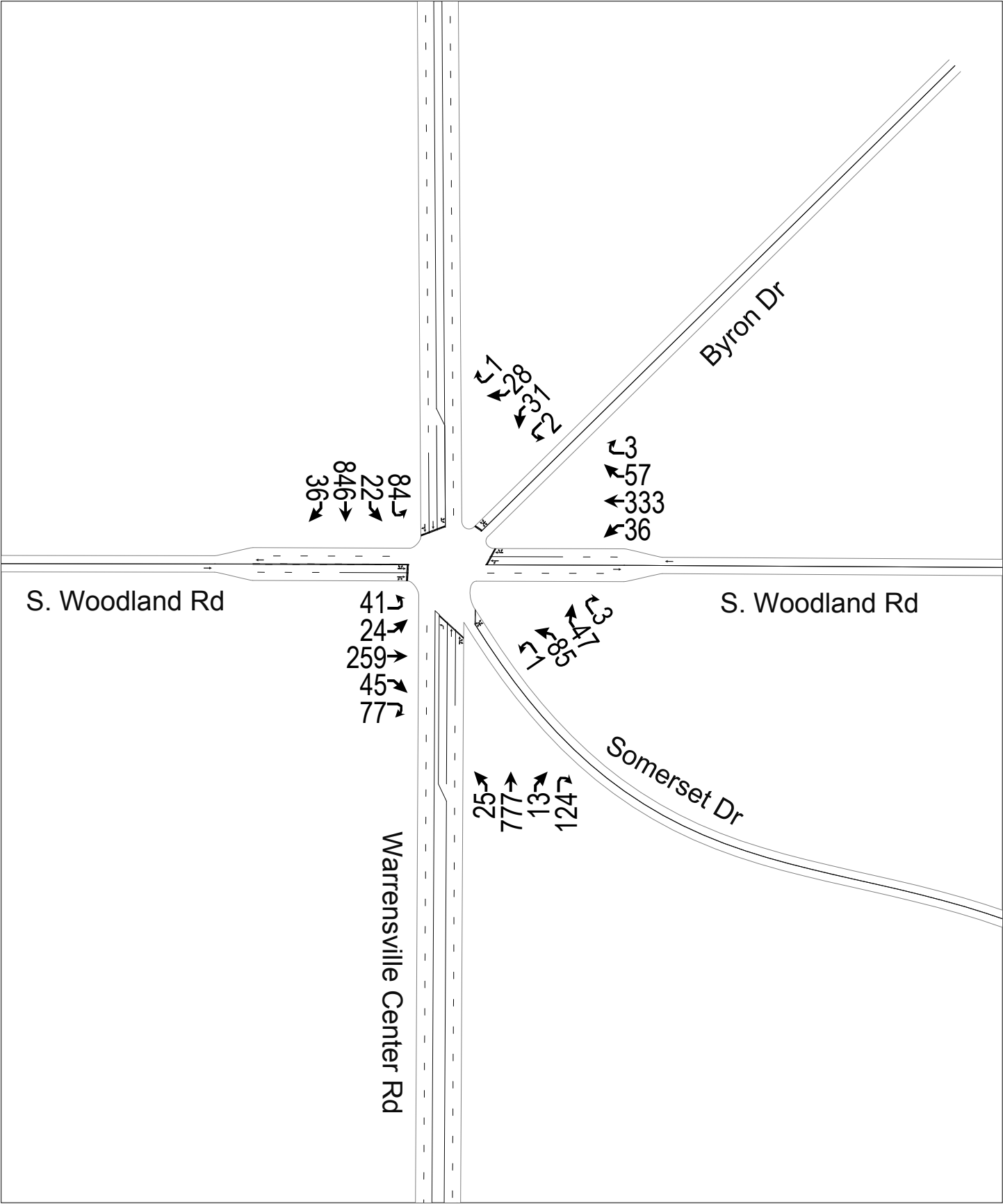
Existing (Balanced) Midday Peak Hour Volumes



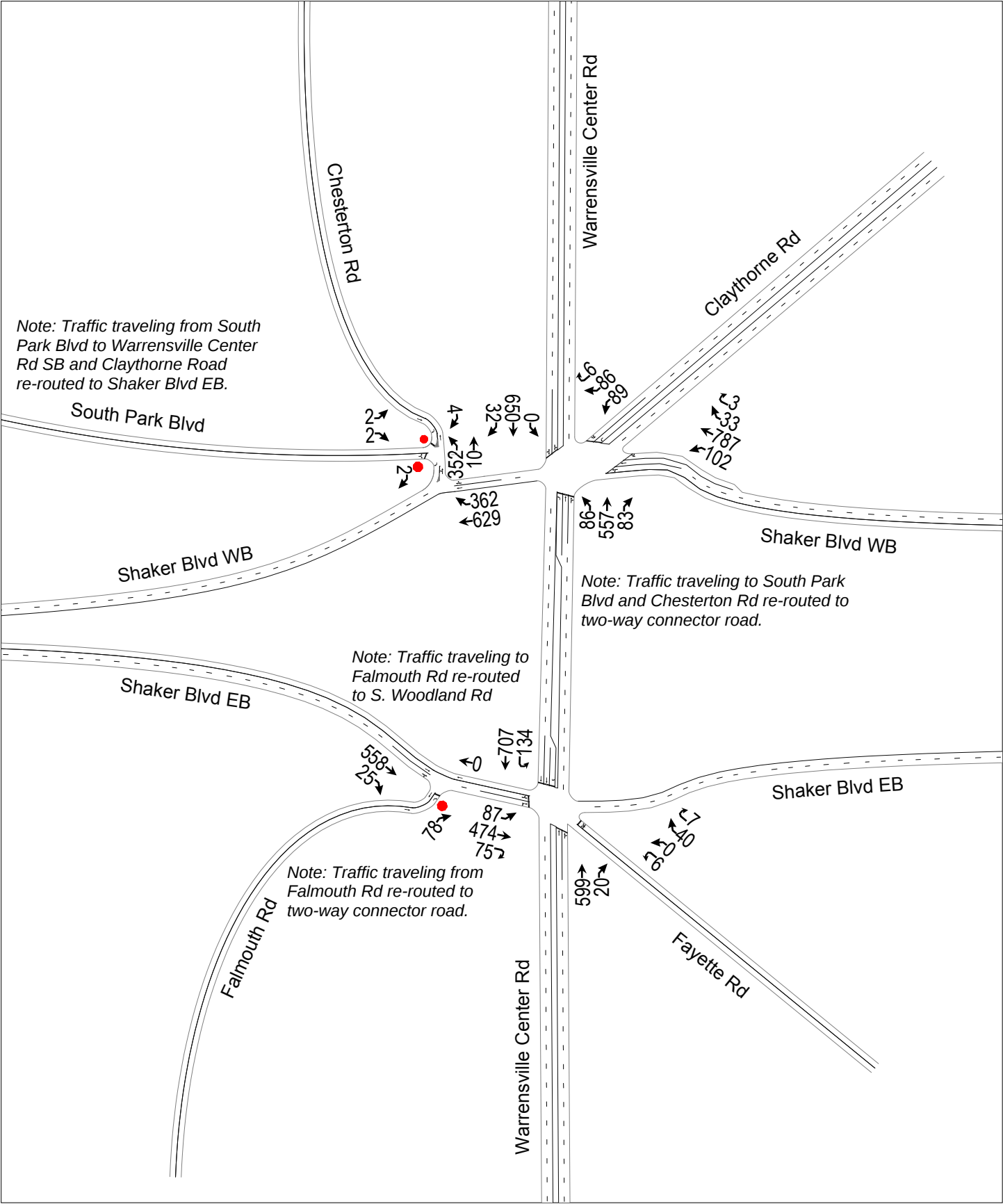
Existing (Balanced) PM Peak Hour Volumes



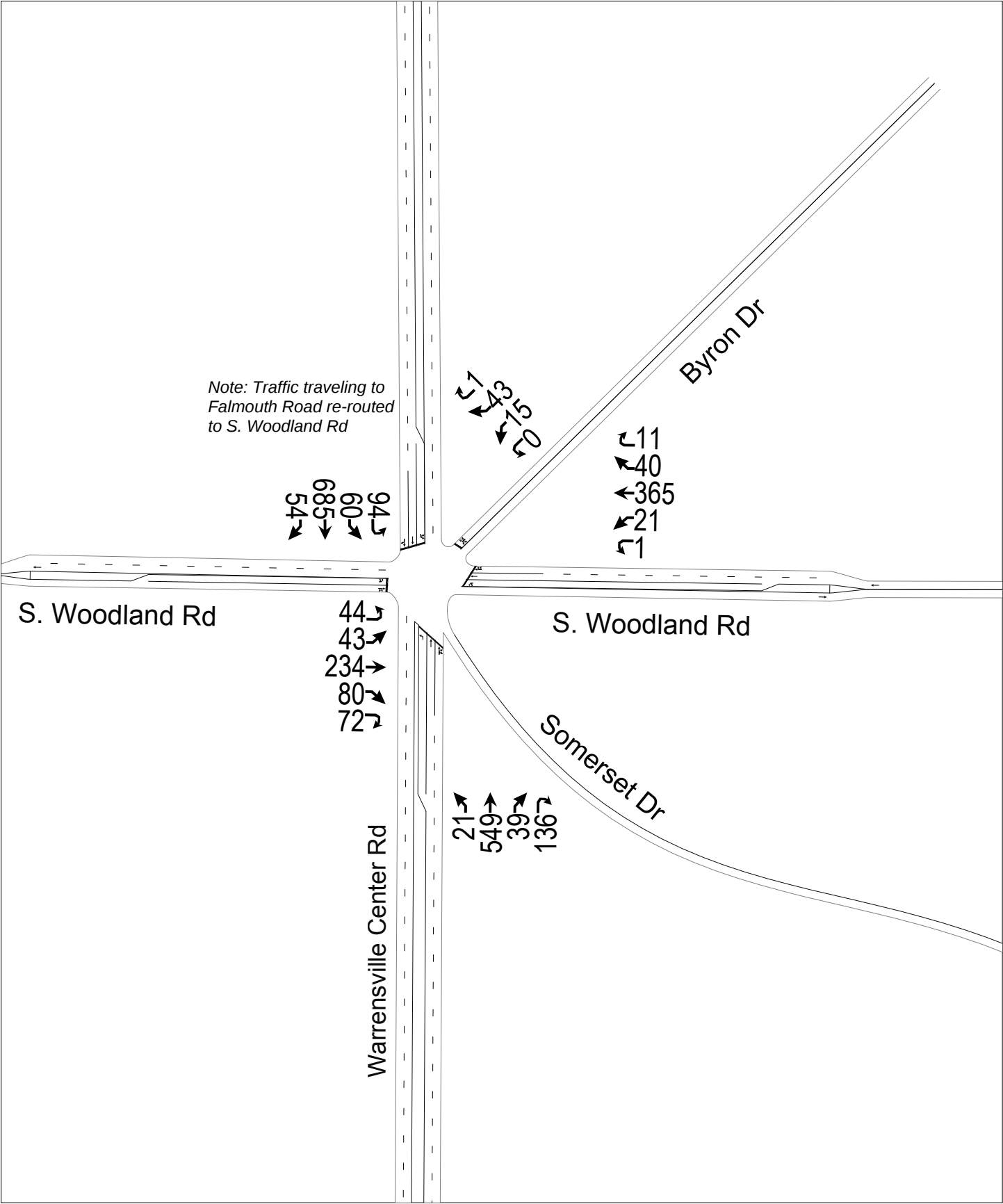
Existing (Balanced) PM Peak Hour Volumes



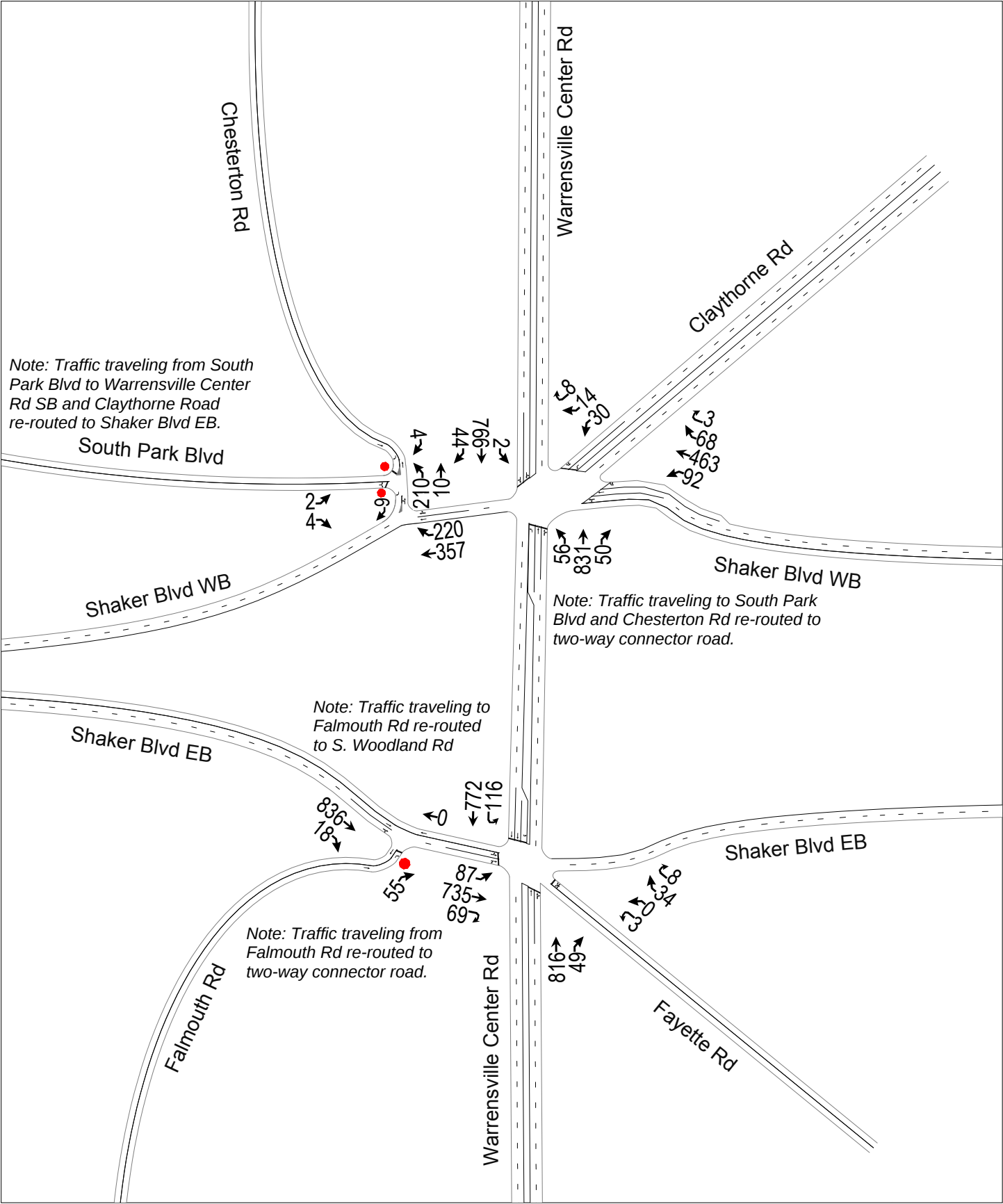
Re-Routed AM Peak Hour Volumes (Recommended Countermeasures)



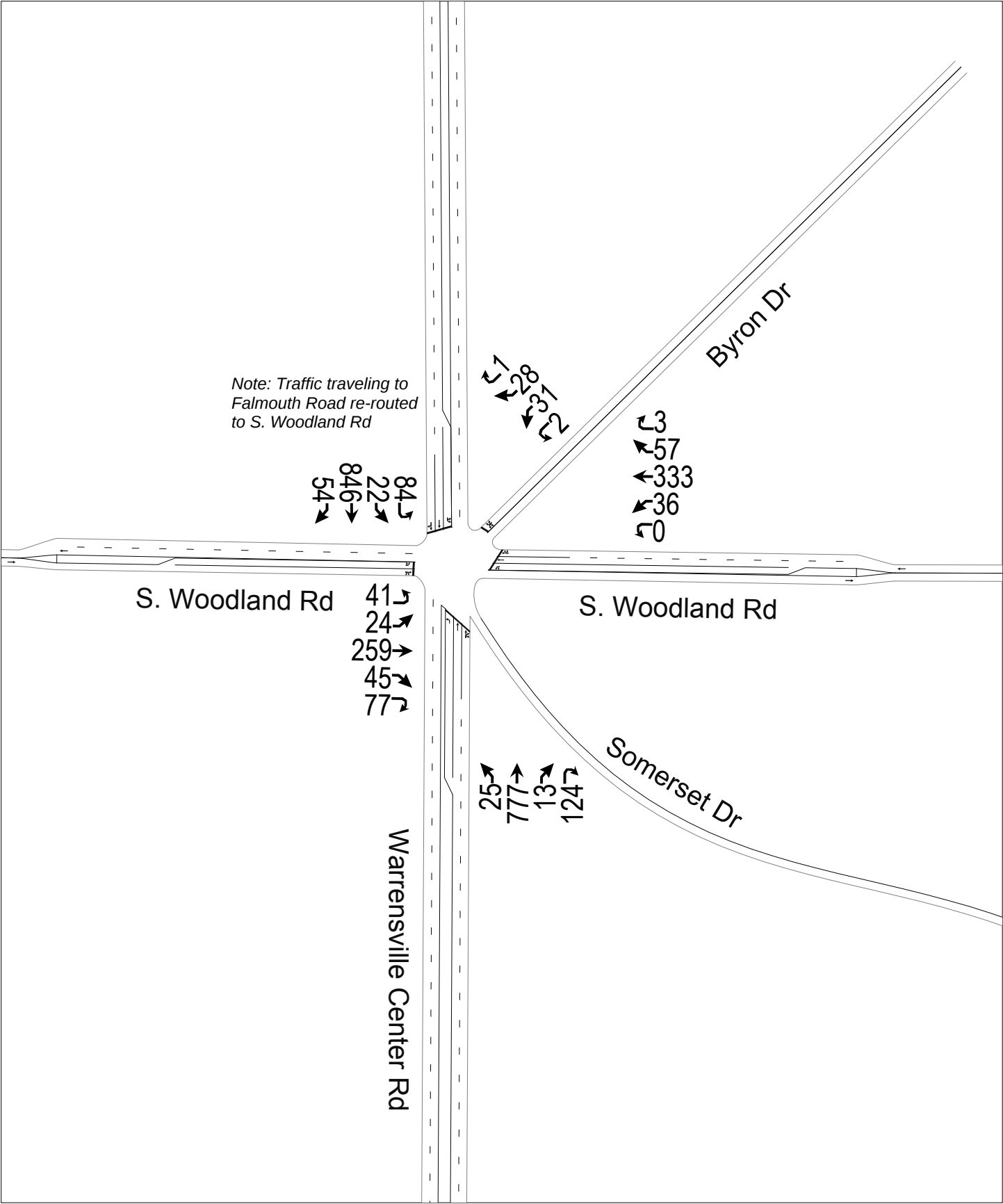
Re-Routed AM Peak Hour Volumes (Recommended Countermeasures)



Re-Routed PM Peak Hour Volumes (Recommended Countermeasures)



Re-Routed PM Peak Hour Volumes (Recommended Countermeasures)



APPENDIX D: SHORT-TERM OPTIMIZED CONDITION SYNCHRO RESULTS

Lanes, Volumes, Timings
14: Chesterton Rd

Short-Term Optimized Condition
Timing Plan: AM Peak (7:30)

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations		↗		↖		
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	0	1863	0	0
Flt Permitted						
Satd. Flow (perm)	0	1863	0	1863	0	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1299			268	63	
Travel Time (s)	29.5			6.1	1.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	0.0%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: AM Peak (7:30)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations												
Traffic Volume (vph)	5	26	0	99	2	102	525	262	33	3	28	58
Future Volume (vph)	5	26	0	99	2	102	525	262	33	3	28	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0		0			0		100			125
Storage Lanes		0		0			2		0			1
Taper Length (ft)		25					25					25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00
Frt			0.897					0.982				
Flt Protected			0.988				0.950					0.950
Satd. Flow (prot)	0	0	1599	0	0	0	3467	1843	0	0	0	1710
Flt Permitted			0.988				0.950					0.217
Satd. Flow (perm)	0	0	1599	0	0	0	3467	1843	0	0	0	390
Right Turn on Red	No											
Satd. Flow (RTOR)												
Link Speed (mph)			35					35				
Link Distance (ft)			2140					1892				
Travel Time (s)			41.7					36.9				
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	1%	8%	0%	4%	50%	1%	1%	1%	3%	1%	11%	3%
Adj. Flow (vph)	6	29	0	111	2	115	590	294	37	3	31	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	148	0	0	0	705	334	0	0	0	96
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)			0					24				
Link Offset(ft)			0					0				
Crosswalk Width(ft)			16					16				
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	9	15	25		9	9	15	15
Number of Detectors	1	1	1			1	1	1			1	1
Detector Template	Left	Left				Left					Left	
Leading Detector (ft)	20	20	40			20	40	40			20	50
Trailing Detector (ft)	0	0	0			0	0	0			0	0
Detector 1 Position(ft)	0	0	0			0	0	0			0	0
Detector 1 Size(ft)	20	20	40			20	40	40			20	50
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Turn Type	Split	Split	NA			Split	Split	NA			pm+pt	pm+pt
Protected Phases	7	7	7			3	3	3			1	1
Permitted Phases											2	2
Detector Phase	7	7	7			3	3	3			1	1
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0			6.0	6.0	6.0			6.0	6.0
Minimum Split (s)	11.0	11.0	11.0			30.0	30.0	30.0			9.0	9.0

Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: AM Peak (7:30)

									
Lane Group	NBT	NBR	SBT	SBR	SBR2	SWL	SWT	SWR	SWR2
Lane Configurations	↑↑	↑	↑↓			↖	↑		
Traffic Volume (vph)	557	57	650	30	2	89	46	40	6
Future Volume (vph)	557	57	650	30	2	89	46	40	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0		0		0		0	
Storage Lanes		1		0		1		0	
Taper Length (ft)						25			
Lane Util. Factor	0.95	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.850	0.993				0.925		
Flt Protected						0.950			
Satd. Flow (prot)	3406	1583	3516	0	0	1736	1563	0	0
Flt Permitted						0.950			
Satd. Flow (perm)	3406	1583	3516	0	0	1736	1563	0	0
Right Turn on Red									
Satd. Flow (RTOR)									
Link Speed (mph)	35		35				25		
Link Distance (ft)	683		2003				1013		
Travel Time (s)	13.3		39.0				27.6		
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	6%	2%	2%	1%	1%	4%	1%	25%	17%
Adj. Flow (vph)	626	64	730	34	2	100	52	45	7
Shared Lane Traffic (%)									
Lane Group Flow (vph)	626	64	766	0	0	100	104	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Right	Right
Median Width(ft)	12		12				24		
Link Offset(ft)	0		0				0		
Crosswalk Width(ft)	16		16				16		
Two way Left Turn Lane									
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9		9	9	15		9	9
Number of Detectors	0	0	0			1	1		
Detector Template									
Leading Detector (ft)	0	0	0			40	40		
Trailing Detector (ft)	0	0	0			0	0		
Detector 1 Position(ft)	0	0	0			0	0		
Detector 1 Size(ft)	6	20	6			40	40		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex		
Detector 1 Channel									
Detector 1 Extend (s)	0.0	0.0	0.0			0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0			0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0			0.0	0.0		
Turn Type	NA	Perm	NA			Split	NA		
Protected Phases	2		2			4	4		
Permitted Phases		2							
Detector Phase	2	2	2			4	4		
Switch Phase									
Minimum Initial (s)	22.0	22.0	22.0			8.0	8.0		
Minimum Split (s)	46.0	46.0	46.0			13.0	13.0		

Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: AM Peak (7:30)

