

Bridgetown, Glenway and Race Intersection Improvement Study





Fall Quarter 2007 Prepared for John C. Niehaus Hamilton County Engineer's Office ODOT

Prepared by:

Qingyi Ai Matthew Foreman Amruta Inapurapu Sudhir Itekyala Zhixia Li David Murnan Vijay Nemalapuri Sarah Perrino Viswanath Pokala Craig Schrader Nicholas Wilkerson Andrew Zoller



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I. Executive Summary

Introduction

The intersection of Bridgetown, Glenway and Race is a major crossroads within Green Township. Very recently, the *Western Hamilton County Transportation* study ranked improvement of this intersection as the second highest ranked need in Green Township that did not at the time have a formal study or plan. During the peak periods the geometrics and traffic volumes lead to significant queues along every approach.

The purpose of this report is to identify a set of recommendations regarding the improvement of the intersection of Bridgetown, Glenway, and Race Roads. These recommendations look to satisfy needs of all stakeholders involved. This project aims to provide an acceptable level of service for motorists, while keeping the intersection safe for motorists and pedestrians. At the same time, this study aims to make recommendations that are of minimal impact for property holders and businesses. These recommendations will be the product of analyzing the existing conditions of the intersection, identifying alternatives, and performing capacity analyses for these alternatives.

Existing Conditions

The intersection of Race and Glenway is a major crossroads within western Hamilton County, serving about 45000 vehicles as of 2007. An intersection of a state route and county roads, this intersection is a gateway to points throughout western Hamilton County.

Bridgetown Road within the Bridgetown Area is a four lane facility that is classified by the Hamilton County Thoroughfare Plan as a minor arterial. Race Road is a four lane facility that is classified as a major arterial, while Glenway Avenue is a five lane facility that is also classified as a major arterial. State Route 264 travels north along Glenway Avenue and continues west on Bridgetown Road, and this alignment is under ODOT maintenance. Race Road and the eastern approach of Bridgetown Road are under Hamilton County Engineer's Office maintenance.

Figure 1, located in the *Existing Conditions* section of the report, is an existing schematic of the intersection. Each approach has a left turn lane and three approaches have a channelized right turn lane, and the storage lengths of these turn lanes are located in *Table 1,* also located in the *Existing Conditions* section. Only the southbound approach possesses two through lanes at the intersection. Traffic control at the intersection consists of a traffic signal operating in six phases, last timed in 1992. The southbound left turn has no protected phase. All channelized right turns are stop controlled.

Turning movement counts were completed in July of 2007. These counts have been analyzed for three peak periods, and also grown to 2030 volumes. These counts can be found in *Tables 2 through 8*, located in the *Existing Conditions* section.

An accident analysis was completed for the intersection using crash data from 2004 to 2006. This data is found in *Appendix C*, and is summarized in *Figure 2*. Over the three analysis years, 134 accidents were observed, of which ten were injury accidents and 2 involved pedestrians.

Analysis of the existing conditions of the intersection has identified several deficiencies with the intersection. These deficiencies are identified below:

- Drivers demonstrate disregard for traffic control items within the channelized right turn. Often, the stop signs are treated as a yield sign by motorists. This action greatly decreases the safety for pedestrians crossing the channelized right turns.
- Only one through lane exists for the northbound approach, and the left turn lane is dropped from the same travel lane as the through lane. The two heavy movements combined cause a significant queue and delay for both northbound movements.
- A very heavy through movement exists for the southbound approach. In addition, no right turn lane exists at the intersection. The current geometry for this approach causes large southbound delays to be incurred.
- Left turn movements on Bridgetown Rd. are heavy during the PM peak, and these left turn movements currently incur significant queues and delays.
- A merging distance is provided for right turning vehicles from Bridgetown to Glenway. Coupled with the channelized right turn, motorists may attempt to make quick right turns with little regard for motorists heading south.
- The traffic signal has not been seen a timing change since the early 1990s. Current phasing, especially during the PM peak, leads to significant delays and queues that could be alleviated by optimized timing.

Alternatives Considered

Three alternatives have been identified for analysis and recommendations. The no build alternative leaves geometrics and timings as it currently is. The no build alternative with optimized timing keeps the geometrics of the intersection as is, but optimizes the timing at the intersection. The feasible alternative provides necessary lanes, storage lengths, and timings to provide an acceptable level of service. A schematic of this alternative can be found in *Figure 3*, and is described in great detail in the *Alternatives Considered* section.

