

Delaware Avenue Corridor Study

City of Marysville, Ohio

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Table of Contents

Introduction	1
Study Area	1
Data Collection	1
Traffic Volumes.....	3
Capacity Analysis	3
Charles Lane	8
Coleman's Crossing Boulevard.....	9
US 33 Eastbound Ramps.....	10
US 33 Westbound Ramps.....	11
Watkins Road/Square Drive	12
Five Points Alternatives	12
Signal Timing/Phasing	13
Turn Lane Additions	15
Roundabout.....	15
Fifth Street Realignment	17
Dunham Street Extension	17
Safety Improvements	20
Access Management.....	21
Pedestrian/Bicycle Connectivity	23
Signal System Timing.....	23
Recommendations	24

List of Figures

Figure 1	Study Area	2
Figure 2	2008 AM DHV	4
Figure 3	2008 PM DHV	5
Figure 4	2030 AM DHV	6
Figure 5	2030 PM DHV	7
Figure 6	Five Points Crash Diagram	14
Figure 7	Potential Five Points Roundabout.....	16
Figure 8	Potential Fifth Street Realignment	18
Figure 9	Potential Dunham Street Extensions	19
Figure 10	Potential Access Management Plan.....	22
Figure 11	Recommended Improvements	24

List of Tables

Table 1	Charles Lane Intersection LOS & Delays	8
Table 2	Coleman's Crossing Boulevard Intersection LOS & Delays.....	9
Table 3	US 33 Eastbound Ramps Intersection LOS & Delays	11
Table 4	US 33 Westbound Ramps Intersection LOS & Delays	11
Table 5	Watkins Road/Square Drive Intersection LOS & Delays.....	12
Table 6	Effects of Five Points Options on 2030 LOS & Delays.....	13

Appendix

Appendix A	Traffic Counts
Appendix B	HCS Reports
Appendix C	SimTraffic Reports
Appendix D	Signal Timing Plans

Introduction

The purpose of this study is to analyze and provide recommendations for the Delaware Avenue corridor in the eastern portion of Marysville, Ohio. Each of the signalized intersections in the corridor will be evaluated to determine what, if any, improvements are necessary for traffic to operate successfully over the next two decades. A particular focus of this study is the “Five Points” intersection, where Delaware Avenue, Columbus Avenue, Fifth Street, and Cherry Street meet at a common point. This study will develop and evaluate several alternatives for addressing congestion and safety issues at this unique intersection. Also included in this study is a signal warrant analysis of the Coleman’s Crossing Boulevard/Fifth Street intersection.

Study Area

The study area for this document includes Delaware Avenue from the Five Points intersection to the Watkins Road intersection. **Figure 1** shows a map of the study area. There are a total of six signals in the study area, including two at the US 33 freeway interchange. The other four signals are at the “Five Points” intersection (Cherry Street/Columbus Avenue), Charles Lane, Coleman’s Crossing Boulevard, and at Watkins Road. An at-grade CSX railroad crossing also exists on Delaware Avenue in the study area. Delaware Avenue is a commercial corridor, featuring primarily retail land uses. Delaware Avenue is a 3-lane roadway west of the Coleman’s Crossing Boulevard intersection, which includes a center two-way left turn lane. Numerous businesses have access points onto Delaware Avenue in this area. East of Coleman’s Crossing Boulevard, Delaware Avenue has two through lanes in each direction plus turn lanes and a wide median. No private access points exist on Delaware Avenue between Coleman’s Crossing Boulevard and Watkins Road. Delaware Avenue is signed as US 36 east of the US 33 freeway interchange and tapers down to a 2-lane rural roadway east of the Watkins Road intersection.

Data Collection

AM and PM peak hour turning movement counts were collected as part of this study. Based on 24-hour traffic count data provided by the City of Marysville, the AM peak hour was determined to be 7:00-8:00 AM and the PM peak hour was determined to be 4:30-5:30 PM. Weekday turning movement counts were taken at each signalized intersection during these hours. The counts were conducted during March 2008, at which time the Fifth Street at-grade railroad crossing was closed. After Fifth Street was reopened at the railroad crossing, additional turning movement counts were taken at the Five Points and the Coleman’s Crossing intersections. Copies of all count data are provided in **Appendix A**.

In addition to turning movement counts, the City of Marysville provided daily traffic count data on approach legs to the Coleman’s Crossing/Fifth Avenue intersection. These

Figure 1: Study Area



daily counts were conducted in June 2008, after the CSX crossing had been reopened. The City also provided the most recent three years of crash data (2005-2007) for the study area. Notable highlights of the crash data are discussed in the following sections on each individual intersection.

Traffic Volumes

Because the Fifth Street railroad crossing is anticipated to remain open in the future, the turning movement counts taken while Fifth Street was open were used for the capacity analyses in this document. The newer traffic counts showed approximately 100 peak hour vehicles (roughly 50 in each direction) diverted to East Fifth Street after the railroad crossing opened. These diverted vehicles were removed from the east-west through volumes at the Charles Lane intersection. (As drivers get more accustomed to this new connection, traffic volumes could increase on Fifth Street. Future monitoring of Fifth Street is recommended for a potential signal warrant at Coleman's Crossing Boulevard.)

The turning movement counts were compiled and smoothed to obtain 2008 AM and PM volumes for the study area. The appropriate ODOT Seasonal Adjustment factor of 0.975 was applied to the smoothed count data, resulting in average weekday peak hour volumes. An ODOT Design Hourly Volume (DHV) factor of 1.21 was applied to the data to obtain design hour traffic for 2008. To develop design year (2030) traffic, a linear growth rate of 1.5% per year was applied to the existing volumes. Using data from the Marysville Water Master Study, a 1.5% growth rate was developed in previous traffic studies as a growth rate for the city. Because this corridor features retail uses that draw traffic from all parts of the city (e.g., Wal-Mart and Best Buy), this projected citywide growth rate is reasonable to use for this study. The resulting 2008 and 2030 traffic volumes are provided on **Figures 2-5**.

Capacity Analysis

Capacity analyses were performed for each intersection using Highway Capacity Software (HCS+) and Synchro/SimTraffic software. The HCS program is primarily used to evaluate the performance of individual signals and does not take into account the interaction and queuing from adjacent signals. Synchro/SimTraffic is a traffic modeling program that does account for the effects of signal progression and interaction of closely spaced signals. HCS and Synchro/SimTraffic analyses were performed for the 2008 and 2030 AM and PM design hours with the existing intersection configurations. For a developed, urbanized area like the Delaware Avenue corridor, level-of-service (LOS) D is generally considered to be acceptable traffic operations. If an intersection was not predicted to operate at LOS D or better in the 2030 design year, recommended improvements were identified to achieve the desired level-of-service. Capacity analyses for these recommended configurations were performed using the 2030 design hour volumes. Copies of all HCS reports can be found in **Appendix B**, while copies of the SimTraffic reports are provided in **Appendix C**.



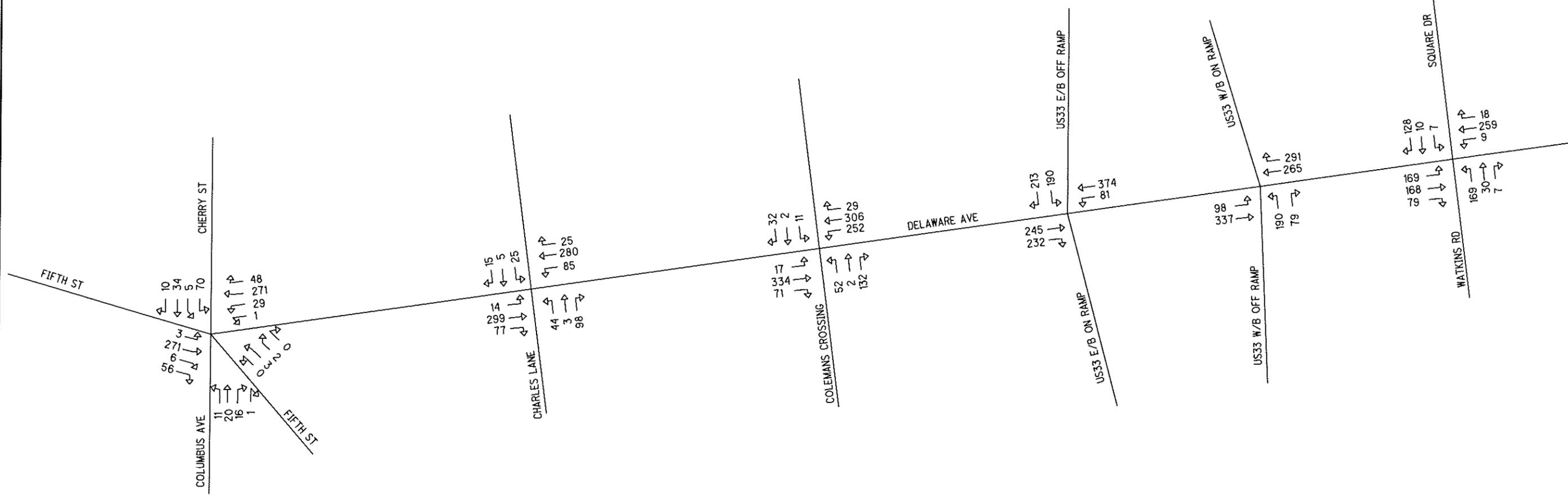


FIGURE 2

DELAWARE AVENUE CORRIDOR STUDY
 2008 AM DHV

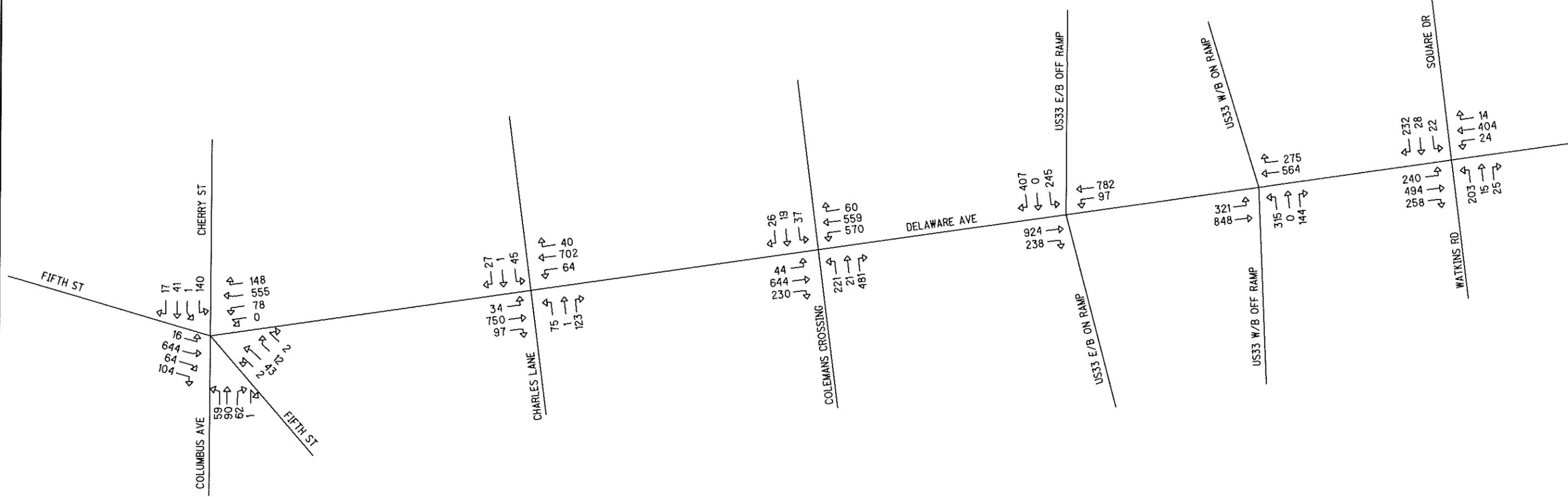


FIGURE 3

DELAWARE AVENUE CORRIDOR STUDY
2008 PM DHV



34" x 22"

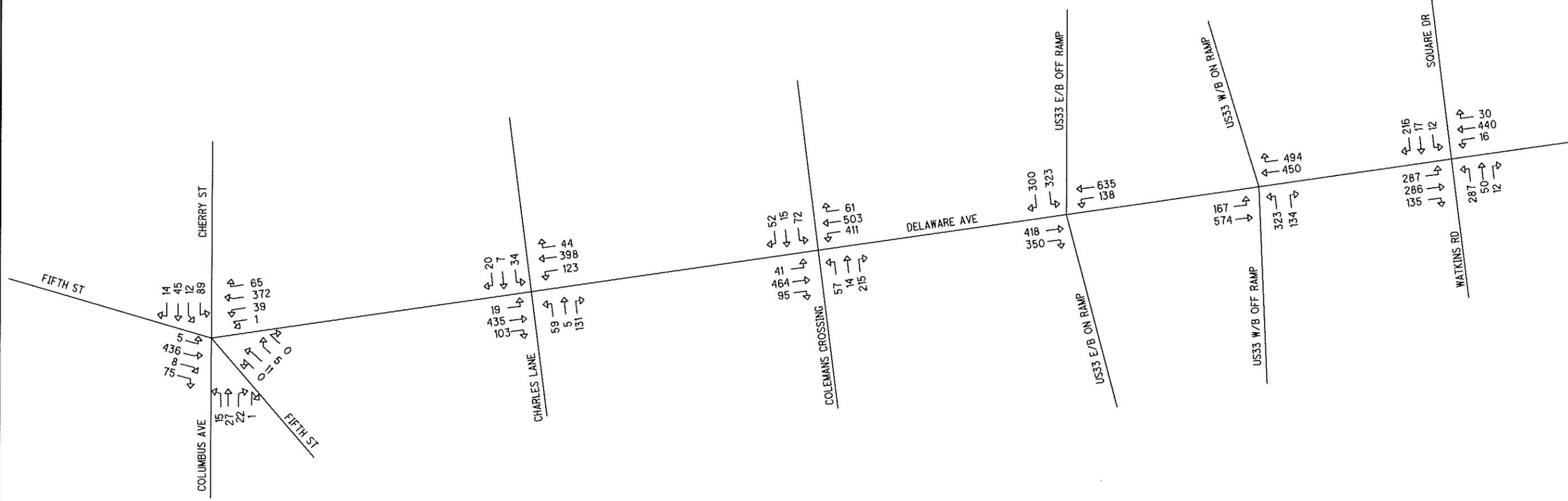
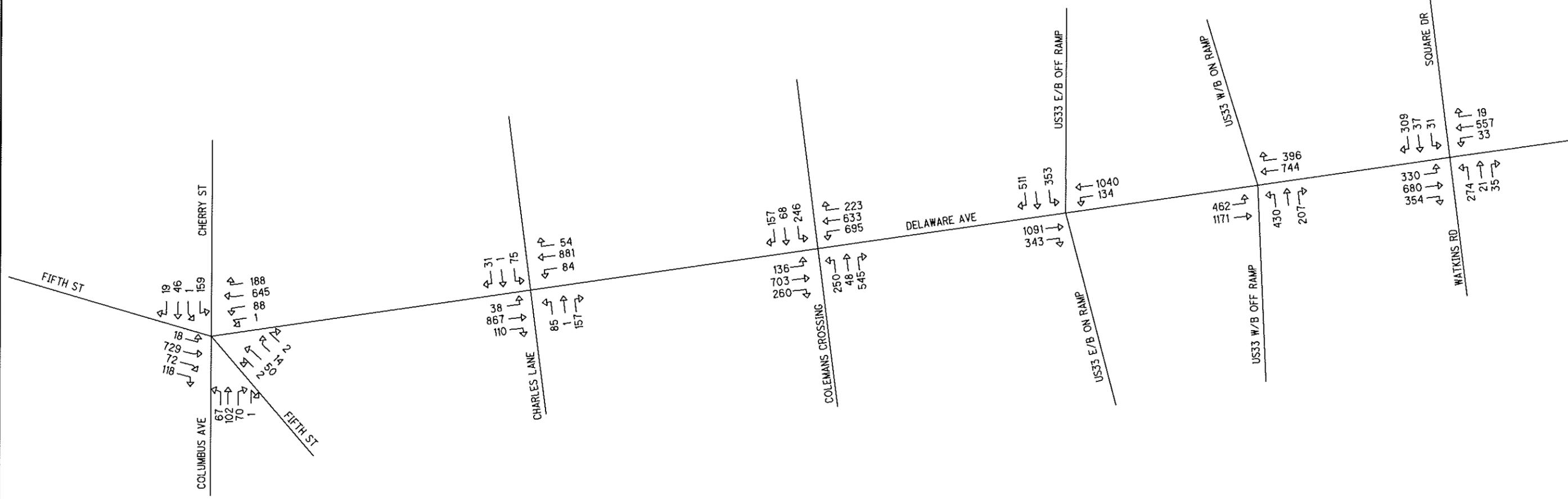


FIGURE 4

DELAWARE AVENUE CORRIDOR STUDY
2030 AM DHV



Because of the variability of individual SimTraffic simulations, a total of 10 SimTraffic runs were performed and averaged for each condition. It should be noted that SimTraffic results are based on the amount of delay vehicles experience waiting at a given intersection. If queuing from a signal extends into and beyond an adjacent intersection, the delays for these vehicles are included in the adjacent intersection’s LOS calculations. In the following tables, locations have been noted where this “shifting” of delays has occurred in the SimTraffic results.

Charles Lane

Table 1
Charles Lane Intersection LOS & Delays (in seconds)

		AM HCS	AM SimTraffic	PM HCS	PM SimTraffic
Existing Network EB: L, TR WB: L, TR NB: L, TR SB: L, TR	2008	C 20.3	A 9.7	C 26.2	C 20.0
	2030	C 20.8	B 10.5	C 32.3	C 20.3
Recommended Configuration EB: L, T, TR WB: L, TR NB: L, TR SB: L, TR	2030	C 20.7	B 10.9	C 25.5	C 22.5

The capacity analyses in **Table 1** show that this intersection will operate at LOS C or better through 2030. However, SimTraffic modeling shows that eastbound queues extend beyond the CSX railroad tracks and occasionally reach the Five Points Intersection. Crash reports indicate numerous rear-end collisions on eastbound Delaware Avenue between Five Points and Charles Lane, most likely resulting from queues at the Charles Lane or Coleman’s Crossing signal. Adding a second eastbound lane approaching this signal could reduce these queue lengths. While it would be ideal for Delaware Avenue to have five lanes east of the Five Points intersection, a smaller widening project would also achieve safety and operational benefits. Adding a second eastbound lane approximately 300 feet east of the CSX railroad tracks would substantially reduce eastbound queuing at the Charles Lane signal. This could be done without the cost of widening Delaware Avenue at or west of the railroad crossing.



Coleman’s Crossing Boulevard

Table 2
Coleman’s Crossing Boulevard Intersection LOS & Delays (in seconds)

		AM HCS	AM SimTraffic	PM HCS	PM SimTraffic
Existing Network EB: L, T, T, R WB: L, L, T, R NB: L, TR, R SB: L, TR	2008	C 20.1	B 15.1	C 30.8	C 32.8
	2030	C 23.1	B 20.1	D 44.1	E* 75.4
Recommended Configuration EB: L, T, T, R WB: L, L, T, R** NB: L, TR, R SB: L, TR	2030	C 20.4	B 18.1	C 33.1	D 42.7

*Westbound left turn queues extend into upstream intersections. SimTraffic includes these delays in the calculations for these other intersections.

**assumes that southbound Coleman’s Crossing is widened to extend the existing two receiving lanes so that westbound dual left turn lanes are loaded equally.

While the HCS analyses in **Table 2** show that the overall intersection will operate at LOS D or better through 2030, several movements are expected to operate at LOS E or LOS F. In addition, SimTraffic modeling predicts the intersection operating at LOS E in 2030, with westbound left turn queues extending into the US 33 interchange intersections, contributing to very poor operations at those locations. Field observations have noted westbound dual left turn lane queues extending back to the US 33 freeway ramps. This is primarily due to the uneven loading of the left turn lanes. The rightmost left turn lane has very few vehicles because the right lane of Coleman’s Crossing is tapered out less than 200 feet from the intersection. The second southbound lane of Coleman’s Crossing Boulevard will need to be extended in order for the intersection to operate acceptably. Traffic counts at the Coleman’s Crossing/Fifth Street intersection indicate that a low percentage (5%) of southbound vehicles turn onto Fifth Street or Charles Lane. Therefore, in order for the westbound dual left turn lanes to load evenly, the second southbound lane would need to extend to the Wal-Mart shopping center driveway. While not an ideal scenario because it would force left turns to be made from through lanes, it may be feasible to restripe the existing two-way left turn lane in this area to an additional southbound travel lane. This could be done as a short-term solution until a roadway widening project can be undertaken.



The northbound and southbound left turn lanes are offset from each other, making it difficult for drivers to see oncoming through vehicles. Analysis of crash data did not show a crash pattern involving northbound and southbound left turns. However, traffic at this intersection continues to grow, particularly on the newer southbound approach. This intersection should continue to be monitored to determine when or if the offset left turn condition will need to be modified. The best solution, if needed, would be to eliminate the median on the southbound approach, which would allow for the southbound left turn lane to be shifted directly across from the northbound left turn lane. In this scenario, the current southbound left turn lane would be restriped as a through lane, and the shared through/right turn lane would be restriped as an exclusive right turn lane. This would also allow for a future dual southbound left turn lane if left turn traffic volumes increased more than anticipated. Split-phase operation of the north-south approaches would improve safety and could preserve the existing median, but it would add considerable delays to the intersection and is not recommended.

An additional item for consideration at this intersection would be improved signage or pavement markings on the westbound approach. This is of particular concern because the leftmost through lane is forced off as a left turn lane. No advance signage or pavement markings indicate this condition until drivers get close to the intersection. It is recommended that advance signs, such as “Thru Traffic Keep Right” or overhead lane control signs, be installed just west of the US 33 westbound ramp intersection. Pavement markings could also be installed on the leftmost through lane to gain the attention of drivers.