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Total Split (s)	18.0	18.0	18.0			31.0	31.0	31.0			9.0	9.0
Total Split (%)	15.0%	15.0%	15.0%			25.8%	25.8%	25.8%			7.5%	7.5%
Maximum Green (s)	13.0	13.0	13.0			26.0	26.0	26.0			6.0	6.0
Yellow Time (s)	3.0	3.0	3.0			3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	2.0	2.0	2.0			2.0	2.0	2.0			0.0	0.0
Lost Time Adjust (s)			0.0				0.0	0.0				0.0
Total Lost Time (s)			5.0				5.0	5.0				3.0
Lead/Lag						Lead	Lead	Lead			Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0			3.0	3.0
Recall Mode	None	None	None			None	None	None			None	None
Walk Time (s)	0.0	0.0	0.0			7.0	7.0	7.0				
Flash Dont Walk (s)	0.0	0.0	0.0			15.0	15.0	15.0				
Pedestrian Calls (#/hr)	0	0	0			0	0	0				
Act Effect Green (s)			12.8				26.0	26.0				51.2
Actuated g/C Ratio			0.11				0.22	0.22				0.43
v/c Ratio			0.87				0.94	0.84				0.41
Control Delay			95.1				67.4	64.2				17.3
Queue Delay			0.0				0.0	0.0				0.0
Total Delay			95.1				67.4	64.2				17.3
LOS			F				E	E				B
Approach Delay			95.1					66.4				
Approach LOS			F					E				
90th %ile Green (s)	13.0	13.0	13.0			26.0	26.0	26.0			6.0	6.0
90th %ile Term Code	Max	Max	Max			Max	Max	Max			Max	Max
70th %ile Green (s)	13.0	13.0	13.0			26.0	26.0	26.0			6.0	6.0
70th %ile Term Code	Max	Max	Max			Max	Max	Max			Max	Max
50th %ile Green (s)	13.0	13.0	13.0			26.0	26.0	26.0			6.0	6.0
50th %ile Term Code	Max	Max	Max			Max	Max	Max			Max	Max
30th %ile Green (s)	13.0	13.0	13.0			26.0	26.0	26.0			6.0	6.0
30th %ile Term Code	Max	Max	Max			Max	Max	Max			Max	Max
10th %ile Green (s)	11.8	11.8	11.8			26.0	26.0	26.0			6.5	6.5
10th %ile Term Code	Gap	Gap	Gap			Max	Max	Max			Gap	Gap
Stops (vph)			117				571	267				32
Fuel Used(gal)			5				21	10				1
CO Emissions (g/hr)			383				1501	695				67
NOx Emissions (g/hr)			74				292	135				13
VOC Emissions (g/hr)			89				348	161				16
Dilemma Vehicles (#)			5				0	12				0
Queue Length 50th (ft)			115				278	249				9
Queue Length 95th (ft)			#231				#386	#394				m43
Internal Link Dist (ft)			2060					1812				
Turn Bay Length (ft)												125
Base Capacity (vph)			173				751	399				233
Starvation Cap Reductn			0				0	0				0
Spillback Cap Reductn			0				0	0				0
Storage Cap Reductn			0				0	0				0
Reduced v/c Ratio			0.86				0.94	0.84				0.41

Lanes, Volumes, Timings

101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: AM Peak (7:30)

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow, Master Intersection

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 46.7

Intersection LOS: D

Intersection Capacity Utilization 90.6%

ICU Level of Service E

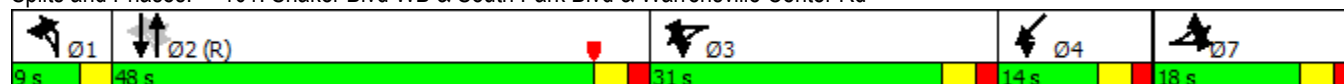
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 101: Shaker Blvd WB & South Park Blvd & Warrensville Center Rd



Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: AM Peak (7:30)

	↑	↗	↓	↘	↖	↙	↘	↖	↙
Lane Group	NBT	NBR	SBT	SBR	SBR2	SWL	SWT	SWR	SWR2
Total Split (s)	48.0	48.0	48.0			14.0	14.0		
Total Split (%)	40.0%	40.0%	40.0%			11.7%	11.7%		
Maximum Green (s)	43.0	43.0	43.0			9.0	9.0		
Yellow Time (s)	3.0	3.0	3.0			3.0	3.0		
All-Red Time (s)	2.0	2.0	2.0			2.0	2.0		
Lost Time Adjust (s)	0.0	0.0	0.0			0.0	0.0		
Total Lost Time (s)	5.0	5.0	5.0			5.0	5.0		
Lead/Lag	Lag	Lag	Lag			Lag	Lag		
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0		
Recall Mode	C-Max	C-Max	C-Max			None	None		
Walk Time (s)	5.0	5.0	5.0			0.0	0.0		
Flash Dont Walk (s)	36.0	36.0	36.0			0.0	0.0		
Pedestrian Calls (#/hr)	0	0	0			0	0		
Act Effect Green (s)	43.1	43.1	43.1			9.0	9.0		
Actuated g/C Ratio	0.36	0.36	0.36			0.08	0.08		
v/c Ratio	0.51	0.11	0.61			0.77	0.89		
Control Delay	8.9	5.9	34.0			89.8	112.9		
Queue Delay	0.0	0.0	0.0			0.0	0.0		
Total Delay	8.9	5.9	34.0			89.8	112.9		
LOS	A	A	C			F	F		
Approach Delay	9.7		34.0				101.6		
Approach LOS	A		C				F		
90th %ile Green (s)	43.0	43.0	43.0			9.0	9.0		
90th %ile Term Code	Coord	Coord	Coord			Max	Max		
70th %ile Green (s)	43.0	43.0	43.0			9.0	9.0		
70th %ile Term Code	Coord	Coord	Coord			Max	Max		
50th %ile Green (s)	43.0	43.0	43.0			9.0	9.0		
50th %ile Term Code	Coord	Coord	Coord			Max	Max		
30th %ile Green (s)	43.0	43.0	43.0			9.0	9.0		
30th %ile Term Code	Coord	Coord	Coord			Max	Max		
10th %ile Green (s)	43.7	43.7	43.7			9.0	9.0		
10th %ile Term Code	Coord	Coord	Coord			Max	Max		
Stops (vph)	144	8	544			78	79		
Fuel Used(gal)	5	0	19			3	3		
CO Emissions (g/hr)	338	29	1305			188	227		
NOx Emissions (g/hr)	66	6	254			37	44		
VOC Emissions (g/hr)	78	7	303			44	53		
Dilemma Vehicles (#)	10	0	28			0	0		
Queue Length 50th (ft)	32	6	254			77	81		
Queue Length 95th (ft)	39	m10	315			#167	#186		
Internal Link Dist (ft)	603		1923				933		
Turn Bay Length (ft)									
Base Capacity (vph)	1224	569	1263			130	117		
Starvation Cap Reductn	0	0	0			0	0		
Spillback Cap Reductn	0	0	0			0	0		
Storage Cap Reductn	0	0	0			0	0		
Reduced v/c Ratio	0.51	0.11	0.61			0.77	0.89		

Intersection Summary

Lanes, Volumes, Timings

102: Falmouth & Warrensville Center & Fayette & Shaker EB

Short-Term Optimized Condition

Timing Plan: AM Peak (7:30)

												
Lane Group	EBL	EBT	EBR2	NBT	NBR	SBL2	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations												
Traffic Volume (vph)	52	337	44	599	20	183	732	25	6	0	40	7
Future Volume (vph)	52	337	44	599	20	183	732	25	6	0	40	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0				0			75		0	0	
Storage Lanes	0				0			1		1	0	
Taper Length (ft)	25									25		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00
Frt		0.984		0.995				0.850		0.880		
Flt Protected		0.994				0.950				0.994		
Satd. Flow (prot)	0	3458	0	3453	0	1736	3539	1599	0	1633	0	0
Flt Permitted		0.994				0.238				0.994		
Satd. Flow (perm)	0	3458	0	3453	0	435	3539	1599	0	1633	0	0
Right Turn on Red												Yes
Satd. Flow (RTOR)										164		
Link Speed (mph)		35		35			35			25		
Link Distance (ft)		2145		1358			683			883		
Travel Time (s)		41.8		26.5			13.3			24.1		
Peak Hour Factor	0.92	0.92	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	3%	2%	2%	4%	5%	4%	2%	1%	1%	0%	2%	1%
Adj. Flow (vph)	57	366	52	705	24	215	861	29	7	0	47	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	475	0	729	0	215	861	29	0	62	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(ft)		0		12			18			12		
Link Offset(ft)		0		0			0			0		
Crosswalk Width(ft)		16		16			16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9		9	15		9	15	15	9	9
Number of Detectors	1	1		0		1	0	0	1	1		
Detector Template	Left								Left			
Leading Detector (ft)	20	50		0		60	0	0	20	50		
Trailing Detector (ft)	0	0		0		0	0	0	0	0		
Detector 1 Position(ft)	0	0		0		0	0	0	0	0		
Detector 1 Size(ft)	20	50		6		60	6	20	20	50		
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0		
Turn Type	Perm	NA		NA		pm+pt	NA	Perm	Prot	Prot		
Protected Phases		4		2		1	1 2		3	3		
Permitted Phases	4					1 2		1 2				
Detector Phase	4	4		2		1			3	3		
Switch Phase												
Minimum Initial (s)	6.0	6.0		21.0		6.0			6.0	6.0		
Minimum Split (s)	39.0	39.0		33.0		11.0			12.0	12.0		



Lane Group	NEL	NER	NER2
Lane Configurations			
Traffic Volume (vph)	9	49	20
Future Volume (vph)	9	49	20
Ideal Flow (vphpl)	1900	1900	1900
Storage Length (ft)	0	0	
Storage Lanes	1	0	
Taper Length (ft)	25		
Lane Util. Factor	1.00	1.00	1.00
Frt	0.881		
Flt Protected	0.994		
Satd. Flow (prot)	1586	0	0
Flt Permitted	0.994		
Satd. Flow (perm)	1586	0	0
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)	25		
Link Distance (ft)	1536		
Travel Time (s)	41.9		
Peak Hour Factor	0.85	0.85	0.85
Heavy Vehicles (%)	20%	2%	5%
Adj. Flow (vph)	11	58	24
Shared Lane Traffic (%)			
Lane Group Flow (vph)	93	0	0
Enter Blocked Intersection	No	No	No
Lane Alignment	Left	Right	Right
Median Width(ft)	12		
Link Offset(ft)	0		
Crosswalk Width(ft)	16		
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.00
Turning Speed (mph)	15	9	9
Number of Detectors	1		
Detector Template			
Leading Detector (ft)	40		
Trailing Detector (ft)	0		
Detector 1 Position(ft)	0		
Detector 1 Size(ft)	40		
Detector 1 Type	Cl+Ex		
Detector 1 Channel			
Detector 1 Extend (s)	0.0		
Detector 1 Queue (s)	0.0		
Detector 1 Delay (s)	0.0		
Turn Type	Prot		
Protected Phases	7		
Permitted Phases			
Detector Phase	7		
Switch Phase			
Minimum Initial (s)	6.0		
Minimum Split (s)	12.0		

Lanes, Volumes, Timings

Short-Term Optimized Condition

102: Falmouth & Warrensville Center & Fayette & Shaker EB Timing Plan: AM Peak (7:30)

												
Lane Group	EBL	EBT	EBR2	NBT	NBR	SBL2	SBT	SBR	NWL2	NWL	NWR	NWR2
Total Split (s)	39.0	39.0		36.0		19.0			12.0	12.0		
Total Split (%)	32.5%	32.5%		30.0%		15.8%			10.0%	10.0%		
Maximum Green (s)	34.0	34.0		29.0		15.0			7.0	7.0		
Yellow Time (s)	3.0	3.0		3.0		3.0			3.0	3.0		
All-Red Time (s)	2.0	2.0		4.0		1.0			2.0	2.0		
Lost Time Adjust (s)		0.0		0.0		0.0				0.0		
Total Lost Time (s)		5.0		7.0		4.0				5.0		
Lead/Lag	Lag	Lag		Lag		Lead			Lead	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0		3.0			3.0	3.0		
Recall Mode	None	None		C-Max		None			None	None		
Walk Time (s)	5.0	5.0		5.0					0.0	0.0		
Flash Dont Walk (s)	29.0	29.0		21.0					0.0	0.0		
Pedestrian Calls (#/hr)	0	0		0					0	0		
Act Effect Green (s)		22.0		41.2		58.3	62.3	62.3		6.0		
Actuated g/C Ratio		0.18		0.34		0.49	0.52	0.52		0.05		
v/c Ratio		0.75		0.61		0.59	0.47	0.03		0.26		
Control Delay		53.9		38.5		33.7	16.8	17.6		2.7		
Queue Delay		0.0		0.0		0.0	0.0	0.0		0.0		
Total Delay		53.9		38.5		33.7	16.8	17.6		2.7		
LOS		D		D		C	B	B		A		
Approach Delay		53.9		38.5			20.1			2.7		
Approach LOS		D		D			C			A		
90th %ile Green (s)	27.8	27.8		29.0		15.0			6.0	6.0		
90th %ile Term Code	Gap	Gap		Coord		Max			Min	Min		
70th %ile Green (s)	24.0	24.0		30.6		18.2			6.0	6.0		
70th %ile Term Code	Gap	Gap		Coord		Gap			Min	Min		
50th %ile Green (s)	21.9	21.9		37.1		15.5			6.0	6.0		
50th %ile Term Code	Gap	Gap		Coord		Gap			Min	Min		
30th %ile Green (s)	19.7	19.7		44.2		12.7			6.0	6.0		
30th %ile Term Code	Gap	Gap		Coord		Gap			Min	Min		
10th %ile Green (s)	16.5	16.5		65.3		8.7			0.0	0.0		
10th %ile Term Code	Gap	Gap		Coord		Gap			Skip	Skip		
Stops (vph)		398		502		114	306	11		0		
Fuel Used(gal)		14		15		3	8	0		0		
CO Emissions (g/hr)		1010		1029		211	588	21		30		
NOx Emissions (g/hr)		197		200		41	114	4		6		
VOC Emissions (g/hr)		234		238		49	136	5		7		
Dilemma Vehicles (#)		16		25		0	68	0		0		
Queue Length 50th (ft)		185		259		90	146	7		0		
Queue Length 95th (ft)		230		337		m156	m234	m17		0		
Internal Link Dist (ft)		2065		1278			603			803		
Turn Bay Length (ft)						75		75				
Base Capacity (vph)		979		1186		386	1836	829		249		
Starvation Cap Reductn		0		0		0	0	0		0		
Spillback Cap Reductn		0		0		0	0	0		0		
Storage Cap Reductn		0		0		0	0	0		0		
Reduced v/c Ratio		0.49		0.61		0.56	0.47	0.03		0.25		

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 106 (88%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 33.2

Intersection LOS: C

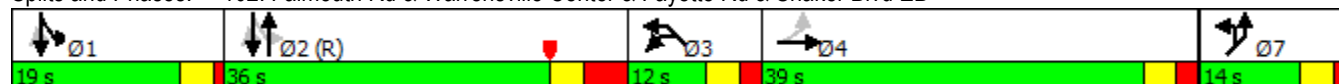
Intersection Capacity Utilization 71.5%

ICU Level of Service C

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 102: Falmouth Rd & Warrensville Center & Fayette Rd & Shaker Blvd EB





Lane Group	NEL	NER	NER2
Total Split (s)	14.0		
Total Split (%)	11.7%		
Maximum Green (s)	9.0		
Yellow Time (s)	3.0		
All-Red Time (s)	2.0		
Lost Time Adjust (s)	0.0		
Total Lost Time (s)	5.0		
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0		
Recall Mode	None		
Walk Time (s)	0.0		
Flash Dont Walk (s)	0.0		
Pedestrian Calls (#/hr)	0		
Act Effct Green (s)	13.0		
Actuated g/C Ratio	0.11		
v/c Ratio	0.54		
Control Delay	62.1		
Queue Delay	0.0		
Total Delay	62.1		
LOS	E		
Approach Delay	62.1		
Approach LOS	E		
90th %ile Green (s)	16.2		
90th %ile Term Code	Max		
70th %ile Green (s)	15.2		
70th %ile Term Code	Gap		
50th %ile Green (s)	13.5		
50th %ile Term Code	Gap		
30th %ile Green (s)	11.4		
30th %ile Term Code	Gap		
10th %ile Green (s)	8.5		
10th %ile Term Code	Gap		
Stops (vph)	73		
Fuel Used(gal)	2		
CO Emissions (g/hr)	162		
NOx Emissions (g/hr)	31		
VOC Emissions (g/hr)	37		
Dilemma Vehicles (#)	0		
Queue Length 50th (ft)	69		
Queue Length 95th (ft)	115		
Internal Link Dist (ft)	1456		
Turn Bay Length (ft)			
Base Capacity (vph)	172		
Starvation Cap Reductn	0		
Spillback Cap Reductn	0		
Storage Cap Reductn	0		
Reduced v/c Ratio	0.54		

Intersection Summary

Lanes, Volumes, Timings

103: Somerset & S. Woodland & Warrensville Center & Byron

Short-Term Optimized Condition

Timing Plan: AM Peak (7:30)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL	NBT
Lane Configurations												
Traffic Volume (vph)	44	43	234	80	72	1	21	365	40	11	21	549
Future Volume (vph)	44	43	234	80	72	1	21	365	40	11	21	549
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0		0			0		0		215	
Storage Lanes		0		0			0		0		1	
Taper Length (ft)		25					25				25	
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	1.00	0.95
Frt			0.952					0.983				0.964
Flt Protected			0.991					0.997			0.950	
Satd. Flow (prot)	0	0	3303	0	0	0	0	3405	0	0	1787	3282
Flt Permitted			0.661					0.907			0.195	
Satd. Flow (perm)	0	0	2203	0	0	0	0	3098	0	0	367	3282
Right Turn on Red				No							No	
Satd. Flow (RTOR)												
Link Speed (mph)			35					35				35
Link Distance (ft)			228					243				1089
Travel Time (s)			4.4					4.7				21.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	9%	3%	1%	3%	1%	5%	4%	1%	9%	1%	5%
Adj. Flow (vph)	48	47	254	87	78	1	23	397	43	12	23	597
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	514	0	0	0	0	476	0	0	23	787
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)			0					0				18
Link Offset(ft)			0					0				0
Crosswalk Width(ft)			16					16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	9	15	15		9	9	15	
Number of Detectors	1	1	1			1	1	1			1	0
Detector Template	Left	Left				Left	Left					
Leading Detector (ft)	20	20	50			20	20	50			70	0
Trailing Detector (ft)	0	0	0			0	0	0			0	0
Detector 1 Position(ft)	0	0	0			0	0	0			0	0
Detector 1 Size(ft)	20	20	50			20	20	50			70	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Turn Type	pm+pt	pm+pt	NA			pm+pt	pm+pt	NA			pm+pt	NA
Protected Phases	3	3	4			3	3	4			1	2
Permitted Phases	4	4				4	4				2	
Detector Phase	3	3	4			3	3	4			1	
Switch Phase												
Minimum Initial (s)	5.0	5.0	8.0			5.0	5.0	8.0			5.0	25.0
Minimum Split (s)	11.0	11.0	50.0			11.0	11.0	50.0			11.0	45.0

Lanes, Volumes, Timings

103: Somerset & S. Woodland & Warrensville Center & Byron

Short-Term Optimized Condition

Timing Plan: AM Peak (7:30)

												
Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	39	136	94	60	685	29	3	65	15	1	15	43
Future Volume (vph)	39	136	94	60	685	29	3	65	15	1	15	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			140		0		0	0		0	0
Storage Lanes	0			1		0		1	0		1	0
Taper Length (ft)				25				25			25	
Lane Util. Factor	0.95	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.994			0.975			0.899	
Flt Protected				0.950				0.961			0.987	
Satd. Flow (prot)	0	0	0	1780	3550	0	0	1735	0	0	1609	0
Flt Permitted				0.190				0.961			0.987	
Satd. Flow (perm)	0	0	0	356	3550	0	0	1735	0	0	1609	0
Right Turn on Red	No											
Satd. Flow (RTOR)												
Link Speed (mph)					35			25			25	
Link Distance (ft)					1358			1448			1047	
Travel Time (s)					26.5			39.5			28.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	28%	4%	1%	2%	1%	3%	50%	1%	1%	1%	13%	2%
Adj. Flow (vph)	42	148	102	65	745	32	3	71	16	1	16	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	167	777	0	0	91	0	0	63	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Right	Right	Left	Left	Left	Right	Left	Left	Right	Right	Left	Right
Median Width(ft)					12			12			12	
Link Offset(ft)					0			0			0	
Crosswalk Width(ft)					16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	9	9	15	15		9	15	15	9	9	15	9
Number of Detectors			1	1	0		1	1			1	
Detector Template			Left				Left					
Leading Detector (ft)			20	70	0		20	40			40	
Trailing Detector (ft)			0	0	0		0	0			0	
Detector 1 Position(ft)			0	0	0		0	0			0	
Detector 1 Size(ft)			20	70	6		20	40			40	
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0		0.0	0.0			0.0	
Detector 1 Queue (s)			0.0	0.0	0.0		0.0	0.0			0.0	
Detector 1 Delay (s)			0.0	0.0	0.0		0.0	0.0			0.0	
Turn Type			pm+pt	pm+pt	NA		Prot	Prot			Prot	
Protected Phases			1	1	2		5	5			7	
Permitted Phases			2	2								
Detector Phase			1	1			5	5			7	
Switch Phase												
Minimum Initial (s)			5.0	5.0	25.0		8.0	8.0			8.0	
Minimum Split (s)			11.0	11.0	45.0		13.0	13.0			13.0	

Lanes, Volumes, Timings

103: Somerset & S. Woodland & Warrensville Center & Byron

Short-Term Optimized Condition

Timing Plan: AM Peak (7:30)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL	NBT
Total Split (s)	11.0	11.0	50.0			11.0	11.0	50.0			12.0	46.0
Total Split (%)	7.6%	7.6%	34.5%			7.6%	7.6%	34.5%			8.3%	31.7%
Maximum Green (s)	6.0	6.0	45.0			6.0	6.0	45.0			7.0	41.0
Yellow Time (s)	3.0	3.0	3.0			3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	2.0	2.0	2.0			2.0	2.0	2.0			2.0	2.0
Lost Time Adjust (s)			0.0					0.0			0.0	0.0
Total Lost Time (s)			5.0					5.0			5.0	5.0
Lead/Lag	Lag	Lag	Lead			Lag	Lag	Lead			Lead	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0			3.0	3.0
Recall Mode	None	None	None			None	None	None			None	Max
Walk Time (s)			5.0					5.0				5.0
Flash Dont Walk (s)			40.0					40.0				25.0
Pedestrian Calls (#/hr)			0					0				0
Act Effect Green (s)			34.7					34.7			48.5	41.4
Actuated g/C Ratio			0.29					0.29			0.40	0.34
v/c Ratio			0.82					0.54			0.10	0.70
Control Delay			52.0					39.0			24.1	40.6
Queue Delay			0.0					0.0			0.0	0.0
Total Delay			52.0					39.0			24.1	40.6
LOS			D					D			C	D
Approach Delay			52.0					39.0				40.1
Approach LOS			D					D				D
90th %ile Green (s)	0.0	0.0	45.0			0.0	0.0	45.0			7.0	41.0
90th %ile Term Code	Skip	Skip	Max			Skip	Skip	Max			Max	MaxR
70th %ile Green (s)	0.0	0.0	40.0			0.0	0.0	40.0			7.0	41.0
70th %ile Term Code	Skip	Skip	Gap			Skip	Skip	Gap			Max	MaxR
50th %ile Green (s)	0.0	0.0	34.8			0.0	0.0	34.8			7.0	41.0
50th %ile Term Code	Skip	Skip	Gap			Skip	Skip	Gap			Max	MaxR
30th %ile Green (s)	0.0	0.0	30.8			0.0	0.0	30.8			7.0	41.0
30th %ile Term Code	Skip	Skip	Gap			Skip	Skip	Gap			Max	MaxR
10th %ile Green (s)	0.0	0.0	24.5			0.0	0.0	24.5			7.0	41.0
10th %ile Term Code	Skip	Skip	Gap			Skip	Skip	Gap			Max	MaxR
Stops (vph)			423					352			14	615
Fuel Used(gal)			14					12			0	16
CO Emissions (g/hr)			997					825			26	1140
NOx Emissions (g/hr)			194					160			5	222
VOC Emissions (g/hr)			231					191			6	264
Dilemma Vehicles (#)			18					17			0	29
Queue Length 50th (ft)			203					170			11	290
Queue Length 95th (ft)			271					224			31	408
Internal Link Dist (ft)			148					163				1009
Turn Bay Length (ft)											215	
Base Capacity (vph)			824					1159			229	1119
Starvation Cap Reductn			0					0			0	0
Spillback Cap Reductn			0					0			0	0
Storage Cap Reductn			0					0			0	0
Reduced v/c Ratio			0.62					0.41			0.10	0.70