Capacity Analysis

Capacity analyses were completed for the three alternatives using HCS 2000. HCS analyzes intersection according to the *Highway Capacity Manual (HCM)*. HCM measures effectiveness using the level of service (LOS) concept. The level of service concept for signalized intersection is described in *Table 9*, located in the *Capacity Analysis* section.

The three alternatives were analyzed for AM, Noon, and Peak periods in the years 2007 and 2030. The results of these analyses are described in great detail in *Tables 10 through 12*, located in the *Capacity Analysis* section of the report. Analysis shows that while the No Build Alternative operates at a LOS of E during the PM peak, which degrades to an LOS of F by 2030. The noon peak LOS also degrades to an E in 2030. An optimized timing of the intersection will provide an LOS no worse than a D during the 2007 analysis years, but by 2030 the LOS for the PM peaks degrades to an E with a delay of 74.5 seconds. The feasible alternative provides a LOS of C or better for all analysis periods, which a 2030 PM peak hour delay of 34.1 seconds.

Recommendations

After analyzing the three alternatives, short term and long term recommendations have been prepared for the intersection. These recommendations are summarized below:

Short Term Recommendations

• Optimize signal phasing and timing for each peak period

Long Term Recommendations

All lanes at the intersection will be widened to 12 feet and shifted as needed to accommodate the following intersection improvements.

Southbound Race Rd.

- Remove the channelized right turn lane
- Add a second northbound receiving lane
- Add a dedicated left turn lane with 100 feet of storage
- Add a dedicated right turn lane with 550 feet of storage

Northbound Glenway Ave.

- Remove the channelization of the right turn lane
- Modify the channelized right turn lane to become a drop right turn lane with 450 feet of storage
- Widen Glenway Ave. on the west side
- Add a second northbound through lane
- Extend the dedicated left turn lane to 450 feet of storage

Eastbound Bridgetown Rd.

- Remove the channelization of the right turn lane
- Modify the channelized right turn lane to become a drop right turn lane with 375 feet of storage
- Modify the travel lane to become a dedicated left turn lane with 375 feet of storage
- Widen Bridgetown Rd. on the north side
- Add a westbound receiving lane

Westbound Bridgetown Rd.

- Remove the inside eastbound receiving lane
- Modify the eastbound receiving lane to become a dedicated left turn lane with 325 feet of storage

Additional

• Mark crosswalks at each approach

II. Introduction

Green Township is a vibrant community within western Hamilton County Ohio. According to the latest census estimate, almost 61,000 residents call Green Township home. To serve these residents, a network of arterials and collectors has been constructed to ensure mobility through out the township. As the township and western Hamilton County has continued to grow, use of the roadway network has increased dramatically, causing congestion to exist on several of the arterials through out the county and township. One recent study, the *Western Hamilton County Transportation Study*, looked to create a map for future improvements within the western part of the county. Any deficiencies that did not currently have a study or plan were identified throughout the county, and from these deficiencies improvements were ranked and recommended. From this report the fifth highest ranked need in western Hamilton County and second highest ranked need in Green Township that did not at the time have a formal study or plan was an intersection improvement for Bridgetown Road, Race Road, and Glenway Avenue.

The intersection of Bridgetown Road, Race Road, and Glenway Avenue is a major intersection located in the community of Bridgetown, in Green Township. The intersection is along a major corridor into Western Hills, and Bridgetown travels west to Cleves. As of 2007, this intersection has seen a daily volume of 45,000 traveling through the intersection. Prior to 1990, the Chesapeake and Ohio Railroad ran trains on a viaduct located previously over the intersection. Certainly, this intersection is a major crossroads not only today, but also in the past; however, with the intersection's status as a major crossroads comes heavy traffic. This traffic coupled with



Photo: Intersection Location Map

the existing geometrics and timing plan leads to heavy congestion during the peak periods. Often, vehicles queue several hundred feet back from the intersection during the peak periods. These queues and delays are expected to only intensify in the coming years.

The purpose of this report is to identify a set of recommendations regarding the improvement of the intersection of Bridgetown, Glenway, and Race Roads. These recommendations look to satisfy needs of all stakeholders involved. This project aims to provide an acceptable level of service for motorists, while keeping the intersection safe for motorists and pedestrians. At the same time, this study aims to make recommendations that are of minimal impact for property holders and businesses. These recommendations will be the product of analyzing the existing conditions of the intersection, identifying alternatives, and performing capacity analyses for these alternatives.