US 33 Eastbound Ramps

The US 33 eastbound ramp has only one approach lane. By 2030, HCS analysis indicates that an additional lane will be needed to provide acceptable levels-of-service. One right turn lane and one left turn lane should be provided on the eastbound exit ramp approach to this intersection. No lane additions are expected to be necessary on the Delaware Avenue approaches to this intersection. However, it is recommended that a protected-permissive westbound left turn phase should be added. While 2008 intersection levels-of-service are good, HCS shows that the westbound left turn currently operates at LOS E. Addition of a left turn phase will allow the westbound left turn movement to operate at LOS D or better through 2030. The HCS and SimTraffic results are shown in **Table 3**.



Table 3
US 33 Eastbound Ramps Intersection LOS & Delays (in seconds)

		AM HCS	AM SimTraffic	PM HCS	PM SimTraffic
<i>Existing Network</i> EB: T, T, R WB: L, T, T SB: LR	2008	B 19.2	C 20.7	C 26.6	C 33.2
	2030	C 27.0	B 26.1	E 71.1	F 365.2*
<i>Recommended Configuration</i> EB: T, T, R WB: L, T, T SB: L, R	2030	B 19.5	B 17.1	C 27.8	C 29.7**

*Some of this delay can be attributed to queuing from the Coleman's Crossing intersection.

**Some of the delay reduction can be attributed to improvements assumed at Coleman's Crossing intersection (extending southbound receiving lanes).

US 33 Westbound Ramps

The US 33 westbound ramp currently contains only one approach lane at this intersection. The capacity analyses show that the intersection will degrade to LOS E operations by 2030. In order to obtain acceptable levels-of-service, two additional lanes will need to be constructed by 2030. Two left turn lanes and one right turn lane are anticipated to be necessary on the exit ramp. No changes are recommended for the Delaware Avenue approaches to this intersection. The results of the capacity analyses are shown in **Table 4**.

Table 4
US 33 Westbound Ramps Intersection LOS & Delays (in seconds)

		AM HCS	AM SimTraffic	PM HCS	PM SimTraffic
<i>Existing Network</i> EB: L, T, T WB: T, TR NB: LR	2008	B 19.9	B 15.3	C 28.7	C 31.4
	2030	C 25.6	C 20.5	E 76.7	F 280.8*
<i>Recommended Configuration</i> EB: L, T, T WB: T, TR NB: L, L, R	2030	B 19.5	B 14.5	C 28.3	D 39.3**

*Some of this delay can be attributed to queuing from the Coleman's Crossing intersection.

**Some of the delay reduction can be attributed to improvements assumed at Coleman's Crossing intersection (extending southbound receiving lanes).



Watkins Road/Square Drive

Table 5

Watkins Road/Square Drive Intersection LOS & Delays (in seconds)

		AM HCS	AM SimTraffic	PM HCS	PM SimTraffic
<i>Existing Network & Recommended Configuration</i> EB: L, T, TR WB: L, T, TR NB: L, TR SB: L, TR	2008	C 22.9	C 19.2	C 25.1	C 20.3
	2030	C 26.6	C 21.1	D 44.0	C 26.0

The capacity analyses in **Table 5** show that this intersection is expected to operate at LOS D or better through 2030. No improvements are expected to be necessary at this intersection. As noted in the Traffic Signal Study, the minor street left turn phases should optimally have second-car or third-car detection. This will help to reduce unnecessary signal phases during times of day with low traffic volumes. Currently, the Watkins Road or Square Drive left turn phases will activate when only one left turning vehicle is present on the approach.

Five Points Intersection

The Five Points intersection (Delaware Avenue & Cherry Street & Fifth Street & Columbus Avenue) is one of the most congested locations in the City of Marysville. As with most intersections containing greater than four approaches, the signal operations are not efficient because of the number of approaches that must be served. Even though the Five Points intersection does not have any exclusive turn phases, the signal still needs three phases to serve all vehicles. The eastbound and southwest-bound approaches (heaviest movements) are served in a common phase, then the Cherry Street and Columbus Street approaches are served in a common phase, and then the westbound Fifth Street approach has a phase.

The eastbound Fifth Street approach currently contains a shared lane for left turns onto Cherry Street and Delaware Avenue plus a shared lane for through Fifth Street traffic and right turn traffic onto Columbus Avenue. The southwest-bound Delaware Avenue approach has a lane for left turns onto either Fifth Street or Columbus Avenue, plus a shared through/right-turn lane. Southbound Cherry Street has a lane for left turns onto Delaware Avenue or Fifth Street, plus a shared through/right turn lane. Columbus Avenue has only one northbound approach lane. Fifth Street has only one westbound approach lane.



The current intersection design can also be confusing to motorists, with several streets intersecting at one point. The City of Marysville provided 2005-2007 crash data for the Five Points intersection area, which is summarized on **Figure 6**. The most prevalent crash patterns are rear-end collisions on Delaware Avenue and Fifth Street (more frequent in the eastbound direction), as well as left turn crashes into and out of the United Dairy Farmers driveway on Cherry Street.

Five options have been developed for the Five Points intersection to solve the capacity problems that exist today. Synchro/SimTraffic was used to analyze the effectiveness of these options. A total of 10 SimTraffic runs were performed for each option and averaged, with the results shown in **Table 6**. For simplicity, only the 2030 PM design hour (the most critical peak hour) was analyzed in Table 6. The AM design hour has much lower traffic volumes and is predicted to operate acceptably without any improvements in this corridor. Because some of the options effect the operations of adjacent intersections, these effects are also shown in Table 6. Each of the options shown in Table 6 is described in the paragraphs below.

Table 6

Effects of Five Points Options on 2030 PM LOS & Delays Using SimTraffic

(assuming improvements at other intersections in the Delaware Avenue corridor)

	Existing	Phasing & Timing	Turn Lanes	Round-about	No Fifth leg	Dunham Street (Phase 1)
Five Points	F 128.4	F 212.4	F 90.0	B* 13.0	E 57.4	C 28.3
Charles Lane & Delaware Avenue	C 20.3	C 20.9	C 25.1	C 25.1	C 30.4	C 24.6
Coleman's Crossing & Delaware Avenue	E 75.4	E 79.6	D 53.0	D 53.0	D 54.4	D 47.4
Total Network Delay (hrs.)	246.3	437.5	229.1	N/A	216.0	175.5

*SIDRA results

Signal Timing/Phasing

Signal timing and phasing improvements were investigated to see if Five Points operations could be improved without roadway construction or other more costly options. Eastbound and southwest-bound left turns are currently permissive operations. Thus, adding left turn phases for these movements would create more delays and would not be beneficial. Another possible phasing adjustment would be to split-phase the northbound and southbound movements. This may improve safety, although no crashes have been reported in the most recent three years involving northbound or southbound left turns. Without the benefit of crash reduction, split-phasing would only add delays to the



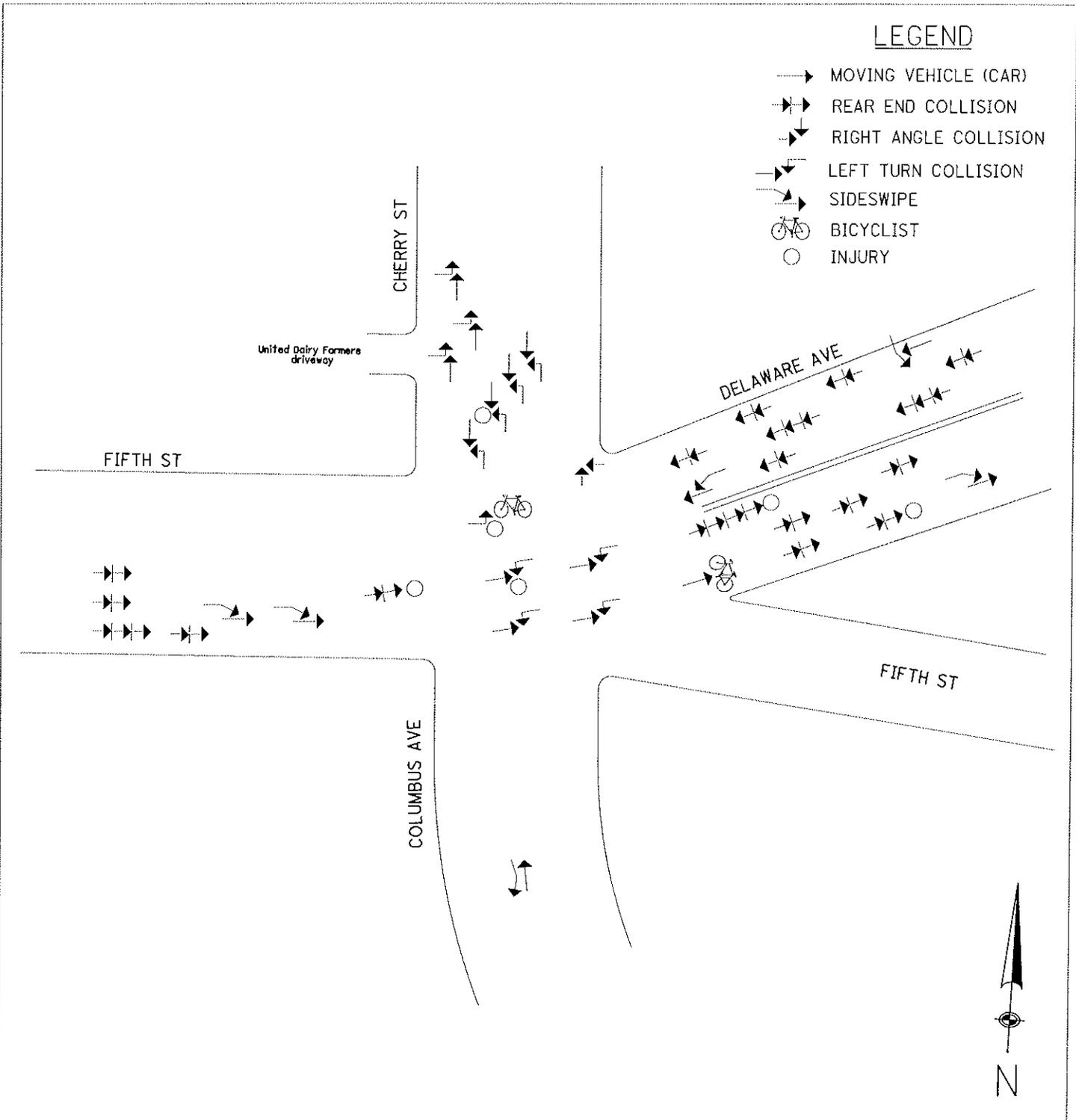
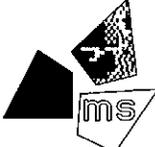


Figure 6
FIVE POINTS CRASH DIAGRAM
 (2005-2007)

DELAWARE AVENUE CORRIDOR STUDY
 Marysville, Ohio



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intersection. The results in Table 6, which include split-phasing and left turn phases, show these additional phases would be detrimental to intersection operations. Therefore, this option is not recommended for this intersection.

Turn Lane Additions

Given the current configuration of the intersection and the turning movement volumes, the turn lane additions that would provide the greatest benefit would be a southwest-bound right turn lane and a northbound left turn lane. Synchro analyses indicate that these two turn lanes would greatly reduce vehicle delays. Both turn lanes may also improve intersection safety. The westbound right turn lane might help reduce rear-end collisions, while the northbound left turn lane would help to prevent southbound left turn crashes into northbound through vehicles. However, the SimTraffic analysis showed the intersection would remain at LOS F in 2030. Therefore, turn lane additions alone will not solve the capacity problems at this intersection.

Roundabout

This alternative would replace the existing intersection design with a roundabout. Because HCS and Synchro/SimTraffic are not optimal tools for analysis of roundabouts, this alternative was analyzed using SIDRA software. The SIDRA analysis showed that a one-lane roundabout would not provide an acceptable level-of-service. The northbound, southbound, and southwest-bound approaches were predicted to operate at LOS E or worse during the 2030 PM peak. The only way to obtain LOS D or better through the design year would be to provide two circulating lanes around the majority of the roundabout plus a southwest-bound right turn lane, as shown in **Figure 7**. This would allow for more gaps for approaching vehicles to accept, thus improving the level-of-service. As seen on Figure 7, the roundabout alternative would require right-of-way from adjacent properties, with the greatest impact being on the parcel located between Columbus Avenue and the east leg of Fifth Street. It should be noted that the geometrics shown in Figure 7 represent the minimum possible impacts of the roundabout. If constructed, the approaches would likely be designed with curves to slow approaching traffic, thus requiring more right-of-way than implied by Figure 7. While this option does provide a good level-of-service, other options can provide acceptable traffic operations for less cost and right-of-way.

Because the concept shown in Figure 7 has two lanes through much of the roundabout, it might seem logical that a full two-lane roundabout should be considered. While a full two-lane roundabout would help to reduce southwest-bound queuing on Delaware Avenue, such a design would be impractical without improvements on the west leg of Fifth Street. As only one westbound lane enters and leaves the intersection currently, a second westbound departure lane would be necessary in order for the roundabout alternative to improve traffic flow in the westbound direction. This would also require widening of Delaware Avenue from the Five Points to the US 33 eastbound ramp





Figure 7
Potential Five Points Roundabout

intersection, in addition to widening or restriping Fifth Street west of the Five Points. If such widening projects were ever planned, a full two-lane roundabout would be a feasible and perhaps the best option for this intersection. However, until such projects are planned, a full two-lane roundabout is not practical at this location.

Fifth Street Realignment

Intersections with more than four approach legs are usually inefficient to operate because of the number of phases required to serve all the entering roadways. In this case, the Fifth Street approach has the lowest traffic volume, but receives its own exclusive signal phase. Removing the Fifth Street approach would allow the signal to be converted to two-phase operation. Fifth Street could be realigned west of the railroad tracks and connect to Columbus Avenue across from Dunham Street, as illustrated on **Figure 8**. While this would reduce the number of signal phases at the Five Points intersection, the total traffic volume would be nearly identical, as the majority of the westbound traffic on the realigned Fifth Street would be expected to turn right onto Columbus Avenue toward the Five Points. The SimTraffic analysis showed the Fifth Street Realignment would dramatically reduce delays, but Five Points would still operate at LOS E.

Dunham Street Extension

If Fifth Street were realigned to intersect Columbus Avenue across from Dunham Street, a western extension of Dunham Street could provide relief for the Five Points intersection. Traffic traveling between the residential south side of town and the Coleman's Crossing retail area could bypass the Five Points intersection by using this potential new roadway. In order to divert a substantial amount of traffic, Dunham Street would need to be extended to at least Chestnut Street. For optimal traffic operation at the Five Points, Dunham Street would be extended back to the Plum Street/Ninth Street intersection. An abandoned railroad alignment exists in this corridor that would be used as the roadway extension. The City of Marysville owns the right-of-way on this unoccupied corridor east of Vine Street. The corridor is privately owned west of Vine Street, but is largely unused, except for on the west side of Chestnut Street where it is used as part of an industrial site. **Figure 9** shows the potential corridor for Dunham Street extensions.

In the Synchro/SimTraffic analysis on Table 6, it was assumed that 100 vehicles in each direction would divert from the Delaware Avenue corridor onto the new Dunham Street extension if constructed. This would not only reduce traffic volumes from the Five Points intersection, but would reduce eastbound right turns and northbound left turns at the Delaware Avenue/Coleman's Crossing intersection. The assumption of 100 diverted vehicles is based on Dunham Street being extended only to Chestnut Street (labeled as Phase 1 on Figure 9). If Dunham Street were extended west to the Ninth Street/Plum Street intersection (labeled as Phase 2 on Figure 9), it is likely that even more traffic would divert from the Five Points intersection. With the Fifth Street Realignment and the





Phase 1 Dunham Street extension, Synchro/SimTraffic predicts Five Points would operate at LOS C through 2030. Given that Phase 1 alone would provide acceptable operations at Five Points, Phase 2 would not be worth the expense and disruption to property owners and businesses in the corridor. The Phase 2 extension should only be considered if the land needed for Phase 2 was vacated in the future. It is therefore recommended that Fifth Street Realignment be constructed and Dunham Street be extended west to Chestnut Street only (Phase 1).

Safety Improvements

In the three-year analysis period (2005-2007) of crash data, seven crashes involving vehicles turning left into or out of the United Dairy Farmers (UDF) driveway were reported. Most of the crashes occurred while traffic was queued in the southbound left turn lane at the Five Points signal and drivers attempted to turn into a gap in the queued traffic, only to be hit by moving traffic in another lane. Complicating this situation is the location of the UDF driveway, located on Cherry Street less than 100 feet north of the Five Points intersection. Due to the high number of crashes at this location, it is recommended that the UDF driveway be converted to right-in/right-out operation. (No crashes involving right turning vehicles were reported at this driveway.) Any vehicles that currently turn left into UDF can access the gas station via the Fifth Street driveway. Vehicles that currently turn left out of the UDF can turn right onto Fifth Street and circle the block via Vine Street and Fourth Street in order to access Cherry Street. Ideally, this driveway would also be located further away from the busy Five Points intersection. If the land use were to ever change on this site, it is recommended that the Cherry Street access point be relocated to the north edge of the parcel.

Another safety consideration would be the possibility of prohibiting eastbound left turns from Fifth Street onto Cherry Street. The eastbound approach to this intersection features a shared through/left turn lane, meaning that the left turns can block the much heavier through movement. This eastbound left turn movement has fewer than 20 peak hour vehicles, thus a turn prohibition would not disrupt many drivers. Furthermore, there are several alternate routes that eastbound-to-northbound could divert to if this movement were prohibited. Because few blockages are occurring today, this would not have a noticeable effect on the intersection level-of-service. The left turn prohibition would be primarily to prevent rear-end crashes and occasional delays.

Field observations have noted several near-collisions involving southbound vehicles not yielding to northbound through vehicles. There are two factors that contribute to southbound drivers having difficulty seeing northbound through vehicles. The curve just south of the intersection probably makes it challenging for southbound drivers to see approaching northbound traffic and to tell whether a vehicle has a turn signal on. Secondly, because the northbound approach only has one lane, southbound drivers may wrongly assume an approaching vehicle is about to turn left. A northbound through vehicle might suddenly go around a stopped left turning vehicle, surprising a southbound

driver who assumed it was safe to make a left turn. While elimination of the Columbus Avenue curve would likely have significant property impacts to several parcels, providing a northbound left turn lane may only impact one parcel. Additionally, the turn lane would benefit the Five Points intersection capacity. Because no crashes were documented in the last three years, construction of a northbound left turn lane is not a high priority. However, if actual crashes start to occur (instead of the observed near-collisions), a northbound left turn lane is recommended.

Access Management

The Delaware Avenue corridor was examined to identify access management solutions to implement in the study area. No driveways currently exist on Delaware Avenue in the study area east of Charles Lane. West of Charles Lane, numerous closely-spaced driveways are located on Delaware Avenue. Several properties have multiple access points that should be combined for optimal traffic operations. It is unreasonable to consolidate these driveways at this time. However, when properties redevelop in the corridor, sites with multiple access points on Delaware Avenue should be reduced to one driveway. There are two locations where driveways can be realigned with driveways or streets across Delaware Avenue. Another concern in the corridor is the presence of driveways near the CSX railroad crossing. The driveways immediately west of the railroad tracks can be eliminated or consolidated. The driveway east of the railroad tracks that serves the Ray Lewis & Son industrial property should not be eliminated unless the land use of the property changes. Even though Ray Lewis & Son has access to Cherry Street, it is not desirable to have truck traffic on Cherry Street and force trucks to make the hard turns at the Five Points intersection. Buerger Street also intersects Delaware Avenue in close proximity to the railroad tracks. Buerger Street could be closed north of Delaware Avenue to alleviate this situation, diverting traffic to Connolly Street. This may not be desirable because Connolly Street has a narrower street width and right-of-way than Buerger Street.

One possible access management solution for this corridor would be to remove the signal at the Charles Lane intersection, which is in close proximity to the Coleman's Crossing signal. Charles Lane could be converted to right-in/right-out operation and backage roads could funnel left turns to the Coleman's Crossing signal. However, the Coleman's Crossing signal is already predicted to operate at LOS D, with delays nearly at LOS E levels (55 seconds per vehicle is the upper limit for LOS D). Adding inbound and outbound left turn volume to this intersection would likely cause unacceptable operations. Therefore, converting Charles Lane to right-in/right-out operation is not recommended. On the south side of Delaware Avenue, a connection between Charles Lane and Fifth Street would be beneficial, especially if the Fifth Street Realignment is constructed.