Intersection Summary

Area Type: Other

Cycle Length: 145

Actuated Cycle Length: 121.4

Natural Cycle: 145

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 44.8

Intersection LOS: D

Intersection Capacity Utilization 93.9%

ICU Level of Service F

Analysis Period (min) 15

90th %ile Actuated Cycle: 134

70th %ile Actuated Cycle: 129

50th %ile Actuated Cycle: 123.8

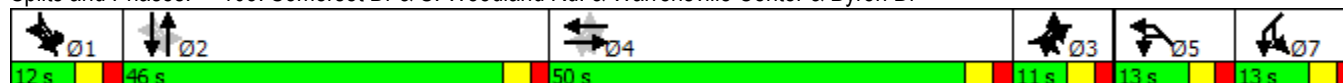
30th %ile Actuated Cycle: 119.8

10th %ile Actuated Cycle: 100.5

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 103: Somerset Dr & S. Woodland Rd. & Warrensville Center & Byron Dr



Lanes, Volumes, Timings

103: Somerset & S. Woodland & Warrensville Center & Byron

Short-Term Optimized Condition

Timing Plan: AM Peak (7:30)

												
Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	SWL	SWR
Total Split (s)			12.0	12.0	46.0		13.0	13.0			13.0	
Total Split (%)			8.3%	8.3%	31.7%		9.0%	9.0%			9.0%	
Maximum Green (s)			7.0	7.0	41.0		8.0	8.0			8.0	
Yellow Time (s)			3.0	3.0	3.0		3.0	3.0			3.0	
All-Red Time (s)			2.0	2.0	2.0		2.0	2.0			2.0	
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	
Total Lost Time (s)				5.0	5.0			5.0			5.0	
Lead/Lag			Lead	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0		3.0	3.0			3.0	
Recall Mode			None	None	Max		None	None			None	
Walk Time (s)					5.0		0.0	0.0			0.0	
Flash Dont Walk (s)					25.0		0.0	0.0			0.0	
Pedestrian Calls (#/hr)					0		0	0			0	
Act Effect Green (s)				48.5	41.4			8.1			8.1	
Actuated g/C Ratio				0.40	0.34			0.07			0.07	
v/c Ratio				0.75	0.64			0.79			0.59	
Control Delay				47.9	38.5			99.9			81.0	
Queue Delay				0.0	0.0			0.0			0.0	
Total Delay				47.9	38.5			99.9			81.0	
LOS				D	D			F			F	
Approach Delay					40.1			99.9			81.0	
Approach LOS					D			F			F	
90th %ile Green (s)			7.0	7.0	41.0		8.0	8.0			8.0	
90th %ile Term Code			Max	Max	MaxR		Max	Max			Max	
70th %ile Green (s)			7.0	7.0	41.0		8.0	8.0			8.0	
70th %ile Term Code			Max	Max	MaxR		Max	Max			Max	
50th %ile Green (s)			7.0	7.0	41.0		8.0	8.0			8.0	
50th %ile Term Code			Max	Max	MaxR		Max	Max			Max	
30th %ile Green (s)			7.0	7.0	41.0		8.0	8.0			8.0	
30th %ile Term Code			Max	Max	MaxR		Max	Max			Max	
10th %ile Green (s)			7.0	7.0	41.0		8.0	8.0			0.0	
10th %ile Term Code			Max	Max	MaxR		Max	Max			Skip	
Stops (vph)				100	588			69			51	
Fuel Used(gal)				4	17			3			2	
CO Emissions (g/hr)				263	1191			210			117	
NOx Emissions (g/hr)				51	232			41			23	
VOC Emissions (g/hr)				61	276			49			27	
Dilemma Vehicles (#)				0	29			0			0	
Queue Length 50th (ft)				83	279			73			50	
Queue Length 95th (ft)				#198	391			#186			#126	
Internal Link Dist (ft)					1278			1368			967	
Turn Bay Length (ft)				140								
Base Capacity (vph)				224	1210			115			107	
Starvation Cap Reductn				0	0			0			0	
Spillback Cap Reductn				0	0			0			0	
Storage Cap Reductn				0	0			0			0	
Reduced v/c Ratio				0.75	0.64			0.79			0.59	

Lanes, Volumes, Timings
14: Chesterton Rd

Short-Term Optimized Condition
Timing Plan: Mid Peak (12:30)

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations		↗		↖		
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	0	1863	0	0
Flt Permitted						
Satd. Flow (perm)	0	1863	0	1863	0	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1299			268	63	
Travel Time (s)	29.5			6.1	1.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 0.0%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: Mid Peak (12:30)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations												
Traffic Volume (vph)	3	8	3	28	3	59	157	83	36	3	26	33
Future Volume (vph)	3	8	3	28	3	59	157	83	36	3	26	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0		0			0		100			125
Storage Lanes		0		0			2		0			1
Taper Length (ft)		25					25					25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00
Frt			0.907					0.952				
Flt Protected			0.988				0.950					0.950
Satd. Flow (prot)	0	0	1655	0	0	0	3458	1780	0	0	0	1767
Flt Permitted			0.988				0.950					0.331
Satd. Flow (perm)	0	0	1655	0	0	0	3458	1780	0	0	0	616
Right Turn on Red	No											
Satd. Flow (RTOR)												
Link Speed (mph)			35					35				
Link Distance (ft)			2140					1892				
Travel Time (s)			41.7					36.9				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	4%	1%	2%	1%	1%	3%	1%	1%	3%
Adj. Flow (vph)	3	9	3	30	3	64	171	90	39	3	28	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	48	0	0	0	235	132	0	0	0	64
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)			0					24				
Link Offset(ft)			0					0				
Crosswalk Width(ft)			16					16				
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	9	15	25		9	9	15	15
Number of Detectors	1	1	1			1	1	1			1	1
Detector Template	Left	Left				Left					Left	
Leading Detector (ft)	20	20	40			20	40	40			20	50
Trailing Detector (ft)	0	0	0			0	0	0			0	0
Detector 1 Position(ft)	0	0	0			0	0	0			0	0
Detector 1 Size(ft)	20	20	40			20	40	40			20	50
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Turn Type	Split	Split	NA			Split	Split	NA			pm+pt	pm+pt
Protected Phases	7	7	7			3	3	3			1	1
Permitted Phases											2	2
Detector Phase	7	7	7			3	3	3			1	1
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0			6.0	6.0	6.0			6.0	6.0
Minimum Split (s)	11.0	11.0	11.0			27.0	27.0	27.0			9.0	9.0

Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: Mid Peak (12:30)

										
Lane Group	NBT	NBR	SBL2	SBT	SBR	SBR2	SWL	SWT	SWR	SWR2
Lane Configurations	↑↑	↑		↑↑			↑	↑		
Traffic Volume (vph)	504	18	1	610	20	5	11	2	1	2
Future Volume (vph)	504	18	1	610	20	5	11	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0			0		0		0	
Storage Lanes		1			0		1		0	
Taper Length (ft)							25			
Lane Util. Factor	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.850		0.994				0.910		
Flt Protected							0.950			
Satd. Flow (prot)	3471	1599	0	3487	0	0	1787	1434	0	0
Flt Permitted				0.955			0.950			
Satd. Flow (perm)	3471	1599	0	3330	0	0	1787	1434	0	0
Right Turn on Red										
Satd. Flow (RTOR)										
Link Speed (mph)	35			35				25		
Link Distance (ft)	683			2003				1013		
Travel Time (s)	13.3			39.0				27.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	1%	1%	3%	1%	1%	1%	1%	1%	50%
Adj. Flow (vph)	548	20	1	663	22	5	12	2	1	2
Shared Lane Traffic (%)										
Lane Group Flow (vph)	548	20	0	691	0	0	12	5	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(ft)	12			12				24		
Link Offset(ft)	0			0				0		
Crosswalk Width(ft)	16			16				16		
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		9	9	15		9	9
Number of Detectors	0	0	1	0			1	1		
Detector Template			Left							
Leading Detector (ft)	0	0	20	0			40	40		
Trailing Detector (ft)	0	0	0	0			0	0		
Detector 1 Position(ft)	0	0	0	0			0	0		
Detector 1 Size(ft)	6	20	20	6			40	40		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex		
Detector 1 Channel										
Detector 1 Extend (s)	0.0	0.0	0.0	0.0			0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0			0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0			0.0	0.0		
Turn Type	NA	Perm	Perm	NA			Split	NA		
Protected Phases	2			2			4	4		
Permitted Phases		2	2							
Detector Phase	2	2	2	2			4	4		
Switch Phase										
Minimum Initial (s)	22.0	22.0	22.0	22.0			8.0	8.0		
Minimum Split (s)	46.0	46.0	46.0	46.0			13.0	13.0		

Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: Mid Peak (12:30)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Total Split (s)	11.0	11.0	11.0			31.0	31.0	31.0			9.0	9.0
Total Split (%)	10.0%	10.0%	10.0%			28.2%	28.2%	28.2%			8.2%	8.2%
Maximum Green (s)	6.0	6.0	6.0			26.0	26.0	26.0			6.0	6.0
Yellow Time (s)	3.0	3.0	3.0			3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	2.0	2.0	2.0			2.0	2.0	2.0			0.0	0.0
Lost Time Adjust (s)			0.0				0.0	0.0				0.0
Total Lost Time (s)			5.0				5.0	5.0				3.0
Lead/Lag						Lead	Lead	Lead			Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0			3.0	3.0
Recall Mode	None	None	None			None	None	None			None	None
Walk Time (s)	0.0	0.0	0.0			7.0	7.0	7.0				
Flash Dont Walk (s)	0.0	0.0	0.0			15.0	15.0	15.0				
Pedestrian Calls (#/hr)	0	0	0			0	0	0				
Act Effect Green (s)			8.8				13.7	13.7				69.2
Actuated g/C Ratio			0.08				0.12	0.12				0.63
v/c Ratio			0.37				0.55	0.60				0.14
Control Delay			55.0				49.6	56.4				3.3
Queue Delay			0.0				0.0	0.0				0.0
Total Delay			55.0				49.6	56.4				3.3
LOS			D				D	E				A
Approach Delay			55.0					52.0				
Approach LOS			D					D				
90th %ile Green (s)	11.8	11.8	11.8			18.6	18.6	18.6			7.6	7.6
90th %ile Term Code	Gap	Gap	Gap			Gap	Gap	Gap			Max	Max
70th %ile Green (s)	10.1	10.1	10.1			15.6	15.6	15.6			8.2	8.2
70th %ile Term Code	Gap	Gap	Gap			Gap	Gap	Gap			Gap	Gap
50th %ile Green (s)	8.7	8.7	8.7			13.5	13.5	13.5			6.8	6.8
50th %ile Term Code	Gap	Gap	Gap			Gap	Gap	Gap			Gap	Gap
30th %ile Green (s)	7.3	7.3	7.3			11.3	11.3	11.3			6.2	6.2
30th %ile Term Code	Gap	Gap	Gap			Gap	Gap	Gap			Gap	Gap
10th %ile Green (s)	0.0	0.0	0.0			9.3	9.3	9.3			0.0	0.0
10th %ile Term Code	Skip	Skip	Skip			Gap	Gap	Gap			Skip	Skip
Stops (vph)			41				197	113				6
Fuel Used(gal)			1				7	4				0
CO Emissions (g/hr)			104				462	272				26
NOx Emissions (g/hr)			20				90	53				5
VOC Emissions (g/hr)			24				107	63				6
Dilemma Vehicles (#)			2				0	5				0
Queue Length 50th (ft)			33				81	90				3
Queue Length 95th (ft)			70				115	146				9
Internal Link Dist (ft)			2060					1812				
Turn Bay Length (ft)												125
Base Capacity (vph)			131				817	420				460
Starvation Cap Reductn			0				0	0				0
Spillback Cap Reductn			0				0	0				0
Storage Cap Reductn			0				0	0				0
Reduced v/c Ratio			0.37				0.29	0.31				0.14

Lanes, Volumes, Timings

101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: Mid Peak (12:30)

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow, Master Intersection

Natural Cycle: 110

Control Type: Actuated-Coordinated

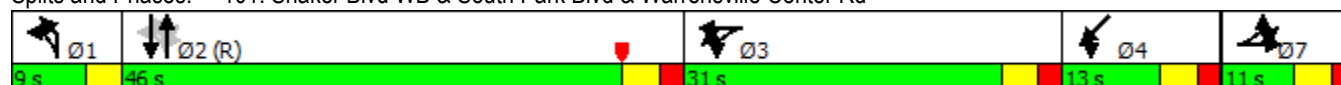
Maximum v/c Ratio: 0.60

Intersection Signal Delay: 21.5 Intersection LOS: C

Intersection Capacity Utilization 72.8% ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 101: Shaker Blvd WB & South Park Blvd & Warrensville Center Rd



Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: Mid Peak (12:30)

										
Lane Group	NBT	NBR	SBL2	SBT	SBR	SBR2	SWL	SWT	SWR	SWR2
Total Split (s)	46.0	46.0	46.0	46.0			13.0	13.0		
Total Split (%)	41.8%	41.8%	41.8%	41.8%			11.8%	11.8%		
Maximum Green (s)	41.0	41.0	41.0	41.0			8.0	8.0		
Yellow Time (s)	3.0	3.0	3.0	3.0			3.0	3.0		
All-Red Time (s)	2.0	2.0	2.0	2.0			2.0	2.0		
Lost Time Adjust (s)	0.0	0.0		0.0			0.0	0.0		
Total Lost Time (s)	5.0	5.0		5.0			5.0	5.0		
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag		
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0	3.0		
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None		
Walk Time (s)	5.0	5.0	5.0	5.0			0.0	0.0		
Flash Dont Walk (s)	36.0	36.0	36.0	36.0			0.0	0.0		
Pedestrian Calls (#/hr)	0	0	0	0			0	0		
Act Effect Green (s)	61.4	61.4		61.4			8.0	8.0		
Actuated g/C Ratio	0.56	0.56		0.56			0.07	0.07		
v/c Ratio	0.28	0.02		0.37			0.09	0.05		
Control Delay	4.0	4.2		18.3			49.5	48.6		
Queue Delay	0.0	0.0		0.0			0.0	0.0		
Total Delay	4.0	4.2		18.3			49.5	48.6		
LOS	A	A		B			D	D		
Approach Delay	4.0			18.3				49.2		
Approach LOS	A			B				D		
90th %ile Green (s)	41.0	41.0	41.0	41.0			8.0	8.0		
90th %ile Term Code	Coord	Coord	Coord	Coord			Min	Min		
70th %ile Green (s)	45.1	45.1	45.1	45.1			8.0	8.0		
70th %ile Term Code	Coord	Coord	Coord	Coord			Min	Min		
50th %ile Green (s)	63.0	63.0	63.0	63.0			0.0	0.0		
50th %ile Term Code	Coord	Coord	Coord	Coord			Skip	Skip		
30th %ile Green (s)	67.2	67.2	67.2	67.2			0.0	0.0		
30th %ile Term Code	Coord	Coord	Coord	Coord			Skip	Skip		
10th %ile Green (s)	90.7	90.7	90.7	90.7			0.0	0.0		
10th %ile Term Code	Coord	Coord	Coord	Coord			Skip	Skip		
Stops (vph)	77	2		367			12	7		
Fuel Used(gal)	3	0		14			0	0		
CO Emissions (g/hr)	243	8		1001			18	8		
NOx Emissions (g/hr)	47	2		195			3	2		
VOC Emissions (g/hr)	56	2		232			4	2		
Dilemma Vehicles (#)	10	0		29			0	0		
Queue Length 50th (ft)	19	1		130			8	3		
Queue Length 95th (ft)	27	4		260			28	16		
Internal Link Dist (ft)	603			1923				933		
Turn Bay Length (ft)										
Base Capacity (vph)	1937	892		1858			129	104		
Starvation Cap Reductn	0	0		0			0	0		
Spillback Cap Reductn	0	0		0			0	0		
Storage Cap Reductn	0	0		0			0	0		
Reduced v/c Ratio	0.28	0.02		0.37			0.09	0.05		

Intersection Summary

Lanes, Volumes, Timings
102: Falmouth & Warrensville Center & Shaker EB

Short-Term Optimized Condition
Timing Plan: Mid Peak (12:30)

												
Lane Group	EBL	EBT	EBR2	NBT	NBR	SBL2	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations												
Traffic Volume (vph)	30	216	26	514	25	117	569	22	1	0	29	8
Future Volume (vph)	30	216	26	514	25	117	569	22	1	0	29	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0				0			75		0	0	
Storage Lanes	0				0			1		1	0	
Taper Length (ft)	25									25		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00
Frt		0.986		0.993				0.850		0.868		
Flt Protected		0.994				0.950				0.999		
Satd. Flow (prot)	0	3476	0	3447	0	1752	3505	1599	0	1631	0	0
Flt Permitted		0.994				0.389				0.999		
Satd. Flow (perm)	0	3476	0	3447	0	718	3505	1599	0	1631	0	0
Right Turn on Red												Yes
Satd. Flow (RTOR)										179		
Link Speed (mph)		35		35			35			25		
Link Distance (ft)		2145		1358			683			883		
Travel Time (s)		41.8		26.5			13.3			24.1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	1%	4%	4%	3%	3%	1%	1%	0%	1%	1%
Adj. Flow (vph)	33	235	28	559	27	127	618	24	1	0	32	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	296	0	586	0	127	618	24	0	42	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(ft)		0		12			18			12		
Link Offset(ft)		0		0			0			0		
Crosswalk Width(ft)		16		16			16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9		9	15		9	15	15	9	9
Number of Detectors	1	1		0		1	0	0	1	1		
Detector Template	Left								Left			
Leading Detector (ft)	20	50		0		60	0	0	20	50		
Trailing Detector (ft)	0	0		0		0	0	0	0	0		
Detector 1 Position(ft)	0	0		0		0	0	0	0	0		
Detector 1 Size(ft)	20	50		6		60	6	20	20	50		
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0		
Turn Type	Perm	NA		NA		pm+pt	NA	Perm	Prot	Prot		
Protected Phases		4		2		1	1 2		3	3		
Permitted Phases	4					1 2		1 2				
Detector Phase	4	4		2		1			3	3		
Switch Phase												
Minimum Initial (s)	6.0	6.0		21.0		6.0			6.0	6.0		
Minimum Split (s)	39.0	39.0		33.0		11.0			12.0	12.0		

Lanes, Volumes, Timings
102: Falmouth & Warrensville Center & Shaker EB

Short-Term Optimized Condition
Timing Plan: Mid Peak (12:30)



Lane Group	NEL	NER	NER2
Lane Configurations			
Traffic Volume (vph)	8	17	2
Future Volume (vph)	8	17	2
Ideal Flow (vphpl)	1900	1900	1900
Storage Length (ft)	0	0	
Storage Lanes	1	0	
Taper Length (ft)	25		
Lane Util. Factor	1.00	1.00	1.00
Frt	0.907		
Flt Protected	0.985		
Satd. Flow (prot)	1681	0	0
Flt Permitted	0.985		
Satd. Flow (perm)	1681	0	0
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)	25		
Link Distance (ft)	1536		
Travel Time (s)	41.9		
Peak Hour Factor	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%
Adj. Flow (vph)	9	18	2
Shared Lane Traffic (%)			
Lane Group Flow (vph)	29	0	0
Enter Blocked Intersection	No	No	No
Lane Alignment	Left	Right	Right
Median Width(ft)	12		
Link Offset(ft)	0		
Crosswalk Width(ft)	16		
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.00
Turning Speed (mph)	15	9	9
Number of Detectors	1		
Detector Template			
Leading Detector (ft)	40		
Trailing Detector (ft)	0		
Detector 1 Position(ft)	0		
Detector 1 Size(ft)	40		
Detector 1 Type	Cl+Ex		
Detector 1 Channel			
Detector 1 Extend (s)	0.0		
Detector 1 Queue (s)	0.0		
Detector 1 Delay (s)	0.0		
Turn Type	Prot		
Protected Phases	7		
Permitted Phases			
Detector Phase	7		
Switch Phase			
Minimum Initial (s)	6.0		
Minimum Split (s)	12.0		

Lanes, Volumes, Timings
102: Falmouth & Warrensville Center & Shaker EB

Short-Term Optimized Condition
Timing Plan: Mid Peak (12:30)

												
Lane Group	EBL	EBT	EBR2	NBT	NBR	SBL2	SBT	SBR	NWL2	NWL	NWR	NWR2
Total Split (s)	39.0	39.0		33.0		14.0			12.0	12.0		
Total Split (%)	35.5%	35.5%		30.0%		12.7%			10.9%	10.9%		
Maximum Green (s)	34.0	34.0		26.0		10.0			7.0	7.0		
Yellow Time (s)	3.0	3.0		3.0		3.0			3.0	3.0		
All-Red Time (s)	2.0	2.0		4.0		1.0			2.0	2.0		
Lost Time Adjust (s)		0.0		0.0		0.0				0.0		
Total Lost Time (s)		5.0		7.0		4.0				5.0		
Lead/Lag	Lead	Lead		Lag		Lead			Lag	Lag		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0		3.0			3.0	3.0		
Recall Mode	None	None		C-Max		None			None	None		
Walk Time (s)	5.0	5.0		5.0					0.0	0.0		
Flash Dont Walk (s)	29.0	29.0		21.0					0.0	0.0		
Pedestrian Calls (#/hr)	0	0		0					0	0		
Act Effect Green (s)		14.7		55.6		67.6	71.6	71.6		6.0		
Actuated g/C Ratio		0.13		0.51		0.61	0.65	0.65		0.05		
v/c Ratio		0.64		0.34		0.24	0.27	0.02		0.16		
Control Delay		51.2		20.7		11.4	9.7	12.1		1.4		
Queue Delay		0.0		0.0		0.0	0.0	0.0		0.0		
Total Delay		51.2		20.7		11.4	9.7	12.1		1.4		
LOS		D		C		B	A	B		A		
Approach Delay		51.2		20.7			10.1			1.4		
Approach LOS		D		C			B			A		
90th %ile Green (s)	18.7	18.7		36.8		12.7			6.0	6.0		
90th %ile Term Code	Gap	Gap		Coord		Gap			Min	Min		
70th %ile Green (s)	16.4	16.4		42.8		10.5			6.0	6.0		
70th %ile Term Code	Gap	Gap		Coord		Gap			Min	Min		
50th %ile Green (s)	14.7	14.7		46.9		9.1			6.0	6.0		
50th %ile Term Code	Gap	Gap		Coord		Gap			Min	Min		
30th %ile Green (s)	13.1	13.1		74.2		6.7			0.0	0.0		
30th %ile Term Code	Gap	Gap		Coord		Gap			Skip	Skip		
10th %ile Green (s)	10.7	10.7		77.3		6.0			0.0	0.0		
10th %ile Term Code	Gap	Gap		Coord		Min			Skip	Skip		
Stops (vph)		250		329		36	167	7		0		
Fuel Used(gal)		9		10		1	5	0		0		
CO Emissions (g/hr)		624		701		78	363	15		21		
NOx Emissions (g/hr)		121		136		15	71	3		4		
VOC Emissions (g/hr)		145		163		18	84	3		5		
Dilemma Vehicles (#)		11		25		0	38	0		0		
Queue Length 50th (ft)		105		147		26	66	5		0		
Queue Length 95th (ft)		145		228		69	134	20		0		
Internal Link Dist (ft)		2065		1278			603			803		
Turn Bay Length (ft)						75		75				
Base Capacity (vph)		1074		1742		552	2281	1040		271		
Starvation Cap Reductn		0		0		0	0	0		0		
Spillback Cap Reductn		0		0		0	0	0		0		
Storage Cap Reductn		0		0		0	0	0		0		
Reduced v/c Ratio		0.28		0.34		0.23	0.27	0.02		0.15		