These tasks will be completed by the University of Cincinnati Traffic Engineering Team. For this report, the following classmates completed the following tasks:

- Qingyi Ai: HCS Analyses, Report
- Matthew Foreman: HCS Analyses, Report, Presentation
- Amruta Inapurapu: Parking Analysis
- Sudhir Itekyala: Accident Analysis, Report
- Zhixia Li: HCS Analyses, Report
- David Murnan: Field Data Collection, HCS Analyses, Report, Presentation
- Vijay Nemalapuri: Accident Analysis, Report
- Sarah Perrino: Report, Presentation
- Viswanath Pokala: Accident Analysis, Report
- Craig Schrader: Drafting, Schematics
- Nicholas Wilkerson: Drafting, Schematics
- Andrew Zoller: Parking Analysis

III. Existing Conditions

The intersection of Bridgetown Road and Glenway Avenue is a crossroads within a very vibrant community. From the south and west, one can travel along SR264 on their way to the Western Hills commercial district, Mack, or all the way to US50 in Cincinnati or Cleves. Traveling north through the intersection can take drivers to Harrison Avenue and on their way to Interstate 74, while vehicles traveling east can find themselves entering the heart of Cheviot. Certainly, this intersection is a very important crossroads within Green Township. In a given weekday, up to 45000 vehicles travel through the intersection on the way to their destinations within and outside of this community of around sixty thousand residents. This large number of vehicles, coupled with the



Photo: Aerial Image of intersection of Bridgetown Rd. & Glenway Ave and the surrounding area.

current geometric design of the intersection, cause both safety and capacity related deficiencies. The purpose of this section is to identify the existing conditions of the intersection that result in the capacity and safety deficiencies at the intersection.

Existing Geometrics

Bridgetown Road within the Bridgetown Area is a four lane facility that is classified by the Hamilton County Thoroughfare Plan as a minor arterial. Race Road is a four lane facility that is classified as a major arterial, while Glenway Avenue is a five lane facility that is also classified as a major arterial. State Route 264 travels north along Glenway Avenue and continues west on Bridgetown Road, and this alignment is under ODOT maintenance. Race Road and the eastern approach of Bridgetown Road are under Hamilton County Engineer's Office maintenance.

Figure 1 is a schematic of the existing geometrics of the intersection. A complete description of the geometrics is as follows:

The intersection of Bridgetown Road and Glenway Avenue possesses left turn lanes on all four approaches. In addition, the westbound approach and the northbound approach also possess right turn lanes. A summary of the storage lengths at the intersection can be found in *Table 1*.



	Turn	Storage Length
Direction	Lane	(ft)
Northbound	Left	215
Northbound	Right	260*
Southbound	Left	200
Westbound	Left	150*
Eastbound	Left	130
Eastbound	Right	270*

Table 1: Existing Storage Lengths

*Lane is created from Travel Lane

It is noted that the northbound and westbound right turn lanes and the eastbound left turn lane are created from the travel lane. In addition, the northbound left turn lane is created from a two-way left turn lane. The storage lengths listed in *Table 1* are only the lengths of the turn lane as it is marked.

The number of through lanes at the intersection may differ from the number of travel lanes on the arterial beyond the intersection. Currently, the only approach with two through lanes is the southbound approach. All other approaches possess only one through travel lane. The northbound, southbound, and eastbound approaches also have their right turns channelized by a raised concrete island. The right turn from Bridgetown Road onto Glenway Road also has a merging distance of approximately 30 feet on Glenway.

There are two marked crosswalks across the south and west approaches of the intersection. Unmarked crosswalks exist across the other two approaches. Crosswalks are also marked within all three channelized right turns.

Traffic Control

The intersection of Bridgetown Road and Glenway Avenue is an actuated, signalized intersection. Currently, the signal operates with a total of six phases in a cycle of 130 seconds. The intersection was last timed in 1992. Five-section signal heads control protected-permissive left turns on the northbound, eastbound, and westbound approaches, while the southbound left turn is a permissive only movement. All through movements at the intersection have a maximum green time of 40 seconds, while the left turn movements on Bridgetown have a maximum green time of 16 seconds. The northbound left turn movement has a maximum green time of 14 seconds. The existing timing sheet for the intersection provided by ODOT can be found in *Appendix A*.