Figure 10 shows an access management plan for the Delaware Avenue corridor. The items discussed in the previous two paragraphs have been incorporated into the plan. As

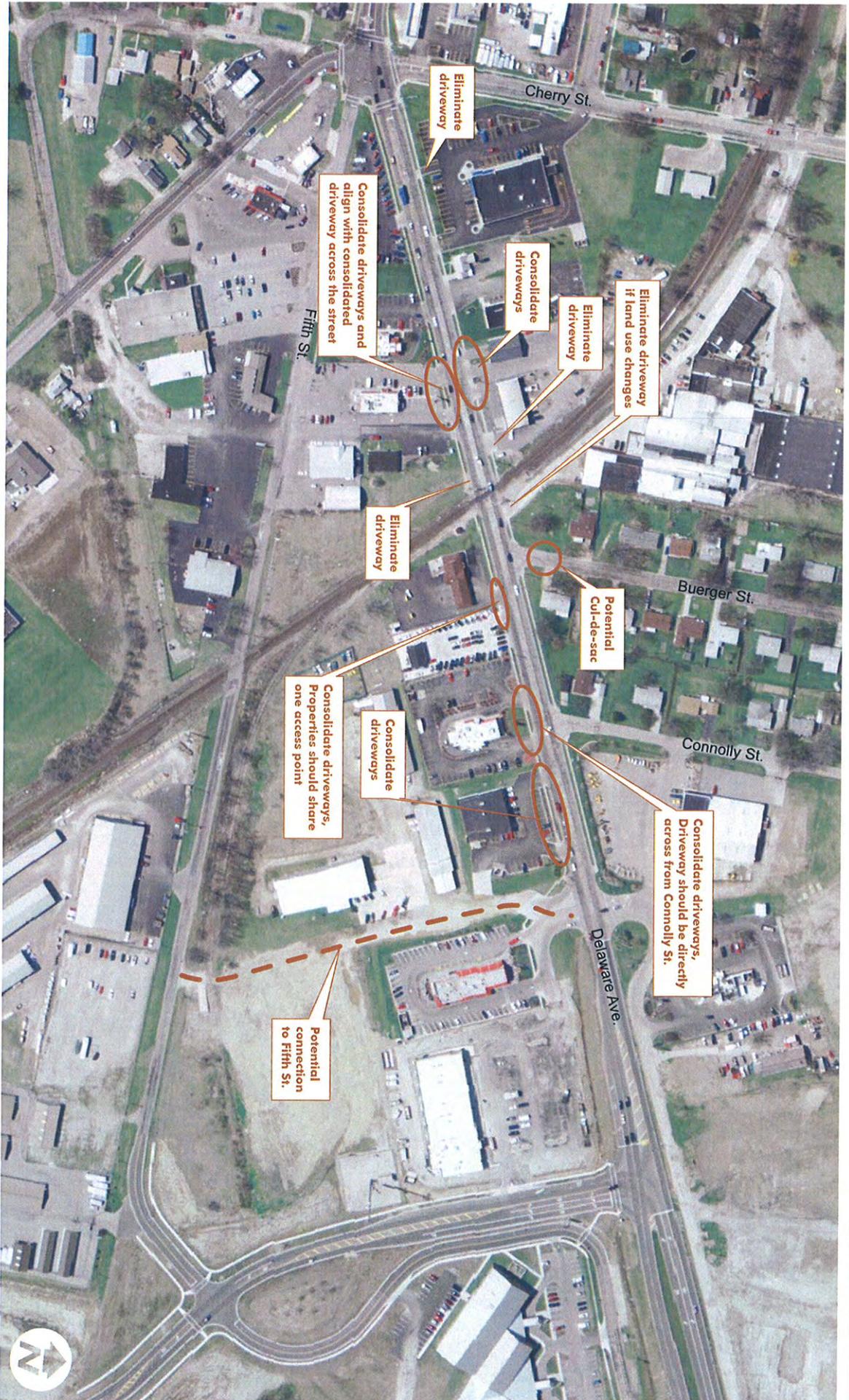


Figure 10
Potential Access Management Plan

previously noted, many of the recommendations are not reasonable to implement until properties redevelop in the corridor.

Pedestrian/Bicycle Connectivity

Sidewalks are presented throughout much of the Delaware Avenue corridor. On the south side of the street, sidewalks exist from Five Points to Charles Lane and from the US 33 eastbound ramps to Watkins Road. In between Charles Lane and the US 33 eastbound ramps, pedestrians can utilize sidewalks on the portions of Charles Lane that parallel Delaware Avenue. It is beneficial to have sidewalk located adjacent to the YMCA, which likely attracts pedestrian trips. However, any pedestrians traveling between Charles Lane and Coleman's Crossing have to walk through the Starbucks/Quizno's plaza parking lot. The section of Delaware Avenue between Charles Lane and Coleman's Crossing should have sidewalk installed adjacent to the south side of the street.

On the north side of the street, sidewalks exist from Five Points to Charles Lane and a short sidewalk segment exists just west of Coleman's Crossing Boulevard. Ideally, sidewalks should be present on both sides of Delaware Avenue. However, there is probably limited demand for pedestrian traffic on the north side of the street through the interchange and the westbound US 33 ramp interchange features a free-flow slip ramp that pedestrians would have to cross. If funding permits, sidewalks should be installed on the entirety length of north side of the street, but it is not necessarily a high priority.

From field observations, bicycle traffic does not currently appear to be a significant mode of travel in the Delaware Avenue corridor. The existing street does not have space for bike lanes to be provided. The existing right-of-way does not have room for a bicycle path in addition to the existing sidewalks. Many of the businesses in the corridor, particularly on the south side of the street, have parking lots that extend nearly to the sidewalk. The City of Marysville is currently developing a bicycle plan. If this corridor is identified as a location for future bicycle facilities (bike paths, bike lanes, etc.), then Delaware Avenue can be reevaluated to determine the best method of providing the recommendations.

Signal System Timing

Using the 2008 volumes, optimized signal timings were developed for the AM and PM peak hours. Currently, the signals in the corridor run on 100-second cycles. Based on optimization from Synchro, the best cycle length for the AM peak hour is 80 seconds. The cycle length for the PM peak hour is recommended to remain at 100 seconds. Synchro was then used to develop optimal intersection timing, phasing, and offsets. This optimization showed that the eastbound left turn phases at Coleman's Crossing and at the US 33 westbound ramp intersections should be lagging phases. The remaining left turn phases in the network should remain as leading left turn phases. **Appendix D** contains

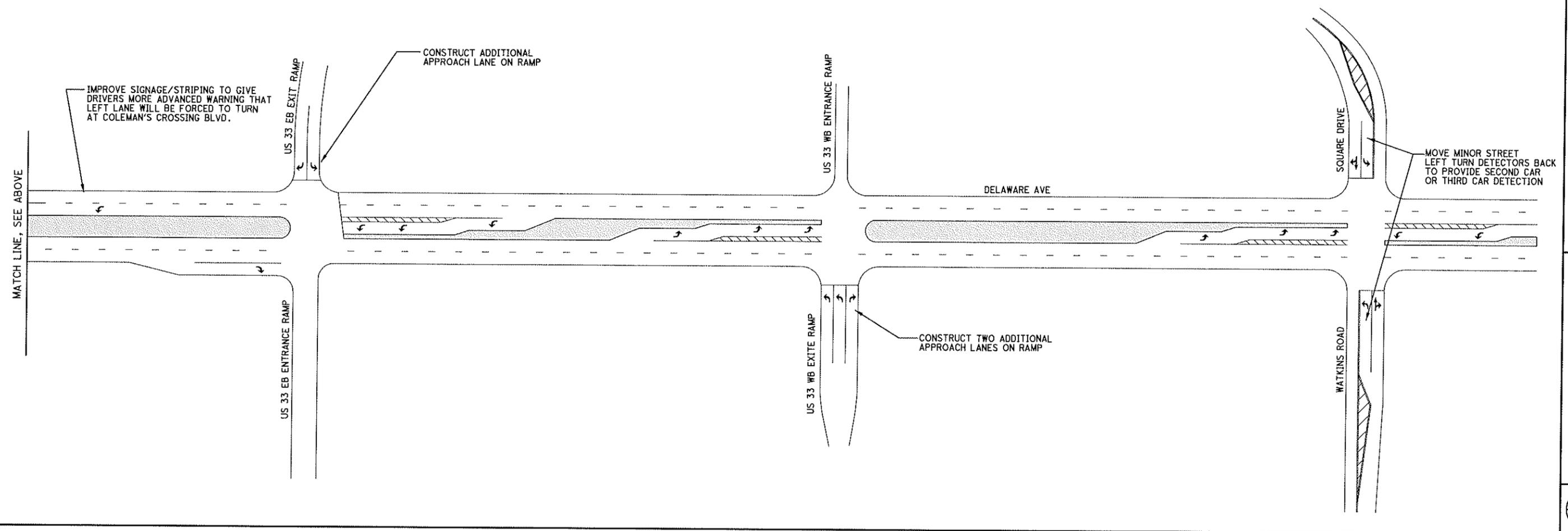
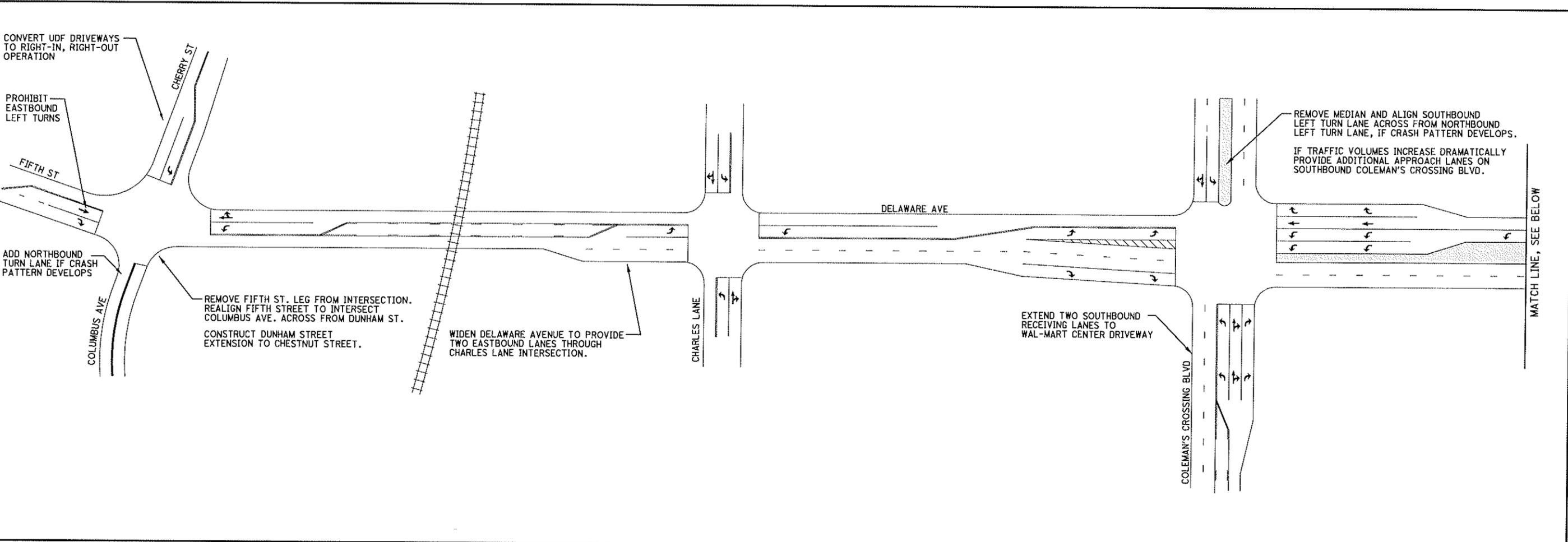
the recommended phase splits and offsets for each signal in the study area. Time-space diagrams are also provided in Appendix D. It should be noted that in some instances, the minor street through phases may not be long enough for pedestrians to cross Delaware Avenue. If the minor street pedestrian is called, the signal will have to briefly step out of coordination in order to allow for the proper pedestrian crossing time. Given the limited amount of pedestrian crossing activity in corridor, the signals would not be running uncoordinated often.

Recommendations

The following improvements are recommended for the Delaware Avenue corridor. Most of these recommendations can be found on **Figure 11**.

- Relocate northbound and southbound left turn detectors on Watkins Road to provide second-car or third-car detection for left turn phases
- Construct two additional approach lanes on US 33 westbound exit ramp
- Construct one additional approach lane on US 33 eastbound exit ramp
- Improve signage/pavement markings on westbound approach to Coleman's Crossing Boulevard intersection to warn of left lane being forced off
- Provide two southbound lanes on Coleman's Crossing Boulevard to Wal-Mart to allow for improved lane balance on westbound left turn lanes
- Monitor southbound Coleman's Crossing Boulevard approach traffic volumes and crashes
 - If a pattern of northbound or southbound left turn crashes develops, the southbound left turn lane should be realigned directly across from the northbound left turn lane (eliminating the median)
 - If traffic volumes increase on the southbound approach, the existing median should be used to provide an additional approach lane
- Widen Delaware Avenue to provide two eastbound lanes from approximately 300 feet east of the CSX railroad tracks to the existing two-lane eastbound section
- Implement Fifth Street Realignment, as shown in Figure 8
- Implement Phase 1 of Dunham Street Extension, as shown in Figure 9
- Convert United Dairy Farmers driveway on Cherry Street to right-in/right-out operation, and potentially move driveway north if future opportunity exists





DELAWARE AVENUE CORRIDOR STUDY
 RECOMMENDED IMPROVEMENTS

FIGURE 11



- Add northbound left turn lane on Columbus Avenue
- Prohibit eastbound left turns at Five Points intersection
- Implementation of access management, such as the plan provided on Figure 10, when properties redevelop in the Delaware Avenue corridor
- Construct sidewalk on south side of Delaware Avenue between Charles Lane and Coleman's Crossing intersections
- Implement signal timing and phasing changes as outlined in Appendix D

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Appendix A

Traffic Counts



ms consultants inc.
 2221 Schrock Road
 Columbus, OH 43229

Marysville Traffic Study
 Marysville, OH
 Weekday Peak Hours

File Name : Watkins
 Site Code : 00000000
 Start Date : 3/12/2008
 Page No : 1

Groups Printed- Passenger Cars - Trucks

Start Time	WATKINS RD Southbound					U S 36 Westbound					WATKINS RD Northbound					U S 36 Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	2	1	25	0	28	2	55	5	0	62	42	4	3	0	49	19	33	8	0	60	199
07:15 AM	4	2	37	0	43	1	48	3	0	52	36	4	0	0	40	29	37	23	0	89	224
07:30 AM	1	2	33	0	36	3	49	2	0	54	33	8	2	0	43	43	51	20	0	114	247
07:45 AM	0	5	33	0	38	3	54	8	0	65	48	14	2	0	64	78	47	28	0	153	320
Total	7	10	128	0	145	9	206	18	0	233	159	30	7	0	196	169	168	79	0	416	990
05:00 PM	4	0	64	0	68	7	88	4	0	99	38	2	5	0	45	48	116	66	0	230	442
05:15 PM	3	7	47	0	57	6	84	2	0	92	39	2	6	0	47	62	100	59	0	221	417
05:30 PM	5	7	48	0	60	0	83	2	0	85	46	5	4	0	55	55	101	51	0	207	407
05:45 PM	7	10	38	0	55	7	78	4	0	89	49	4	6	0	59	38	92	70	0	200	403
Total	19	24	197	0	240	20	333	12	0	365	172	13	21	0	206	203	409	246	0	858	1669
Grand Total	26	34	325	0	385	29	539	30	0	598	331	43	28	0	402	372	577	325	0	1274	2659
Apprch %	6.8	8.8	84.4	0.0		4.8	90.1	5.0	0.0		82.3	10.7	7.0	0.0		29.2	45.3	25.5	0.0		
Total %	1.0	1.3	12.2	0.0	14.5	1.1	20.3	1.1	0.0	22.5	12.4	1.6	1.1	0.0	15.1	14.0	21.7	12.2	0.0	47.9	

Marysville Traffic Study
 Marysville, OH
 Weekday Peak Hours

ms consultants inc.
 2221 Schrock Road
 Columbus, OH 43229

File Name : Delaware_33EB
 Site Code : 00000000
 Start Date : 3/14/2008
 Page No : 1

Groups Printed- Passenger Cars - Trucks

Start Time	US 33 Southbound					US 36 Westbound					US 33 Northbound					US 36 Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	26	0	27	0	53	15	82	0	0	97	0	0	0	0	0	0	57	79	1	137	287
07:15 AM	43	0	63	0	106	23	73	0	0	96	0	0	0	0	0	0	32	60	0	92	294
07:30 AM	42	0	54	0	96	28	85	0	0	113	0	0	0	0	0	0	51	54	0	105	314
07:45 AM	59	0	69	0	128	15	119	0	0	134	0	0	0	0	0	0	72	37	1	110	372
Total	170	0	213	0	383	81	359	0	0	440	0	0	0	0	0	0	212	230	2	444	1267
05:00 PM	53	0	72	0	125	24	162	0	0	186	0	0	0	0	0	0	216	53	0	269	580
05:15 PM	51	0	79	0	130	19	159	0	0	178	0	0	0	0	0	0	190	47	0	237	545
05:30 PM	61	0	82	0	143	20	129	0	0	149	0	0	0	0	0	0	178	33	0	211	503
05:45 PM	43	0	88	0	131	19	148	0	0	167	0	0	0	0	0	0	199	36	0	235	533
Total	208	0	321	0	529	82	598	0	0	680	0	0	0	0	0	0	783	169	0	952	2161
Grand Total	378	0	534	0	912	163	957	0	0	1120	0	0	0	0	0	0	995	399	2	1396	3428
Apprch %	41.4	0.0	58.6	0.0		14.6	85.4	0.0	0.0		0.0	0.0	0.0	0.0		0.0	71.3	28.6	0.1		
Total %	11.0	0.0	15.6	0.0	26.6	4.8	27.9	0.0	0.0	32.7	0.0	0.0	0.0	0.0	0.0	0.0	29.0	11.6	0.1	40.7	

Marysville Traffic Study
 Marysville, OH
 Weekday Peak Hours

Groups Printed- Passenger Cars - Trucks

Start Time	COLEMANS CROSSING Southbound					DELAWARE AVE Westbound					COLEMANS CROSSING Northbound					DELAWARE AVE Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	3	0	2	0	5	49	76	7	0	132	7	1	32	0	40	4	76	17	0	97	274
07:15 AM	5	1	1	0	7	69	90	5	0	164	16	0	33	0	49	3	83	13	0	99	319
07:30 AM	2	1	6	0	9	71	90	11	0	172	15	2	36	0	53	5	84	16	0	105	339
07:45 AM	2	1	4	0	7	65	96	8	0	169	13	1	35	0	49	7	91	19	0	117	342
Total	12	3	13	0	28	254	352	31	0	637	51	4	136	0	191	19	334	65	0	418	1274
05:00 PM	5	6	4	1	16	92	107	11	0	210	63	4	102	0	169	8	128	41	2	179	574
05:15 PM	9	3	6	0	18	105	131	19	0	255	48	8	84	0	140	7	126	53	0	186	599
05:30 PM	13	4	7	0	24	116	135	16	0	267	39	4	96	0	139	7	131	45	0	183	613
05:45 PM	10	4	6	0	20	96	137	22	1	256	37	4	114	0	155	9	143	51	0	203	634
Total	37	17	23	1	78	409	510	68	1	988	187	20	396	0	603	31	528	190	2	751	2420
Grand Total	49	20	36	1	106	663	862	99	1	1625	238	24	532	0	794	50	862	255	2	1169	3694
Apprch %	46.2	18.9	34.0	0.9		40.8	53.0	6.1	0.1		30.0	3.0	67.0	0.0		4.3	73.7	21.8	0.2		
Total %	1.3	0.5	1.0	0.0	2.9	17.9	23.3	2.7	0.0	44.0	6.4	0.6	14.4	0.0	21.5	1.4	23.3	6.9	0.1	31.6	

ms consultants inc.
 2221 Schrock Road
 Columbus, OH 43229

Marysville Traffic Study
 Marysville, OH
 Weekday Peak Hours

File Name : Colemans Crossing
 Site Code : 00000000
 Start Date : 3/11/2008
 Page No : 1

Groups Printed- Passenger Cars - Trucks

Start Time	COLEMANS CR BLVD Southbound					U S 36 Westbound					COLEMANS CR BLVD Northbound					U S 36 Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	2	0	1	0	3	42	61	6	0	109	5	0	29	0	34	3	70	14	0	87	233
07:15 AM	4	1	3	0	8	72	85	6	0	163	20	0	26	0	46	4	79	18	0	101	318
07:30 AM	3	1	3	0	7	75	108	8	0	191	11	0	46	0	57	2	83	18	0	103	358
07:45 AM	2	0	5	0	7	63	91	9	0	163	16	2	31	0	49	8	91	21	0	120	339
Total	11	2	12	0	25	252	345	29	0	626	52	2	132	0	186	17	323	71	0	411	1248
05:00 PM	9	4	5	0	18	95	98	10	0	203	56	7	114	1	178	9	154	54	0	217	616
05:15 PM	8	4	3	0	15	137	139	14	0	290	44	2	89	0	135	9	120	67	0	196	636
05:30 PM	8	5	9	0	22	125	132	15	0	272	71	1	109	0	181	10	125	62	0	197	672
05:45 PM	6	3	5	0	14	126	105	12	0	243	54	8	106	0	168	9	107	68	0	184	609
Total	31	16	22	0	69	483	474	51	0	1008	225	18	418	1	662	37	506	251	0	794	2533
Grand Total	42	18	34	0	94	735	819	80	0	1634	277	20	550	1	848	54	829	322	0	1205	3781
Apprch %	44.7	19.1	36.2	0.0		45.0	50.1	4.9	0.0		32.7	2.4	64.9	0.1		4.5	68.8	26.7	0.0		
Total %	1.1	0.5	0.9	0.0	2.5	19.4	21.7	2.1	0.0	43.2	7.3	0.5	14.5	0.0	22.4	1.4	21.9	8.5	0.0	31.9	

ms consultants inc.
 2221 Schrock Road
 Columbus, OH 43229

Marysville Traffic Study
 Marysville, OH
 Weekday Peak Hours

File Name : Charles Lane
 Site Code : 00000000
 Start Date : 3/6/2008
 Page No : 1

Groups Printed- Passenger Cars - Trucks

Start Time	DELAWARE AVE. Eastbound					DELAWARE AVE. Westbound					CHARLES LN Northbound					CHARLES LN Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	4	61	13	0	78	16	52	3	0	71	5	1	18	0	24	6	1	3	0	10	183
07:15 AM	3	71	23	0	97	23	73	9	0	105	14	0	27	0	41	3	3	4	0	10	253
07:30 AM	4	78	23	0	105	22	97	6	0	125	9	2	28	0	39	11	1	4	0	16	285
07:45 AM	3	90	18	0	111	24	104	7	0	135	16	0	25	0	41	5	0	4	0	9	296
Total	14	300	77	0	391	85	326	25	0	436	44	3	98	0	145	25	5	15	0	45	1017
05:00 PM	8	204	24	0	236	14	179	19	0	212	16	1	34	0	51	10	0	5	0	15	514
05:15 PM	4	174	14	0	192	14	181	4	0	199	15	0	23	0	38	14	0	9	0	23	452
05:30 PM	11	214	28	0	253	14	166	5	0	185	16	0	21	0	37	8	0	5	0	13	488
05:45 PM	6	186	16	0	208	12	173	6	0	191	17	0	26	0	43	6	1	4	0	11	453
Total	29	778	82	0	889	54	699	34	0	787	64	1	104	0	169	38	1	23	0	62	1907
Grand Total	43	1078	159	0	1280	139	1025	59	0	1223	108	4	202	0	314	63	6	38	0	107	2924
Apprch %	3.4	84.2	12.4	0.0		11.4	83.8	4.8	0.0		34.4	1.3	64.3	0.0		58.9	5.6	35.5	0.0		
Total %	1.5	36.9	5.4	0.0	43.8	4.8	35.1	2.0	0.0	41.8	3.7	0.1	6.9	0.0	10.7	2.2	0.2	1.3	0.0	3.7	