Lanes, Volumes, Timings 102: FFalmouth & Warrensville Center & Shaker EB

Short-Term Optimized Condition
Timing Plan: Mid Peak (12:30)

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 97 (88%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 21.3

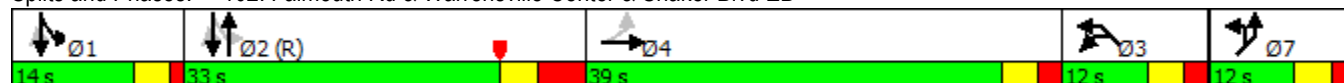
Intersection LOS: C

Intersection Capacity Utilization 63.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 102: Falmouth Rd & Warrensville Center & Shaker Blvd EB



Lanes, Volumes, Timings
102: Falmouth & Warrensville Center & Shaker EB

Short-Term Optimized Condition
Timing Plan: Mid Peak (12:30)



Lane Group	NEL	NER	NER2
Total Split (s)	12.0		
Total Split (%)	10.9%		
Maximum Green (s)	7.0		
Yellow Time (s)	3.0		
All-Red Time (s)	2.0		
Lost Time Adjust (s)	0.0		
Total Lost Time (s)	5.0		
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0		
Recall Mode	None		
Walk Time (s)	0.0		
Flash Dont Walk (s)	0.0		
Pedestrian Calls (#/hr)	0		
Act Effct Green (s)	7.5		
Actuated g/C Ratio	0.07		
v/c Ratio	0.25		
Control Delay	53.4		
Queue Delay	0.0		
Total Delay	53.4		
LOS	D		
Approach Delay	53.4		
Approach LOS	D		
90th %ile Green (s)	9.8		
90th %ile Term Code	Gap		
70th %ile Green (s)	8.3		
70th %ile Term Code	Gap		
50th %ile Green (s)	7.3		
50th %ile Term Code	Gap		
30th %ile Green (s)	0.0		
30th %ile Term Code	Skip		
10th %ile Green (s)	0.0		
10th %ile Term Code	Skip		
Stops (vph)	26		
Fuel Used(gal)	1		
CO Emissions (g/hr)	52		
NOx Emissions (g/hr)	10		
VOC Emissions (g/hr)	12		
Dilemma Vehicles (#)	0		
Queue Length 50th (ft)	20		
Queue Length 95th (ft)	49		
Internal Link Dist (ft)	1456		
Turn Bay Length (ft)			
Base Capacity (vph)	120		
Starvation Cap Reductn	0		
Spillback Cap Reductn	0		
Storage Cap Reductn	0		
Reduced v/c Ratio	0.24		

Intersection Summary

Lanes, Volumes, Timings

103: Somerset & S. Woodland & Warrensville Center & Byron

Short-Term Optimized Condition

Timing Plan: Mid Peak (12:30)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL	WBT	WBR	WBR2	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	33	8	151	15	47	20	173	32	2	20	450	14
Future Volume (vph)	33	8	151	15	47	20	173	32	2	20	450	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0		0		0		0		215		0
Storage Lanes		0		0		0		0		1		0
Taper Length (ft)		25				25				25		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	1.00	0.95	0.95
Frt			0.964				0.978				0.975	
Flt Protected			0.992				0.996			0.950		
Satd. Flow (prot)	0	0	3294	0	0	0	3407	0	0	1787	3387	0
Flt Permitted			0.828				0.901			0.371		
Satd. Flow (perm)	0	0	2749	0	0	0	3082	0	0	698	3387	0
Right Turn on Red				No						No		
Satd. Flow (RTOR)												
Link Speed (mph)			35				35				35	
Link Distance (ft)			224				252				1089	
Travel Time (s)			4.4				4.9				21.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	9%	13%	5%	1%	1%	1%	3%	3%	50%	1%	4%	1%
Adj. Flow (vph)	36	9	164	16	51	22	188	35	2	22	489	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	276	0	0	0	247	0	0	22	587	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)			0				0				18	
Link Offset(ft)			0				0				0	
Crosswalk Width(ft)			16				16				16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	9	15		9	9	15		9
Number of Detectors	1	1	1			1	1			1	0	
Detector Template	Left	Left				Left						
Leading Detector (ft)	20	20	50			20	50			70	0	
Trailing Detector (ft)	0	0	0			0	0			0	0	
Detector 1 Position(ft)	0	0	0			0	0			0	0	
Detector 1 Size(ft)	20	20	50			20	50			70	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0			0.0	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0			0.0	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0			0.0	0.0			0.0	0.0	
Turn Type	pm+pt	pm+pt	NA			pm+pt	NA			pm+pt	NA	
Protected Phases	3	3	4			3	4			1	2	
Permitted Phases	4	4				4				2		
Detector Phase	3	3	4			3	4			1		
Switch Phase												
Minimum Initial (s)	5.0	5.0	8.0			5.0	8.0			5.0	25.0	
Minimum Split (s)	11.0	11.0	50.0			11.0	50.0			11.0	45.0	

Lanes, Volumes, Timings

103: Somerset & S. Woodland & Warrensville Center & Byron

Short-Term Optimized Condition

Timing Plan: Mid Peak (12:30)

												
Lane Group	NBR2	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	SWL2	SWL	SWR	SWR2
Lane Configurations												
Traffic Volume (vph)	76	45	42	522	26	2	24	13	1	5	6	1
Future Volume (vph)	76	45	42	522	26	2	24	13	1	5	6	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)			140		0		0	0		0	0	
Storage Lanes			1		0		1	0		1	0	
Taper Length (ft)			25				25			25		
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.993			0.955			0.923		
Flt Protected			0.950				0.968			0.979		
Satd. Flow (prot)	0	0	1787	3484	0	0	1708	0	0	1593	0	0
Flt Permitted			0.376				0.968			0.979		
Satd. Flow (perm)	0	0	707	3484	0	0	1708	0	0	1593	0	0
Right Turn on Red					No							No
Satd. Flow (RTOR)												
Link Speed (mph)				35			25			25		
Link Distance (ft)				1358			1448			1047		
Travel Time (s)				26.5			39.5			28.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	1%	1%	3%	1%	1%	4%	1%	1%	20%	1%	1%
Adj. Flow (vph)	83	49	46	567	28	2	26	14	1	5	7	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	95	595	0	0	42	0	0	14	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Right	Left	Left	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(ft)				12			12			12		
Link Offset(ft)				0			0			0		
Crosswalk Width(ft)				16			16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	9	15	15		9	15	15	9	15	15	9	9
Number of Detectors		1	1	0		1	1		1	1		
Detector Template		Left				Left			Left			
Leading Detector (ft)		20	70	0		20	40		20	40		
Trailing Detector (ft)		0	0	0		0	0		0	0		
Detector 1 Position(ft)		0	0	0		0	0		0	0		
Detector 1 Size(ft)		20	70	6		20	40		20	40		
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Queue (s)		0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Delay (s)		0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Turn Type		pm+pt	pm+pt	NA		Prot	Prot		Prot	Prot		
Protected Phases		1	1	2		5	5		7	7		
Permitted Phases		2	2									
Detector Phase		1	1			5	5		7	7		
Switch Phase												
Minimum Initial (s)		5.0	5.0	25.0		8.0	8.0		8.0	8.0		
Minimum Split (s)		11.0	11.0	45.0		13.0	13.0		13.0	13.0		

Lanes, Volumes, Timings

103: Somerset & S. Woodland & Warrensville Center & Byron

Short-Term Optimized Condition

Timing Plan: Mid Peak (12:30)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL	WBT	WBR	WBR2	NBL	NBT	NBR
Total Split (s)	11.0	11.0	50.0			11.0	50.0			12.0	46.0	
Total Split (%)	7.6%	7.6%	34.5%			7.6%	34.5%			8.3%	31.7%	
Maximum Green (s)	6.0	6.0	45.0			6.0	45.0			7.0	41.0	
Yellow Time (s)	3.0	3.0	3.0			3.0	3.0			3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0			2.0	2.0			2.0	2.0	
Lost Time Adjust (s)			0.0				0.0			0.0	0.0	
Total Lost Time (s)			5.0				5.0			5.0	5.0	
Lead/Lag	Lag	Lag	Lead			Lag	Lead			Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0			3.0	3.0	
Recall Mode	None	None	None			None	None			None	Max	
Walk Time (s)			5.0				5.0				5.0	
Flash Dont Walk (s)			40.0				40.0				25.0	
Pedestrian Calls (#/hr)			0				0				0	
Act Effect Green (s)			14.5				14.5			48.0	42.7	
Actuated g/C Ratio			0.17				0.17			0.56	0.50	
v/c Ratio			0.59				0.47			0.05	0.35	
Control Delay			40.7				37.6			11.6	17.5	
Queue Delay			0.0				0.0			0.0	0.0	
Total Delay			40.7				37.6			11.6	17.5	
LOS			D				D			B	B	
Approach Delay			40.7				37.6				17.3	
Approach LOS			D				D				B	
90th %ile Green (s)	0.0	0.0	20.6			0.0	20.6			7.0	41.0	
90th %ile Term Code	Skip	Skip	Gap			Skip	Gap			Max	MaxR	
70th %ile Green (s)	0.0	0.0	17.0			0.0	17.0			7.0	41.0	
70th %ile Term Code	Skip	Skip	Gap			Skip	Gap			Max	MaxR	
50th %ile Green (s)	0.0	0.0	13.9			0.0	13.9			7.0	41.0	
50th %ile Term Code	Skip	Skip	Gap			Skip	Gap			Max	MaxR	
30th %ile Green (s)	0.0	0.0	12.4			0.0	12.4			6.9	41.0	
30th %ile Term Code	Skip	Skip	Gap			Skip	Gap			Gap	MaxR	
10th %ile Green (s)	0.0	0.0	9.6			0.0	9.6			0.0	41.0	
10th %ile Term Code	Skip	Skip	Gap			Skip	Gap			Skip	MaxR	
Stops (vph)			220				190			10	321	
Fuel Used(gal)			7				6			0	9	
CO Emissions (g/hr)			518				424			20	600	
NOx Emissions (g/hr)			101				83			4	117	
VOC Emissions (g/hr)			120				98			5	139	
Dilemma Vehicles (#)			13				11			0	31	
Queue Length 50th (ft)			78				68			5	111	
Queue Length 95th (ft)			137				122			21	214	
Internal Link Dist (ft)			144				172				1009	
Turn Bay Length (ft)										215		
Base Capacity (vph)			1503				1685			484	1688	
Starvation Cap Reductn			0				0			0	0	
Spillback Cap Reductn			0				0			0	0	
Storage Cap Reductn			0				0			0	0	
Reduced v/c Ratio			0.18				0.15			0.05	0.35	

Lanes, Volumes, Timings

103: Somerset & S. Woodland & Warrensville Center & Byron

Short-Term Optimized Condition

Timing Plan: Mid Peak (12:30)

Intersection Summary

Area Type: Other

Cycle Length: 145

Actuated Cycle Length: 85.7

Natural Cycle: 145

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 24.0

Intersection LOS: C

Intersection Capacity Utilization 78.0%

ICU Level of Service D

Analysis Period (min) 15

90th %ile Actuated Cycle: 109.6

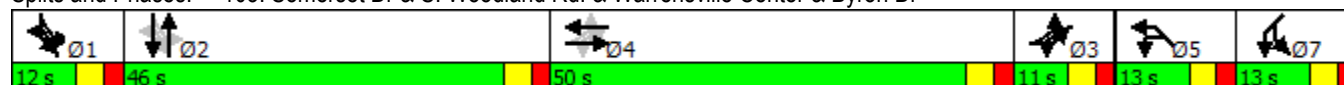
70th %ile Actuated Cycle: 93

50th %ile Actuated Cycle: 89.9

30th %ile Actuated Cycle: 75.3

10th %ile Actuated Cycle: 60.6

Splits and Phases: 103: Somerset Dr & S. Woodland Rd. & Warrensville Center & Byron Dr



Lanes, Volumes, Timings

Short-Term Optimized Condition

103: Somerset & S. Woodland & Warrensville Center & Byron

Timing Plan: Mid Peak (12:30)

												
Lane Group	NBR2	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	SWL2	SWL	SWR	SWR2
Total Split (s)		12.0	12.0	46.0		13.0	13.0		13.0	13.0		
Total Split (%)		8.3%	8.3%	31.7%		9.0%	9.0%		9.0%	9.0%		
Maximum Green (s)		7.0	7.0	41.0		8.0	8.0		8.0	8.0		
Yellow Time (s)		3.0	3.0	3.0		3.0	3.0		3.0	3.0		
All-Red Time (s)		2.0	2.0	2.0		2.0	2.0		2.0	2.0		
Lost Time Adjust (s)			0.0	0.0			0.0			0.0		
Total Lost Time (s)			5.0	5.0			5.0			5.0		
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0	3.0	3.0		3.0	3.0		3.0	3.0		
Recall Mode		None	None	Max		None	None		None	None		
Walk Time (s)				5.0		0.0	0.0		0.0	0.0		
Flash Dont Walk (s)				25.0		0.0	0.0		0.0	0.0		
Pedestrian Calls (#/hr)				0		0	0		0	0		
Act Effect Green (s)			48.0	42.7			8.3			8.3		
Actuated g/C Ratio			0.56	0.50			0.10			0.10		
v/c Ratio			0.20	0.34			0.25			0.09		
Control Delay			11.8	17.4			46.7			44.8		
Queue Delay			0.0	0.0			0.0			0.0		
Total Delay			11.8	17.4			46.7			44.8		
LOS			B	B			D			D		
Approach Delay				16.6			46.7			44.8		
Approach LOS				B			D			D		
90th %ile Green (s)		7.0	7.0	41.0		8.0	8.0		8.0	8.0		
90th %ile Term Code		Max	Max	MaxR		Max	Max		Max	Max		
70th %ile Green (s)		7.0	7.0	41.0		8.0	8.0		0.0	0.0		
70th %ile Term Code		Max	Max	MaxR		Max	Max		Skip	Skip		
50th %ile Green (s)		7.0	7.0	41.0		8.0	8.0		0.0	0.0		
50th %ile Term Code		Max	Max	MaxR		Max	Max		Skip	Skip		
30th %ile Green (s)		6.9	6.9	41.0		0.0	0.0		0.0	0.0		
30th %ile Term Code		Gap	Gap	MaxR		Skip	Skip		Skip	Skip		
10th %ile Green (s)		0.0	0.0	41.0		0.0	0.0		0.0	0.0		
10th %ile Term Code		Skip	Skip	MaxR		Skip	Skip		Skip	Skip		
Stops (vph)			39	323			37			14		
Fuel Used(gal)			1	10			1			0		
CO Emissions (g/hr)			95	680			69			20		
NOx Emissions (g/hr)			18	132			14			4		
VOC Emissions (g/hr)			22	158			16			5		
Dilemma Vehicles (#)			0	31			0			0		
Queue Length 50th (ft)			22	112			23			7		
Queue Length 95th (ft)			65	216			65			30		
Internal Link Dist (ft)				1278			1368			967		
Turn Bay Length (ft)			140									
Base Capacity (vph)			488	1736			165			155		
Starvation Cap Reductn			0	0			0			0		
Spillback Cap Reductn			0	0			0			0		
Storage Cap Reductn			0	0			0			0		
Reduced v/c Ratio			0.19	0.34			0.25			0.09		

Intersection Summary

Lanes, Volumes, Timings
14: Chesteron Rd

Short-Term Optimized Condition
Timing Plan: PM Peak (5:00)

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations		↗		↖		
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	0	1863	0	0
Flt Permitted						
Satd. Flow (perm)	0	1863	0	1863	0	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1299			268	63	
Travel Time (s)	29.5			6.1	1.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	0.0%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: PM Peak (5:00)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations												
Traffic Volume (vph)	10	7	0	99	4	92	281	182	68	3	27	29
Future Volume (vph)	10	7	0	99	4	92	281	182	68	3	27	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0		0			0		100			125
Storage Lanes		0		0			2		0			1
Taper Length (ft)		25					25					25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00
Frt			0.885					0.958				
Flt Protected			0.993				0.950					0.950
Satd. Flow (prot)	0	0	1653	0	0	0	3467	1802	0	0	0	1787
Flt Permitted			0.993				0.950					0.200
Satd. Flow (perm)	0	0	1653	0	0	0	3467	1802	0	0	0	376
Right Turn on Red	No											
Satd. Flow (RTOR)												
Link Speed (mph)			35					35				
Link Distance (ft)			2140					1892				
Travel Time (s)			41.7					36.9				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	11	8	0	108	4	100	305	198	74	3	29	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	131	0	0	0	405	275	0	0	0	61
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)			0					24				
Link Offset(ft)			0					0				
Crosswalk Width(ft)			16					16				
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	9	15	25		9	9	15	15
Number of Detectors	1	1	1			1	1	1			1	1
Detector Template	Left	Left				Left					Left	
Leading Detector (ft)	20	20	40			20	40	40			20	50
Trailing Detector (ft)	0	0	0			0	0	0			0	0
Detector 1 Position(ft)	0	0	0			0	0	0			0	0
Detector 1 Size(ft)	20	20	40			20	40	40			20	50
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Turn Type	Split	Split	NA			Split	Split	NA			pm+pt	pm+pt
Protected Phases	7	7	7			3	3	3			1	1
Permitted Phases											2	2
Detector Phase	7	7	7			3	3	3			1	1
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0			6.0	6.0	6.0			6.0	6.0
Minimum Split (s)	13.0	13.0	13.0			29.0	29.0	29.0			10.0	10.0

Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: PM Peak (5:00)

										
Lane Group	NBT	NBR	SBL2	SBT	SBR	SBR2	SWL	SWT	SWR	SWR2
Lane Configurations	↑↑	↑		↑↑			↑	↑		
Traffic Volume (vph)	831	43	2	766	36	8	30	13	1	8
Future Volume (vph)	831	43	2	766	36	8	30	13	1	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0			0		0		0	
Storage Lanes		1			0		1		0	
Taper Length (ft)							25			
Lane Util. Factor	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.850		0.992				0.937		
Flt Protected							0.950			
Satd. Flow (prot)	3539	1599	0	3546	0	0	1752	1763	0	0
Flt Permitted				0.954			0.950			
Satd. Flow (perm)	3539	1599	0	3383	0	0	1752	1763	0	0
Right Turn on Red										
Satd. Flow (RTOR)										
Link Speed (mph)	35			35				25		
Link Distance (ft)	683			2003				1013		
Travel Time (s)	13.3			39.0				27.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	1%	1%	1%	1%	3%	1%	1%	1%
Adj. Flow (vph)	903	47	2	833	39	9	33	14	1	9
Shared Lane Traffic (%)										
Lane Group Flow (vph)	903	47	0	883	0	0	33	24	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(ft)	12			12				24		
Link Offset(ft)	0			0				0		
Crosswalk Width(ft)	16			16				16		
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		9	9	15		9	9
Number of Detectors	0	0	1	0			1	1		
Detector Template			Left							
Leading Detector (ft)	0	0	20	0			40	40		
Trailing Detector (ft)	0	0	0	0			0	0		
Detector 1 Position(ft)	0	0	0	0			0	0		
Detector 1 Size(ft)	6	20	20	6			40	40		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex		
Detector 1 Channel										
Detector 1 Extend (s)	0.0	0.0	0.0	0.0			0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0			0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0			0.0	0.0		
Turn Type	NA	Perm	Perm	NA			Split	NA		
Protected Phases	2			2			4	4		
Permitted Phases		2	2							
Detector Phase	2	2	2	2			4	4		
Switch Phase										
Minimum Initial (s)	22.0	22.0	22.0	22.0			8.0	8.0		
Minimum Split (s)	48.0	48.0	48.0	48.0			13.0	13.0		

Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: PM Peak (5:00)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Total Split (s)	20.0	20.0	20.0			32.0	32.0	32.0			10.0	10.0
Total Split (%)	16.0%	16.0%	16.0%			25.6%	25.6%	25.6%			8.0%	8.0%
Maximum Green (s)	15.0	15.0	15.0			27.0	27.0	27.0			7.0	7.0
Yellow Time (s)	3.0	3.0	3.0			3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	2.0	2.0	2.0			2.0	2.0	2.0			0.0	0.0
Lost Time Adjust (s)			0.0				0.0	0.0				0.0
Total Lost Time (s)			5.0				5.0	5.0				3.0
Lead/Lag						Lead	Lead	Lead			Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0			3.0	3.0
Recall Mode	None	None	None			None	None	None			None	None
Walk Time (s)	0.0	0.0	0.0			7.0	7.0	7.0				
Flash Dont Walk (s)	0.0	0.0	0.0			15.0	15.0	15.0				
Pedestrian Calls (#/hr)	0	0	0			0	0	0				
Act Effect Green (s)			13.6				23.3	23.3				62.3
Actuated g/C Ratio			0.11				0.19	0.19				0.50
v/c Ratio			0.73				0.63	0.82				0.23
Control Delay			77.1				50.9	68.2				8.7
Queue Delay			0.0				0.0	0.0				0.0
Total Delay			77.1				50.9	68.2				8.7
LOS			E				D	E				A
Approach Delay			77.1					57.9				
Approach LOS			E					E				
90th %ile Green (s)	15.0	15.0	15.0			27.0	27.0	27.0			7.0	7.0
90th %ile Term Code	Max	Max	Max			Max	Max	Max			Max	Max
70th %ile Green (s)	15.0	15.0	15.0			27.0	27.0	27.0			7.0	7.0
70th %ile Term Code	Max	Max	Max			Max	Max	Max			Max	Max
50th %ile Green (s)	15.3	15.3	15.3			25.0	25.0	25.0			7.8	7.8
50th %ile Term Code	Gap	Gap	Gap			Gap	Gap	Gap			Gap	Gap
30th %ile Green (s)	13.0	13.0	13.0			21.0	21.0	21.0			6.8	6.8
30th %ile Term Code	Gap	Gap	Gap			Gap	Gap	Gap			Gap	Gap
10th %ile Green (s)	9.5	9.5	9.5			16.5	16.5	16.5			0.0	0.0
10th %ile Term Code	Gap	Gap	Gap			Gap	Gap	Gap			Skip	Skip
Stops (vph)			114				334	238				8
Fuel Used(gal)			5				11	9				0
CO Emissions (g/hr)			323				802	612				30
NOx Emissions (g/hr)			63				156	119				6
VOC Emissions (g/hr)			75				186	142				7
Dilemma Vehicles (#)			5				0	10				0
Queue Length 50th (ft)			103				154	212				6
Queue Length 95th (ft)			#185				203	307				m12
Internal Link Dist (ft)			2060					1812				
Turn Bay Length (ft)												125
Base Capacity (vph)			199				748	389				268
Starvation Cap Reductn			0				0	0				0
Spillback Cap Reductn			0				0	0				0
Storage Cap Reductn			0				0	0				0
Reduced v/c Ratio			0.66				0.54	0.71				0.23

Lanes, Volumes, Timings

101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: PM Peak (5:00)

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 125

Offset: 8 (6%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 115

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 33.6

Intersection LOS: C

Intersection Capacity Utilization 88.5%

ICU Level of Service E

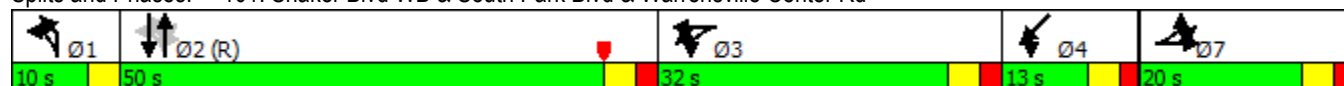
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 101: Shaker Blvd WB & South Park Blvd & Warrensville Center Rd



Lanes, Volumes, Timings
101: Shaker WB & South Park & Warrensville Center

Short-Term Optimized Condition
Timing Plan: PM Peak (5:00)