Pedestrian signals mediate crossings for every approach except for across the east approach. These pedestrian signals contain "WALK" and "DON'T WALK" wordings rather than the symbols. The walk time for signalized pedestrian crossings is seven seconds, while the clearance interval is ten seconds.

The channelized right turns are not controlled by the traffic signals; rather, they are stop sign controlled. For eastbound right turns, the stop sign is located behind the marked crosswalk, and there is a marked merging distance on Glenway for the turn. The stop sign on the southbound approach is located at the intersection of the channelized right turn and Bridgetown Road. There are no traffic control devices that exist near the crosswalk across this channelized turn other than the marked crosswalk lines. There exist two stop signs for the northbound channelized right turn. One is located on the at the stop bar on the left side of the turn lane, while the other is located back from the turn lane on the right. Both signs are located in before the crosswalk, which is directly in front of the stop bar.

Traffic Volumes

Traffic counts were performed at the intersection by the Hamilton County Engineer's Office on July 27 and 30 of 2007. Counts were completed for a twelve hour period starting at 6AM and ending at 6PM, and the manual count data can be found in *Appendix B*. From this 12 hour count, a growth factor of 1.43 was applied by the Engineer's Office to determine an intersection ADT of 43603. It is observed that the heaviest daily volume occurs on Glenway Avenue, with an estimated ADT of almost 30500 vehicles traveling on the road. Race Road is estimated to have an ADT of about 24500 vehicles, while Bridgetown Road is estimated to have an ADT of about 18000 vehicles west of the intersection.

It is advantageous to analyze this intersection during three peak periods: AM, Noon, and PM peak. Each of these peaks has the heaviest movements associated with a traffic pattern. The peak hours have been identified for this intersection, and the volumes associated with the peak hours can be found in *Tables 2 through 4*.

	I	Race Ro	ad	Brid	lgetown	Road	Gle	nway Av	venue	Brid	lgetown		
Start	S	outhbou	ınd	V	Vestbou	nd	N	orthbou	ınd	I	Eastbou	nd	Interval
Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
8:00													
AM	7	124	26	34	25	6	18	98	31	48	52	44	513
8:15													
AM	5	121	33	35	38	5	23	97	34	53	57	34	535
8:30													
AM	7	130	25	35	23	7	16	82	25	35	62	38	485
8:45													
AM	5	128	17	43	41	4	18	105	35	36 66 49			547
Total	24	503	101	147	127	22	75	382	125	172 237 165			2080
PHF	0.86	0.97	0.77	0.85	0.77	0.79	0.82	0.91	0.89	0.81	0.90	0.84	0.95

Table 2: 2007 AM Peak Hour (8am-9am) Turning Movement Counts

	I	Race Ro	ad	Brid	lgetown	Road	Gle	nway Av	venue	Brid	lgetown	Road	
Start	S	outhbou	ınd	V	Vestbou	nd	N	orthbou	ınd	I	Eastbou	nd	Interval
Time	Left Thru Right Le				Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
12:15													
PM	10	135	23	81	58	19	54	126	51	45	68	47	717
12:30													
PM	6	172	19	52	53	11	68	170	56	48	59	60	774
12:45													
PM	10	171	24	41	64	12	71	162	68	46	61	81	811
1:00													
PM	15	138	23	43	64	16	62	164	74	30 58 50		737	
Total	41	616	89	217	239	58	255	622	249	169 246 238		3039	
PHF	0.68	0.90	0.93	0.67	0.93	0.76	0.90	0.91	0.84	0.88 0.90 0.73			0.94

Table 3: 2007 Noon Peak Hour (12:15pm-1:15pm) Turning Movement Counts

Table 4: 2007 PM Peak Hour (4:30pm-5:30pm) Turning Movement Counts

	I	Race Ro	ad	Brid	lgetown	Road	Gle	nway A	venue	Brid	lgetown		
Start	S	outhbou	ind	V	Vestbou	nd	N	orthbou	ınd	I	Eastbou	nd	Interval
Time	Left	Thru	Right	Total									
4:30													
PM	10	226	57	63	94	9	69	141	48	51	62	40	870
4:45													
PM	4	192	48	69	73	16	57	166	56	55	57	43	836
5:00													
PM	10	187	52	51	91	20	47	168	60	61	61	47	855
5:15													
PM	8	223	47	51	105	14	51	166	80	34	46	56	881
Total	32	828	204	234	363	59	224	641	244	201	226	186	3442
PHF	0.80	0.92	0.89	0.85	0.86	0.74	0.81	0.95	0.76	0.82	0.91	0.83	0.98