Groups Printed- Passenger Cars - Trucks

Start Time	DELAWARE Eastbound					DELAWARE Westbound					CHERRY Northbound					CHERRY Southbound					Int. Total
	Left	Thru	Rght	Peds	App. Total	Left	Thru	Rght	Har d Rght	App. Total	Left	Thru	Rght	Peds	App. Total	Har d Left	Left	Thru	Rght	App. Total	
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
11:30 AM	0	0	0	0	0	0	5	81	14	100	0	0	0	0	0	30	0	7	2	39	139
11:45 AM	0	0	0	0	0	0	12	97	27	136	0	0	0	0	0	27	0	6	2	35	171
Total	0	0	0	0	0	0	17	178	41	236	0	0	0	0	0	57	0	13	4	74	310
12:00 PM	0	0	0	0	0	0	11	91	23	125	0	0	0	0	0	27	1	9	2	39	164
12:15 PM	0	0	0	0	0	0	8	108	20	136	0	0	0	0	0	29	0	12	1	42	178
Total	0	0	0	0	0	0	19	199	43	261	0	0	0	0	0	56	1	21	3	81	342
04:15 PM	0	0	0	0	0	0	19	98	22	139	0	0	0	0	0	31	0	4	5	40	179
04:30 PM	0	0	0	0	0	0	9	89	21	119	0	0	0	0	0	29	0	10	4	43	162
04:45 PM	0	0	0	0	0	0	19	127	28	174	0	0	0	0	0	33	0	10	2	45	219
Total	0	0	0	0	0	0	47	314	71	432	0	0	0	0	0	93	0	24	11	128	560
05:00 PM	0	0	0	0	0	0	19	107	47	173	0	0	0	0	0	22	1	9	4	36	209
Grand Total	0	0	0	0	0	0	102	798	202	1102	0	0	0	0	0	228	2	67	22	319	1421
Apprch %	0.0	0.0	0.0	0.0		0.0	9.3	72.4	18.3		0.0	0.0	0.0	0.0		71.5	0.6	21.0	6.9		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	7.2	56.2	14.2	77.6	0.0	0.0	0.0	0.0	0.0	16.0	0.1	4.7	1.5	22.4	

ms consultants inc.
 2221 Schrock Road
 Columbus, OH 43229

Marysville Traffic Study
 Marysville, OH
 Weekday Peak Hours

File Name : 5-pts W S & E legs
 Site Code : 00000000
 Start Date : 5/21/2008
 Page No : 1

Groups Printed- Passenger Cars - Trucks

Start Time	FIFTH ST Eastbound					FIFTH ST Westbound					COLUMBUS AVE Northbound					COLUMBUS AVE Southbound					Int. Total
	Har d Left	Left	Thru	Rig ht	App. Total	Left	Thru	Rig ht	Har d Rig ht	App. Total	Left	Thru	Rig ht	Har d Rig ht	App. Total	Left	Thru	Rig ht	Ped s	App. Total	
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
11:30 AM	0	119	16	17	152	1	10	5	0	16	9	12	15	2	38	0	0	0	0	0	206
11:45 AM	4	111	13	21	149	0	11	4	0	15	13	12	12	2	39	0	0	0	0	0	203
Total	4	230	29	38	301	1	21	9	0	31	22	24	27	4	77	0	0	0	0	0	409
12:00 PM	1	137	10	22	170	0	12	3	0	15	18	13	20	0	51	0	0	0	0	0	236
12:15 PM	2	114	15	19	150	2	12	3	1	18	12	13	13	0	38	0	0	0	0	0	206
Total	3	251	25	41	320	2	24	6	1	33	30	26	33	0	89	0	0	0	0	0	442
04:15 PM	6	124	10	24	164	1	5	4	0	10	13	16	9	0	38	0	0	0	0	0	212
04:30 PM	2	141	19	20	182	0	10	1	0	11	11	20	11	0	42	0	0	0	0	0	235
04:45 PM	3	149	11	26	189	0	8	3	1	12	13	21	10	1	45	0	0	0	0	0	246
Total	11	414	40	70	535	1	23	8	1	33	37	57	30	1	125	0	0	0	0	0	693
05:00 PM	3	123	17	22	165	1	12	1	1	15	18	20	18	0	56	0	0	0	0	0	236
Grand Total	21	1018	111	171	1321	5	80	24	3	112	107	127	108	5	347	0	0	0	0	0	1780
Apprch %	1.6	77.1	8.4	12.9		4.5	71.4	21.4	2.7		30.8	36.6	31.1	1.4		0.0	0.0	0.0	0.0		
Total %	1.2	57.2	6.2	9.6	74.2	0.3	4.5	1.3	0.2	6.3	6.0	7.1	6.1	0.3	19.5	0.0	0.0	0.0	0.0	0.0	

Groups Printed- Passenger Cars - Trucks

Start Time	FIFTH ST Eastbound					CHARLES LANE Westbound					COLEMANS CROSSING Northbound					COLEMANS CROSSING Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
11:30 AM	2	1	11	0	14	6	1	13	0	20	7	112	4	0	123	6	111	3	0	120	277
11:45 AM	1	0	16	0	17	2	2	13	0	17	4	116	6	0	126	11	100	2	0	113	273
Total	3	1	27	0	31	8	3	26	0	37	11	228	10	0	249	17	211	5	0	233	550
12:00 PM	1	1	6	0	8	4	1	13	0	18	6	114	2	0	122	11	131	3	0	145	293
12:15 PM	2	2	17	0	21	3	0	17	0	20	6	117	6	0	129	12	129	2	0	143	313
Total	3	3	23	0	29	7	1	30	0	38	12	231	8	0	251	23	260	5	0	288	606
05:00 PM	0	2	10	1	13	5	3	18	1	27	7	139	1	1	148	28	135	1	1	165	353
05:15 PM	2	0	10	0	12	4	0	11	1	16	4	139	1	0	144	29	134	0	0	163	335
05:30 PM	2	3	8	0	13	3	3	24	0	30	11	136	2	0	149	12	144	2	0	158	350
05:45 PM	1	1	8	0	10	0	0	26	0	26	4	143	4	0	151	22	131	1	0	154	341
Total	5	6	36	1	48	12	6	79	2	99	26	557	8	1	592	91	544	4	1	640	1379
Grand Total	11	10	86	1	108	27	10	135	2	174	49	1016	26	1	1092	131	1015	14	1	1161	2535
Apprch %	10.2	9.3	79.6	0.9		15.5	5.7	77.6	1.1		4.5	93.0	2.4	0.1		11.3	87.4	1.2	0.1		
Total %	0.4	0.4	3.4	0.0	4.3	1.1	0.4	5.3	0.1	6.9	1.9	40.1	1.0	0.0	43.1	5.2	40.0	0.6	0.0	45.8	

Appendix B

HCS Reports



HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Charles Ln
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2008 AM Peak Year :
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue N/S St: Charles Lane

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	17	353	91	100	320	30	52	4	116	30	6	18
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru			A		Thru	A		
Right			A		Right	A		
Peds					Peds			
WB Left		A		A	SB Left	A		
Thru			A		Thru	A		
Right			A		Right	A		
Peds					Peds			
NB Right		A			EB Right			
SB Right					WB Right			
Green		10.0	43.0			32.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	549	1805	0.03	0.60	9.3	A		
TR	829	1842	0.59	0.45	21.8	C	21.4	C
Westbound								
L	467	1805	0.24	0.60	11.2	B		
TR	844	1876	0.46	0.45	19.5	B	17.7	B
Northbound								
L	478	1405	0.12	0.34	22.8	C		
TR	552	1624	0.24	0.34	24.0	C	23.6	C
Southbound								
L	405	1192	0.08	0.34	22.5	C		
TR	574	1689	0.05	0.34	22.2	C	22.3	C

Intersection Delay = 20.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Charles Ln
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2008 PM Peak Year :
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue N/S St: Charles Lane

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	34	750	97	64	702	64	75	1	123	45	1	27
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru					Thru	A		
Right			P		Right	A		
Peds					Peds			
WB Left		A			SB Left	A		
Thru					Thru	A		
Right			P		Right	A		
Peds					Peds			
NB Right		A			EB Right			
SB Right					WB Right			
Green		7.0	56.0			22.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	310	1770	0.12	0.70	12.3	B		
TR	1062	1831	0.89	0.58	29.0	C	28.4	C
Westbound								
L	248	1770	0.29	0.70	17.3	B		
TR	1067	1839	0.80	0.58	22.6	C	22.2	C
Northbound								
L	330	1373	0.25	0.24	31.1	C		
TR	380	1585	0.36	0.24	32.2	C	31.8	C
Southbound								
L	258	1074	0.19	0.24	30.7	C		
TR	382	1592	0.08	0.24	29.5	C	30.2	C

Intersection Delay = 26.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Charles Ln
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2028 AM Peak Year :
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue N/S St: Charles Lane

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	19	435	10	123	398	44	59	5	131	34	7	20
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru			A		Thru	A		
Right			A		Right	A		
Peds					Peds			
WB Left		A			SB Left	A		
Thru			A		Thru	A		
Right			A		Right	A		
Peds					Peds			
NB Right		A			EB Right			
SB Right					WB Right			
Green		10.0	43.0			32.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	469	1805	0.04	0.60	10.3	B		
TR	852	1894	0.58	0.45	21.5	C	21.0	C
Westbound								
L	467	1805	0.29	0.60	11.6	B		
TR	842	1872	0.58	0.45	21.5	C	19.4	B
Northbound								
L	476	1401	0.14	0.34	23.0	C		
TR	553	1626	0.27	0.34	24.3	C	23.9	C
Southbound								
L	388	1141	0.10	0.34	22.6	C		
TR	575	1691	0.05	0.34	22.2	C	22.5	C

Intersection Delay = 20.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2028 PM Peak
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue

Inter.: Delaware Ave & Charles Ln
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: Charles Lane

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	38	867	110	84	881	54	85	1	157	75	1	31
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru					Thru	A		
Right					Right	A		
Peds					Peds			
WB Left		A			SB Left	A		
Thru					Thru	A		
Right					Right	A		
Peds					Peds			
NB Right		A			EB Right			
SB Right					WB Right			
Green		7.0	60.0			18.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	234	1770	0.18	0.74	18.4	B		
TR	1135	1831	0.96	0.62	35.8	D	35.1	D
Westbound								
L	234	1770	0.40	0.74	23.0	C		
TR	1145	1847	0.91	0.62	28.5	C	28.0	C
Northbound								
L	274	1368	0.34	0.20	35.1	D		
TR	317	1585	0.55	0.20	38.1	D	37.0	D
Southbound								
L	173	866	0.48	0.20	37.5	D		
TR	318	1591	0.11	0.20	32.9	C	36.1	D

Intersection Delay = 32.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2028 AM Peak
 Project ID: Delaware Ave. Corridor Study - with Improvements
 E/W St: Delaware Avenue

Inter.: Delaware Ave & Charles Ln
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: Charles Lane

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	1	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	19	435	10	123	398	44	59	5	131	34	7	20
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru					Thru	A		
Right					Right	A		
Peds					Peds			
WB Left		A			SB Left	A		
Thru					Thru	A		
Right					Right	A		
Peds					Peds			
NB Right		A			EB Right			
SB Right					WB Right			
Green		10.0	40.0			35.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	431	1805	0.05	0.57	11.8	B		
TR	1515	3606	0.33	0.42	19.6	B	19.3	B
Westbound								
L	533	1805	0.26	0.57	10.8	B		
TR	786	1872	0.62	0.42	24.4	C	21.4	C
Northbound								
L	518	1401	0.13	0.37	20.9	C		
TR	602	1626	0.25	0.37	22.1	C	21.8	C
Southbound								
L	429	1159	0.09	0.37	20.6	C		
TR	626	1691	0.05	0.37	20.2	C	20.4	C

Intersection Delay = 20.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2028 PM Peak
 Project ID: Delaware Ave. Corridor Study - with Improvements
 E/W St: Delaware Avenue

Inter.: Delaware Ave & Charles Ln
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: Charles Lane

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	1	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	38	867	110	84	881	54	85	1	157	75	1	31
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru					Thru	A		
Right					Right	A		
Peds					Peds			
WB Left		A			SB Left	A		
Thru					Thru	A		
Right					Right	A		
Peds					Peds			
NB Right		A			EB Right			
SB Right					WB Right			
Green		7.0	57.0			21.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	233	1770	0.18	0.71	20.9	C		
TR	2057	3487	0.53	0.59	13.2	B	13.5	B
Westbound								
L	370	1770	0.25	0.71	7.0	A		
TR	1090	1847	0.95	0.59	37.3	D	34.8	C
Northbound								
L	315	1368	0.30	0.23	32.4	C		
TR	365	1585	0.48	0.23	34.3	C	33.6	C
Southbound								
L	213	928	0.39	0.23	33.7	C		
TR	366	1591	0.10	0.23	30.4	C	32.8	C

Intersection Delay = 25.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Colemans Xing
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2008 AM Peak Year :
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue N/S St: Colemans Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	2	1	1	1	1	1	1	1	0
LGConfig	L	T	R	L	T	R	L	TR	R	L	TR	
Volume	20	395	84	297	361	34	51	2	156	13	2	38
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A		
Right		A			Right	A		
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
NB Right	A				EB Right			
SB Right					WB Right			
Green	23.0	35.0			27.0			
Yellow	3.5	3.5			3.5			
All Red	1.5	1.5			1.5			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	363	980	0.06	0.37	20.4	C		
T	1312	3547	0.33	0.37	22.8	C	22.4	C
R	586	1583	0.16	0.37	21.2	C		
Westbound								
L	540	2159	0.61	0.25	35.2	D		
T	1211	1863	0.33	0.65	8.0	A	19.6	B
R	1029	1583	0.04	0.65	6.3	A		
Northbound								
L	394	1357	0.14	0.29	26.5	C		
TR	540	1863	0.00	0.29	25.2	C	14.5	B
R	902	1583	0.19	0.57	10.5	B		
Southbound								
L	409	1409	0.03	0.29	25.5	C		
TR	463	1596	0.10	0.29	26.0	C	25.9	C

Intersection Delay = 20.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Colemans Xing
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2008 PM Peak Year :
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue N/S St: Colemans Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	2	1	1	1	1	1	1	1	0
LGConfig	L	T	R	L	T	R	L	TR	R	L	TR	
Volume	44	644	230	570	559	60	221	21	481	37	19	26
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A		P		NB Left	A		
Thru			P		Thru	A		
Right			P		Right	A		
Peds					Peds			
WB Left	A	A			SB Left	A		
Thru		P	P		Thru	A		
Right		P	P		Right	A		
Peds					Peds			
NB Right	A				EB Right			
SB Right					WB Right			
Green	7.0	19.0	28.0		25.0			
Yellow	3.5	3.5	3.5		3.5			
All Red	1.5	1.5	1.5		1.5			

Cycle Length: 99.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	357	1770	0.14	0.38	19.8	B		
T	1075	3547	0.67	0.30	33.4	C	32.6	C
R	480	1583	0.53	0.30	32.9	C		
Westbound								
L	720	2159	0.88	0.33	43.2	D		
T	1016	1863	0.61	0.55	18.1	B	29.8	C
R	863	1583	0.08	0.55	10.9	B		
Northbound								
L	368	1349	0.67	0.27	36.6	D		
TR	445	1633	0.29	0.27	28.8	C	30.8	C
R	624	1583	0.68	0.39	28.0	C		
Southbound								
L	309	1134	0.13	0.27	27.4	C		
TR	464	1701	0.11	0.27	27.1	C	27.2	C

Intersection Delay = 30.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Colemans Xing
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2028 AM Peak Year :
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue N/S St: Colemans Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	2	1	1	1	1	1	1	1	0
LGConfig	L	T	R	L	T	R	L	TR	R	L	TR	
Volume	41	464	95	411	503	61	57	14	215	72	15	52
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A		
Right		A			Right	A		
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
NB Right	A				EB Right			
SB Right					WB Right			
Green	23.0	35.0			27.0			
Yellow	3.5	3.5			3.5			
All Red	1.5	1.5			1.5			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	313	847	0.15	0.37	21.2	C		
T	1312	3547	0.39	0.37	23.4	C	22.9	C
R	586	1583	0.18	0.37	21.4	C		
Westbound								
L	540	2159	0.85	0.25	47.6	D		
T	1211	1863	0.46	0.65	9.0	A	25.1	C
R	1029	1583	0.07	0.65	6.4	A		
Northbound								
L	381	1315	0.17	0.29	26.7	C		
TR	540	1863	0.03	0.29	25.4	C	14.9	B
R	902	1583	0.26	0.57	11.0	B		
Southbound								
L	404	1392	0.20	0.29	27.0	C		
TR	478	1647	0.16	0.29	26.6	C	26.8	C

Intersection Delay = 23.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Colemans Xing
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2030 PM Peak Year :
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue N/S St: Colemans Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	2	1	1	1	1	1	1	1	0
LGConfig	L	T	R	L	T	R	L	TR	R	L	TR	
Volume	136	703	260	695	633	223	250	48	545	246	68	157
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A		P		NB Left	A		
Thru			P		Thru	A		
Right			P		Right	A		
Peds					Peds			
WB Left	A	A			SB Left	A		
Thru		P	P		Thru	A		
Right		P	P		Right	A		
Peds					Peds			
NB Right	A	P			EB Right			
SB Right					WB Right			
Green	7.0	21.0	21.0		31.0			
Yellow	3.5	3.5	3.5		3.5			
All Red	1.5	1.5	1.5		1.5			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	240	1770	0.63	0.31	37.1	D		
T	816	3547	0.96	0.23	60.7	E	55.8	E
R	364	1583	0.79	0.23	52.5	D		
Westbound								
L	756	2159	1.02	0.35	70.7	E		
T	913	1863	0.77	0.49	27.1	C	45.1	D
R	776	1583	0.32	0.49	16.5	B		
Northbound								
L	283	859	0.98	0.33	81.7	F		
TR	550	1668	0.32	0.33	25.4	C	32.2	C
R	1124	1583	0.43	0.71	6.3	A		
Southbound								
L	347	1053	0.79	0.33	41.7	D		
TR	550	1668	0.45	0.33	27.0	C	34.7	C

Intersection Delay = 44.1 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Colemans Xing
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2028 AM Peak Year :
 Project ID: Delaware Ave. Corridor Study - with Improvements
 E/W St: Delaware Avenue N/S St: Colemans Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	2	1	1	1	1	1	1	1	0
LGConfig	L	T	R	L	T	R	L	TR	R	L	TR	
Volume	41	464	95	411	503	61	57	14	215	72	15	52
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A		
Right		A			Right	A		
Peds					Peds			
WB Left		A			SB Left	A		
Thru		A	A		Thru	A		
Right		A	A		Right	A		
Peds					Peds			
NB Right		A			EB Right			
SB Right					WB Right			
Green	22.0	35.0			28.0			
Yellow	3.5	3.5			3.5			
All Red	1.5	1.5			1.5			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	313	847	0.15	0.37	21.2	C		
T	1312	3547	0.39	0.37	23.4	C	22.9	C
R	586	1583	0.18	0.37	21.4	C		
Westbound								
L	825	3437	0.55	0.24	34.1	C		
T	1192	1863	0.47	0.64	9.6	A	19.7	B
R	1013	1583	0.07	0.64	6.8	A		
Northbound								
L	395	1317	0.16	0.30	25.9	C		
TR	559	1863	0.03	0.30	24.7	C	14.7	B
R	902	1583	0.26	0.57	11.0	B		
Southbound								
L	418	1392	0.19	0.30	26.2	C		
TR	494	1647	0.15	0.30	25.8	C	26.0	C

Intersection Delay = 20.4 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Colemans Xing
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2030 PM Peak Year :
 Project ID: Delaware Ave. Corridor Study - with Improvements
 E/W St: Delaware Avenue N/S St: Colemans Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	2	1	1	1	1	1	1	1	0
LGConfig	L	T	R	L	T	R	L	TR	R	L	TR	
Volume	136	703	260	695	633	223	250	48	545	246	68	157
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A		P		NB Left	A		
Thru			P		Thru	A		
Right			P		Right	A		
Peds					Peds			
WB Left	A	A			SB Left	A		
Thru		P	P		Thru	A		
Right		P	P		Right	A		
Peds					Peds			
NB Right	A	P			EB Right			
SB Right					WB Right			
Green	7.0	12.0	27.0		34.0			
Yellow	3.5	3.5	3.5		3.5			
All Red	1.5	1.5	1.5		1.5			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	204	1770	0.74	0.37	45.1	D		
T	1029	3547	0.76	0.29	37.6	D	38.4	D
R	459	1583	0.63	0.29	37.3	D		
Westbound								
L	894	3437	0.86	0.26	44.1	D		
T	857	1863	0.82	0.46	32.1	C	35.5	D
R	728	1583	0.34	0.46	18.6	B		
Northbound								
L	323	896	0.86	0.36	50.0	D		
TR	600	1668	0.29	0.36	23.1	C	23.9	C
R	1029	1583	0.47	0.65	9.2	A		
Southbound								
L	388	1077	0.70	0.36	33.1	C		
TR	600	1668	0.42	0.36	24.6	C	29.0	C

Intersection Delay = 33.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2008 AM Peak
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue

Inter.: US 33 EB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Eastbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	0	0
LGConfig		T	R	L	T						LR	
Volume		290	275	96	441					251		251
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A				Thru			
Right	A				Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru			
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	42.0				48.0			
Yellow	3.5				3.5			
All Red	1.5				1.5			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

T 1530 3478 0.21 0.44 17.3 B 18.6 B
 R 683 1553 0.45 0.44 20.0- B

Westbound

L 419 953 0.26 0.44 18.0 B
 T 1530 3478 0.32 0.44 18.4 B 18.3 B

Northbound

Southbound

LR 831 1662 0.67 0.50 20.9 C 20.9 C

Intersection Delay = 19.2 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2008 PM Peak
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue

Inter.: US 33 EB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Eastbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	0	0
LGConfig		T	R	L	T						LR	
Volume		924	238	97	782					245		407
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A				Thru			
Right	A				Right			
Peds					Peds			
WB Left		A			SB Left	A		
Thru		A			Thru			
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		43.0				47.0		
Yellow		3.5				3.5		
All Red		1.5				1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