										
Lane Group	NBT	NBR	SBL2	SBT	SBR	SBR2	SWL	SWT	SWR	SWR2
Total Split (s)	50.0	50.0	50.0	50.0			13.0	13.0		
Total Split (%)	40.0%	40.0%	40.0%	40.0%			10.4%	10.4%		
Maximum Green (s)	45.0	45.0	45.0	45.0			8.0	8.0		
Yellow Time (s)	3.0	3.0	3.0	3.0			3.0	3.0		
All-Red Time (s)	2.0	2.0	2.0	2.0			2.0	2.0		
Lost Time Adjust (s)	0.0	0.0		0.0			0.0	0.0		
Total Lost Time (s)	5.0	5.0		5.0			5.0	5.0		
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag		
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0	3.0		
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None		
Walk Time (s)	5.0	5.0	5.0	5.0			0.0	0.0		
Flash Dont Walk (s)	36.0	36.0	36.0	36.0			0.0	0.0		
Pedestrian Calls (#/hr)	0	0	0	0			0	0		
Act Effect Green (s)	54.6	54.6		54.6			8.0	8.0		
Actuated g/C Ratio	0.44	0.44		0.44			0.06	0.06		
v/c Ratio	0.58	0.07		0.60			0.29	0.21		
Control Delay	11.7	12.5		31.9			63.0	60.4		
Queue Delay	0.0	0.0		0.0			0.0	0.0		
Total Delay	11.7	12.5		31.9			63.0	60.4		
LOS	B	B		C			E	E		
Approach Delay	11.6			31.9				61.9		
Approach LOS	B			C				E		
90th %ile Green (s)	45.0	45.0	45.0	45.0			8.0	8.0		
90th %ile Term Code	Coord	Coord	Coord	Coord			Max	Max		
70th %ile Green (s)	45.0	45.0	45.0	45.0			8.0	8.0		
70th %ile Term Code	Coord	Coord	Coord	Coord			Max	Max		
50th %ile Green (s)	45.9	45.9	45.9	45.9			8.0	8.0		
50th %ile Term Code	Coord	Coord	Coord	Coord			Min	Min		
30th %ile Green (s)	53.2	53.2	53.2	53.2			8.0	8.0		
30th %ile Term Code	Coord	Coord	Coord	Coord			Min	Min		
10th %ile Green (s)	84.0	84.0	84.0	84.0			0.0	0.0		
10th %ile Term Code	Coord	Coord	Coord	Coord			Skip	Skip		
Stops (vph)	155	9		623			29	22		
Fuel Used(gal)	7	0		22			1	1		
CO Emissions (g/hr)	506	27		1517			53	38		
NOx Emissions (g/hr)	99	5		295			10	7		
VOC Emissions (g/hr)	117	6		351			12	9		
Dilemma Vehicles (#)	70	0		32			0	0		
Queue Length 50th (ft)	66	7		319			26	19		
Queue Length 95th (ft)	111	m12		401			61	48		
Internal Link Dist (ft)	603			1923				933		
Turn Bay Length (ft)										
Base Capacity (vph)	1546	698		1478			112	112		
Starvation Cap Reductn	0	0		0			0	0		
Spillback Cap Reductn	0	0		0			0	0		
Storage Cap Reductn	0	0		0			0	0		
Reduced v/c Ratio	0.58	0.07		0.60			0.29	0.21		

Intersection Summary

Lanes, Volumes, Timings
102: Falmouth & Warrensville Center & Shaker EB

Short-Term Optimized Condition
Timing Plan: PM Peak (5:00)

Lane Group	EBL	EBT	EBR2	NBL2	NBT	NBR	SBL2	SBT	SBR	NWL2	NWL	NWR
Lane Configurations		↕↕			↕↕		↕	↕↕	↕		↕	
Traffic Volume (vph)	66	613	51	1	816	49	165	804	18	3	0	34
Future Volume (vph)	66	613	51	1	816	49	165	804	18	3	0	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0					0			75		0	0
Storage Lanes	0					0			1		1	0
Taper Length (ft)	25										25	
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00
Frt		0.990			0.992				0.850		0.873	
Flt Protected		0.995					0.950				0.997	
Satd. Flow (prot)	0	3521	0	0	3546	0	1787	3574	1599	0	1637	0
Flt Permitted		0.995			0.954		0.137				0.997	
Satd. Flow (perm)	0	3521	0	0	3383	0	258	3574	1599	0	1637	0
Right Turn on Red												
Satd. Flow (RTOR)											157	
Link Speed (mph)		35			35			35			25	
Link Distance (ft)		2145			1358			683			883	
Travel Time (s)		41.8			26.5			13.3			24.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	72	666	55	1	887	53	179	874	20	3	0	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	793	0	0	941	0	179	874	20	0	49	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			12			18			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15	15	9
Number of Detectors	1	1		1	0		1	0	0	1	1	
Detector Template	Left			Left						Left		
Leading Detector (ft)	20	50		20	0		60	0	0	20	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	50		20	6		60	6	20	20	50	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Prot	Prot	
Protected Phases		4			2		1	1 2		3	3	
Permitted Phases	4			2			1 2		1 2			
Detector Phase	4	4		2	2		1			3	3	
Switch Phase												
Minimum Initial (s)	6.0	6.0		21.0	21.0		6.0			6.0	6.0	
Minimum Split (s)	39.0	39.0		33.0	33.0		11.0			12.0	12.0	

Lanes, Volumes, Timings
102: Falmouth & Warrensville Center & Shaker EB

Short-Term Optimized Condition
Timing Plan: PM Peak (5:00)



Lane Group	NWR2	NEL	NER	NER2
Lane Configurations				
Traffic Volume (vph)	8	14	31	10
Future Volume (vph)	8	14	31	10
Ideal Flow (vphpl)	1900	1900	1900	1900
Storage Length (ft)		0	0	
Storage Lanes		1	0	
Taper Length (ft)		25		
Lane Util. Factor	1.00	1.00	1.00	1.00
Frt		0.899		
Flt Protected		0.988		
Satd. Flow (prot)	0	1652	0	0
Flt Permitted		0.988		
Satd. Flow (perm)	0	1652	0	0
Right Turn on Red	Yes			
Satd. Flow (RTOR)				
Link Speed (mph)		25		
Link Distance (ft)		1536		
Travel Time (s)		41.9		
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	3%	1%
Adj. Flow (vph)	9	15	34	11
Shared Lane Traffic (%)				
Lane Group Flow (vph)	0	60	0	0
Enter Blocked Intersection	No	No	No	No
Lane Alignment	Right	Left	Right	Right
Median Width(ft)		12		
Link Offset(ft)		0		
Crosswalk Width(ft)		16		
Two way Left Turn Lane				
Headway Factor	1.00	1.00	1.00	1.00
Turning Speed (mph)	9	15	9	9
Number of Detectors		1		
Detector Template				
Leading Detector (ft)		40		
Trailing Detector (ft)		0		
Detector 1 Position(ft)		0		
Detector 1 Size(ft)		40		
Detector 1 Type		Cl+Ex		
Detector 1 Channel				
Detector 1 Extend (s)		0.0		
Detector 1 Queue (s)		0.0		
Detector 1 Delay (s)		0.0		
Turn Type		Prot		
Protected Phases		7		
Permitted Phases				
Detector Phase		7		
Switch Phase				
Minimum Initial (s)		6.0		
Minimum Split (s)		12.0		

Lanes, Volumes, Timings
102: Falmouth & Warrensville Center & Shaker EB

Short-Term Optimized Condition
Timing Plan: PM Peak (5:00)

												
Lane Group	EBL	EBT	EBR2	NBL2	NBT	NBR	SBL2	SBT	SBR	NWL2	NWL	NWR
Total Split (s)	42.0	42.0		45.0	45.0		14.0			12.0	12.0	
Total Split (%)	33.6%	33.6%		36.0%	36.0%		11.2%			9.6%	9.6%	
Maximum Green (s)	37.0	37.0		38.0	38.0		10.0			7.0	7.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0	
All-Red Time (s)	2.0	2.0		4.0	4.0		1.0			2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0				0.0	
Total Lost Time (s)		5.0			7.0		4.0				5.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0	
Recall Mode	None	None		C-Max	C-Max		None			None	None	
Walk Time (s)	5.0	5.0		5.0	5.0					0.0	0.0	
Flash Dont Walk (s)	29.0	29.0		21.0	21.0					0.0	0.0	
Pedestrian Calls (#/hr)	0	0		0	0					0	0	
Act Effect Green (s)		33.2			45.4		59.0	63.0	63.0		6.0	
Actuated g/C Ratio		0.27			0.36		0.47	0.50	0.50		0.05	
v/c Ratio		0.85			0.77		0.72	0.49	0.02		0.21	
Control Delay		52.7			42.7		53.2	16.1	17.4		2.2	
Queue Delay		0.0			0.0		0.0	0.0	0.0		0.0	
Total Delay		52.7			42.7		53.2	16.1	17.4		2.2	
LOS		D			D		D	B	B		A	
Approach Delay		52.7			42.7			22.4			2.2	
Approach LOS		D			D			C			A	
90th %ile Green (s)	37.0	37.0		38.0	38.0		10.0			6.0	6.0	
90th %ile Term Code	Max	Max		Coord	Coord		Max			Min	Min	
70th %ile Green (s)	37.0	37.0		38.0	38.0		10.0			6.0	6.0	
70th %ile Term Code	Max	Max		Coord	Coord		Max			Min	Min	
50th %ile Green (s)	34.0	34.0		38.0	38.0		10.7			6.0	6.0	
50th %ile Term Code	Gap	Gap		Coord	Coord		Max			Min	Min	
30th %ile Green (s)	31.4	31.4		40.0	40.0		12.9			6.0	6.0	
30th %ile Term Code	Gap	Gap		Coord	Coord		Gap			Min	Min	
10th %ile Green (s)	26.7	26.7		73.2	73.2		9.1			0.0	0.0	
10th %ile Term Code	Gap	Gap		Coord	Coord		Gap			Skip	Skip	
Stops (vph)		674			733		112	298	6		0	
Fuel Used(gal)		24			22		3	9	0		0	
CO Emissions (g/hr)		1692			1505		241	618	14		25	
NOx Emissions (g/hr)		329			293		47	120	3		5	
VOC Emissions (g/hr)		392			349		56	143	3		6	
Dilemma Vehicles (#)		28			34		0	58	0		0	
Queue Length 50th (ft)		317			386		98	123	4		0	
Queue Length 95th (ft)		383			#510		#187	218	m11		0	
Internal Link Dist (ft)		2065			1278			603			803	
Turn Bay Length (ft)							75		75			
Base Capacity (vph)		1042			1229		253	1800	805		239	
Starvation Cap Reductn		0			0		0	0	0		0	
Spillback Cap Reductn		0			0		0	0	0		0	
Storage Cap Reductn		0			0		0	0	0		0	
Reduced v/c Ratio		0.76			0.77		0.71	0.49	0.02		0.21	

Lanes, Volumes, Timings

102: Falmouth & Warrensville Center & Shaker EB

Short-Term Optimized Condition
Timing Plan: PM Peak (5:00)

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 125

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 37.9

Intersection LOS: D

Intersection Capacity Utilization 98.5%

ICU Level of Service F

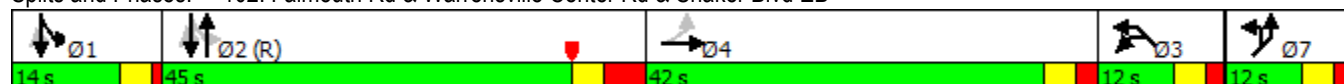
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 102: Falmouth Rd & Warrensville Center Rd & Shaker Blvd EB





Lane Group	NWR2	NEL	NER	NER2
Total Split (s)		12.0		
Total Split (%)		9.6%		
Maximum Green (s)		7.0		
Yellow Time (s)		3.0		
All-Red Time (s)		2.0		
Lost Time Adjust (s)		0.0		
Total Lost Time (s)		5.0		
Lead/Lag				
Lead-Lag Optimize?				
Vehicle Extension (s)		3.0		
Recall Mode		None		
Walk Time (s)		0.0		
Flash Dont Walk (s)		0.0		
Pedestrian Calls (#/hr)		0		
Act Effct Green (s)		8.3		
Actuated g/C Ratio		0.07		
v/c Ratio		0.55		
Control Delay		75.7		
Queue Delay		0.0		
Total Delay		75.7		
LOS		E		
Approach Delay		75.7		
Approach LOS		E		
90th %ile Green (s)		8.0		
90th %ile Term Code		Max		
70th %ile Green (s)		8.0		
70th %ile Term Code		Max		
50th %ile Green (s)		10.3		
50th %ile Term Code		Gap		
30th %ile Green (s)		8.7		
30th %ile Term Code		Gap		
10th %ile Green (s)		0.0		
10th %ile Term Code		Skip		
Stops (vph)		50		
Fuel Used(gal)		2		
CO Emissions (g/hr)		123		
NOx Emissions (g/hr)		24		
VOC Emissions (g/hr)		28		
Dilemma Vehicles (#)		0		
Queue Length 50th (ft)		47		
Queue Length 95th (ft)		#104		
Internal Link Dist (ft)		1456		
Turn Bay Length (ft)				
Base Capacity (vph)		110		
Starvation Cap Reductn		0		
Spillback Cap Reductn		0		
Storage Cap Reductn		0		
Reduced v/c Ratio		0.55		

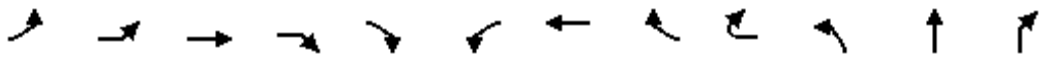
Intersection Summary

Lanes, Volumes, Timings

Short-Term Optimized Condition

103: Warrensville Center & Somerset & S. Woodland & Byron

Timing Plan: PM Peak (5:00)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL	WBT	WBR	WBR2	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	41	24	259	45	77	36	333	57	3	25	777	13
Future Volume (vph)	41	24	259	45	77	36	333	57	3	25	777	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0		0		0		0		215		0
Storage Lanes		0		0		0		0		1		0
Taper Length (ft)		25				25				25		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	1.00	0.95	0.95
Frt			0.959				0.979				0.978	
Flt Protected			0.993				0.996			0.950		
Satd. Flow (prot)	0	0	3401	0	0	0	3485	0	0	1787	3488	0
Flt Permitted			0.688				0.803			0.108		
Satd. Flow (perm)	0	0	2356	0	0	0	2810	0	0	203	3488	0
Right Turn on Red				No						No		
Satd. Flow (RTOR)												
Link Speed (mph)			35				35				35	
Link Distance (ft)			304				295				1089	
Travel Time (s)			5.9				5.7				21.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	8%
Adj. Flow (vph)	45	26	282	49	84	39	362	62	3	27	845	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	486	0	0	0	466	0	0	27	994	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)			0				0				18	
Link Offset(ft)			0				0				0	
Crosswalk Width(ft)			16				16				16	
Two way Left Turn Lane			Yes									
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	9	15		9	9	15		9
Number of Detectors	1	1	1			1	1			1	0	
Detector Template	Left	Left				Left						
Leading Detector (ft)	20	20	50			20	50			70	0	
Trailing Detector (ft)	0	0	0			0	0			0	0	
Detector 1 Position(ft)	0	0	0			0	0			0	0	
Detector 1 Size(ft)	20	20	50			20	50			70	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0			0.0	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0			0.0	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0			0.0	0.0			0.0	0.0	
Turn Type	pm+pt	pm+pt	NA			pm+pt	NA			pm+pt	NA	
Protected Phases	3	3	4			3	4			1	2	
Permitted Phases	4	4				4				2		
Detector Phase	3	3	4			3	4			1		
Switch Phase												
Minimum Initial (s)	5.0	5.0	8.0			5.0	8.0			5.0	25.0	
Minimum Split (s)	11.0	11.0	50.0			11.0	50.0			11.0	45.0	

Lanes, Volumes, Timings

Short-Term Optimized Condition

103: Warrensville Center & Somerset & S. Woodland & Byron

Timing Plan: PM Peak (5:00)

												
Lane Group	NBR2	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	124	84	22	846	36	1	85	47	3	2	31	28
Future Volume (vph)	124	84	22	846	36	1	85	47	3	2	31	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)			140		0		0	0			0	0
Storage Lanes			1		0		1	0			1	0
Taper Length (ft)			25				25				25	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.994			0.950				0.938	
Flt Protected			0.950				0.969				0.974	
Satd. Flow (prot)	0	0	1787	3553	0	0	1732	0	0	0	1696	0
Flt Permitted			0.100				0.969				0.974	
Satd. Flow (perm)	0	0	188	3553	0	0	1732	0	0	0	1696	0
Right Turn on Red	No											
Satd. Flow (RTOR)												
Link Speed (mph)				35			25				25	
Link Distance (ft)				1358			1448				1047	
Travel Time (s)				26.5			39.5				28.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	4%
Adj. Flow (vph)	135	91	24	920	39	1	92	51	3	2	34	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	115	959	0	0	147	0	0	0	67	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Right	Left	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)				12			12				12	
Link Offset(ft)				0			0				0	
Crosswalk Width(ft)				16			16				16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	9	15	15		9	15	15	9	9	15	15	9
Number of Detectors		1	1	0		1	1			1	1	
Detector Template		Left				Left				Left		
Leading Detector (ft)		20	70	0		20	40			20	40	
Trailing Detector (ft)		0	0	0		0	0			0	0	
Detector 1 Position(ft)		0	0	0		0	0			0	0	
Detector 1 Size(ft)		20	70	6		20	40			20	40	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0		0.0	0.0			0.0	0.0	
Detector 1 Queue (s)		0.0	0.0	0.0		0.0	0.0			0.0	0.0	
Detector 1 Delay (s)		0.0	0.0	0.0		0.0	0.0			0.0	0.0	
Turn Type		pm+pt	pm+pt	NA		Prot	Prot			Prot	Prot	
Protected Phases		1	1	2		5	5			7	7	
Permitted Phases		2	2									
Detector Phase		1	1			5	5			7	7	
Switch Phase												
Minimum Initial (s)		5.0	5.0	25.0		8.0	8.0			8.0	8.0	
Minimum Split (s)		11.0	11.0	45.0		13.0	13.0			13.0	13.0	



Lane Group	SWR2
Lane Configurations	
Traffic Volume (vph)	1
Future Volume (vph)	1
Ideal Flow (vphpl)	1900
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	No
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Heavy Vehicles (%)	1%
Adj. Flow (vph)	1
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	

Lanes, Volumes, Timings

Short-Term Optimized Condition

103: Warrensville Center & Somerset & S. Woodland & Byron

Timing Plan: PM Peak (5:00)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL	WBT	WBR	WBR2	NBL	NBT	NBR
Total Split (s)	11.0	11.0	50.0			11.0	50.0			11.0	45.0	
Total Split (%)	7.6%	7.6%	34.5%			7.6%	34.5%			7.6%	31.0%	
Maximum Green (s)	6.0	6.0	45.0			6.0	45.0			6.0	40.0	
Yellow Time (s)	3.0	3.0	3.0			3.0	3.0			3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0			2.0	2.0			2.0	2.0	
Lost Time Adjust (s)			0.0				0.0			0.0	0.0	
Total Lost Time (s)			5.0				5.0			5.0	5.0	
Lead/Lag	Lag	Lag	Lead			Lag	Lead			Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0			3.0	3.0	
Recall Mode	None	None	None			None	None			None	Max	
Walk Time (s)			5.0				5.0				5.0	
Flash Dont Walk (s)			40.0				40.0				25.0	
Pedestrian Calls (#/hr)			0				0				0	
Act Effect Green (s)			29.4				29.4			46.1	40.1	
Actuated g/C Ratio			0.25				0.25			0.39	0.34	
v/c Ratio			0.83				0.67			0.17	0.84	
Control Delay			55.1				45.0			24.4	45.1	
Queue Delay			0.0				0.0			0.0	0.0	
Total Delay			55.1				45.0			24.4	45.1	
LOS			E				D			C	D	
Approach Delay			55.1				45.0				44.5	
Approach LOS			E				D				D	
90th %ile Green (s)	0.0	0.0	39.7			0.0	39.7			6.0	40.0	
90th %ile Term Code	Skip	Skip	Gap			Skip	Gap			Max	MaxR	
70th %ile Green (s)	0.0	0.0	33.6			0.0	33.6			6.0	40.0	
70th %ile Term Code	Skip	Skip	Gap			Skip	Gap			Max	MaxR	
50th %ile Green (s)	0.0	0.0	29.3			0.0	29.3			6.0	40.0	
50th %ile Term Code	Skip	Skip	Gap			Skip	Gap			Max	MaxR	
30th %ile Green (s)	0.0	0.0	25.1			0.0	25.1			6.0	40.0	
30th %ile Term Code	Skip	Skip	Gap			Skip	Gap			Max	MaxR	
10th %ile Green (s)	0.0	0.0	20.9			0.0	20.9			6.0	40.0	
10th %ile Term Code	Skip	Skip	Gap			Skip	Gap			Max	MaxR	
Stops (vph)			408				371			16	795	
Fuel Used(gal)			14				12			0	22	
CO Emissions (g/hr)			948				853			31	1506	
NOx Emissions (g/hr)			185				166			6	293	
VOC Emissions (g/hr)			220				198			7	349	
Dilemma Vehicles (#)			17				16			0	37	
Queue Length 50th (ft)			185				169			12	367	
Queue Length 95th (ft)			249				226			34	#546	
Internal Link Dist (ft)			224				215				1009	
Turn Bay Length (ft)										215		
Base Capacity (vph)			895				1068			159	1178	
Starvation Cap Reductn			0				0			0	0	
Spillback Cap Reductn			0				0			0	0	
Storage Cap Reductn			0				0			0	0	
Reduced v/c Ratio			0.54				0.44			0.17	0.84	

Intersection Summary

Area Type: Other

Cycle Length: 145

Actuated Cycle Length: 118.7

Natural Cycle: 145

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 50.5

Intersection LOS: D

Intersection Capacity Utilization 96.3%

ICU Level of Service F

Analysis Period (min) 15

90th %ile Actuated Cycle: 128.7

70th %ile Actuated Cycle: 122.6

50th %ile Actuated Cycle: 118.3

30th %ile Actuated Cycle: 114.1

10th %ile Actuated Cycle: 109.9

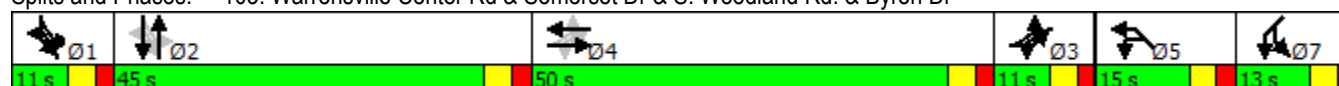
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 103: Warrensville Center Rd & Somerset Dr & S. Woodland Rd. & Byron Dr



Lanes, Volumes, Timings

Short-Term Optimized Condition

103: Warrensville Center & Somerset & S. Woodland & Byron

Timing Plan: PM Peak (5:00)