It is noted that during the AM and PM peaks the heaviest movement is the southbound through movement, with an impressive 828 vehicles traveling south onto Glenway Avenue during the PM peak. The AM peak also experiences a significant number of through vehicles on the northbound and eastbound approaches, and the eastbound approach also has heavy left and right turn movements. The noon peak experiences a high volume of traffic traveling north and south through the intersection. A significant number of vehicles also turn south onto Glenway Avenue from both the east and west bound approaches. The PM peak is the heaviest of all peaks; having almost 1500 more vehicles enter the intersection than during the AM peak. While the north and southbound through movements are the heaviest movements during the PM peak, there are many other heavy movements. Every left turn with the exception of the southbound left turn has more than 200 vehicles making the movement. Heavy right turn movements lead to deficient operation during the PM peak, with queues for heavy movements often extending several hundred feet.

Growth data has been provided by OKI, and growth factors have been derived to inflate these volumes to a projected 2030 volume. These growth factors can be found in *Table 5*.

Table 5: Derived Intersection Growth Factors

Approach	Growth Factor
Southbound	1.12
Westbound	1.25
Northbound	1.07
Eastbound	1.33

Using these growth factors, the existing turning movement counts have been inflated to projected 2030 volumes. The 2030 volumes for the intersection can be found in *Tables 6 through 8*.

Table 6: 2030 AM Peak Hour (8am-9am) Turning Movement Counts

	I	Race Ro	ad	Brid	lgetown	Road	Gle	nway A	venue	Brid	lgetown		
Start	S	outhbo	und	V	Vestbou	ınd	N	orthbo	und	J	Eastbou	nd	Interval
Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Total	
8:00 AM	8	139	29	38	28	7	20	110	35	54	58	49	575
8:15 AM	6	136	37	39	43	6	26	109	38	59	64	38	601
8:30 AM	8	146	28	39	26	8	18	92	28	39	70	43	545
8:45 AM	6	144	19	48	46	4	20	118	39	40	74	55	613
Total	28	565	113	164	143	25	84	429	140	192	266	185	2334
PHF	0.88	0.97	0.76	0.85	0.78	0.78	0.81	0.91	0.90	0.81	0.90	0.84	0.95

Table 7: 2030 Noon Peak Hour (12:15pm-1:15pm) Turning Movement Counts

	I	Race Ro	oad	Brid	lgetown	Road	Gle	nway A	venue	Brid	lgetown	Road	
Start	S	outhbo	und	V	Vestbou	ind	N	orthbo	und]	Eastbou	nd	Interval
Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Total	
12:15 PM	11	152	26	91	65	21	61	141	57	51	76	53	805
12:30 PM	7	193	21	58	59	12	76	191	63	54	66	67	867
12:45 PM	11	192	27	46	72	13	80	182	76	52	68	91	910
1:00 PM	17	155	26	48	72	18	70	184	83	34	65	56	828
Total	46	692	100	243	268	64	287	698	279	9 191 275 267			3410
PHF	0.68	0.90	0.93	0.67	0.93	0.76	6 0.90 0.91 0.84 0.88 0.90 0.7				0.73	0.94	

	I	Race Ro	ad	Brid	lgetown	Road	Gle	nway Av	venue	Brid	lgetown		
Start	S	outhbou	ınd	V	Vestbou	nd	N	orthbou	ınd	1	Eastbou	nd	Interval
Time	Left Thru Right Left Th				Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
4:30													
PM	11	254	64	71	106	10	77	158	54	57	70	45	977
4:45													
PM	4	216	54	77	82	18	64	186	63	62	64	48	938
5:00													
PM	11	210	58	57	102	22	53	189	67	68	68	53	958
5:15													
PM	9	250	53	57	118	16	57	186	90	38 52 63		989	
Total	35	930	229	262	408	66	251	719	274	225 254 209		3862	
PHF	0.80	0.92	0.89	0.85	0.86	0.75	0.81	0.95	0.76	0.83 0.91 0.83			0.98

Table 8: 2030 PM Peak Hour (5:30pm-6:30pm) Turning Movement Counts

Accident Analysis

The intersection of Bridgetown Road and Glenway Avenue is a high accident location in Hamilton County. In 2005, the intersection was not only the highest accident location in Green Township, but it was also the highest accident location within Hamilton County. For this reason, this section seeks to identify problem movements through the accident history.