T	1565	3478	0.66	0.45	22.5	C	21.7	C
R	699	1553	0.38	0.45	18.6	B		

Westbound

L	125	278	0.86	0.45	67.3	E		
T	1565	3478	0.56	0.45	20.6	C	25.8	C

Northbound

Southbound

LR	805	1642	0.90	0.49	36.3	D	36.3	D
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Intersection Delay = 26.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2028 AM Peak
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue

Inter.: US 33 EB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Eastbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	0	0
LGConfig		T	R	L	T						LR	
Volume		418	350	138	635					323		300
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A			Thru			
Right		A			Right			
Peds					Peds			
WB Left		A	A		SB Left	A		
Thru		A	A		Thru			
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		8.0	31.0			46.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
T	1148	3478	0.40	0.33	26.1	C	30.9	C
R	512	1553	0.76	0.33	36.5	D		
Westbound								
L	400	1736	0.38	0.46	17.3	B		
T	1600	3478	0.44	0.46	18.5	B	18.3	B
Northbound								
Southbound								
LR	799	1665	0.87	0.48	33.0	C	33.0	C

Intersection Delay = 27.0 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2028 PM Peak
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue

Inter.: US 33 EB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Eastbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	0	0
LGConfig		T	R	L	T						LR	
Volume		1091	343	134	1040					353		511
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A			Thru			
Right		A			Right			
Peds					Peds			
WB Left		A	A		SB Left	A		
Thru		A	A		Thru			
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		7.0	29.0			49.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

T	1078	3478	1.12	0.31	102.8	F	87.9	F
R	481	1553	0.79	0.31	40.4	D		

Westbound

L	229	1736	0.65	0.43	29.1	C		
T	1496	3478	0.77	0.43	26.9	C	27.2	C

Northbound

Southbound

LR	840	1647	1.14	0.51	102.9	F	102.9	F
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Intersection Delay = 71.1 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2028 AM Peak
 Project ID: Delaware Ave. Corridor Study - with Improvements
 E/W St: Delaware Avenue

Inter.: US 33 EB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Eastbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	1	0	1
LGConfig		T	R	L	T					L		R
Volume		418	350	138	635					323		300
Lane Width		12.0	12.0	12.0	12.0					12.0		12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru			A		Thru			
Right			A		Right			
Peds					Peds			
WB Left		A	A		SB Left	A		
Thru		A	A		Thru			
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		8.0	39.0			38.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

T 1426 3478 0.33 0.41 20.2 C 22.4 C
 R 637 1553 0.61 0.41 24.9 C

Westbound

L 482 1736 0.32 0.54 12.5 B
 T 1878 3478 0.38 0.54 13.4 B 13.2 B

Northbound

Southbound

L 694 1736 0.52 0.40 23.4 C 23.6 C
 R 621 1553 0.54 0.40 23.8 C

Intersection Delay = 19.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2028 PM Peak
 Project ID: Delaware Ave. Corridor Study - with Improvements
 E/W St: Delaware Avenue

Inter.: US 33 EB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Eastbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	1	0	1
LGConfig		T	R	L	T					L		R
Volume		1091	343	134	1040					353		511
Lane Width		12.0	12.0	12.0	12.0					12.0		12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A			Thru			
Right		A			Right			
Peds					Peds			
WB Left	A	A			SB Left	A		
Thru	A	A			Thru			
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	8.0	38.0			39.0			
Yellow	3.5	3.5			3.5			
All Red	1.5	1.5			1.5			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

T	1391	3478	0.87	0.40	33.9	C	32.0	C
R	621	1553	0.61	0.40	25.7	C		
Westbound								
L	247	1736	0.60	0.53	23.0	C		
T	1843	3478	0.63	0.53	17.2	B	17.9	B

Northbound

Southbound

L	712	1736	0.55	0.41	23.4	C	34.6	C
R	637	1553	0.89	0.41	42.3	D		
Intersection Delay = 27.8 (sec/veh) Intersection LOS = C								

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2008 AM Peak
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue

Inter.: US 33 WB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Westbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	0	0	0	0	0	0
LGConfig	L	T			TR			LR				
Volume	116	398			313	343	224			93		
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru			A		Thru			
Right			A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A		
Green		10.0	38.0			37.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	392	1736	0.33	0.55	13.1	B		
T	1913	3478	0.23	0.55	11.7	B	12.0	B
Westbound								
TR	1282	3206	0.57	0.40	23.9	C	23.9	C
Northbound								
LR	661	1695	0.53	0.39	24.3	C	24.3	C
Southbound								

Intersection Delay = 19.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2008 PM Peak
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue

Inter.: US 33 WB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Westbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	0	0	0	0	0	0
LGConfig	L	T			TR			LR				
Volume	321	848			564	275	315			144		
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol						0					0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru				P	Thru			
Right				P	Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A		
Green		19.0	31.0			35.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	447	1770	0.80	0.57	35.2	D		
T	2022	3547	0.47	0.57	12.8	B	18.9	B
Westbound								
TR	1113	3372	0.84	0.33	38.6	D	38.6	D
Northbound								
LR	638	1725	0.80	0.37	35.3	D	35.3	D
Southbound								

Intersection Delay = 28.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2028 AM Peak
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue

Inter.: US 33 WB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Westbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	0	0	0	0	0	0
LGConfig	L	T			TR			LR				
Volume	167	574			450	494	323			134		
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol						0				0		

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru			A		Thru			
Right			A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A		
Green		10.0	38.0			37.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	291	1736	0.64	0.55	21.6	C		
T	1913	3478	0.33	0.55	12.5	B	14.6	B
Westbound								
TR	1282	3205	0.82	0.40	31.1	C	31.1	C
Northbound								
LR	661	1695	0.77	0.39	32.1	C	32.1	C
Southbound								

Intersection Delay = 25.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2028 PM Peak
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue

Inter.: US 33 WB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Westbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	0	0	0	0	0	0
LGConfig	L	T			TR			LR				
Volume	462	1171			744	396	430			207		
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol						0				0		

Duration 0.25 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru				P	Thru			
Right				P	Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A		
Green		19.0	31.0			35.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	447	1770	1.15	0.57	119.9	F		
T	2022	3547	0.64	0.57	15.3	B	44.9	D
Westbound								
TR	1109	3362	1.14	0.33	108.7	F	108.7	F
Northbound								
LR	638	1723	1.11	0.37	101.1	F	101.1	F
Southbound								

Intersection Delay = 76.7 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2028 AM Peak
 Project ID: Delaware Ave. Corridor Study - with Improvements
 E/W St: Delaware Avenue

Inter.: US 33 WB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Westbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	2	0	1	0	0	0
LGConfig	L	T			TR		L		R			
Volume	167	574			450	494	323		134			
Lane Width	12.0	12.0			12.0		12.0		12.0			
RTOR Vol						0			0			

Duration	0.25	Area Type: All other areas									
Signal Operations											
Phase Combination	1	2	3	4	5	6	7	8			
EB Left		A	A		NB Left	A					
Thru		A	A		Thru						
Right					Right	A					
Peds					Peds						
WB Left					SB Left						
Thru			A		Thru						
Right			A		Right						
Peds					Peds						
NB Right					EB Right						
SB Right					WB Right	A					
Green		8.0	44.0			33.0					
Yellow		3.5	3.5			3.5					
All Red		1.5	1.5			1.5					

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	300	1736	0.62	0.59	17.8	B		
T	2052	3478	0.31	0.59	10.4	B	12.1	B
Westbound								
TR	1474	3205	0.71	0.46	23.3	C	23.3	C
Northbound								
L	1179	3370	0.30	0.35	23.8	C	23.7	C
R	544	1553	0.27	0.35	23.6	C		
Southbound								

Intersection Delay = 19.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Analyst: DAB
 Agency: Marysville
 Date: 3/20/2008
 Period: 2028 PM Peak
 Project ID: Delaware Ave. Corridor Study - with Improvements
 E/W St: Delaware Avenue

Inter.: US 33 WB & Delaware Ave
 Area Type: All other areas
 Jurisd:
 Year :
 N/S St: US 33 Westbound Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	2	0	1	0	0	0
LGConfig	L	T			TR		L		R			
Volume	462	1171			744	396	430		207			
Lane Width	12.0	12.0			12.0		12.0		12.0			
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru				P	Thru			
Right				P	Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A		
Green		25.0	40.0			20.0		
Yellow		3.5	3.5			3.5		
All Red		1.5	1.5			1.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	553	1770	0.93	0.72	50.8	D		
T	2554	3547	0.51	0.72	6.4	A	18.9	B
Westbound								
TR	1412	3362	0.90	0.42	36.3	D	36.3	D
Northbound								
L	756	3437	0.63	0.22	37.1	D		
R	348	1583	0.66	0.22	40.2	D	38.1	D
Southbound								

Intersection Delay = 28.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Watlins Rd
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2008 AM Peak Year :
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue N/S St: Watkins Road/Square Dr

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	199	198	93	11	306	21	199	35	8	8	12	151
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A	P		NB Left	A	A	
Thru			P		Thru	A	A	
Right			P		Right	A	A	
Peds					Peds			
WB Left		A	P		SB Left		A	
Thru			P		Thru		A	
Right			P		Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		10.0	30.0			10.0	30.0	
Yellow		3.5	3.5			3.5	3.5	
All Red		1.5	1.5			1.5	1.5	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	481	1770	0.46	0.47	17.2	B		
TR	1081	3377	0.30	0.32	26.3	C	22.6	C
Westbound								
L	501	1770	0.02	0.47	14.4	B		
TR	1124	3513	0.32	0.32	26.5	C	26.2	C
Northbound								
L	540	1770	0.41	0.47	16.9	B		
TR	851	1810	0.06	0.47	14.5	B	16.5	B
Southbound								
L	433	1352	0.02	0.32	23.3	C		
TR	513	1603	0.35	0.32	26.5	C	26.3	C

Intersection Delay = 22.9 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Watlins Rd
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2008 PM Peak Year :
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue N/S St: Watkins Road/Square Dr

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	240	494	258	24	404	14	203	15	25	22	28	232
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A	A	
Thru			A		Thru	A	A	
Right			A		Right	A	A	
Peds					Peds			
WB Left		A			SB Left		A	
Thru			A		Thru		A	
Right			A		Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		7.0	35.0			7.0	31.0	
Yellow		3.5	3.5			3.5	3.5	
All Red		1.5	1.5			1.5	1.5	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	431	1770	0.62	0.49	23.2	C		
TR	1245	3364	0.67	0.37	27.8	C	26.7	C
Westbound								
L	283	1770	0.10	0.49	15.5	B		
TR	1305	3528	0.36	0.37	23.0	C	22.6	C
Northbound								
L	411	1770	0.55	0.45	20.0-	B		
TR	760	1689	0.06	0.45	15.6	B	19.2	B
Southbound								
L	447	1356	0.05	0.33	22.9	C		
TR	532	1613	0.54	0.33	28.5	C	28.1	C

Intersection Delay = 25.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Watlins Rd
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2008 AM Peak Year :
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue N/S St: Watkins Road/Square Dr

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	287	286	135	16	440	30	287	50	12	12	17	216
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		A
Thru			P		Thru	A		A
Right			P		Right	A		A
Peds					Peds			
WB Left		A			SB Left			A
Thru			P		Thru			A
Right			P		Right			A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		10.0	30.0			10.0	30.0	
Yellow		3.5	3.5			3.5	3.5	
All Red		1.5	1.5			1.5	1.5	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	407	1770	0.78	0.47	28.0	C		
TR	1080	3376	0.43	0.32	28.1	C	28.1	C
Westbound								
L	430	1770	0.04	0.47	14.8	B		
TR	1124	3513	0.46	0.32	28.5	C	28.1	C
Northbound								
L	475	1770	0.67	0.47	21.7	C		
TR	851	1810	0.08	0.47	14.6	B	20.5	C
Southbound								
L	424	1326	0.03	0.32	23.4	C		
TR	513	1604	0.50	0.32	28.4	C	28.1	C

Intersection Delay = 26.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: DAB Inter.: Delaware Ave & Watlins Rd
 Agency: Marysville Area Type: All other areas
 Date: 3/20/2008 Jurisd:
 Period: 2028 PM Peak Year :
 Project ID: Delaware Ave. Corridor Study
 E/W St: Delaware Avenue N/S St: Watkins Road/Square Dr

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	330	680	354	33	557	19	274	21	35	31	37	309
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru			A		Thru	A		
Right			A		Right	A		
Peds					Peds			
WB Left		A			SB Left		A	
Thru			A		Thru		A	
Right			A		Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		11.0	33.0			11.0	25.0	
Yellow		3.5	3.5			3.5	3.5	
All Red		1.5	1.5			1.5	1.5	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	406	1770	0.90	0.51	40.4	D		
TR	1178	3365	0.98	0.35	52.5	D	49.6	D
Westbound								
L	304	1770	0.12	0.51	18.0	B		
TR	1235	3529	0.52	0.35	26.2	C	25.7	C
Northbound								
L	331	1770	0.92	0.43	52.0	D		
TR	725	1687	0.09	0.43	16.9	B	46.1	D
Southbound								
L	360	1335	0.09	0.27	27.5	C		
TR	436	1613	0.88	0.27	53.4	D	51.3	D

Intersection Delay = 44.0 (sec/veh) Intersection LOS = D

Appendix C

SimTraffic Reports



Delaware Avenue - Existing Condition (short 2-In CC EB)
 2008 AM Peak

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.0	0.9	0.1	0.3	0.5	0.0	0.6	0.0	0.2	0.3	0.1	0.0
Delay / Veh (s)	11.4	9.1	5.5	12.4	5.5	2.9	39.0	28.0	4.8	40.6	31.2	4.3
Total Stops	8	91	30	70	68	9	41	4	83	23	5	15
Travel Dist (mi)	4.3	103.1	26.8	9.1	29.3	3.0	1.9	0.2	4.1	1.2	0.3	0.8
Travel Time (hr)	0.2	4.0	1.0	0.7	1.4	0.2	0.6	0.0	0.4	0.4	0.1	0.1
Avg Speed (mph)	23	26	26	13	21	20	3	4	11	4	4	12
Fuel Used (gal)	1.6	38.8	9.3	3.4	11.5	1.0	1.9	0.1	1.4	1.1	0.2	0.2
HC Emissions (g)	0	4	1	0	1	0	0	0	0	0	0	0
CO Emissions (g)	55	1620	441	97	467	46	32	1	25	20	2	3
NOx Emissions (g)	0	15	4	1	5	0	0	0	0	0	0	0
Vehicles Entered	15	352	92	100	321	33	50	5	115	28	7	20
Vehicles Exited	15	352	92	99	321	33	51	5	115	28	7	20
Hourly Exit Rate	15	352	92	99	321	33	51	5	115	28	7	20
Input Volume	17	353	91	100	320	30	52	4	116	30	6	18
% of Volume	88	100	101	99	100	110	98	125	99	93	117	111
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	All
Total Delay (hr)	3.1
Delay / Veh (s)	9.7
Total Stops	447
Travel Dist (mi)	184.1
Travel Time (hr)	9.1
Avg Speed (mph)	21
Fuel Used (gal)	70.5
HC Emissions (g)	7
CO Emissions (g)	2809
NOx Emissions (g)	26
Vehicles Entered	1138
Vehicles Exited	1138
Hourly Exit Rate	1138
Input Volume	1137
% of Volume	100
Denied Entry Before	0
Denied Entry After	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2008 AM Peak

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.1	1.1	0.1	3.4	0.4	0.0	0.6	0.0	0.2	0.2	0.0	0.1
Delay / Veh (s)	15.1	10.1	2.6	41.4	3.9	2.6	44.1	46.1	3.6	47.3	54.6	5.6
Total Stops	13	123	28	238	39	4	44	3	103	12	2	41
Travel Dist (mi)	2.0	34.3	7.5	53.5	67.0	6.2	3.9	0.2	12.2	1.1	0.2	3.8
Travel Time (hr)	0.2	2.2	0.4	5.2	2.5	0.2	0.7	0.0	0.7	0.2	0.0	0.2
Avg Speed (mph)	12	16	19	10	27	25	5	5	19	6	4	16
Fuel Used (gal)	1.0	18.6	3.1	28.3	28.5	2.4	2.2	0.1	2.6	0.6	0.1	1.0
HC Emissions (g)	0	2	0	3	4	0	0	0	0	0	0	0
CO Emissions (g)	43	962	166	1204	1383	150	32	1	66	7	1	29
NOx Emissions (g)	0	7	1	10	13	1	0	0	1	0	0	0
Vehicles Entered	22	388	85	293	363	34	49	3	154	13	2	42
Vehicles Exited	22	390	85	291	363	33	49	3	153	12	2	42
Hourly Exit Rate	22	390	85	291	363	33	49	3	153	12	2	42
Input Volume	20	395	84	297	361	34	51	2	156	13	2	38
% of Volume	110	99	101	98	101	97	96	150	98	92	100	111
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	All
Total Delay (hr)	6.1
Delay / Veh (s)	15.1
Total Stops	650
Travel Dist (mi)	191.8
Travel Time (hr)	12.6
Avg Speed (mph)	15
Fuel Used (gal)	88.5
HC Emissions (g)	10
CO Emissions (g)	4046
NOx Emissions (g)	35
Vehicles Entered	1448
Vehicles Exited	1445
Hourly Exit Rate	1445
Input Volume	1453
% of Volume	99
Denied Entry Before	0
Denied Entry After	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2008 AM Peak

12: Delaware Ave. & US 33 EB Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Total Delay (hr)	1.7	0.4	0.7	2.2	2.2	2.0	9.1
Delay / Veh (s)	22.0	4.8	23.8	17.8	34.4	28.0	20.7
Total Stops	160	169	85	236	178	197	1025
Travel Dist (mi)	53.3	51.6	12.3	52.3	23.6	26.1	219.3
Travel Time (hr)	3.4	2.2	1.1	3.8	3.1	3.0	16.7
Avg Speed (mph)	16	23	11	14	8	9	13
Fuel Used (gal)	23.3	18.2	6.5	28.3	12.3	12.6	101.2
HC Emissions (g)	2	2	1	3	1	1	10
CO Emissions (g)	942	837	278	1484	377	421	4340
NOx Emissions (g)	8	7	2	12	3	3	36
Vehicles Entered	282	274	103	439	228	253	1579
Vehicles Exited	282	274	103	439	229	253	1580
Hourly Exit Rate	282	274	103	439	229	253	1580
Input Volume	290	275	96	442	224	251	1578
% of Volume	97	100	107	99	102	101	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

15: Delaware Ave. & US 33 WB Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Total Delay (hr)	0.4	0.9	1.2	0.6	2.4	0.8	6.4
Delay / Veh (s)	12.5	8.5	13.9	6.0	39.0	29.8	15.3
Total Stops	69	109	139	39	188	79	623
Travel Dist (mi)	13.8	47.4	45.4	47.5	28.9	12.2	195.3
Travel Time (hr)	0.9	2.5	2.7	2.4	3.5	1.3	13.1
Avg Speed (mph)	15	19	17	20	8	10	15
Fuel Used (gal)	6.8	24.7	22.8	19.3	15.6	6.0	95.2
HC Emissions (g)	1	3	3	3	1	1	11
CO Emissions (g)	328	1402	1345	1102	660	300	5138
NOx Emissions (g)	3	11	10	9	4	2	38
Vehicles Entered	116	395	316	354	226	95	1502
Vehicles Exited	116	396	315	354	226	95	1502
Hourly Exit Rate	116	396	315	354	226	95	1502
Input Volume	116	398	313	343	224	93	1487
% of Volume	100	99	101	103	101	102	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2008 AM Peak

18: Delaware Ave. & Watkins Rd. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.1	0.8	0.2	0.1	2.0	0.1	1.7	0.2	0.0	0.1	0.1	0.3
Delay / Veh (s)	20.2	14.9	9.5	27.1	22.7	12.0	30.1	20.2	5.8	29.5	30.8	7.2
Total Stops	168	108	53	6	177	12	148	20	6	6	8	121
Travel Dist (mi)	28.5	27.7	12.4	2.5	74.8	4.7	19.9	3.5	1.0	0.7	1.0	13.3
Travel Time (hr)	2.1	1.7	0.7	0.1	3.5	0.2	2.5	0.3	0.1	0.1	0.1	0.9
Avg Speed (mph)	13	17	18	20	21	25	9	11	18	8	7	15
Fuel Used (gal)	12.1	11.4	4.4	1.0	28.8	1.7	9.9	1.5	0.3	0.4	0.5	4.6
HC Emissions (g)	1	1	1	0	4	0	1	0	0	0	0	1
CO Emissions (g)	443	516	213	72	2215	117	266	59	8	13	12	176
NOx Emissions (g)	4	4	2	0	13	1	2	1	0	0	0	2
Vehicles Entered	203	199	89	10	310	20	205	36	10	8	12	156
Vehicles Exited	203	199	89	10	310	20	205	36	10	8	12	156
Hourly Exit Rate	203	199	89	10	310	20	205	36	10	8	12	156
Input Volume	199	199	93	11	306	21	199	35	8	8	12	151
% of Volume	102	100	96	91	101	95	103	103	125	100	100	103
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

18: Delaware Ave. & Watkins Rd. Performance by movement

Movement	All
Total Delay (hr)	6.7
Delay / Veh (s)	19.2
Total Stops	833
Travel Dist (mi)	189.9
Travel Time (hr)	12.3
Avg Speed (mph)	16
Fuel Used (gal)	76.6
HC Emissions (g)	9
CO Emissions (g)	4109
NOx Emissions (g)	28
Vehicles Entered	1258
Vehicles Exited	1258
Hourly Exit Rate	1258
Input Volume	1242
% of Volume	101
Denied Entry Before	0
Denied Entry After	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2008 PM Peak