												
Lane Group	NBR2	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2	SWL2	SWL	SWR
Total Split (s)		11.0	11.0	45.0		15.0	15.0			13.0	13.0	
Total Split (%)		7.6%	7.6%	31.0%		10.3%	10.3%			9.0%	9.0%	
Maximum Green (s)		6.0	6.0	40.0		10.0	10.0			8.0	8.0	
Yellow Time (s)		3.0	3.0	3.0		3.0	3.0			3.0	3.0	
All-Red Time (s)		2.0	2.0	2.0		2.0	2.0			2.0	2.0	
Lost Time Adjust (s)			0.0	0.0			0.0				0.0	
Total Lost Time (s)			5.0	5.0			5.0				5.0	
Lead/Lag		Lead	Lead	Lag								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0	3.0	3.0		3.0	3.0			3.0	3.0	
Recall Mode		None	None	Max		None	None			None	None	
Walk Time (s)				5.0		0.0	0.0			0.0	0.0	
Flash Dont Walk (s)				25.0		0.0	0.0			0.0	0.0	
Pedestrian Calls (#/hr)				0		0	0			0	0	
Act Effect Green (s)			46.1	40.1			10.0				8.0	
Actuated g/C Ratio			0.39	0.34			0.08				0.07	
v/c Ratio			0.75	0.80			1.01				0.59	
Control Delay			54.1	42.5			131.8				76.6	
Queue Delay			0.0	0.0			0.0				0.0	
Total Delay			54.1	42.5			131.8				76.6	
LOS			D	D			F				E	
Approach Delay				43.8			131.8				76.6	
Approach LOS				D			F				E	
90th %ile Green (s)		6.0	6.0	40.0		10.0	10.0			8.0	8.0	
90th %ile Term Code		Max	Max	MaxR		Max	Max			Max	Max	
70th %ile Green (s)		6.0	6.0	40.0		10.0	10.0			8.0	8.0	
70th %ile Term Code		Max	Max	MaxR		Max	Max			Max	Max	
50th %ile Green (s)		6.0	6.0	40.0		10.0	10.0			8.0	8.0	
50th %ile Term Code		Max	Max	MaxR		Max	Max			Max	Max	
30th %ile Green (s)		6.0	6.0	40.0		10.0	10.0			8.0	8.0	
30th %ile Term Code		Max	Max	MaxR		Max	Max			Max	Max	
10th %ile Green (s)		6.0	6.0	40.0		10.0	10.0			8.0	8.0	
10th %ile Term Code		Max	Max	MaxR		Max	Max			Max	Max	
Stops (vph)			62	764			108				56	
Fuel Used(gal)			3	22			6				2	
CO Emissions (g/hr)			187	1540			398				121	
NOx Emissions (g/hr)			36	300			78				24	
VOC Emissions (g/hr)			43	357			92				28	
Dilemma Vehicles (#)			0	37			0				0	
Queue Length 50th (ft)			52	347			~115				51	
Queue Length 95th (ft)			#148	#485			#277				#124	
Internal Link Dist (ft)				1278			1368				967	
Turn Bay Length (ft)			140									
Base Capacity (vph)			153	1200			146				114	
Starvation Cap Reductn			0	0			0				0	
Spillback Cap Reductn			0	0			0				0	
Storage Cap Reductn			0	0			0				0	
Reduced v/c Ratio			0.75	0.80			1.01				0.59	

Intersection Summary



Lane Group	SWR2
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	
90th %ile Term Code	
70th %ile Green (s)	
70th %ile Term Code	
50th %ile Green (s)	
50th %ile Term Code	
30th %ile Green (s)	
30th %ile Term Code	
10th %ile Green (s)	
10th %ile Term Code	
Stops (vph)	
Fuel Used(gal)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

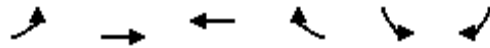
Intersection Summary

APPENDIX E: RECOMMENDED COUNTERMEASURES SYNCHRO RESULTS

Lanes, Volumes, Timings
3: Shaker Blvd WB

Recommended Countermeasures

Timing Plan: AM Peak (7:30)



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑			↗
Traffic Volume (vph)	0	0	629	362	0	2
Future Volume (vph)	0	0	629	362	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Frt			0.945			0.865
Flt Protected						
Satd. Flow (prot)	0	0	3341	0	0	1627
Flt Permitted						
Satd. Flow (perm)	0	0	3341	0	0	1627
Link Speed (mph)		30	30		30	
Link Distance (ft)		1861	257		81	
Travel Time (s)		42.3	5.8		1.8	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	1%	4%	1%	1%
Adj. Flow (vph)	0	0	707	407	0	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1114	0	0	2
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Stop	Free		Free	
Intersection Summary						
Area Type: Other						
Control Type: Unsignalized						
Intersection Capacity Utilization 39.0% ICU Level of Service A						
Analysis Period (min) 15						

Lanes, Volumes, Timings
16: South Park Blvd

Recommended Countermeasures
Timing Plan: AM Peak (7:30)

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	2	2	352	10	0	4
Future Volume (vph)	2	2	352	10	0	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.932					0.865
Flt Protected	0.976			0.954		
Satd. Flow (prot)	1711	0	0	1744	0	1627
Flt Permitted	0.976			0.954		
Satd. Flow (perm)	1711	0	0	1744	0	1627
Link Speed (mph)	20			30	15	
Link Distance (ft)	1728			81	70	
Travel Time (s)	58.9			1.8	3.2	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	1%	1%	4%	1%	1%	1%
Adj. Flow (vph)	2	2	396	11	0	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	4	0	0	407	0	4
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	30.0%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
21: Shaker Blvd EB

Recommended Countermeasures
Timing Plan: AM Peak (7:30)

						
Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	558	25	0	0	0	78
Future Volume (vph)	558	25	0	0	0	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt	0.994					0.865
Flt Protected						
Satd. Flow (prot)	3519	0	0	1863	0	1565
Flt Permitted						
Satd. Flow (perm)	3519	0	0	1863	0	1565
Link Speed (mph)	35			30	30	
Link Distance (ft)	1875			232	83	
Travel Time (s)	36.5			5.3	1.9	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	2%	1%	2%	2%	0%	5%
Adj. Flow (vph)	656	29	0	0	0	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	685	0	0	0	0	92
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	27.7%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
101: Shaker WB & Warrensville Center & Claythorne

Recommended Countermeasures
Timing Plan: AM Peak (7:30)

												
Lane Group	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBT	SBR	SWL	SWR	SWR2
Lane Configurations												
Traffic Volume (vph)	102	787	33	3	86	557	83	650	32	89	86	6
Future Volume (vph)	102	787	33	3	86	557	83	650	32	89	86	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		230		125		0		0	0	0	
Storage Lanes	0		1		1		0		0	1	1	
Taper Length (ft)	25				25					25		
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.981		0.993			0.850	
Flt Protected		0.994			0.950					0.950		
Satd. Flow (prot)	0	3553	1570	0	1719	3349	0	3516	0	1736	1438	0
Flt Permitted		0.994			0.261					0.950		
Satd. Flow (perm)	0	3553	1570	0	472	3349	0	3516	0	1736	1438	0
Right Turn on Red				Yes					Yes			Yes
Satd. Flow (RTOR)			80					6			80	
Link Speed (mph)		35				35		35		25		
Link Distance (ft)		1892				683		2003		1031		
Travel Time (s)		36.9				13.3		39.0		28.1		
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	1%	1%	3%	1%	5%	6%	4%	2%	1%	4%	12%	17%
Adj. Flow (vph)	115	884	37	3	97	626	93	730	36	100	97	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	999	40	0	97	719	0	766	0	100	104	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	1 veh	No
Lane Alignment	Left	Left	Right	Right	Left	Left	Right	Left	Right	Left	Right	Right
Median Width(ft)		0				12		12		24		
Link Offset(ft)		0				0		0		0		
Crosswalk Width(ft)		16				16		16		16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	9	15		9		9	15	9	9
Number of Detectors	1	1	1		1	0		0		1	1	
Detector Template	Left		Right		Left							
Leading Detector (ft)	20	40	20		20	0		0		40	40	
Trailing Detector (ft)	0	0	0		0	0		0		0	0	
Detector 1 Position(ft)	0	0	0		0	0		0		0	0	
Detector 1 Size(ft)	20	40	20		20	6		6		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0		0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0		0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0		0.0		0.0	0.0	
Turn Type	Split	NA	Perm		Perm	NA		NA		Prot	Prot	
Protected Phases	3	3				2		2		4	4	
Permitted Phases			3		2					4	4	
Detector Phase	3	3	3		2	2		2		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0		10.0	10.0		10.0		10.0	10.0	
Minimum Split (s)	22.0	22.0	22.0		29.0	29.0		29.0		22.0	22.0	

Lanes, Volumes, Timings
101: Shaker WB & Warrensville Center & Claythorne

Recommended Countermeasures
Timing Plan: AM Peak (7:30)

												
Lane Group	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBT	SBR	SWL	SWR	SWR2
Total Split (s)	34.0	34.0	34.0		39.0	39.0		39.0		22.0	22.0	
Total Split (%)	35.8%	35.8%	35.8%		41.1%	41.1%		41.1%		23.2%	23.2%	
Maximum Green (s)	29.0	29.0	29.0		34.0	34.0		34.0		17.0	17.0	
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0		3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0		2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)		5.0	5.0		5.0	5.0		5.0		5.0	5.0	
Lead/Lag	Lead	Lead	Lead							Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0		3.0		3.0	3.0	
Recall Mode	None	None	None		C-Max	C-Max		C-Max		None	None	
Walk Time (s)	5.0	5.0	5.0		5.0	5.0		5.0		5.0	5.0	
Flash Dont Walk (s)	12.0	12.0	12.0		17.0	17.0		17.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0		0	0		0		0	0	
Act Effect Green (s)		28.7	28.7		39.7	39.7		39.7		11.7	11.7	
Actuated g/C Ratio		0.30	0.30		0.42	0.42		0.42		0.12	0.12	
v/c Ratio		0.93	0.08		0.49	0.51		0.52		0.47	0.42	
Control Delay		48.3	1.4		16.4	7.5		22.4		45.9	18.4	
Queue Delay		0.0	0.0		0.0	0.0		0.0		0.0	0.0	
Total Delay		48.3	1.4		16.4	7.5		22.4		45.9	18.4	
LOS		D	A		B	A		C		D	B	
Approach Delay		46.4				8.5		22.4		31.9		
Approach LOS		D				A		C		C		
90th %ile Green (s)	29.0	29.0	29.0		36.0	36.0		36.0		15.0	15.0	
90th %ile Term Code	Max	Max	Max		Coord	Coord		Coord		Gap	Gap	
70th %ile Green (s)	29.0	29.0	29.0		38.5	38.5		38.5		12.5	12.5	
70th %ile Term Code	Max	Max	Max		Coord	Coord		Coord		Gap	Gap	
50th %ile Green (s)	29.0	29.0	29.0		40.2	40.2		40.2		10.8	10.8	
50th %ile Term Code	Max	Max	Max		Coord	Coord		Coord		Gap	Gap	
30th %ile Green (s)	29.0	29.0	29.0		41.0	41.0		41.0		10.0	10.0	
30th %ile Term Code	Max	Max	Max		Coord	Coord		Coord		Min	Min	
10th %ile Green (s)	27.4	27.4	27.4		42.6	42.6		42.6		10.0	10.0	
10th %ile Term Code	Gap	Gap	Gap		Coord	Coord		Coord		Min	Min	
Stops (vph)		796	1		19	139		488		80	30	
Fuel Used(gal)		27	1		1	5		17		2	1	
CO Emissions (g/hr)		1878	36		60	362		1164		134	89	
NOx Emissions (g/hr)		365	7		12	70		226		26	17	
VOC Emissions (g/hr)		435	8		14	84		270		31	21	
Dilemma Vehicles (#)		45	0		0	23		36		0	0	
Queue Length 50th (ft)		305	0		9	35		173		58	13	
Queue Length 95th (ft)		#420	6		m31	45		243		102	58	
Internal Link Dist (ft)		1812				603		1923		951		
Turn Bay Length (ft)			230		125							
Base Capacity (vph)		1084	534		196	1398		1471		310	323	
Starvation Cap Reductn		0	0		0	0		0		0	0	
Spillback Cap Reductn		0	0		0	0		0		0	0	
Storage Cap Reductn		0	0		0	0		0		0	0	
Reduced v/c Ratio		0.92	0.07		0.49	0.51		0.52		0.32	0.32	

Lanes, Volumes, Timings

101: Shaker WB & Warrensville Center & Claythorne

Recommended Countermeasures

Timing Plan: AM Peak (7:30)

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow, Master Intersection

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 27.9

Intersection LOS: C

Intersection Capacity Utilization 86.7%

ICU Level of Service E

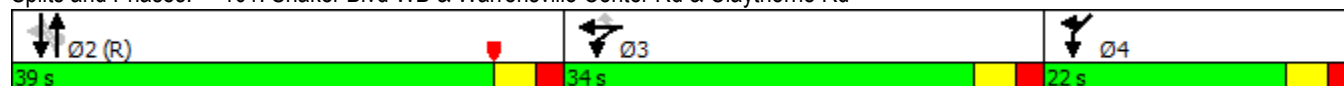
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 101: Shaker Blvd WB & Warrensville Center Rd & Claythorne Rd



Lanes, Volumes, Timings
102: Warrensville Center & Fayette & Shaker EB

Recommended Countermeasures
Timing Plan: AM Peak (7:30)

											
Lane Group	EBL	EBT	EBR2	NBT	NBR	SBL2	SBT	NWL2	NWL	NWR	NWR2
Lane Configurations		↑↑		↑↑		↑	↑↑		↑		
Traffic Volume (vph)	87	474	75	599	20	134	707	6	0	40	7
Future Volume (vph)	87	474	75	599	20	134	707	6	0	40	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0				0				0	0	
Storage Lanes	0				0				1	0	
Taper Length (ft)	25								25		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00
Frt		0.982		0.995					0.880		
Flt Protected		0.993				0.950			0.994		
Satd. Flow (prot)	0	3438	0	3453	0	1736	3539	0	1633	0	0
Flt Permitted		0.993				0.276			0.994		
Satd. Flow (perm)	0	3438	0	3453	0	504	3539	0	1633	0	0
Right Turn on Red			Yes								Yes
Satd. Flow (RTOR)		161							161		
Link Speed (mph)		35		35			35		25		
Link Distance (ft)		232		1358			683		883		
Travel Time (s)		4.5		26.5			13.3		24.1		
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	4%	2%	3%	4%	5%	4%	2%	1%	0%	2%	1%
Adj. Flow (vph)	102	558	88	705	24	158	832	7	0	47	8
Shared Lane Traffic (%)											
Lane Group Flow (vph)	0	748	0	729	0	158	832	0	62	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Left	Left	Right	Right
Median Width(ft)		0		12			18		12		
Link Offset(ft)		0		0			0		0		
Crosswalk Width(ft)		16		16			16		16		
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9		9	15		15	15	9	9
Number of Detectors	1	1		0		1	0	1	1		
Detector Template	Left							Left			
Leading Detector (ft)	20	50		0		60	0	20	50		
Trailing Detector (ft)	0	0		0		0	0	0	0		
Detector 1 Position(ft)	0	0		0		0	0	0	0		
Detector 1 Size(ft)	20	50		6		60	6	20	50		
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0		
Turn Type	Perm	NA		NA		pm+pt	NA	Perm	Prot		
Protected Phases		4		2		1	1 2		3		
Permitted Phases	4					1 2		3			
Detector Phase	4	4		2		1		3	3		
Switch Phase											
Minimum Initial (s)	6.0	6.0		21.0		6.0		6.0	6.0		
Minimum Split (s)	39.0	39.0		33.0		11.0		12.0	12.0		

Lanes, Volumes, Timings
102: Warrensville Center & Fayette & Shaker EB

Recommended Countermeasures
Timing Plan: AM Peak (7:30)



Lane Group	EBL	EBT	EBR2	NBT	NBR	SBL2	SBT	NWL2	NWL	NWR	NWR2
Total Split (s)	39.0	39.0		33.0		11.0		12.0	12.0		
Total Split (%)	41.1%	41.1%		34.7%		11.6%		12.6%	12.6%		
Maximum Green (s)	34.0	34.0		26.0		6.0		7.0	7.0		
Yellow Time (s)	3.0	3.0		3.0		3.0		3.0	3.0		
All-Red Time (s)	2.0	2.0		4.0		2.0		2.0	2.0		
Lost Time Adjust (s)		0.0		0.0		0.0			0.0		
Total Lost Time (s)		5.0		7.0		5.0			5.0		
Lead/Lag	Lead	Lead		Lag		Lead		Lag	Lag		
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0		3.0		3.0		3.0	3.0		
Recall Mode	None	None		C-Max		None		None	None		
Walk Time (s)	5.0	5.0		5.0				0.0	0.0		
Flash Dont Walk (s)	25.0	25.0		21.0				0.0	0.0		
Pedestrian Calls (#/hr)	0	0		0				0	0		
Act Effect Green (s)		23.2		36.1		48.0	53.0		6.0		
Actuated g/C Ratio		0.24		0.38		0.51	0.56		0.06		
v/c Ratio		0.78		0.56		0.41	0.42		0.25		
Control Delay		31.6		27.6		19.0	12.9		2.3		
Queue Delay		0.0		0.0		0.0	0.0		0.0		
Total Delay		31.6		27.6		19.0	12.9		2.3		
LOS		C		C		B	B		A		
Approach Delay		31.6		27.6			13.9		2.3		
Approach LOS		C		C			B		A		
90th %ile Green (s)	30.0	30.0		26.0		11.0		6.0	6.0		
90th %ile Term Code	Gap	Gap		Coord		Max		Min	Min		
70th %ile Green (s)	25.8	25.8		29.1		12.1		6.0	6.0		
70th %ile Term Code	Gap	Gap		Coord		Gap		Min	Min		
50th %ile Green (s)	23.3	23.3		33.3		10.4		6.0	6.0		
50th %ile Term Code	Gap	Gap		Coord		Gap		Min	Min		
30th %ile Green (s)	20.7	20.7		37.3		9.0		6.0	6.0		
30th %ile Term Code	Gap	Gap		Coord		Gap		Min	Min		
10th %ile Green (s)	16.2	16.2		54.9		6.9		0.0	0.0		
10th %ile Term Code	Gap	Gap		Coord		Gap		Skip	Skip		
Stops (vph)		457		489		61	266		0		
Fuel Used(gal)		9		13		2	7		0		
CO Emissions (g/hr)		601		925		114	513		30		
NOx Emissions (g/hr)		117		180		22	100		6		
VOC Emissions (g/hr)		139		214		27	119		7		
Dilemma Vehicles (#)		30		33		0	71		0		
Queue Length 50th (ft)		175		188		29	80		0		
Queue Length 95th (ft)		200		261		m92	m182		0		
Internal Link Dist (ft)		152		1278			603		803		
Turn Bay Length (ft)						75					
Base Capacity (vph)		1333		1312		382	1974		269		
Starvation Cap Reductn		0		0		0	0		0		
Spillback Cap Reductn		0		0		0	0		0		
Storage Cap Reductn		0		0		0	0		0		
Reduced v/c Ratio		0.56		0.56		0.41	0.42		0.23		

Lanes, Volumes, Timings

102: Warrensville Center & Fayette & Shaker EB

Recommended Countermeasures

Timing Plan: AM Peak (7:30)

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 82 (86%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 22.8

Intersection LOS: C

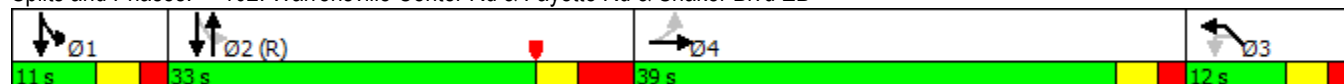
Intersection Capacity Utilization 66.3%

ICU Level of Service C

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 102: Warrensville Center Rd & Fayette Rd & Shaker Blvd EB



Lanes, Volumes, Timings

103: S. Woodland & Warrensville Center & Byron

Recommended Countermeasures

Timing Plan: AM Peak (7:30)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL	NBT
Lane Configurations												
Traffic Volume (vph)	44	43	234	80	72	1	21	365	40	11	21	549
Future Volume (vph)	44	43	234	80	72	1	21	365	40	11	21	549
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	12	12
Storage Length (ft)		350		0			420		475		215	
Storage Lanes		1		0			1		0		1	
Taper Length (ft)		25					25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	0.95	1.00	0.95
Frt			0.941					0.982				0.964
Flt Protected		0.950					0.950				0.950	
Satd. Flow (prot)	0	1597	1627	0	0	0	1607	3186	0	0	1787	3282
Flt Permitted		0.346					0.245				0.237	
Satd. Flow (perm)	0	582	1627	0	0	0	414	3186	0	0	446	3282
Right Turn on Red				No							No	
Satd. Flow (RTOR)												
Link Speed (mph)			35					35				35
Link Distance (ft)			600					626				1089
Travel Time (s)			11.7					12.2				21.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	9%	3%	1%	3%	1%	5%	4%	1%	9%	1%	5%
Adj. Flow (vph)	48	47	254	87	78	1	23	397	43	12	23	597
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	95	419	0	0	0	24	452	0	0	23	787
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)			10					10				18
Link Offset(ft)			0					0				0
Crosswalk Width(ft)			16					16				16
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.00	1.00
Turning Speed (mph)	15	15		9	9	15	15		9	9	15	
Number of Detectors	1	1	1			1	1	1			1	0
Detector Template	Left					Left						
Leading Detector (ft)	20	75	40			20	75	40			70	0
Trailing Detector (ft)	0	25	0			0	25	0			0	0
Detector 1 Position(ft)	0	25	0			0	25	0			0	180
Detector 1 Size(ft)	20	50	40			20	50	40			70	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0
Turn Type	pm+pt	pm+pt	NA			Perm	pm+pt	NA			pm+pt	NA
Protected Phases	7	7	4				3	8			1	6
Permitted Phases	4	4				8	8				6	
Detector Phase	7	7	4			8	3	8			1	
Switch Phase												
Minimum Initial (s)	6.0	6.0	10.0			10.0	6.0	10.0			6.0	10.0

Lanes, Volumes, Timings
103: S. Woodland & Warrensville Center & Byron

Recommended Countermeasures

Timing Plan: AM Peak (7:30)

									
Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SWL	SWR	SWR2
Lane Configurations									
Traffic Volume (vph)	39	136	94	60	685	54	15	43	1
Future Volume (vph)	39	136	94	60	685	54	15	43	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12
Storage Length (ft)	0			140		0	0	0	
Storage Lanes	0			1		0	1	0	
Taper Length (ft)				25			25		
Lane Util. Factor	0.95	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt					0.989		0.899		
Flt Protected				0.950			0.988		
Satd. Flow (prot)	0	0	0	1780	3530	0	1612	0	0
Flt Permitted				0.171			0.988		
Satd. Flow (perm)	0	0	0	320	3530	0	1612	0	0
Right Turn on Red						No			No
Satd. Flow (RTOR)									
Link Speed (mph)					35		25		
Link Distance (ft)					1358		1047		
Travel Time (s)					26.5		28.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	28%	4%	1%	2%	1%	3%	13%	2%	0%
Adj. Flow (vph)	42	148	102	65	745	59	16	47	1
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	0	0	167	804	0	64	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No
Lane Alignment	Right	Right	Left	Left	Left	Right	Left	Right	Right
Median Width(ft)					12		12		
Link Offset(ft)					0		0		
Crosswalk Width(ft)					16		16		
Two way Left Turn Lane									
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	9	9	15	15		9	15	9	9
Number of Detectors			1	1	0		1		
Detector Template									
Leading Detector (ft)			70	70	0		40		
Trailing Detector (ft)			0	0	0		0		
Detector 1 Position(ft)			0	0	180		0		
Detector 1 Size(ft)			70	70	6		40		
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel									
Detector 1 Extend (s)			0.0	0.0	0.0		0.0		
Detector 1 Queue (s)			0.0	0.0	0.0		0.0		
Detector 1 Delay (s)			0.0	0.0	0.0		0.0		
Turn Type			pm+pt	pm+pt	NA		Prot		
Protected Phases			5	5	2		9		
Permitted Phases			2	2					
Detector Phase			5	5			9		
Switch Phase									
Minimum Initial (s)			6.0	6.0	10.0		8.0		