Intersection crash data has been provided by the Hamilton County Engineer's Office, and this data can be found in *Appendix C*. From this data it is observed that 134 accidents have occurred at the intersection between 2004 and 2006. Of those accidents, ten were injury accidents, two were pedestrian related, and none were fatal. A collision diagram has been prepared for this intersection, and is located in *Figure 2*.



From the collision diagram, it is noted that a significant number of rear end accidents occur on the northbound and southbound approaches, with the vast majority of the rear end accidents occurring during the afternoon. These accidents can be attributed to the large volume of vehicles utilizing these approaches. A large number of rear end accidents also have occurred west of the intersection on Bridgetown while heading west. It is noted that a major driveway exists on Bridgetown west of the intersection, and it is possible that a high number of turns into or out of this driveway could be stopping westbound traffic, leading to unexpected conditions and rear end collisions. Angle collisions involving right turning vehicles from Bridgetown and southbound vehicles is also observed. It is noted that current geometrics and control at the intersection promote a quick turn from Bridgetown onto Glenway. It is possible that drivers may be making this quick right turn with disregard for vehicles already in the mainline. Such disregard could be resulting in the right angle collisions.

Nine of the ten injury accidents involve vehicles inside of the intersection. Of those accidents, seven involve left turning vehicles. There are 22 accidents observed involving left turning vehicles. With the volumes heading through the intersection and the permissive green left turns, these accidents will continue to occur under existing conditions.

Parking Analysis

There are several properties directly abutting the intersection and its right of way. A survey of these properties' parking lots has been completed, and an analysis of their current parking stalls and the required minimum stalls for each potentially impacted property has been analyzed. The results of this parking analysis can be found in Appendix D.

Identified Deficiencies

Analysis of the existing conditions of the intersection has identified several deficiencies with the intersection. These deficiencies are identified below:

- Drivers demonstrate disregard for traffic control items within the channelized right turn. Often, the stop signs are treated as a yield sign by motorists. This action greatly decreases the safety for pedestrians crossing the channelized right turns.
- Only one through lane exists for the northbound approach, and the left turn lane is dropped from the same travel lane as the through lane. The two heavy movements combined cause a significant queue and delay for both northbound movements.
- A very heavy through movement exists for the southbound approach. In addition, no right turn lane exists at the intersection. The current geometry for this approach causes large southbound delays to be incurred.
- Left turn movements on Bridgetown Rd. are heavy during the PM peak, and these left turn movements currently incur significant queues and delays.

- A merging distance is provided for right turning vehicles from Bridgetown to Glenway. Coupled with the channelized right turn, motorists may attempt to make quick right turns with little regard for motorists heading south.
- The traffic signal has not been seen a timing change since the early 1990s. Current phasing, especially during the PM peak, leads to significant delays and queues that could be alleviated by optimized timing.

IV. Alternatives Considered

A total of three alternatives have been identified for analysis and possible recommendations. These alternatives consist of a no build alternative, an optimized timing only alternative, and the feasible alternative. These alternatives are discussed in detail below.

No Build

The intersection will retain remain unchanged from the way it is today. Although the traffic volumes grow year by year, the geometry and signal phasing and timing still remain the same as they are. This alternative will serve as a baseline for evaluating the other alternatives, allowing for the comparison of current conditions to the proposed alternatives.

No Build – Optimized Timing

There will not be any changes to the intersection except that the signal phasing and timing are optimized for each peak period. Signal timings are optimized using the program HCS 2000. These optimizations aim to obtain better levels of service (LOS) as well as balanced levels of service for each approach.

Feasible Alternative

The geometry of this intersection will be changed, and the signal timing and phasing will be changed or optimized for this alternative. Storage lengths are determined according the *ODOT Location and Design Manual*. A schematic of the proposed improvements can be found in *Figure 3*. A description of the geometric improvements is as follows:

Southbound (Race Rd.): All lanes will be widened to 12 feet. The centerline of the roadway will be shifted 12 feet to the west to allow for the construction of a second lane heading north. The geometric design of the lanes approaching the intersection will consist of a dedicated right turn lane with a storage length of 550 feet, two through lanes, and one dedicated left turn lane with a storage length of 100 feet. The channelized right turn is to be removed.