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.3	5.1	0.6	0.5	2.7	0.1	0.8	0.0	0.3	0.5	0.0	0.1
Delay / Veh (s)	35.2	24.3	21.1	30.5	13.5	11.1	38.9	17.1	8.7	38.7	27.1	11.9
Total Stops	35	444	62	64	323	19	58	0	94	37	1	20
Travel Dist (mi)	9.4	217.8	27.8	5.8	66.7	3.6	2.6	0.0	4.5	1.9	0.0	1.1
Travel Time (hr)	0.6	11.7	1.5	0.8	4.9	0.3	0.9	0.0	0.6	0.6	0.0	0.1
Avg Speed (mph)	15	19	19	8	14	13	3	6	8	4	4	8
Fuel Used (gal)	3.8	83.8	10.4	3.3	32.1	1.5	2.8	0.0	1.9	1.6	0.0	0.4
HC Emissions (g)	0	9	1	0	3	0	0	0	0	0	0	0
CO Emissions (g)	123	2800	393	75	1071	59	58	0	34	23	0	8
NOx Emissions (g)	1	32	5	1	12	1	1	0	0	0	0	0
Vehicles Entered	32	750	96	63	723	38	71	1	124	45	1	26
Vehicles Exited	32	747	95	63	721	39	71	1	124	44	1	26
Hourly Exit Rate	32	747	95	63	721	39	71	1	124	44	1	26
Input Volume	34	750	97	64	702	40	75	1	123	45	1	27
% of Volume	94	100	98	98	103	98	95	100	101	98	100	96
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	All
Total Delay (hr)	10.9
Delay / Veh (s)	20.0
Total Stops	1157
Travel Dist (mi)	341.1
Travel Time (hr)	21.9
Avg Speed (mph)	16
Fuel Used (gal)	141.7
HC Emissions (g)	14
CO Emissions (g)	4645
NOx Emissions (g)	52
Vehicles Entered	1970
Vehicles Exited	1964
Hourly Exit Rate	1964
Input Volume	1959
% of Volume	100
Denied Entry Before	0
Denied Entry After	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2008 PM Peak

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.6	9.8	0.9	7.2	3.4	0.1	2.6	0.2	1.1	0.4	0.2	0.1
Delay / Veh (s)	51.4	55.3	14.8	45.5	21.0	5.8	43.3	37.7	8.1	38.9	51.9	15.1
Total Stops	46	636	238	574	301	30	213	16	219	33	16	26
Travel Dist (mi)	3.9	57.1	20.2	104.0	106.5	11.3	17.4	1.6	39.5	3.2	1.6	2.4
Travel Time (hr)	0.8	11.6	1.8	10.8	6.7	0.5	3.3	0.3	2.8	0.5	0.3	0.2
Avg Speed (mph)	5	5	11	10	16	22	5	6	14	6	5	11
Fuel Used (gal)	3.0	45.6	9.5	57.1	50.0	4.7	10.3	0.8	10.8	1.8	1.0	1.0
HC Emissions (g)	0	3	1	5	6	1	1	0	1	0	0	0
CO Emissions (g)	88	1111	312	2186	2092	226	160	14	363	40	16	37
NOx Emissions (g)	1	12	4	19	21	2	2	0	3	0	0	0
Vehicles Entered	44	644	228	568	579	62	219	20	496	35	17	27
Vehicles Exited	43	636	228	569	578	61	221	20	497	36	17	27
Hourly Exit Rate	43	636	228	569	578	61	221	20	497	36	17	27
Input Volume	44	645	230	570	560	60	221	21	481	37	19	26
% of Volume	98	99	99	100	103	102	100	95	103	97	89	104
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	All
Total Delay (hr)	26.8
Delay / Veh (s)	32.8
Total Stops	2348
Travel Dist (mi)	368.8
Travel Time (hr)	39.5
Avg Speed (mph)	9
Fuel Used (gal)	195.5
HC Emissions (g)	18
CO Emissions (g)	6644
NOx Emissions (g)	64
Vehicles Entered	2939
Vehicles Exited	2933
Hourly Exit Rate	2933
Input Volume	2914
% of Volume	101
Denied Entry Before	0
Denied Entry After	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2008 PM Peak

12: Delaware Ave. & US 33 EB Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Total Delay (hr)	11.3	0.4	1.1	4.3	3.1	4.8	25.1
Delay / Veh (s)	44.5	6.2	39.1	19.7	45.4	41.4	33.2
Total Stops	770	187	97	391	220	375	2040
Travel Dist (mi)	172.8	46.7	11.6	94.2	25.4	43.3	394.0
Travel Time (hr)	16.9	2.2	1.5	7.3	4.0	6.6	38.4
Avg Speed (mph)	10	22	8	13	7	7	10
Fuel Used (gal)	96.6	19.9	7.1	51.1	14.4	23.7	212.7
HC Emissions (g)	10	3	0	5	1	2	21
CO Emissions (g)	3775	1139	217	2232	306	562	8231
NOx Emissions (g)	35	9	2	20	3	5	75
Vehicles Entered	920	249	98	792	246	419	2724
Vehicles Exited	916	250	96	790	245	419	2716
Hourly Exit Rate	916	250	96	790	245	419	2716
Input Volume	925	238	97	783	245	407	2695
% of Volume	99	105	99	101	100	103	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

15: Delaware Ave. & US 33 WB Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Total Delay (hr)	3.8	6.3	5.5	1.4	3.3	1.3	21.6
Delay / Veh (s)	43.3	27.0	34.4	17.1	38.2	32.5	31.4
Total Stops	385	626	469	163	262	116	2021
Travel Dist (mi)	37.3	100.1	82.3	38.7	40.3	18.5	317.1
Travel Time (hr)	5.1	9.4	8.2	2.8	4.8	2.0	32.2
Avg Speed (mph)	7	11	10	14	9	9	10
Fuel Used (gal)	22.3	54.1	46.5	17.7	20.3	8.8	169.8
HC Emissions (g)	2	5	4	2	2	1	16
CO Emissions (g)	582	1893	1909	842	735	357	6319
NOx Emissions (g)	7	20	16	8	5	3	58
Vehicles Entered	316	843	573	289	315	144	2480
Vehicles Exited	316	845	572	288	316	144	2481
Hourly Exit Rate	316	845	572	288	316	144	2481
Input Volume	321	848	564	275	315	144	2467
% of Volume	98	100	101	105	100	100	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2008 PM Peak

18: Delaware Ave. & Watkins Rd. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.3	2.4	1.2	0.2	3.0	0.1	1.7	0.1	0.0	0.1	0.2	0.8
Delay / Veh (s)	19.0	17.3	16.7	33.6	25.7	18.4	29.3	23.2	6.0	26.4	33.1	11.8
Total Stops	187	274	168	18	258	10	154	9	14	13	20	189
Travel Dist (mi)	33.8	68.4	36.2	5.7	101.7	3.2	20.3	1.5	2.4	1.6	2.2	19.8
Travel Time (hr)	2.4	4.4	2.5	0.4	5.1	0.2	2.5	0.1	0.1	0.2	0.3	1.6
Avg Speed (mph)	14	16	14	18	20	21	9	10	18	9	7	12
Fuel Used (gal)	15.5	32.2	15.3	2.4	40.4	1.2	9.7	0.6	0.7	0.9	1.2	7.9
HC Emissions (g)	2	4	2	0	6	0	1	0	0	0	0	1
CO Emissions (g)	655	1432	573	169	3185	78	253	11	28	33	33	275
NOx Emissions (g)	6	14	6	1	18	0	2	0	0	0	0	2
Vehicles Entered	241	489	259	23	422	13	209	15	24	19	25	232
Vehicles Exited	240	489	258	23	421	13	209	15	24	19	26	232
Hourly Exit Rate	240	489	258	23	421	13	209	15	24	19	26	232
Input Volume	240	494	258	24	404	14	203	15	25	22	28	232
% of Volume	100	99	100	96	104	93	103	100	96	86	93	100
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

18: Delaware Ave. & Watkins Rd. Performance by movement

Movement	All
Total Delay (hr)	11.1
Delay / Veh (s)	20.3
Total Stops	1314
Travel Dist (mi)	296.6
Travel Time (hr)	19.9
Avg Speed (mph)	15
Fuel Used (gal)	127.9
HC Emissions (g)	15
CO Emissions (g)	6726
NOx Emissions (g)	50
Vehicles Entered	1971
Vehicles Exited	1969
Hourly Exit Rate	1969
Input Volume	1959
% of Volume	101
Denied Entry Before	0
Denied Entry After	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2030 AM Peak

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.1	1.4	0.2	0.5	0.6	0.0	0.6	0.0	0.2	0.3	0.1	0.0
Delay / Veh (s)	14.4	11.7	8.3	15.0	4.8	2.3	37.9	29.5	5.9	35.3	33.9	5.6
Total Stops	11	130	38	94	66	7	48	4	101	27	6	16
Travel Dist (mi)	4.9	127.1	31.2	11.5	39.1	4.0	2.2	0.2	4.8	1.4	0.3	0.9
Travel Time (hr)	0.2	5.3	1.3	1.0	1.8	0.2	0.7	0.1	0.5	0.4	0.1	0.1
Avg Speed (mph)	22	24	24	12	22	21	3	4	10	4	4	11
Fuel Used (gal)	1.8	47.9	11.0	4.7	16.9	1.3	2.3	0.2	1.8	1.2	0.2	0.3
HC Emissions (g)	0	6	1	0	2	0	0	0	0	0	0	0
CO Emissions (g)	57	2029	403	141	780	46	41	2	36	29	2	3
NOx Emissions (g)	0	19	3	2	8	0	0	0	0	0	0	0
Vehicles Entered	16	432	106	126	448	44	60	6	134	34	7	21
Vehicles Exited	16	431	106	126	448	44	60	6	134	34	7	21
Hourly Exit Rate	16	431	106	126	448	44	60	6	134	34	7	21
Input Volume	19	435	103	123	445	44	59	5	131	34	7	20
% of Volume	84	99	103	102	101	100	102	120	102	100	100	105
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	All
Total Delay (hr)	4.2
Delay / Veh (s)	10.5
Total Stops	548
Travel Dist (mi)	227.6
Travel Time (hr)	11.6
Avg Speed (mph)	20
Fuel Used (gal)	89.5
HC Emissions (g)	10
CO Emissions (g)	3570
NOx Emissions (g)	34
Vehicles Entered	1434
Vehicles Exited	1433
Hourly Exit Rate	1433
Input Volume	1425
% of Volume	101
Denied Entry Before	0
Denied Entry After	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2030 AM Peak

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.3	2.7	0.1	4.8	1.0	0.1	0.6	0.2	0.4	0.7	0.2	0.2
Delay / Veh (s)	24.5	20.9	4.8	41.7	7.0	4.0	39.9	45.2	6.2	38.0	45.2	12.2
Total Stops	32	253	48	332	92	12	48	13	132	61	13	52
Travel Dist (mi)	3.6	41.1	8.3	74.2	91.5	11.5	4.4	1.2	17.1	6.4	1.2	5.1
Travel Time (hr)	0.4	4.0	0.5	7.3	3.8	0.5	0.8	0.2	1.1	1.0	0.2	0.4
Avg Speed (mph)	9	10	17	10	24	24	6	5	16	6	6	12
Fuel Used (gal)	2.1	24.6	3.5	39.6	40.0	4.7	2.3	0.6	4.0	3.9	0.7	1.9
HC Emissions (g)	0	3	0	4	5	1	0	0	0	0	0	0
CO Emissions (g)	92	1125	176	1522	1818	250	37	6	118	93	12	70
NOx Emissions (g)	1	10	2	13	18	3	0	0	1	1	0	1
Vehicles Entered	41	465	94	414	507	64	55	15	215	71	14	56
Vehicles Exited	41	468	94	414	507	63	55	15	215	71	14	56
Hourly Exit Rate	41	468	94	414	507	63	55	15	215	71	14	56
Input Volume	41	465	95	411	503	61	57	14	215	72	15	52
% of Volume	100	101	99	101	101	103	96	107	100	99	93	108
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	All
Total Delay (hr)	11.2
Delay / Veh (s)	20.1
Total Stops	1088
Travel Dist (mi)	265.6
Travel Time (hr)	20.3
Avg Speed (mph)	13
Fuel Used (gal)	128.0
HC Emissions (g)	14
CO Emissions (g)	5319
NOx Emissions (g)	48
Vehicles Entered	2011
Vehicles Exited	2013
Hourly Exit Rate	2013
Input Volume	2001
% of Volume	101
Denied Entry Before	0
Denied Entry After	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2030 AM Peak

12: Delaware Ave. & US 33 EB Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Total Delay (hr)	3.6	0.7	1.0	4.0	3.5	2.8	15.7
Delay / Veh (s)	31.2	7.6	28.6	22.7	38.4	33.1	26.1
Total Stops	317	268	126	405	273	253	1642
Travel Dist (mi)	77.7	65.8	15.6	76.5	33.8	31.8	301.2
Travel Time (hr)	6.0	3.2	1.6	6.5	4.7	4.1	26.2
Avg Speed (mph)	13	21	10	12	7	8	12
Fuel Used (gal)	38.6	25.5	8.6	43.1	17.8	15.8	149.5
HC Emissions (g)	4	4	1	5	1	1	15
CO Emissions (g)	1639	1313	320	2011	400	388	6071
NOx Emissions (g)	14	12	3	17	4	4	52
Vehicles Entered	416	352	132	641	326	307	2174
Vehicles Exited	416	352	130	639	327	308	2172
Hourly Exit Rate	416	352	130	639	327	308	2172
Input Volume	418	350	138	636	323	300	2165
% of Volume	100	101	94	100	101	103	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

15: Delaware Ave. & US 33 WB Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Total Delay (hr)	1.0	2.6	2.6	1.5	3.3	1.1	12.2
Delay / Veh (s)	21.2	16.2	21.1	11.0	36.9	30.9	20.5
Total Stops	132	274	273	160	269	104	1212
Travel Dist (mi)	19.3	69.4	64.2	66.5	41.7	16.9	278.0
Travel Time (hr)	1.7	4.8	4.7	4.0	4.8	1.8	21.8
Avg Speed (mph)	12	14	14	17	9	10	13
Fuel Used (gal)	10.4	38.4	33.9	28.3	20.6	7.7	139.3
HC Emissions (g)	1	4	4	3	2	1	15
CO Emissions (g)	416	1923	1707	1319	765	329	6459
NOx Emissions (g)	3	16	14	12	5	2	53
Vehicles Entered	163	580	447	494	325	132	2141
Vehicles Exited	162	579	447	495	325	131	2139
Hourly Exit Rate	162	579	447	495	325	131	2139
Input Volume	167	574	450	494	323	134	2142
% of Volume	97	101	99	100	101	98	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2030 AM Peak

18: Delaware Ave. & Watkins Rd. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.8	1.2	0.4	0.1	3.6	0.2	2.5	0.3	0.0	0.1	0.2	0.8
Delay / Veh (s)	22.6	15.0	11.4	31.3	29.5	20.8	32.0	22.1	10.1	25.9	41.4	12.7
Total Stops	253	159	84	11	298	23	222	29	8	11	14	184
Travel Dist (mi)	40.3	40.1	18.9	3.5	106.6	7.9	27.3	4.9	1.2	1.2	1.4	18.7
Travel Time (hr)	3.2	2.4	1.1	0.2	5.9	0.4	3.5	0.5	0.1	0.1	0.2	1.6
Avg Speed (mph)	13	17	17	18	18	20	9	11	15	9	6	12
Fuel Used (gal)	18.5	17.9	7.5	1.6	43.5	2.9	14.1	2.2	0.4	0.7	0.8	7.6
HC Emissions (g)	2	2	1	0	6	1	1	0	0	0	0	1
CO Emissions (g)	710	859	346	118	3315	276	371	71	12	24	18	262
NOx Emissions (g)	7	8	3	0	18	2	3	1	0	0	0	2
Vehicles Entered	288	288	136	15	442	32	281	51	12	14	17	219
Vehicles Exited	287	288	135	15	439	32	281	51	12	14	16	219
Hourly Exit Rate	287	288	135	15	439	32	281	51	12	14	16	219
Input Volume	287	287	135	16	440	30	287	50	12	12	17	216
% of Volume	100	100	100	94	100	107	98	102	100	117	94	101
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

18: Delaware Ave. & Watkins Rd. Performance by movement

Movement	All
Total Delay (hr)	11.3
Delay / Veh (s)	22.7
Total Stops	1296
Travel Dist (mi)	272.0
Travel Time (hr)	19.3
Avg Speed (mph)	14
Fuel Used (gal)	117.6
HC Emissions (g)	14
CO Emissions (g)	6381
NOx Emissions (g)	44
Vehicles Entered	1795
Vehicles Exited	1789
Hourly Exit Rate	1789
Input Volume	1789
% of Volume	100
Denied Entry Before	0
Denied Entry After	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
2030 PM Peak

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.3	6.3	0.8	0.6	1.6	0.1	0.9	0.0	0.4	0.9	0.0	0.1
Delay / Veh (s)	33.5	27.7	25.5	32.7	8.2	5.7	38.3		9.7	40.4		9.6
Total Stops	41	530	76	64	139	11	68	0	119	65	0	28
Travel Dist (mi)	9.8	235.7	31.0	6.2	62.1	3.9	3.1	0.0	5.6	3.2	0.0	1.6
Travel Time (hr)	0.6	13.5	1.8	0.9	3.7	0.2	1.0	0.0	0.7	1.0	0.0	0.2
Avg Speed (mph)	16	18	17	7	17	16	3	10	8	4	5	9
Fuel Used (gal)	3.9	91.8	11.7	4.0	33.1	1.8	3.3	0.0	2.5	2.9	0.0	0.6
HC Emissions (g)	0	9	1	0	4	0	0	0	0	0	0	0
CO Emissions (g)	122	2941	328	92	1329	70	66	0	46	57	0	14
NOx Emissions (g)	1	33	4	1	15	1	1	0	1	1	0	0
Vehicles Entered	34	818	108	68	685	42	84	0	155	76	0	38
Vehicles Exited	34	820	106	68	687	42	83	0	154	76	0	37
Hourly Exit Rate	34	820	106	68	687	42	83	0	154	76	0	37
Input Volume	38	867	110	84	902	54	85	1	157	75	1	31
% of Volume	89	95	96	81	76	78	98	0	98	101	0	119
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	1	0	0	0	0	0

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	All
Total Delay (hr)	11.9
Delay / Veh (s)	20.3
Total Stops	1141
Travel Dist (mi)	362.2
Travel Time (hr)	23.7
Avg Speed (mph)	16
Fuel Used (gal)	155.7
HC Emissions (g)	15
CO Emissions (g)	5065
NOx Emissions (g)	57
Vehicles Entered	2108
Vehicles Exited	2107
Hourly Exit Rate	2107
Input Volume	2405
% of Volume	88
Denied Entry Before	0
Denied Entry After	1

Delaware Avenue - Existing Condition (short 2-In CC EB)
2030 PM Peak

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.2	7.0	0.8	38.2	8.2	1.7	3.1	0.7	2.3	3.7	0.9	1.0
Delay / Veh (s)	35.9	38.0	10.7	343.5	76.1	49.0	43.5	49.4	15.3	52.5	43.9	24.5
Total Stops	105	592	238	1244	583	181	274	48	350	290	66	131
Travel Dist (mi)	10.9	59.4	23.1	73.9	72.0	23.3	20.6	4.0	43.0	22.7	6.5	13.5
Travel Time (hr)	1.6	8.9	1.7	40.6	10.4	2.6	3.9	0.8	4.1	4.6	1.1	1.6
Avg Speed (mph)	7	7	13	2	7	9	5	5	10	5	6	8
Fuel Used (gal)	7.3	41.5	10.7	115.3	47.6	13.3	12.4	2.4	15.2	17.2	4.2	7.2
HC Emissions (g)	1	3	1	5	4	1	1	0	1	1	0	1
CO Emissions (g)	239	1161	412	1556	1328	421	213	46	417	412	121	221
NOx Emissions (g)	2	12	5	14	15	4	2	0	3	4	1	2
Vehicles Entered	122	668	260	418	393	127	259	51	540	254	72	150
Vehicles Exited	122	668	259	382	386	125	260	51	540	252	72	149
Hourly Exit Rate	122	668	259	382	386	125	260	51	540	252	72	149
Input Volume	136	703	260	695	633	223	250	48	545	246	68	157
% of Volume	90	95	100	55	61	56	104	106	99	102	106	95
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	All
Total Delay (hr)	68.8
Delay / Veh (s)	75.4
Total Stops	4102
Travel Dist (mi)	373.0
Travel Time (hr)	82.1
Avg Speed (mph)	5
Fuel Used (gal)	294.3
HC Emissions (g)	19
CO Emissions (g)	6547
NOx Emissions (g)	65
Vehicles Entered	3314
Vehicles Exited	3266
Hourly Exit Rate	3266
Input Volume	3964
% of Volume	82
Denied Entry Before	0
Denied Entry After	0

Delaware Avenue - Existing Condition (short 2-In CC EB)
 2030 PM Peak

12: Delaware Ave. & US 33 EB Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Total Delay (hr)	10.1	0.6	3.0	23.9	93.3	137.9	268.8
Delay / Veh (s)	32.5	6.8	118.5	117.2	2180.9	2319.2	365.2
Total Stops	884	209	192	1128	354	499	3266
Travel Dist (mi)	206.1	63.7	10.8	87.2	15.9	21.9	405.7
Travel Time (hr)	16.8	3.0	3.4	26.6	93.8	138.7	282.3
Avg Speed (mph)	12	21	3	3	2	2	6
Fuel Used (gal)	107.9	27.0	10.7	87.2	217.3	321.8	772.0
HC Emissions (g)	11	3	1	5	7	7	35
CO Emissions (g)	4258	1435	219	1579	1927	2437	11854
NOx Emissions (g)	40	12	2	16	7	8	85
Vehicles Entered	1122	338	92	742	155	216	2665
Vehicles Exited	1114	338	92	726	153	211	2634
Hourly Exit Rate	1114	338	92	726	153	211	2634
Input Volume	1151	343	134	1040	353	511	3532
% of Volume	97	99	69	70	43	41	75
Denied Entry Before	0	0	0	0	2	2	4
Denied Entry After	0	0	0	0	196	285	481