Lanes, Volumes, Timings
103: S. Woodland & Warrensville Center & Byron

Recommended Countermeasures

Timing Plan: AM Peak (7:30)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL	NBT
Minimum Split (s)	11.0	11.0	50.0			50.0	11.0	50.0			11.0	35.0
Total Split (s)	11.0	11.0	50.0			50.0	11.0	50.0			11.0	35.0
Total Split (%)	9.2%	9.2%	41.7%			41.7%	9.2%	41.7%			9.2%	29.2%
Maximum Green (s)	6.0	6.0	45.0			45.0	6.0	45.0			6.0	30.0
Yellow Time (s)	3.0	3.0	3.0			3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	2.0	2.0	2.0			2.0	2.0	2.0			2.0	2.0
Lost Time Adjust (s)		0.0	0.0				0.0	0.0			0.0	0.0
Total Lost Time (s)		5.0	5.0				5.0	5.0			5.0	5.0
Lead/Lag	Lead	Lead	Lag			Lag	Lead	Lag			Lead	Lag
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0			3.0	4.0
Recall Mode	None	None	None			None	None	None			None	Max
Walk Time (s)			5.0			5.0		5.0				5.0
Flash Dont Walk (s)			40.0			40.0		40.0				25.0
Pedestrian Calls (#/hr)			0			0		0				0
Act Effect Green (s)		32.9	30.9				30.9	26.4			37.5	31.2
Actuated g/C Ratio		0.34	0.32				0.32	0.27			0.38	0.32
v/c Ratio		0.36	0.81				0.12	0.53			0.09	0.75
Control Delay		24.8	44.6				20.2	32.6			23.9	38.8
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		24.8	44.6				20.2	32.6			23.9	38.8
LOS		C	D				C	C			C	D
Approach Delay			40.9					31.9				38.4
Approach LOS			D					C				D
90th %ile Green (s)	6.0	6.0	45.0			45.0	6.0	45.0			6.0	30.0
90th %ile Term Code	Max	Max	Max			Hold	Max	Hold			Max	MaxR
70th %ile Green (s)	6.0	6.0	37.7			37.7	6.0	37.7			6.0	30.0
70th %ile Term Code	Max	Max	Gap			Hold	Max	Hold			Max	MaxR
50th %ile Green (s)	6.0	6.0	32.3			21.3	0.0	21.3			0.0	30.0
50th %ile Term Code	Max	Max	Gap			Hold	Skip	Hold			Skip	MaxR
30th %ile Green (s)	6.0	6.0	27.3			16.3	0.0	16.3			0.0	30.0
30th %ile Term Code	Max	Max	Hold			Gap	Skip	Gap			Skip	MaxR
10th %ile Green (s)	0.0	0.0	16.3			16.3	0.0	16.3			0.0	30.0
10th %ile Term Code	Skip	Skip	Gap			Hold	Skip	Hold			Skip	MaxR
Stops (vph)		54	334				13	327			16	591
Fuel Used(gal)		2	11				0	11			0	16
CO Emissions (g/hr)		143	781				33	740			27	1108
NOx Emissions (g/hr)		28	152				6	144			5	216
VOC Emissions (g/hr)		33	181				8	171			6	257
Dilemma Vehicles (#)		0	18				0	20			0	36
Queue Length 50th (ft)		41	227				10	132			8	228
Queue Length 95th (ft)		74	391				26	178			31	#445
Internal Link Dist (ft)			520					546				1009
Turn Bay Length (ft)		350					420				215	
Base Capacity (vph)		261	781				207	1531			257	1051
Starvation Cap Reductn		0	0				0	0			0	0
Spillback Cap Reductn		0	0				0	0			0	0
Storage Cap Reductn		0	0				0	0			0	0
Reduced v/c Ratio		0.36	0.54				0.12	0.30			0.09	0.75

Lanes, Volumes, Timings
103: S. Woodland & Warrensville Center & Byron

Recommended Countermeasures

Timing Plan: AM Peak (7:30)

									
Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SWL	SWR	SWR2
Minimum Split (s)			11.0	11.0	35.0		13.0		
Total Split (s)			11.0	11.0	35.0		13.0		
Total Split (%)			9.2%	9.2%	29.2%		10.8%		
Maximum Green (s)			6.0	6.0	30.0		8.0		
Yellow Time (s)			3.0	3.0	3.0		3.0		
All-Red Time (s)			2.0	2.0	2.0		2.0		
Lost Time Adjust (s)				0.0	0.0		0.0		
Total Lost Time (s)				5.0	5.0		5.0		
Lead/Lag			Lead	Lead	Lag				
Lead-Lag Optimize?									
Vehicle Extension (s)			3.0	3.0	4.0		3.0		
Recall Mode			None	None	Max		None		
Walk Time (s)					5.0				
Flash Dont Walk (s)					25.0				
Pedestrian Calls (#/hr)					0				
Act Effect Green (s)				41.0	39.0		8.3		
Actuated g/C Ratio				0.42	0.40		0.09		
v/c Ratio				0.73	0.57		0.47		
Control Delay				47.1	30.8		60.9		
Queue Delay				0.0	0.0		0.0		
Total Delay				47.1	30.8		60.9		
LOS				D	C		E		
Approach Delay					33.6		60.9		
Approach LOS					C		E		
90th %ile Green (s)			6.0	6.0	30.0		8.0		
90th %ile Term Code			Max	Max	MaxR		Max		
70th %ile Green (s)			6.0	6.0	30.0		8.0		
70th %ile Term Code			Max	Max	MaxR		Max		
50th %ile Green (s)			6.0	6.0	41.0		8.0		
50th %ile Term Code			Max	Max	Hold		Max		
30th %ile Green (s)			6.0	6.0	41.0		8.0		
30th %ile Term Code			Max	Max	Hold		Max		
10th %ile Green (s)			6.0	6.0	41.0		0.0		
10th %ile Term Code			Max	Max	Hold		Skip		
Stops (vph)				87	542		53		
Fuel Used(gal)				4	16		1		
CO Emissions (g/hr)				255	1117		102		
NOx Emissions (g/hr)				50	217		20		
VOC Emissions (g/hr)				59	259		24		
Dilemma Vehicles (#)				0	37		0		
Queue Length 50th (ft)				63	187		38		
Queue Length 95th (ft)				#207	#434		#110		
Internal Link Dist (ft)					1278		967		
Turn Bay Length (ft)				140					
Base Capacity (vph)				228	1412		137		
Starvation Cap Reductn				0	0		0		
Spillback Cap Reductn				0	0		0		
Storage Cap Reductn				0	0		0		
Reduced v/c Ratio				0.73	0.57		0.47		

Lanes, Volumes, Timings
103: S. Woodland & Warrensville Center & Byron

Recommended Countermeasures

Timing Plan: AM Peak (7:30)

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 97.5

Natural Cycle: 120

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 36.6

Intersection LOS: D

Intersection Capacity Utilization 83.4%

ICU Level of Service E

Analysis Period (min) 15

90th %ile Actuated Cycle: 120

70th %ile Actuated Cycle: 112.7

50th %ile Actuated Cycle: 96.3

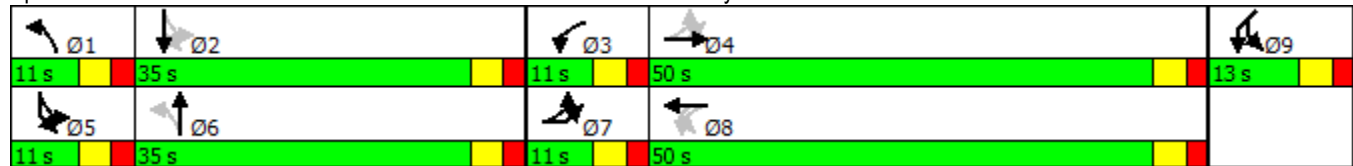
30th %ile Actuated Cycle: 91.3

10th %ile Actuated Cycle: 67.3

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 103: S. Woodland Rd & Warrensville Center Rd & Byron Dr

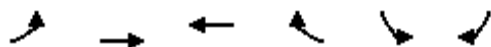


Lanes, Volumes, Timings

3: Shaker Blvd WB

Recommended Countermeasures

Timing Plan: PM Peak (5:00)



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑			↑
Traffic Volume (vph)	0	0	357	220	0	6
Future Volume (vph)	0	0	357	220	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Frt			0.943			0.865
Flt Protected						
Satd. Flow (prot)	0	0	3371	0	0	1627
Flt Permitted						
Satd. Flow (perm)	0	0	3371	0	0	1627
Link Speed (mph)		30	30		30	
Link Distance (ft)		1861	257		81	
Travel Time (s)		42.3	5.8		1.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	1%	1%	1%	1%
Adj. Flow (vph)	0	0	388	239	0	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	627	0	0	7
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Stop	Free		Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 26.9%

ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
16: South Park Blvd

Recommended Countermeasures
Timing Plan: PM Peak (5:00)

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	2	4	210	10	0	4
Future Volume (vph)	2	4	210	10	0	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.910					0.865
Flt Protected	0.984			0.954		
Satd. Flow (prot)	1684	0	0	1795	0	1627
Flt Permitted	0.984			0.954		
Satd. Flow (perm)	1684	0	0	1795	0	1627
Link Speed (mph)	20			30	15	
Link Distance (ft)	1728			81	70	
Travel Time (s)	58.9			1.8	3.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	2	4	228	11	0	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	6	0	0	239	0	4
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	22.2%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
21: Shaker Blvd EB

Recommended Countermeasures
Timing Plan: PM Peak (5:00)

						
Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	836	18	0	0	0	55
Future Volume (vph)	836	18	0	0	0	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt	0.997					0.865
Flt Protected						
Satd. Flow (prot)	3564	0	0	1863	0	1627
Flt Permitted						
Satd. Flow (perm)	3564	0	0	1863	0	1627
Link Speed (mph)	35			30	30	
Link Distance (ft)	1875			232	83	
Travel Time (s)	36.5			5.3	1.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	2%	2%	0%	1%
Adj. Flow (vph)	909	20	0	0	0	60
Shared Lane Traffic (%)						
Lane Group Flow (vph)	929	0	0	0	0	60
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	33.8%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
101: Shaker WB & Warrensville Center

Recommended Countermeasures
Timing Plan: PM Peak (5:00)

												
Lane Group	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	92	463	68	3	56	831	50	2	766	44	30	14
Future Volume (vph)	92	463	68	3	56	831	50	2	766	44	30	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		230		125		0	0		0	0	0
Storage Lanes	0		1		1		0	0		0	1	1
Taper Length (ft)	25				25			25			25	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00
Frt			0.850			0.992			0.992			0.850
Flt Protected		0.992			0.950						0.950	
Satd. Flow (prot)	0	3546	1598	0	1787	3544	0	0	3546	0	1752	1599
Flt Permitted		0.992			0.266				0.954		0.950	
Satd. Flow (perm)	0	3546	1598	0	500	3544	0	0	3383	0	1752	1599
Right Turn on Red				Yes						Yes		
Satd. Flow (RTOR)			76						7			76
Link Speed (mph)		35				35			35		25	
Link Distance (ft)		1892				683			2003		1031	
Travel Time (s)		36.9				13.3			39.0		28.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	3%	1%	1%	2%	1%	1%	1%	3%	1%
Adj. Flow (vph)	100	503	74	3	61	903	54	2	833	48	33	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	603	77	0	61	957	0	0	883	0	33	24
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	1 veh
Lane Alignment	Left	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)		0				12			12		24	
Link Offset(ft)		0				0			0		0	
Crosswalk Width(ft)		16				16			16		16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	9	15		9	15		9	15	9
Number of Detectors	1	1	1		1	0		1	0		1	1
Detector Template	Left		Right		Left			Left				
Leading Detector (ft)	20	40	20		20	0		20	0		40	40
Trailing Detector (ft)	0	0	0		0	0		0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0		0	0		0	0
Detector 1 Size(ft)	20	40	20		20	6		20	6		40	40
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Turn Type	Split	NA	Perm		Perm	NA		Perm	NA		Prot	Prot
Protected Phases	3	3				2			2		4	4
Permitted Phases			3		2			2			4	4
Detector Phase	3	3	3		2	2		2	2		4	4
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0
Minimum Split (s)	22.0	22.0	22.0		29.0	29.0		29.0	29.0		22.0	22.0

Lanes, Volumes, Timings
101: Shaker WB & Warrensville Center

Recommended Countermeasures
Timing Plan: PM Peak (5:00)



Lane Group	SWR2
Lane Configurations	
Traffic Volume (vph)	8
Future Volume (vph)	8
Ideal Flow (vphpl)	1900
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Heavy Vehicles (%)	1%
Adj. Flow (vph)	9
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	

Lanes, Volumes, Timings
101: Shaker WB & Warrensville Center

Recommended Countermeasures

Timing Plan: PM Peak (5:00)

												
Lane Group	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR
Total Split (s)	30.0	30.0	30.0		48.0	48.0		48.0	48.0		22.0	22.0
Total Split (%)	30.0%	30.0%	30.0%		48.0%	48.0%		48.0%	48.0%		22.0%	22.0%
Maximum Green (s)	25.0	25.0	25.0		43.0	43.0		43.0	43.0		17.0	17.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0			0.0		0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	5.0			5.0		5.0	5.0
Lead/Lag	Lead	Lead	Lead								Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Recall Mode	None	None	None		C-Max	C-Max		C-Max	C-Max		None	None
Walk Time (s)	5.0	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)	12.0	12.0	12.0		17.0	17.0		17.0	17.0		12.0	12.0
Pedestrian Calls (#/hr)	0	0	0		0	0		0	0		0	0
Act Effect Green (s)		21.9	21.9		59.1	59.1			59.1		10.0	10.0
Actuated g/C Ratio		0.22	0.22		0.59	0.59			0.59		0.10	0.10
v/c Ratio		0.78	0.19		0.21	0.46			0.44		0.19	0.11
Control Delay		43.9	8.5		4.1	3.1			14.0		44.2	0.9
Queue Delay		0.0	0.0		0.0	0.0			0.0		0.0	0.0
Total Delay		43.9	8.5		4.1	3.1			14.0		44.2	0.9
LOS		D	A		A	A			B		D	A
Approach Delay		39.9				3.1			14.0		26.0	
Approach LOS		D				A			B		C	
90th %ile Green (s)	25.0	25.0	25.0		50.0	50.0		50.0	50.0		10.0	10.0
90th %ile Term Code	Max	Max	Max		Coord	Coord		Coord	Coord		Min	Min
70th %ile Green (s)	24.9	24.9	24.9		50.1	50.1		50.1	50.1		10.0	10.0
70th %ile Term Code	Gap	Gap	Gap		Coord	Coord		Coord	Coord		Min	Min
50th %ile Green (s)	22.9	22.9	22.9		52.1	52.1		52.1	52.1		10.0	10.0
50th %ile Term Code	Gap	Gap	Gap		Coord	Coord		Coord	Coord		Min	Min
30th %ile Green (s)	20.0	20.0	20.0		70.0	70.0		70.0	70.0		0.0	0.0
30th %ile Term Code	Gap	Gap	Gap		Coord	Coord		Coord	Coord		Skip	Skip
10th %ile Green (s)	16.9	16.9	16.9		73.1	73.1		73.1	73.1		0.0	0.0
10th %ile Term Code	Gap	Gap	Gap		Coord	Coord		Coord	Coord		Skip	Skip
Stops (vph)		504	13		6	89			444		29	0
Fuel Used(gal)		16	1		0	6			17		1	0
CO Emissions (g/hr)		1142	83		26	389			1215		45	14
NOx Emissions (g/hr)		222	16		5	76			236		9	3
VOC Emissions (g/hr)		265	19		6	90			282		10	3
Dilemma Vehicles (#)		27	0		0	35			41		0	0
Queue Length 50th (ft)		188	1		4	36			181		20	0
Queue Length 95th (ft)		244	36		m7	46			245		50	0
Internal Link Dist (ft)		1812				603			1923		951	
Turn Bay Length (ft)			230		125							
Base Capacity (vph)		886	456		295	2093			2000		297	334
Starvation Cap Reductn		0	0		0	0			0		0	0
Spillback Cap Reductn		0	0		0	0			0		0	0
Storage Cap Reductn		0	0		0	0			0		0	0
Reduced v/c Ratio		0.68	0.17		0.21	0.46			0.44		0.11	0.07

Lanes, Volumes, Timings
101: Shaker WB & Warrensville Center

Recommended Countermeasures
Timing Plan: PM Peak (5:00)

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow, Master Intersection

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 16.7

Intersection LOS: B

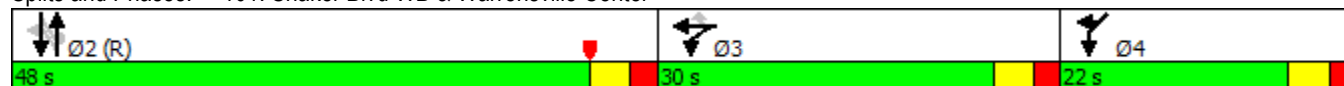
Intersection Capacity Utilization 82.8%

ICU Level of Service E

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 101: Shaker Blvd WB & Warrensville Center





Lane Group	SWR2
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	
90th %ile Term Code	
70th %ile Green (s)	
70th %ile Term Code	
50th %ile Green (s)	
50th %ile Term Code	
30th %ile Green (s)	
30th %ile Term Code	
10th %ile Green (s)	
10th %ile Term Code	
Stops (vph)	
Fuel Used(gal)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lanes, Volumes, Timings
102: Warrensville Center & Fayette & Shaker EB

Recommended Countermeasures
Timing Plan: PM Peak (5:00)



Lane Group	EBL	EBT	EBR2	NBT	NBR	SBL2	SBT	NWL2	NWL	NWR	NWR2
Lane Configurations		↑↑		↑↑		↑	↑↑		↑		
Traffic Volume (vph)	87	735	69	816	49	116	772	3	0	34	8
Future Volume (vph)	87	735	69	816	49	116	772	3	0	34	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0				0				0	0	
Storage Lanes	0				0				1	0	
Taper Length (ft)	25								25		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00
Frt		0.988		0.992					0.873		
Flt Protected		0.995				0.950			0.997		
Satd. Flow (prot)	0	3514	0	3546	0	1787	3574	0	1637	0	0
Flt Permitted		0.995				0.152			0.997		
Satd. Flow (perm)	0	3514	0	3546	0	286	3574	0	1637	0	0
Right Turn on Red			Yes								Yes
Satd. Flow (RTOR)		153							153		
Link Speed (mph)		35		35			35		25		
Link Distance (ft)		232		1358			683		883		
Travel Time (s)		4.5		26.5			13.3		24.1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	0%	1%	1%
Adj. Flow (vph)	95	799	75	887	53	126	839	3	0	37	9
Shared Lane Traffic (%)											
Lane Group Flow (vph)	0	969	0	940	0	126	839	0	49	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Left	Left	Right	Right
Median Width(ft)		0		12			18		12		
Link Offset(ft)		0		0			0		0		
Crosswalk Width(ft)		16		16			16		16		
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9		9	15		15	15	9	9
Number of Detectors	1	1		0		1	0	1	1		
Detector Template	Left							Left			
Leading Detector (ft)	20	50		0		60	0	20	50		
Trailing Detector (ft)	0	0		0		0	0	0	0		
Detector 1 Position(ft)	0	0		0		0	0	0	0		
Detector 1 Size(ft)	20	50		6		60	6	20	50		
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0		0.0		0.0	0.0	0.0	0.0		
Turn Type	Perm	NA		NA		pm+pt	NA	Perm	Prot		
Protected Phases		4		2		1	1 2		3		
Permitted Phases	4					1 2		3			
Detector Phase	4	4		2		1		3	3		
Switch Phase											
Minimum Initial (s)	6.0	6.0		21.0		6.0		6.0	6.0		
Minimum Split (s)	39.0	39.0		33.0		11.0		12.0	12.0		

Lanes, Volumes, Timings
102: Warrensville Center & Fayette & Shaker EB

Recommended Countermeasures

Timing Plan: PM Peak (5:00)



Lane Group	EBL	EBT	EBR2	NBT	NBR	SBL2	SBT	NWL2	NWL	NWR	NWR2
Total Split (s)	39.0	39.0		37.0		12.0		12.0	12.0		
Total Split (%)	39.0%	39.0%		37.0%		12.0%		12.0%	12.0%		
Maximum Green (s)	34.0	34.0		30.0		7.0		7.0	7.0		
Yellow Time (s)	3.0	3.0		3.0		3.0		3.0	3.0		
All-Red Time (s)	2.0	2.0		4.0		2.0		2.0	2.0		
Lost Time Adjust (s)		0.0		0.0		0.0			0.0		
Total Lost Time (s)		5.0		7.0		5.0			5.0		
Lead/Lag	Lead	Lead		Lag		Lead		Lag	Lag		
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0		3.0		3.0		3.0	3.0		
Recall Mode	None	None		C-Max		None		None	None		
Walk Time (s)	5.0	5.0		5.0				0.0	0.0		
Flash Dont Walk (s)	25.0	25.0		21.0				0.0	0.0		
Pedestrian Calls (#/hr)	0	0		0				0	0		
Act Effect Green (s)		30.1		36.1		46.1	51.1		6.0		
Actuated g/C Ratio		0.30		0.36		0.46	0.51		0.06		
v/c Ratio		0.83		0.73		0.50	0.46		0.20		
Control Delay		34.0		34.0		29.0	11.4		1.9		
Queue Delay		0.0		0.0		0.0	0.0		0.0		
Total Delay		34.0		34.0		29.0	11.4		1.9		
LOS		C		C		C	B		A		
Approach Delay		34.0		34.0			13.7		1.9		
Approach LOS		C		C			B		A		
90th %ile Green (s)	34.0	34.0		30.0		8.0		6.0	6.0		
90th %ile Term Code	Max	Max		Coord		Max		Min	Min		
70th %ile Green (s)	34.0	34.0		30.0		8.0		6.0	6.0		
70th %ile Term Code	Max	Max		Coord		Max		Min	Min		
50th %ile Green (s)	30.9	30.9		31.6		9.5		6.0	6.0		
50th %ile Term Code	Gap	Gap		Coord		Gap		Min	Min		
30th %ile Green (s)	28.2	28.2		35.6		8.2		6.0	6.0		
30th %ile Term Code	Gap	Gap		Coord		Gap		Min	Min		
10th %ile Green (s)	23.4	23.4		53.3		6.3		0.0	0.0		
10th %ile Term Code	Gap	Gap		Coord		Gap		Skip	Skip		
Stops (vph)		691		721		79	259		0		
Fuel Used(gal)		13		20		2	8		0		
CO Emissions (g/hr)		898		1391		129	527		25		
NOx Emissions (g/hr)		175		271		25	103		5		
VOC Emissions (g/hr)		208		322		30	122		6		
Dilemma Vehicles (#)		42		42		0	35		0		
Queue Length 50th (ft)		255		292		29	96		0		
Queue Length 95th (ft)		318		#412		m90	116		0		
Internal Link Dist (ft)		152		1278			603		803		
Turn Bay Length (ft)						75					
Base Capacity (vph)		1295		1280		254	1826		256		
Starvation Cap Reductn		0		0		0	0		0		
Spillback Cap Reductn		0		0		0	0		0		
Storage Cap Reductn		0		0		0	0		0		
Reduced v/c Ratio		0.75		0.73		0.50	0.46		0.19		

Lanes, Volumes, Timings
102: Warrensville Center & Fayette & Shaker EB

Recommended Countermeasures
Timing Plan: PM Peak (5:00)

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 87 (87%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 26.8

Intersection LOS: C

Intersection Capacity Utilization 78.9%

ICU Level of Service D

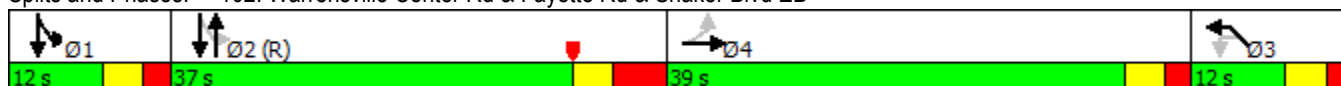
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 102: Warrensville Center Rd & Fayette Rd & Shaker Blvd EB



Lanes, Volumes, Timings

103: S. Woodland & Warrensville Center & Byron

Recommended Countermeasures

Timing Plan: PM Peak (5:00)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL	WBT	WBR	WBR2	NBL	NBT	NBR
Lane Configurations												
Traffic Volume (vph)	41	24	259	45	77	36	333	57	3	25	777	13
Future Volume (vph)	41	24	259	45	77	36	333	57	3	25	777	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	10	10	10	12	12	12
Storage Length (ft)		350		0		420		475		215		0
Storage Lanes		1		0		1		0		1		0
Taper Length (ft)		25				25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	0.95	0.95
Frt			0.952				0.977				0.978	
Flt Protected		0.950				0.950				0.950		
Satd. Flow (prot)	0	1658	1671	0	0	1668	3259	0	0	1787	3488	0
Flt Permitted		0.384				0.230				0.129		
Satd. Flow (perm)	0	670	1671	0	0	404	3259	0	0	243	3488	0
Right Turn on Red				No						No		
Satd. Flow (RTOR)												
Link Speed (mph)			35				35				35	
Link Distance (ft)			600				626				1089	
Travel Time (s)			11.7				12.2				21.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	8%
Adj. Flow (vph)	45	26	282	49	84	39	362	62	3	27	845	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	71	415	0	0	39	427	0	0	27	994	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)			10				10				18	
Link Offset(ft)			0				0				0	
Crosswalk Width(ft)			16				16				16	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	9	15		9	9	15		9
Number of Detectors	1	1	1			1	1			1	0	
Detector Template	Left											
Leading Detector (ft)	20	75	40			75	40			70	0	
Trailing Detector (ft)	0	25	0			25	0			0	0	
Detector 1 Position(ft)	0	25	0			25	0			0	180	
Detector 1 Size(ft)	20	50	40			50	40			70	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0			0.0	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0			0.0	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0			0.0	0.0			0.0	0.0	
Turn Type	pm+pt	pm+pt	NA			pm+pt	NA			pm+pt	NA	
Protected Phases	7	7	4			3	8			1	6	
Permitted Phases	4	4				8				6		
Detector Phase	7	7	4			3	8			1		
Switch Phase												
Minimum Initial (s)	6.0	6.0	10.0			6.0	10.0			6.0	10.0	