15: Delaware Ave. & US 33 WB Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Total Delay (hr)	4.5	6.6	24.3	10.5	112.7	52.4	210.9
Delay / Veh (s)	39.6	23.5	139.5	107.9	1870.4	1923.3	280.8
Total Stops	461	736	1118	577	760	338	3990
Travel Dist (mi)	44.9	109.1	90.7	46.8	27.7	12.5	331.7
Travel Time (hr)	6.1	9.8	27.1	12.1	113.6	52.8	221.6
Avg Speed (mph)	8	12	3	4	1	1	4
Fuel Used (gal)	26.0	58.6	88.3	39.4	266.5	123.3	602.1
HC Emissions (g)	2	5	6	2	5	4	24
CO Emissions (g)	652	1929	1600	686	1923	1039	7830
NOx Emissions (g)	8	21	17	7	7	4	64
Vehicles Entered	408	1001	633	354	218	100	2714
Vehicles Exited	410	1004	620	344	215	97	2690
Hourly Exit Rate	410	1004	620	344	215	97	2690
Input Volume	462	1171	745	396	430	207	3411
% of Volume	89	86	83	87	50	47	79
Denied Entry Before	0	0	0	0	1	0	1
Denied Entry After	0	0	0	0	206	101	307

Delaware Avenue - Existing Condition (short 2-In CC EB)
 2030 PM Peak

18: Delaware Ave. & Watkins Rd. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.7	3.3	1.6	0.4	11.5	0.3	21.0	1.0	1.7	2.3	4.0	37.7
Delay / Veh (s)	23.5	20.8	21.5	45.4	73.5	59.1	311.4	202.3	208.6	409.9	624.5	664.8
Total Stops	232	416	222	31	637	21	402	18	30	24	30	268
Travel Dist (mi)	37.2	78.5	37.6	7.4	137.0	4.5	23.7	1.7	2.9	1.7	2.0	17.4
Travel Time (hr)	3.0	5.6	3.0	0.6	14.4	0.4	21.9	1.1	1.9	2.3	4.1	38.4
Avg Speed (mph)	12	14	13	14	10	10	2	4	6	4	1	2
Fuel Used (gal)	17.1	36.9	16.0	3.3	68.8	2.1	56.1	2.9	4.9	6.0	9.7	92.0
HC Emissions (g)	2	3	2	0	8	0	1	0	0	0	0	2
CO Emissions (g)	618	1363	534	246	4117	113	506	33	68	61	91	786
NOx Emissions (g)	6	14	6	1	23	0	3	0	0	0	0	3
Vehicles Entered	266	568	268	31	572	19	251	18	31	20	24	213
Vehicles Exited	262	568	268	30	554	19	235	18	29	20	23	196
Hourly Exit Rate	262	568	268	30	554	19	235	18	29	20	23	196
Input Volume	330	695	354	33	557	19	274	21	35	31	37	309
% of Volume	79	82	76	91	99	100	86	86	83	65	62	63
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	32	3	6	8	10	101

18: Delaware Ave. & Watkins Rd. Performance by movement

Movement	All
Total Delay (hr)	86.5
Delay / Veh (s)	138.4
Total Stops	2331
Travel Dist (mi)	351.6
Travel Time (hr)	96.7
Avg Speed (mph)	7
Fuel Used (gal)	315.9
HC Emissions (g)	19
CO Emissions (g)	8537
NOx Emissions (g)	58
Vehicles Entered	2281
Vehicles Exited	2222
Hourly Exit Rate	2222
Input Volume	2695
% of Volume	82
Denied Entry Before	0
Denied Entry After	160

1: Fifth St. & Delaware Ave. Performance by movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Total Delay (hr)	0.3	13.9	1.2	1.7	0.0	0.8	0.2	0.0	2.1	3.0	1.6	0.0
Delay / Veh (s)	74.0	73.1	60.7	52.2		65.2	54.9	44.7	104.5	109.4	99.8	157.1
Total Stops	20	860	87	148	0	41	11	3	89	125	71	2
Travel Dist (mi)	4.8	211.5	22.2	37.1	0.1	10.1	2.6	0.8	13.5	19.2	11.3	0.3
Travel Time (hr)	0.5	22.5	2.1	3.3	0.0	1.1	0.3	0.1	2.5	3.6	2.0	0.1
Avg Speed (mph)	10	10	11	12	10	9	9	12	5	5	6	6
Fuel Used (gal)	2.2	99.6	10.1	16.0	0.1	4.9	1.2	0.3	9.0	12.9	7.3	0.2
HC Emissions (g)	0	5	1	1	0	0	0	0	0	1	1	0
CO Emissions (g)	19	1511	181	318	1	90	20	6	200	381	218	5
NOx Emissions (g)	0	21	2	4	0	1	0	0	1	3	2	0
Vehicles Entered	16	687	72	120	0	44	11	3	71	101	59	2
Vehicles Exited	16	679	71	118	0	44	12	3	71	98	59	1
Hourly Exit Rate	16	679	71	118	0	44	12	3	71	98	59	1
Input Volume	18	687	73	118	1	45	12	3	70	99	61	1
% of Volume	89	99	97	100	0	98	100	100	101	99	97	100
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	1	0	0	0	0	0	0	0	0	0	0

1: Fifth St. & Delaware Ave. Performance by movement

Movement	SBL2	SBL	SBT	SBR	SWL	SWR	SWR2	All
Total Delay (hr)	7.8	0.1	1.1	0.2	6.3	27.9	7.9	76.2
Delay / Veh (s)	220.0	211.2	39.5	49.1	300.4	202.5	202.9	128.4
Total Stops	170	1	49	15	239	1421	416	3768
Travel Dist (mi)	9.0	0.1	5.2	1.1	41.8	270.2	77.2	738.0
Travel Time (hr)	8.3	0.1	1.4	0.3	7.6	35.9	10.4	102.0
Avg Speed (mph)	1	1	4	4	6	8	8	8
Fuel Used (gal)	21.8	0.2	5.7	1.0	25.5	132.2	38.2	388.4
HC Emissions (g)	1	0	1	0	1	9	2	22
CO Emissions (g)	234	1	192	21	254	1970	527	6150
NOx Emissions (g)	2	0	2	0	3	26	7	74
Vehicles Entered	130	1	103	15	82	522	150	2189
Vehicles Exited	123	1	102	15	71	469	134	2087
Hourly Exit Rate	123	1	102	15	71	469	134	2087
Input Volume	147	1	115	19	84	539	155	2248
% of Volume	84	100	89	79	85	87	86	93
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	4	22	6	33

1: Delaware Ave. & Fifth St. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2	SBL2
Total Delay (hr)	76.0	7.0	11.6	0.0	0.7	0.2	0.0	1.4	2.4	1.5	0.0	3.3
Delay / Veh (s)	447.3	415.2	410.8	41.8	45.6	46.1	26.1	80.6	84.6	79.1	84.6	72.8
Total Stops	1108	109	184	2	49	13	3	85	141	90	2	191
Travel Dist (mi)	88.1	8.8	14.7	0.4	12.3	3.1	0.6	8.1	13.0	8.5	0.1	18.2
Travel Time (hr)	79.0	7.3	12.2	0.0	1.1	0.3	0.0	1.7	2.9	1.8	0.0	3.9
Avg Speed (mph)	4	5	6	11	11	11	14	5	5	5	4	5
Fuel Used (gal)	202.9	19.4	31.9	0.2	5.2	1.4	0.2	6.2	10.2	6.6	0.1	13.6
HC Emissions (g)	7	1	1	0	1	0	0	0	1	0	0	1
CO Emissions (g)	2016	224	412	3	138	22	4	135	284	161	2	320
NOx Emissions (g)	15	2	3	0	2	0	0	1	3	1	0	3
Vehicles Entered	616	61	102	2	54	14	3	65	103	68	1	162
Vehicles Exited	608	61	101	2	54	14	3	64	104	68	1	160
Hourly Exit Rate	608	61	101	2	54	14	3	64	104	68	1	160
Input Volume	729	72	118	2	50	14	2	67	102	70	1	159
% of Volume	83	85	86	100	108	100	150	96	102	97	100	101
Denied Entry Before	1	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	114	9	18	0	0	0	0	0	0	0	0	0

1: Delaware Ave. & Fifth St. Performance by movement

Movement	SBL	SBT	SBR	SWL2	SWL	SWT	SWR	SWR2	All
Total Delay (hr)	0.0	0.6	0.1	0.0	1.8	0.3	13.3	3.5	123.8
Delay / Veh (s)	99.7	43.4	23.2		94.9	16.6	92.9	85.9	212.4
Total Stops	2	41	16	1	134	19	837	242	3269
Travel Dist (mi)	0.2	5.2	2.1	0.1	19.2	8.6	149.2	42.7	403.2
Travel Time (hr)	0.0	0.7	0.2	0.0	2.4	0.5	17.8	5.0	137.2
Avg Speed (mph)	5	7	10	7	8	16	8	9	6
Fuel Used (gal)	0.1	2.9	0.9	0.0	9.9	3.6	73.7	20.5	409.3
HC Emissions (g)	0	0	0	0	1	0	6	1	21
CO Emissions (g)	2	81	23	1	219	133	1628	425	6232
NOx Emissions (g)	0	1	0	0	2	2	19	5	58
Vehicles Entered	1	46	18	0	67	59	515	147	2104
Vehicles Exited	1	46	18	0	67	59	515	147	2093
Hourly Exit Rate	1	46	18	0	67	59	515	147	2093
Input Volume	1	46	19	1	88	75	645	188	2449
% of Volume	100	100	95	0	76	79	80	78	85
Denied Entry Before	0	0	0	0	0	0	0	0	1
Denied Entry After	0	0	0	0	0	0	0	0	141

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.3	5.7	0.6	0.5	1.9	0.1	1.1	0.0	0.5	0.8	0.0	0.1
Delay / Veh (s)	34.0	26.9	22.8	30.5	10.1	9.0	50.2	21.6	11.9	40.8	27.2	14.8
Total Stops	39	516	71	60	181	15	66	1	130	60	1	25
Travel Dist (mi)	9.5	217.6	28.3	5.8	62.9	3.9	2.9	0.0	5.9	3.1	0.0	1.4
Travel Time (hr)	0.6	12.3	1.6	0.8	4.1	0.3	1.3	0.0	0.9	1.0	0.0	0.2
Avg Speed (mph)	15	18	18	7	15	14	3	5	8	4	4	7
Fuel Used (gal)	3.9	85.1	10.6	3.7	33.9	1.8	3.7	0.0	2.9	2.9	0.0	0.6
HC Emissions (g)	1	9	1	0	4	0	0	0	0	0	0	0
CO Emissions (g)	148	2637	314	102	1242	72	58	0	51	56	0	15
NOx Emissions (g)	2	32	4	1	15	1	1	0	1	1	0	0
Vehicles Entered	33	757	98	64	695	43	80	1	164	73	1	32
Vehicles Exited	34	757	99	63	695	43	79	1	164	73	1	32
Hourly Exit Rate	34	757	99	63	695	43	79	1	164	73	1	32
Input Volume	38	867	110	84	902	54	85	1	157	75	1	31
% of Volume	89	87	90	75	77	80	93	100	104	97	100	103
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	All
Total Delay (hr)	11.8
Delay / Veh (s)	20.9
Total Stops	1165
Travel Dist (mi)	341.5
Travel Time (hr)	23.1
Avg Speed (mph)	15
Fuel Used (gal)	149.2
HC Emissions (g)	15
CO Emissions (g)	4696
NOx Emissions (g)	56
Vehicles Entered	2041
Vehicles Exited	2041
Hourly Exit Rate	2041
Input Volume	2405
% of Volume	85
Denied Entry Before	0
Denied Entry After	0

Delaware Avenue 2030 PM
 Timing & Phasing Alternative

9/21/2008

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.2	6.5	0.7	40.7	9.4	2.0	2.9	0.6	2.1	3.7	0.9	1.1
Delay / Veh (s)	35.9	36.8	10.7	356.8	85.6	55.3	40.5	44.3	14.0	52.8	46.8	26.2
Total Stops	108	557	221	1346	656	210	256	44	336	296	60	142
Travel Dist (mi)	10.6	56.3	21.2	75.4	72.6	24.3	20.8	4.1	44.3	22.6	6.0	14.0
Travel Time (hr)	1.6	8.3	1.6	43.3	11.6	2.9	3.6	0.7	3.9	4.6	1.1	1.8
Avg Speed (mph)	7	7	13	2	6	8	6	6	11	5	6	8
Fuel Used (gal)	7.2	39.1	9.8	122.0	50.5	14.4	11.6	2.1	14.6	17.1	4.0	7.6
HC Emissions (g)	1	3	1	5	4	1	1	0	1	1	0	1
CO Emissions (g)	244	1156	376	1567	1290	465	189	44	403	458	109	255
NOx Emissions (g)	2	12	4	14	15	5	2	0	3	4	1	2
Vehicles Entered	118	635	240	424	397	132	255	49	538	251	66	155
Vehicles Exited	119	635	240	398	392	131	255	50	538	250	66	155
Hourly Exit Rate	119	635	240	398	392	131	255	50	538	250	66	155
Input Volume	136	703	260	695	633	223	250	48	545	246	68	157
% of Volume	88	90	92	57	62	59	102	104	99	102	97	99
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	All
Total Delay (hr)	71.7
Delay / Veh (s)	79.6
Total Stops	4232
Travel Dist (mi)	372.2
Travel Time (hr)	85.1
Avg Speed (mph)	4
Fuel Used (gal)	300.1
HC Emissions (g)	20
CO Emissions (g)	6555
NOx Emissions (g)	66
Vehicles Entered	3260
Vehicles Exited	3229
Hourly Exit Rate	3229
Input Volume	3964
% of Volume	81
Denied Entry Before	0
Denied Entry After	0

Total Network Performance

Total Delay (hr)	732.6
Delay / Veh (s)	519.7
Total Stops	18521
Travel Dist (mi)	2942.3
Travel Time (hr)	831.9
Avg Speed (mph)	6
Fuel Used (gal)	2799.6
HC Emissions (g)	180
CO Emissions (g)	61500
NOx Emissions (g)	546
Vehicles Entered	5227
Vehicles Exited	4928
Hourly Exit Rate	4928
Input Volume	26329
% of Volume	19
Denied Entry Before	2
Denied Entry After	951

1: Delaware Ave. & Fifth St. Performance by movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Total Delay (hr)	0.2	10.5	0.7	1.0	0.0	0.6	0.2	0.0	0.9	1.1	0.7	0.0
Delay / Veh (s)	48.0	50.4	37.5	32.2	50.4	47.5	44.2	28.3	43.9	39.2	37.2	24.8
Total Stops	17	727	56	98	2	42	12	2	64	85	58	2
Travel Dist (mi)	2.7	107.8	10.0	16.9	0.4	10.7	2.9	0.5	9.4	12.9	8.6	0.2
Travel Time (hr)	0.3	14.1	1.1	1.7	0.0	1.0	0.3	0.0	1.3	1.6	1.0	0.0
Avg Speed (mph)	9	9	12	14	9	11	11	15	8	8	8	9
Fuel Used (gal)	1.3	55.8	5.3	8.1	0.2	4.5	1.2	0.2	5.3	6.7	4.5	0.1
HC Emissions (g)	0	3	0	1	0	0	0	0	0	0	0	0
CO Emissions (g)	15	949	177	247	3	109	19	4	147	164	143	2
NOx Emissions (g)	0	12	1	2	0	1	0	0	1	1	1	0
Vehicles Entered	18	747	70	116	2	47	13	2	74	102	68	2
Vehicles Exited	18	747	69	117	2	47	13	2	74	102	68	2
Hourly Exit Rate	18	747	69	117	2	47	13	2	74	102	68	2
Input Volume	18	729	72	118	2	50	14	2	67	102	70	1
% of Volume	100	102	96	99	100	94	93	100	110	100	97	200
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

1: Delaware Ave. & Fifth St. Performance by movement

Movement	SBL2	SBL	SBT	SBR	SWL2	SWL	SWT	SWR	SWR2	All
Total Delay (hr)	28.9	0.2	6.1	2.6	0.0	2.0	0.1	3.8	0.4	60.2
Delay / Veh (s)	839.2	636.9	664.7	626.3	103.5	89.8	2.3	21.9	8.2	90.0
Total Stops	317	3	75	36	1	86	0	341	92	2116
Travel Dist (mi)	13.8	0.1	3.6	1.7	0.2	23.4	11.6	180.5	53.3	471.1
Travel Time (hr)	29.4	0.2	6.2	2.7	0.0	2.8	0.4	9.2	2.2	75.6
Avg Speed (mph)	1	1	1	2	6	8	29	20	24	9
Fuel Used (gal)	71.2	0.4	15.3	6.6	0.1	11.9	4.6	65.5	17.4	286.3
HC Emissions (g)	1	0	1	0	0	1	1	7	2	18
CO Emissions (g)	579	3	167	46	2	281	191	1955	573	5774
NOx Emissions (g)	3	0	1	0	0	3	2	25	7	62
Vehicles Entered	131	1	35	16	1	82	79	627	184	2417
Vehicles Exited	117	1	31	15	1	82	79	625	183	2395
Hourly Exit Rate	117	1	31	15	1	82	79	625	183	2395
Input Volume	159	1	46	19	1	88	75	645	188	2467
% of Volume	74	100	67	79	100	93	105	97	97	97
Denied Entry Before	0	0	0	0	0	0	0	0	0	0
Denied Entry After	34	0	9	4	0	0	0	0	0	47

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.5	8.5	1.0	0.9	3.0	0.1	0.9	0.0	0.5	0.9	0.0	0.1
Delay / Veh (s)	48.1	36.5	32.7	39.9	12.1	9.5	40.0	22.6	10.5	41.5	18.1	13.5
Total Stops	52	631	87	84	286	19	67	1	128	67	0	25
Travel Dist (mi)	11.1	241.7	31.6	7.3	80.0	4.6	2.9	0.0	5.9	3.4	0.0	1.4
Travel Time (hr)	0.9	15.8	2.1	1.2	5.6	0.3	1.0	0.0	0.8	1.1	0.0	0.2
Avg Speed (mph)	13	16	16	6	14	14	3	4	7	3	4	7
Fuel Used (gal)	4.7	97.4	12.3	4.9	42.1	2.1	3.1	0.0	2.8	3.2	0.0	0.6
HC Emissions (g)	0	9	1	0	4	0	0	0	0	0	0	0
CO Emissions (g)	128	2839	374	120	1303	77	57	0	60	59	0	12
NOx Emissions (g)	1	33	4	2	18	1	1	0	1	1	0	0
Vehicles Entered	39	840	110	80	883	50	78	1	163	80	1	33
Vehicles Exited	39	837	109	80	881	50	78	1	163	80	1	33
Hourly Exit Rate	39	837	109	80	881	50	78	1	163	80	1	33
Input Volume	38	867	110	84	902	54	85	1	157	75	1	31
% of Volume	103	97	99	95	98	93	92	100	104	107	100	106
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	All
Total Delay (hr)	16.4
Delay / Veh (s)	25.1
Total Stops	1447
Travel Dist (mi)	389.9
Travel Time (hr)	29.1
Avg Speed (mph)	14
Fuel Used (gal)	173.3
HC Emissions (g)	16
CO Emissions (g)	5030
NOx Emissions (g)	60
Vehicles Entered	2358
Vehicles Exited	2352
Hourly Exit Rate	2352
Input Volume	2405
% of Volume	98
Denied Entry Before	0
Denied Entry After	0

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.7	7.0	1.1	16.7	15.0	2.9	3.3	0.6	2.9	3.3	1.0	1.6
Delay / Veh (s)	45.9	36.5	15.1	92.0	87.4	50.4	48.0	49.6	19.3	47.1	51.2	37.8
Total Stops	136	595	233	1094	1026	345	254	40	341	280	66	150
Travel Dist (mi)	12.1	61.5	22.6	120.4	114.1	37.7	23.3	4.3	51.7	22.4	6.2	13.8
Travel Time (hr)	2.2	8.9	2.0	20.8	18.5	4.2	4.1	0.8	5.0	4.2	1.2	2.2
Avg Speed (mph)	6	7	11	6	6	9	6	6	12	5	5	6
Fuel Used (gal)	9.1	42.4	11.2	85.2	77.4	20.6	15.8	2.6	21.8	16.0	4.3	8.7
HC Emissions (g)	0	4	1	6	6	2	1	0	2	1	0	1
CO Emissions (g)	226	1276	379	2184	1846	601	491	57	816	429	109	261
NOx Emissions (g)	2	14	4	23	22	6	4	0	6	4	1	2
Vehicles Entered	135	690	254	661	623	206	249	46	551	249	68	153
Vehicles Exited	135	689	255	648	612	203	249	46	550	250	68	153
Hourly Exit Rate	135	689	255	648	612	203	249	46	550	250	68	153
Input Volume	136	703	260	695	633	223	250	48	545	246	68	157
% of Volume	99	98	98	93	97	91	100	96	101	102	100	97
Denied Entry Before	0	0	0	0	0	0	0	0	1	0	0	0
Denied Entry After	0	0	0	0	0	0	1	0	0	0	0	0

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	All
Total Delay (hr)	57.1
Delay / Veh (s)	53.0
Total Stops	4560
Travel Dist (mi)	490.2
Travel Time (hr)	74.3
Avg Speed (mph)	7
Fuel Used (gal)	315.2
HC Emissions (g)	25
CO Emissions (g)	8675
NOx Emissions (g)	89
Vehicles Entered	3885
Vehicles Exited	3858
Hourly Exit Rate	3858
Input Volume	3964
% of Volume	97
Denied Entry Before	1
Denied Entry After	1

Total Network Performance

Total Delay (hr)	261.8
Delay / Veh (s)	156.0
Total Stops	16304
Travel Dist (mi)	3460.3
Travel Time (hr)	379.0
Avg Speed (mph)	11
Fuel Used (gal)	1935.7
HC Emissions (g)	180
CO Emissions (g)	65604
NOx Emissions (g)	625
Vehicles Entered	6088
Vehicles Exited	5988
Hourly Exit Rate	5988
Input Volume	24499
% of Volume	24
Denied Entry Before	2
Denied Entry After	149

Intersection Summary

Five Points

Enter subtitle

Performance Measure

Demand Flows - Total
 Percent Heavy Vehicles
 Degree of Saturation
 Effective Intersection Capacity
 95% Back of Queue (ft)
 95% Back of Queue (veh)
 Control Delay (Total)
 Control Delay (Average)
 Level of Service
 Level of Service (Worst Movement)
 Total Effective Stops
 Effective Stop Rate
 Proportion Queued
 Travel Distance (Total)
 Travel Distance (Average)
 Travel Time (Total)
 Travel Time (Average)
 Travel Speed
 Operating Cost (Total)
 Fuel Consumption (Total)
 Carbon Dioxide (Total)
 Hydrocarbons (Total)
 Carbon Monoxide (Total)
 NOX (Total)

Vehicles

2658 veh/h
 2.1 %
 0.773
 3437 veh/h
 294 ft
 11.6 veh
 9.57 veh-h/h
 13.0 s/veh
 LOS B
 LOS C
 2168 veh/h
 0.82 per veh
 0.76
 1038.9 veh-mi/h
 2064 ft
 36.0 veh-h/h
 48.7 secs
 28.9 mph
 607 \$/h
 55.0 gal/h
 521.2 kg/h
 0.874 kg/h
 43.61 kg/h
 1.313 kg/h

Persons

3190 pers/h

 11.48 pers-h/h
 13.0 s/pers

 2601 pers/h
 0.82 per pers
 0.76
 1246.7 pers-mi/h
 2064 ft
 43.2 pers-h/h
 48.7 secs
 28.9 mph
 607 \$/h



SIDRA SOLUTIONS

Site: Five Points 2030 PM Roundabout
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Table S.15 - Capacity and Level of Service

Five Points
 Roundabout Alternative
 Intersection ID: 0
 Roundabout

Mov ID	Mov Typ	Total Flow (veh /h)	Total Cap. (veh /h)	Deg. of Satn (v/c)	Aver. Delay (sec)	LOS	Longest Queue 95% Back (vehs)	Queue (ft)
West: Fifth St.								
5L	L	830	1681	0.494	13.5	B	4.9	124
2T	T	80	162	0.494	7.4	A	4.9	124
2R	R	131	265	0.494	8.7	A	4.9	124
South: Columbus Ave.								
3L	L	74	121	0.612	23.3	C	4.8	122
8T	T	113	185	0.611	16.2	B	4.8	122
8R	R	79	129	0.612	16.2	B	4.8	122
East: Fifth St.								
1L	L	3	15	0.200	20.1	C	1.1	30
6T	T	55	278	0.198	13.0	B	1.1	30
6R	R	18	91	0.198	14.2	B	1.1	30
NorthEast: Delaware Ave.								
17L	L	99	128	0.773*	15.8	B	11.6	294
14T	T	716	926	0.773*	9.9	A	11.6	294
14R	R	209	571	0.366	10.7	B	2.4	60
North: Cherry St.								
7L	L	178	476	0.374	21.2	C	3.2	81
4T	T	51	237	0.215	14.1	B	1.5	38
4R	R	22	102	0.216	15.3	B	1.5	38
ALL VEHICLES:		2658		0.773	13.0	B	11.6	294

Level of Service calculations are based on average control delay including geometric delay (HCM criteria), independent of the current delay definition used.