Lanes, Volumes, Timings

103: S. Woodland & Warrensville Center & Byron

Recommended Countermeasures

Timing Plan: PM Peak (5:00)

									
Lane Group	NBR2	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations									
Traffic Volume (vph)	124	84	22	846	54	2	31	28	1
Future Volume (vph)	124	84	22	846	54	2	31	28	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12
Storage Length (ft)			140		0		0	0	
Storage Lanes			1		0		1	0	
Taper Length (ft)			25				25		
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt				0.991			0.938		
Flt Protected			0.950				0.974		
Satd. Flow (prot)	0	0	1787	3542	0	0	1696	0	0
Flt Permitted			0.108				0.974		
Satd. Flow (perm)	0	0	203	3542	0	0	1696	0	0
Right Turn on Red					No				No
Satd. Flow (RTOR)									
Link Speed (mph)				35			25		
Link Distance (ft)				1358			1047		
Travel Time (s)				26.5			28.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	1%	1%	1%	1%	1%	4%	1%
Adj. Flow (vph)	135	91	24	920	59	2	34	30	1
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	0	115	979	0	0	67	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No
Lane Alignment	Right	Left	Left	Left	Right	Left	Left	Right	Right
Median Width(ft)				12			12		
Link Offset(ft)				0			0		
Crosswalk Width(ft)				16			16		
Two way Left Turn Lane									
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	9	15	15		9	15	15	9	9
Number of Detectors		1	1	0		1	1		
Detector Template						Left			
Leading Detector (ft)		70	70	0		20	40		
Trailing Detector (ft)		0	0	0		0	0		
Detector 1 Position(ft)		0	0	180		0	0		
Detector 1 Size(ft)		70	70	6		20	40		
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		
Detector 1 Channel									
Detector 1 Extend (s)		0.0	0.0	0.0		0.0	0.0		
Detector 1 Queue (s)		0.0	0.0	0.0		0.0	0.0		
Detector 1 Delay (s)		0.0	0.0	0.0		0.0	0.0		
Turn Type		pm+pt	pm+pt	NA		Prot	Prot		
Protected Phases		5	5	2		9	9		
Permitted Phases		2	2						
Detector Phase		5	5			9	9		
Switch Phase									
Minimum Initial (s)		6.0	6.0	10.0		8.0	8.0		

Lanes, Volumes, Timings
103: S. Woodland & Warrensville Center & Byron

Recommended Countermeasures
Timing Plan: PM Peak (5:00)

												
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL	WBT	WBR	WBR2	NBL	NBT	NBR
Minimum Split (s)	11.0	11.0	50.0			11.0	50.0			11.0	35.0	
Total Split (s)	11.0	11.0	50.0			11.0	50.0			11.0	35.0	
Total Split (%)	9.2%	9.2%	41.7%			9.2%	41.7%			9.2%	29.2%	
Maximum Green (s)	6.0	6.0	45.0			6.0	45.0			6.0	30.0	
Yellow Time (s)	3.0	3.0	3.0			3.0	3.0			3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0			2.0	2.0			2.0	2.0	
Lost Time Adjust (s)		0.0	0.0			0.0	0.0			0.0	0.0	
Total Lost Time (s)		5.0	5.0			5.0	5.0			5.0	5.0	
Lead/Lag	Lead	Lead	Lag			Lead	Lag			Lead	Lag	
Lead-Lag Optimize?						Yes				Yes		
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0			3.0	4.0	
Recall Mode	None	None	None			None	None			None	Max	
Walk Time (s)			5.0				5.0				5.0	
Flash Dont Walk (s)			40.0				40.0				25.0	
Pedestrian Calls (#/hr)			0				0				0	
Act Effect Green (s)		33.1	30.0			32.1	27.6			37.5	31.3	
Actuated g/C Ratio		0.34	0.30			0.33	0.28			0.38	0.32	
v/c Ratio		0.25	0.82			0.18	0.47			0.14	0.90	
Control Delay		22.0	46.5			21.2	31.2			25.0	47.9	
Queue Delay		0.0	0.0			0.0	0.0			0.0	0.0	
Total Delay		22.0	46.5			21.2	31.2			25.0	47.9	
LOS		C	D			C	C			C	D	
Approach Delay			42.9				30.4				47.3	
Approach LOS			D				C				D	
90th %ile Green (s)	6.0	6.0	44.3			6.0	44.3			6.0	30.0	
90th %ile Term Code	Max	Max	Gap			Max	Hold			Max	MaxR	
70th %ile Green (s)	6.0	6.0	36.1			6.0	36.1			6.0	30.0	
70th %ile Term Code	Max	Max	Gap			Max	Hold			Max	MaxR	
50th %ile Green (s)	6.0	6.0	31.1			6.0	31.1			6.0	30.0	
50th %ile Term Code	Max	Max	Gap			Max	Hold			Max	MaxR	
30th %ile Green (s)	6.0	6.0	26.3			0.0	15.3			0.0	30.0	
30th %ile Term Code	Max	Max	Hold			Skip	Gap			Skip	MaxR	
10th %ile Green (s)	0.0	0.0	15.9			0.0	15.9			0.0	30.0	
10th %ile Term Code	Skip	Skip	Gap			Skip	Hold			Skip	MaxR	
Stops (vph)		38	332			22	300			18	725	
Fuel Used(gal)		1	11			1	10			0	22	
CO Emissions (g/hr)		103	786			55	687			32	1506	
NOx Emissions (g/hr)		20	153			11	134			6	293	
VOC Emissions (g/hr)		24	182			13	159			7	349	
Dilemma Vehicles (#)		0	18			0	19			0	42	
Queue Length 50th (ft)		30	265			16	124			11	~360	
Queue Length 95th (ft)		58	382			37	167			35	#600	
Internal Link Dist (ft)			520				546				1009	
Turn Bay Length (ft)		350				420				215		
Base Capacity (vph)		287	794			211	1549			190	1105	
Starvation Cap Reductn		0	0			0	0			0	0	
Spillback Cap Reductn		0	0			0	0			0	0	
Storage Cap Reductn		0	0			0	0			0	0	
Reduced v/c Ratio		0.25	0.52			0.18	0.28			0.14	0.90	

Lanes, Volumes, Timings
103: S. Woodland & Warrensville Center & Byron

Recommended Countermeasures

Timing Plan: PM Peak (5:00)

									
Lane Group	NBR2	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Minimum Split (s)		11.0	11.0	35.0		13.0	13.0		
Total Split (s)		11.0	11.0	35.0		13.0	13.0		
Total Split (%)		9.2%	9.2%	29.2%		10.8%	10.8%		
Maximum Green (s)		6.0	6.0	30.0		8.0	8.0		
Yellow Time (s)		3.0	3.0	3.0		3.0	3.0		
All-Red Time (s)		2.0	2.0	2.0		2.0	2.0		
Lost Time Adjust (s)			0.0	0.0			0.0		
Total Lost Time (s)			5.0	5.0			5.0		
Lead/Lag		Lead	Lead	Lag					
Lead-Lag Optimize?									
Vehicle Extension (s)		3.0	3.0	4.0		3.0	3.0		
Recall Mode		None	None	Max		None	None		
Walk Time (s)				5.0					
Flash Dont Walk (s)				25.0					
Pedestrian Calls (#/hr)				0					
Act Effect Green (s)			40.1	36.9			8.3		
Actuated g/C Ratio			0.41	0.37			0.08		
v/c Ratio			0.63	0.74			0.47		
Control Delay			42.1	37.1			61.1		
Queue Delay			0.0	0.0			0.0		
Total Delay			42.1	37.1			61.1		
LOS			D	D			E		
Approach Delay				37.7			61.1		
Approach LOS				D			E		
90th %ile Green (s)		6.0	6.0	30.0		8.0	8.0		
90th %ile Term Code		Max	Max	MaxR		Max	Max		
70th %ile Green (s)		6.0	6.0	30.0		8.0	8.0		
70th %ile Term Code		Max	Max	MaxR		Max	Max		
50th %ile Green (s)		6.0	6.0	30.0		8.0	8.0		
50th %ile Term Code		Max	Max	MaxR		Max	Max		
30th %ile Green (s)		6.0	6.0	41.0		8.0	8.0		
30th %ile Term Code		Max	Max	Hold		Max	Max		
10th %ile Green (s)		6.0	6.0	41.0		0.0	0.0		
10th %ile Term Code		Max	Max	Hold		Skip	Skip		
Stops (vph)			62	665			55		
Fuel Used(gal)			2	21			2		
CO Emissions (g/hr)			169	1443			107		
NOx Emissions (g/hr)			33	281			21		
VOC Emissions (g/hr)			39	335			25		
Dilemma Vehicles (#)			0	42			0		
Queue Length 50th (ft)			50	346			45		
Queue Length 95th (ft)			#150	#582			#112		
Internal Link Dist (ft)				1278			967		
Turn Bay Length (ft)			140						
Base Capacity (vph)			182	1325			143		
Starvation Cap Reductn			0	0			0		
Spillback Cap Reductn			0	0			0		
Storage Cap Reductn			0	0			0		
Reduced v/c Ratio			0.63	0.74			0.47		

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 98.7

Natural Cycle: 120

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 41.0 Intersection LOS: D

Intersection Capacity Utilization 85.3% ICU Level of Service E

Analysis Period (min) 15

90th %ile Actuated Cycle: 119.3

70th %ile Actuated Cycle: 111.1

50th %ile Actuated Cycle: 106.1

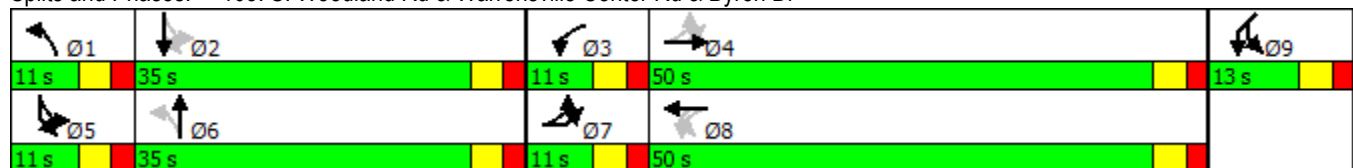
30th %ile Actuated Cycle: 90.3

10th %ile Actuated Cycle: 66.9

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 103: S. Woodland Rd & Warrensville Center Rd & Byron Dr



APPENDIX F:
COST ESTIMATES

Shaker Boulevard Westbound/ Warrensville Center Road Recommended Countermeasures						
Cost Estimate						
ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE ESTIMATED DOLLARS I CTS	TOTAL AMOUNT EST. DOLLARS I CTS
		ROADWAY				
202	23000	PAVEMENT REMOVED	SQ YD	1,811	\$ 12.00	\$ 21,733.33
202	30000	WALK REMOVED	SQ FT	600	\$ 4.00	\$ 2,400.00
202	32000	CURB REMOVED	FT	820	\$ 10.00	\$ 8,200.00
608	10001	4" CONCRETE WALK, AS PER PLAN	SQ FT	2,000	\$ 4.00	\$ 8,000.00
608		CURB RAMP, TYPE A2, B1, B2, B3, AS PER PLAN	EACH	8	\$ 1,200.00	\$ 9,600.00
609	26001	CURB, TYPE 6, AS PER PLAN	FT	815	\$ 18.00	\$ 14,670.00
SECTION TOTAL ROADWAY :					\$	64,603.33
		PAVEMENT				
		FULL DEPTH FLEXIBLE PAVEMENT	SQ YD	20	\$ 80.00	\$ 1,600.00
SECTION TOTAL PAVEMENT :					\$	1,600.00
		DRAINAGE				
202	58500	CATCH BASIN ABANDONED	EACH	2	\$ 1,000.00	\$ 2,000.00
605	14020	6" BASE PIPE UNDERDRAIN WITH GEOTEXTILE FABRIC	FT	815	\$ 12.00	\$ 9,780.00
611	04600	12 CONDUIT, TYPE C	FT	200	\$ 50.00	\$ 10,000.00
611	98180	CATCH BASIN NO. 3A	EACH	4	\$ 1,500.00	\$ 6,000.00
611	99654	MANHOLE ADJUSTED TO GRADE	EACH	1	\$ 500.00	\$ 500.00
SECTION TOTAL DRAINAGE :					\$	28,280.00
		EROSION CONTROL				
832	30000	EROSION CONTROL	EACH	3,000	\$ 1.00	\$ 3,000.00
SECTION TOTAL EROSION CONTROL:					\$	3,000.00
		TRAFFIC CONTROL				
630	79500	SIGN SUPPORT ASSEMBLY, POLE MOUNTED	EACH	3	\$ 150.00	\$ 450.00
630		GROUND MOUNTED SIGN COMPLETE	EACH	12	\$ 160.00	\$ 1,920.00
630	84900	REMOVAL OF GROUND MOUNTED SIGN AND DISPOSAL	EACH	6	\$ 25.00	\$ 150.00
630	86002	REMOVAL OF GROUND MOUNTED POST SUPPORT AND DISPOSAL	EACH	6	\$ 25.00	\$ 150.00
630	87400	REMOVAL OF OVERHEAD SIGN AND DISPOSAL	EACH	5	\$ 200.00	\$ 1,000.00
632	26501	DETECTOR LOOP, AS PER PLAN	EACH	2	\$ 2,000.00	\$ 4,000.00
632		SIGNAL HEAD WORK (REMOVE, ADJUST LOCATION)	EACH	3	\$ 300.00	\$ 900.00
632		SYSTEM TIMING	LUMP			\$ 400.00
632		REMOVAL OF PEDESTRIAN SIGNAL HEAD	EACH	2	\$ 250.00	\$ 500.00
632		New Ped Head/ Pedestal/Push Button Complete	EACH	3	\$ 2,500.00	\$ 7,500.00
646		PAVEMENT MARKINGS	LUMP			\$ 5,000.00
646	50100	PAVEMENT MARKING REMOVED	FT	262	\$ 5.00	\$ 1,310.00
SECTION TOTAL TRAFFIC CONTROL:					\$	23,280.00
		MISCELLANEOUS				
614		MAINTENANCE OF TRAFFIC	LUMP			\$ 10,000.00
623	10001	CONSTRUCTION LAYOUT STAKES AND SURVEYING, AS PER PLAN	LUMP			\$ 2,500.00
624	10001	MOBILIZATION, AS PER PLAN	LUMP			\$ 5,000.00
SPECIAL		PROJECT DVD RECORDING (REFER TO PROPOSAL NOTES IN THE BID PACKAGE)	LUMP			\$ 1,000.00
SECTION TOTAL MISCELLANEOUS :					\$	18,500.00
PROJECT TOTAL					\$	139,263.33
ENGINEERING & SURVEY					\$	30,000.00
PROJECT CONTINGENCY (10%)					\$	13,926.33
PRELIMINARY GRAND TOTAL ESTIMATED:					\$	183,189.67

Shaker Boulevard Eastbound/ Warrensville Center Road Recommended Countermeasures						
Cost Estimate						
ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE ESTIMATED DOLLARS I CTS	TOTAL AMOUNT EST. DOLLARS I CTS
		ROADWAY				
202	23000	PAVEMENT REMOVED	SQ YD	503	\$ 12.00	\$ 6,040.00
202	30000	WALK REMOVED	SQ FT	300	\$ 4.00	\$ 1,200.00
202	32000	CURB REMOVED	FT	500	\$ 10.00	\$ 5,000.00
608	10001	4" CONCRETE WALK, AS PER PLAN	SQ FT	950	\$ 4.00	\$ 3,800.00
608		CURB RAMP, TYPE A2, B1, B2, B3, AS PER PLAN	EACH	6	\$ 1,200.00	\$ 7,200.00
609	26001	CURB, TYPE 6, AS PER PLAN	FT	590	\$ 18.00	\$ 10,620.00
SECTION TOTAL ROADWAY :					\$	33,860.00
		PAVEMENT				
		FULL DEPTH FLEXIBLE PAVEMENT	SQ YD	18	\$ 80.00	\$ 1,440.00
SECTION TOTAL PAVEMENT :					\$	1,440.00
		DRAINAGE				
202	58500	CATCH BASIN ABANDONED	EACH	2	\$ 1,000.00	\$ 2,000.00
605	14020	6" BASE PIPE UNDERDRAIN WITH GEOTEXTILE FABRIC	FT	590	\$ 12.00	\$ 7,080.00
611	04600	12 CONDUIT, TYPE C	FT	100	\$ 50.00	\$ 5,000.00
611	98180	CATCH BASIN NO. 3A	EACH	2	\$ 1,500.00	\$ 3,000.00
SECTION TOTAL DRAINAGE :					\$	17,080.00
		EROSION CONTROL				
832	30000	EROSION CONTROL	EACH	2,000	\$ 1.00	\$ 2,000.00
SECTION TOTAL EROSION CONTROL :					\$	2,000.00
		TRAFFIC CONTROL				
630	79500	SIGN SUPPORT ASSEMBLY, POLE MOUNTED	EACH	3	\$ 150.00	\$ 450.00
630		GROUND MOUNTED SIGN COMPLETE	EACH	8	\$ 160.00	\$ 1,280.00
630	84900	REMOVAL OF GROUND MOUNTED SIGN AND DISPOSAL	EACH	5	\$ 25.00	\$ 125.00
630	86002	REMOVAL OF GROUND MOUNTED POST SUPPORT AND DISPOSAL	EACH	5	\$ 25.00	\$ 125.00
631		REMOVE AND RESET SIGN FLASHER ASSEMBLY	EACH	1	\$ 3,000.00	\$ 3,000.00
632	26501	DETECTOR LOOP, AS PER PLAN	EACH	2	\$ 2,000.00	\$ 4,000.00
632		MAST ARM SIGNAL SUPPORT AND FOUNDATION REMOVED	LUMP			\$ 5,000.00
632		SYSTEM TIMING	LUMP			\$ 400.00
632		REMOVAL OF PEDESTRIAN SIGNAL HEAD	EACH	2	\$ 250.00	\$ 500.00
632		New Ped Head/ Pedestal/ Push Button Complete	EACH	3	\$ 2,500.00	\$ 7,500.00
646		PAVEMENT MARKINGS	LUMP			\$ 3,000.00
SECTION TOTAL TRAFFIC CONTROL :					\$	25,380.00
		MISCELLANEOUS				
614		MAINTENANCE OF TRAFFIC	LUMP			\$ 6,000.00
623	10001	CONSTRUCTION LAYOUT STAKES AND SURVEYING, AS PER PLAN	LUMP			\$ 1,500.00
624	10001	MOBILIZATION, AS PER PLAN	LUMP			\$ 3,000.00
SPECIAL		PROJECT DVD RECORDING (REFER TO PROPOSAL NOTES IN THE BID PACKAGE)	LUMP			\$ 1,000.00
SECTION TOTAL MISCELLANEOUS :					\$	11,500.00
PROJECT TOTAL					\$	91,260.00
ENGINEERING & SURVEY					\$	30,000.00
PROJECT CONTINGENCY (10%)					\$	9,126.00
PRELIMINARY GRAND TOTAL ESTIMATED:					\$	130,386.00

Warrensville Center Road/ South Woodland Road Recommended Countermeasures						
Cost Estimate						
ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE ESTIMATED DOLLARS I CTS	TOTAL AMOUNT EST. DOLLARS I CTS
ROADWAY						
202	23000	PAVEMENT REMOVED	SQ YD	400	\$ 15.00	\$ 6,000.00
202	30000	WALK REMOVED	SQ FT	200	\$ 4.00	\$ 800.00
202	32000	CURB REMOVED	FT	250	\$ 10.00	\$ 2,500.00
608	10001	4" CONCRETE WALK, AS PER PLAN	SQ FT	500	\$ 6.00	\$ 3,000.00
608		CURB RAMP, TYPE A2, B1, B2, B3, AS PER PLAN	EACH	3	\$ 1,200.00	\$ 3,600.00
609	26001	CURB, TYPE 6, AS PER PLAN	FT	300	\$ 20.00	\$ 6,000.00
SECTION TOTAL ROADWAY :					\$	21,900.00
PAVEMENT						
		FULL DEPTH FLEXIBLE PAVEMENT	SQ YD	10	\$ 80.00	\$ 800.00
SECTION TOTAL PAVEMENT :					\$	800.00
DRAINAGE						
202	58500	CATCH BASIN ABANDONED	EACH	2	\$ 1,000.00	\$ 2,000.00
611	14020	6" BASE PIPE UNDERDRAIN WITH GEOTEXTILE FABRIC	FT	300	\$ 12.00	\$ 3,600.00
611	04600	12 CONDUIT, TYPE C	FT	160	\$ 50.00	\$ 8,000.00
611	98180	CATCH BASIN NO. 3A	EACH	2	\$ 1,500.00	\$ 3,000.00
SECTION TOTAL DRAINAGE :					\$	16,600.00
EROSION CONTROL						
832	30000	EROSION CONTROL	EACH	2,000	\$ 1.00	\$ 2,000.00
SECTION TOTAL EROSION CONTROL:					\$	2,000.00
TRAFFIC CONTROL						
630	79500	SIGN SUPPORT ASSEMBLY, POLE MOUNTED	EACH	2	\$ 150.00	\$ 300.00
630		GROUND MOUNTED SIGN COMPLETE	EACH	8	\$ 160.00	\$ 1,280.00
630	84900	REMOVAL OF GROUND MOUNTED SIGN AND DISPOSAL	EACH	1	\$ 25.00	\$ 25.00
630	86002	REMOVAL OF GROUND MOUNTED POST SUPPORT AND DISPOSAL	EACH	1	\$ 25.00	\$ 25.00
630	87400	REMOVAL OF OVERHEAD SIGN AND DISPOSAL	EACH	1	\$ 200.00	\$ 200.00
632	26501	DETECTOR LOOP, AS PER PLAN	EACH	4	\$ 2,000.00	\$ 8,000.00
632		SIGNAL HEAD WORK (REMOVE, ADJUST LOCATION)	EACH	5	\$ 300.00	\$ 1,500.00
632		SYSTEM TIMING	LUMP			\$ 800.00
632		SIGNAL CONTROLLER WITH CABINET	EACH	1	\$ 15,000.00	\$ 15,000.00
632		REMOVAL OF PEDESTRIAN SIGNAL HEAD	EACH	2	\$ 250.00	\$ 500.00
646		PAVEMENT MARKINGS (SOUTH WOODLAND)	LUMP			\$ 4,000.00
646	50100	PAVEMENT MARKING REMOVED	FT	480	\$ 5.00	\$ 2,400.00
SECTION TOTAL TRAFFIC CONTROL:					\$	34,030.00
MISCELLANEOUS						
614		MAINTENANCE OF TRAFFIC	LUMP			\$ 6,000.00
623	10001	CONSTRUCTION LAYOUT STAKES AND SURVEYING, AS PER PLAN	LUMP			\$ 1,500.00
624	10001	MOBILIZATION, AS PER PLAN	LUMP			\$ 3,000.00
SPECIAL		PROJECT DVD RECORDING (REFER TO PROPOSAL NOTES IN THE BID PACKAGE)	LUMP			\$ 1,000.00
SECTION TOTAL MISCELLANEOUS :					\$	11,500.00
PROJECT TOTAL					\$	86,830.00
ENGINEERING & SURVEY					\$	30,000.00
PROJECT CONTINGENCY (10%)					\$	8,683.00
PRELIMINARY GRAND TOTAL ESTIMATED:					\$	125,513.00