For the criteria, refer to the "Level of Service" topic in the SIDRA Output Guide or the Output section of the on-line help.

* Maximum v/c ratio, or critical green periods

" Movement Level of service has been determined using adjacent lane v/c ratio rather than short lane v/c ratio (v/c=1.0)

1: Delaware Ave. & Cherry St. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.7	20.3	3.9	1.5	4.4	1.0	1.5	1.5	0.8	2.2	0.4	0.1
Delay / Veh (s)	125.2	103.5	76.9	62.6	22.7	20.3	48.3	47.7	41.1	50.0	27.0	16.1
Total Stops	35	804	178	86	319	92	120	116	77	158	31	14
Travel Dist (mi)	2.7	102.5	26.8	25.3	198.4	53.5	14.6	14.5	9.5	17.5	5.5	2.1
Travel Time (hr)	0.8	23.8	5.0	2.3	10.3	2.8	2.1	2.0	1.2	2.8	0.6	0.2
Avg Speed (mph)	5	7	11	11	19	19	7	7	8	7	10	13
Fuel Used (gal)	2.3	79.1	18.0	11.1	70.0	18.2	8.4	8.2	5.1	10.5	2.5	0.8
HC Emissions (g)	0	4	2	1	7	2	1	1	0	1	0	0
CO Emissions (g)	19	1123	472	256	2115	552	221	218	141	243	73	21
NOx Emissions (g)	0	13	5	3	26	7	2	2	1	2	1	0
Vehicles Entered	19	709	183	85	707	181	113	113	73	155	48	19
Vehicles Exited	19	703	184	84	702	181	114	113	73	156	48	19
Hourly Exit Rate	19	703	184	84	702	181	114	113	73	156	48	19
Input Volume	18	729	190	88	721	188	117	116	72	159	46	19
% of Volume	106	96	97	95	97	96	97	97	101	98	104	100
Denied Entry Before	0	1	1	0	0	0	0	0	0	0	0	0
Denied Entry After	0	18	5	0	0	0	0	0	0	0	0	0

1: Delaware Ave. & Cherry St. Performance by movement

Movement	All
Total Delay (hr)	38.3
Delay / Veh (s)	57.4
Total Stops	2030
Travel Dist (mi)	473.0
Travel Time (hr)	53.7
Avg Speed (mph)	11
Fuel Used (gal)	234.1
HC Emissions (g)	19
CO Emissions (g)	5455
NOx Emissions (g)	62
Vehicles Entered	2405
Vehicles Exited	2396
Hourly Exit Rate	2396
Input Volume	2463
% of Volume	97
Denied Entry Before	2
Denied Entry After	23

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.7	11.2	1.2	1.0	3.1	0.2	1.0	0.0	0.5	0.8	0.0	0.1
Delay / Veh (s)	60.7	48.4	42.4	42.7	12.9	10.0	40.5	25.7	11.0	41.2		14.8
Total Stops	65	800	100	90	297	22	74	0	122	60	0	25
Travel Dist (mi)	11.7	241.8	30.2	7.8	79.4	5.4	3.3	0.0	5.7	3.1	0.0	1.3
Travel Time (hr)	1.0	18.4	2.2	1.3	5.8	0.4	1.1	0.0	0.8	1.0	0.0	0.2
Avg Speed (mph)	12	14	14	6	14	13	3	3	7	3	3	7
Fuel Used (gal)	5.2	100.4	11.9	5.4	41.7	2.5	3.6	0.0	2.8	2.9	0.0	0.6
HC Emissions (g)	0	8	2	0	4	0	0	0	0	0	0	0
CO Emissions (g)	133	2510	388	130	1233	69	58	0	52	45	0	20
NOx Emissions (g)	1	30	5	2	17	1	1	0	1	0	0	0
Vehicles Entered	40	838	104	85	877	60	88	1	159	73	0	31
Vehicles Exited	40	833	104	86	872	59	88	1	158	74	0	31
Hourly Exit Rate	40	833	104	86	872	59	88	1	158	74	0	31
Input Volume	38	867	110	84	902	54	85	1	157	75	1	31
% of Volume	105	96	95	102	97	109	104	100	101	99	0	100
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	2	0	0	0	0	0	0	0	0	0	0

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	All
Total Delay (hr)	19.9
Delay / Veh (s)	30.4
Total Stops	1655
Travel Dist (mi)	389.8
Travel Time (hr)	32.4
Avg Speed (mph)	12
Fuel Used (gal)	177.0
HC Emissions (g)	15
CO Emissions (g)	4638
NOx Emissions (g)	57
Vehicles Entered	2356
Vehicles Exited	2346
Hourly Exit Rate	2346
Input Volume	2405
% of Volume	98
Denied Entry Before	0
Denied Entry After	2

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.6	6.5	1.0	20.1	12.9	2.4	4.1	0.7	3.5	3.8	0.9	1.5
Delay / Veh (s)	45.0	34.3	14.7	107.9	74.8	39.9	58.6	54.4	22.9	53.2	46.3	34.0
Total Stops	123	560	228	1231	924	316	286	46	348	301	62	143
Travel Dist (mi)	11.4	60.9	22.5	123.6	114.3	39.8	23.7	4.6	51.8	23.0	6.2	14.1
Travel Time (hr)	2.0	8.4	2.0	24.4	16.4	3.9	4.9	0.9	5.6	4.7	1.1	2.1
Avg Speed (mph)	6	7	11	5	7	10	6	6	12	5	6	7
Fuel Used (gal)	8.5	41.2	11.2	93.0	72.3	20.2	17.7	2.8	23.4	17.4	4.2	8.6
HC Emissions (g)	1	3	1	7	6	2	1	0	2	1	0	1
CO Emissions (g)	252	1214	365	2287	1774	666	503	66	824	410	120	263
NOx Emissions (g)	3	13	4	23	21	7	4	1	6	4	1	2
Vehicles Entered	127	684	253	679	624	216	254	49	553	255	68	157
Vehicles Exited	128	684	254	665	614	214	252	48	551	254	68	156
Hourly Exit Rate	128	684	254	665	614	214	252	48	551	254	68	156
Input Volume	136	703	260	695	633	223	250	48	545	246	68	157
% of Volume	94	97	98	96	97	96	101	100	101	103	100	99
Denied Entry Before	0	0	0	0	0	0	0	0	1	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	All
Total Delay (hr)	59.0
Delay / Veh (s)	54.4
Total Stops	4568
Travel Dist (mi)	495.9
Travel Time (hr)	76.4
Avg Speed (mph)	7
Fuel Used (gal)	320.4
HC Emissions (g)	25
CO Emissions (g)	8743
NOx Emissions (g)	89
Vehicles Entered	3919
Vehicles Exited	3888
Hourly Exit Rate	3888
Input Volume	3964
% of Volume	98
Denied Entry Before	1
Denied Entry After	0

Total Network Performance

Total Delay (hr)	216.0
Delay / Veh (s)	127.4
Total Stops	15988
Travel Dist (mi)	3468.2
Travel Time (hr)	333.1
Avg Speed (mph)	11
Fuel Used (gal)	1832.6
HC Emissions (g)	179
CO Emissions (g)	65507
NOx Emissions (g)	625
Vehicles Entered	6150
Vehicles Exited	6060
Hourly Exit Rate	6060
Input Volume	24490
% of Volume	25
Denied Entry Before	7
Denied Entry After	69

1: Delaware Ave. & Cherry St. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.2	5.7	0.9	1.0	3.2	0.9	0.7	1.2	0.7	2.5	0.4	0.1
Delay / Veh (s)	46.8	32.6	15.9	40.0	18.8	16.9	38.4	38.1	31.2	57.0	29.1	15.4
Total Stops	24	460	106	82	251	92	60	102	73	165	31	14
Travel Dist (mi)	2.6	92.1	28.8	26.0	170.7	56.2	8.1	15.1	10.2	17.9	5.3	2.3
Travel Time (hr)	0.3	8.9	2.0	1.8	8.2	2.7	1.0	1.8	1.1	3.2	0.6	0.2
Avg Speed (mph)	8	11	18	14	21	21	8	9	10	6	10	13
Fuel Used (gal)	1.2	40.0	10.8	10.0	59.1	18.4	4.3	7.8	4.9	11.3	2.5	0.9
HC Emissions (g)	0	3	1	1	6	2	0	1	0	1	0	0
CO Emissions (g)	14	749	403	276	1788	570	106	229	129	265	83	25
NOx Emissions (g)	0	9	3	3	22	7	1	2	1	2	1	0
Vehicles Entered	18	635	197	88	613	190	63	117	79	158	47	20
Vehicles Exited	18	631	198	87	607	189	63	117	79	158	47	20
Hourly Exit Rate	18	631	198	87	607	189	63	117	79	158	47	20
Input Volume	18	629	190	88	621	188	67	116	72	159	46	19
% of Volume	100	100	104	99	98	101	94	101	110	99	102	105
Denied Entry Before	0	0	1	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

1: Delaware Ave. & Cherry St. Performance by movement

Movement	All
Total Delay (hr)	17.5
Delay / Veh (s)	28.3
Total Stops	1460
Travel Dist (mi)	435.3
Travel Time (hr)	31.7
Avg Speed (mph)	14
Fuel Used (gal)	171.1
HC Emissions (g)	15
CO Emissions (g)	4636
NOx Emissions (g)	52
Vehicles Entered	2225
Vehicles Exited	2214
Hourly Exit Rate	2214
Input Volume	2213
% of Volume	100
Denied Entry Before	1
Denied Entry After	0

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.4	7.7	1.0	0.9	2.6	0.1	0.9	0.0	0.5	0.9	0.0	0.1
Delay / Veh (s)	43.7	35.8	31.8	37.3	11.8	8.5	41.1	37.7	10.7	41.7	33.7	10.3
Total Stops	48	583	82	83	242	19	70	1	124	63	1	24
Travel Dist (mi)	10.4	223.5	31.6	7.5	71.9	5.1	3.1	0.0	5.7	3.2	0.0	1.3
Travel Time (hr)	0.8	14.4	2.0	1.2	5.0	0.4	1.1	0.0	0.8	1.0	0.0	0.2
Avg Speed (mph)	14	16	16	7	14	14	3	4	7	3	3	8
Fuel Used (gal)	4.2	87.4	12.0	5.0	38.1	2.3	3.4	0.0	2.7	3.0	0.0	0.5
HC Emissions (g)	0	8	2	0	4	0	0	0	0	0	0	0
CO Emissions (g)	117	2424	409	117	1261	66	57	0	60	52	0	15
NOx Emissions (g)	1	28	5	1	15	1	1	0	1	0	0	0
Vehicles Entered	36	777	110	83	796	56	83	1	159	76	1	31
Vehicles Exited	36	773	110	83	798	56	83	1	159	76	1	31
Hourly Exit Rate	36	773	110	83	798	56	83	1	159	76	1	31
Input Volume	38	767	110	84	802	54	85	1	157	75	1	31
% of Volume	95	101	100	99	100	104	98	100	101	101	100	100
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

7: Delaware Ave. & Charles Ln. Performance by movement

Movement	All
Total Delay (hr)	15.1
Delay / Veh (s)	24.6
Total Stops	1340
Travel Dist (mi)	363.4
Travel Time (hr)	26.8
Avg Speed (mph)	14
Fuel Used (gal)	158.7
HC Emissions (g)	14
CO Emissions (g)	4580
NOx Emissions (g)	54
Vehicles Entered	2209
Vehicles Exited	2207
Hourly Exit Rate	2207
Input Volume	2205
% of Volume	100
Denied Entry Before	0
Denied Entry After	0

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.8	7.6	0.7	17.3	10.1	1.7	1.7	0.7	2.7	3.1	0.7	1.3
Delay / Veh (s)	47.3	38.8	16.0	89.2	58.5	26.9	39.2	51.3	18.1	46.7	41.9	29.8
Total Stops	144	630	154	1067	742	262	135	45	338	257	56	146
Travel Dist (mi)	12.6	62.7	14.4	128.8	115.1	41.1	14.4	4.6	51.0	21.5	5.8	14.8
Travel Time (hr)	2.3	9.6	1.3	21.7	13.7	3.2	2.2	0.8	4.8	4.0	1.0	2.0
Avg Speed (mph)	5	7	11	6	8	13	7	6	12	5	6	7
Fuel Used (gal)	9.4	43.9	7.4	88.4	66.5	19.2	9.0	2.8	21.5	15.4	3.7	8.3
HC Emissions (g)	1	4	1	7	5	2	1	0	2	1	0	1
CO Emissions (g)	234	1269	263	2327	1778	703	317	74	799	419	110	273
NOx Emissions (g)	2	14	3	23	20	7	2	1	6	4	1	2
Vehicles Entered	141	705	162	705	628	224	155	49	543	240	64	163
Vehicles Exited	140	703	162	694	619	222	154	49	543	238	64	163
Hourly Exit Rate	140	703	162	694	619	222	154	49	543	238	64	163
Input Volume	136	703	160	695	633	223	150	48	545	246	68	157
% of Volume	103	100	101	100	98	100	103	102	100	97	94	104
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	1	0	0	0

10: Delaware Ave. & Citygate Dr. Performance by movement

Movement	All
Total Delay (hr)	49.6
Delay / Veh (s)	47.4
Total Stops	3976
Travel Dist (mi)	486.9
Travel Time (hr)	66.7
Avg Speed (mph)	7
Fuel Used (gal)	295.6
HC Emissions (g)	24
CO Emissions (g)	8567
NOx Emissions (g)	85
Vehicles Entered	3779
Vehicles Exited	3751
Hourly Exit Rate	3751
Input Volume	3764
% of Volume	100
Denied Entry Before	0
Denied Entry After	1

Total Network Performance

Total Delay (hr)	175.5
Delay / Veh (s)	106.2
Total Stops	14638
Travel Dist (mi)	3388.7
Travel Time (hr)	290.0
Avg Speed (mph)	12
Fuel Used (gal)	1708.4
HC Emissions (g)	169
CO Emissions (g)	63621
NOx Emissions (g)	599
Vehicles Entered	5984
Vehicles Exited	5907
Hourly Exit Rate	5907
Input Volume	23590
% of Volume	25
Denied Entry Before	4
Denied Entry After	9

Appendix D

Signal Timing Plans



Delaware Avenue Optimized Signal Timing

All times and offsets given in seconds.

All offsets referenced beginning of EB/WB coordinated through phase.

Table E-1: Five Points Signal Timing

	EB + SWB	NB + SB	WB	Offset
AM Peak	35	25	20	10
PM Peak	48	30	22	78

Table E-2: Charles Lane Signal Timing

	WBLT	EB	EBLT	WB	NB	SB	Offset
AM Peak	17	35	17	35	28	28	45
PM Peak	20	50	20	50	30	30	55

Table E-3: Coleman's Crossing Boulevard/Citygate Drive Signal Timing

	WBLT	EB	EBLT*	WB	NB	SB	Offset
AM Peak	23	32	17	38	25	25	50
PM Peak	35	29	20	44	36	36	77

*Lagging left turn phase

Table E-4: US 33 Eastbound Ramp Intersection Signal Timing

	EB	WB	SB	Offset
AM Peak	45	45	35	73
PM Peak	59	59	41	89

Table E-5: US 33 Westbound Ramp Intersection Signal Timing

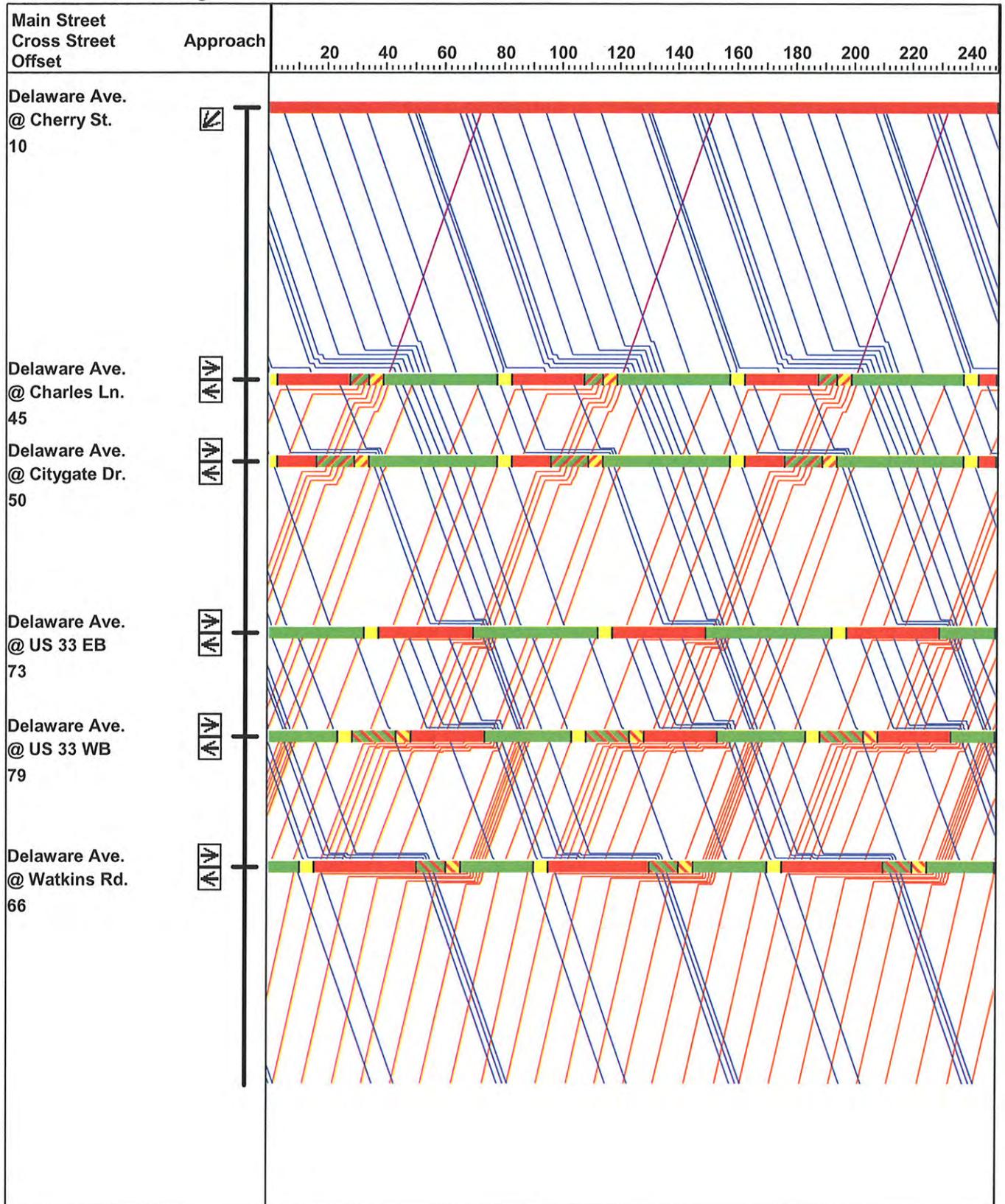
	EB	EBLT*	WB	NB	Offset
AM Peak	50	20	30	30	79
PM Peak	60	28	32	40	0

*Lagging left turn phase

Table E-6: Watkins Road Signal Timing

	WBLT	EB	EBLT	WB	NBLT	SB	SBLT	NB	Offset
AM Peak	15	30	15	30	15	20	15	20	66
PM Peak	20	35	20	35	21	24	17	28	0

**Delaware Avenue Corridor Study
AM Peak Hour Timing**



**Delaware Avenue Corridor Study
PM Peak Hour Timing**