Northbound (Glenway Ave.): All lanes are to be widened to 12 foot widths. To accommodate a second through lane, the centerline of Glenway Ave. will be shifted 12 feet west. There will remain two receiving lanes, and the left turn lane will be extended to be 450 feet in length. The right turn lane will remain where it is located currently, except it will be modified to be a drop right turn lane with a storage length of 450 feet. The channelization of the right turn is to be removed. Widening of Glenway Avenue is to be accomplished through the acquisition of land on the west side of the road.

Eastbound (Bridgetown Rd.): All lanes are to be widened to 12 foot lanes. The left turn, through, and right turn lanes will be extended. The right turn lane will become a drop

lane, while the left turn lane will be created from the travel lane. Both turn lanes will have a storage length of 375 feet. The channelized right turn will be removed. One additional receiving lane will be built by acquiring land on the north side of this approach.

Westbound (Bridgetown Rd.): A second through lane is to be constructed. The resulting approach geometry will consist of a through-right lane, a through lane, and a left turn lane. The left turn lane, with a storage length of 325 feet, will be constructed by removing the inside receiving lane and replacing it with the turn lane. As a result, only one receiving lane will exist heading east on Bridgetown Rd. All lanes will be widened to a 12 foot width.

Other Improvements: Crosswalks will be marked across each approach.



BRIDGETOWN RD

⊕

BRIDGETOWN RD AND GLENWAY AVE INTERSECTION IMPROVEMENT STUDY

PROPOSED SCHEMATIC: FIGURE: 3 SCALE: I" = I50'

DATE: 12/04/07 DRAWN: CAS

V. Capacity Analysis

The level of service (LOS) concept, as defined in the *Highway Capacity Manual (HCM)*, is the most prevalent and popular method of determining the adequacy of a roadway network element. For a signalized intersection, the level of service of the intersection is determined by its control delay and is ranked from A-F, with A being the best LOS. A description of the LOS criteria for a signalized intersection can be found in *Table 9*.

Level of Service	Average Control Delay (sec/veh)	General Description
А	≤ 10	Free Flow
В	>10-20	Stable Flow (Slight Delays)
С	>20-35	Stable Flow (Acceptable Delays)
D	>35-55	Approaching Unstable Flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
Е	>55-80	Unstable Flow (Intolerable Delay)
F	>80	Forced Flow (Jammed)

Table 9: Level of Service Criteria for Signalized Intersections

From Highway Capacity Manual, 2000

Capacity Analyses have been completed for the three alternatives using the program *Highway Capacity Software (HCS)*. The capacity analyses were completed for the AM, Noon, and PM peak hours. Each alternative has two analyses per peak period, one for the design year of 2007 and one for the design year of 2030. The HCS output for these analyses can be found in *Appendix E*. The results of these analyses are summarized below for each peak period.

AM Peak

Capacity analyses were completed for the three alternatives during the AM Peak Period. The result of the HCS analyses is summarized in *Table 10*.

				Level of Service (Delay)										
	Analysis	Brid	getown Rd.	(EB)	Bridg	etown Rd. (WB)	Glei	nway Ave. (I	NB)	F	Race Rd. (SE	B)	
Alternative	Year	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Intersection
		С	D	D	С			С	С	С	С			
		(22.4s)	(37.4s)	(36.3s)	(22.1s)	D (35.	3s)	(23.1s)	(25.7s)	(21.8s)	(32.3s)	D (39	9.5s)	
	2007		C (32.3s)			C (29.0s)			C (24.5s)			D (39.2s)		C (31.6s)
		С	D	D	С			C (24.2	С	С	С			
No Build		(23.2s)	(38.7s)	(37.0s)	(22.9s)	D (35.	8s)	s)	(27.0s)	(22.0s)	(32.6s)	D (41	.5s)	
Alternative	2030		C (32.9s)			C (29.7s)			C (25.5s)			D (41.1s)		C (32.9s)
		С	С	С	В			В	В	В	С			
		(20.4s)	(27.7c)	(26.8s)	(18.1s)	C (25.	9s)	(15.9s)	(17.6s)	(14.8s)	(20.1s)	C (24	.4s)	
No Build /	2007		C (25.1s)			C (22.2s)			B (16.7s)			C (24.2s)		C (22.1s)
Optimized		В	C	С	В			В	В	В	С			
Timing		(19.4s)	(26.9s)	(25.1s)	(16.5s)	C (24.	0s)	(16.5s)	(18.3s)	(14.6s)	(20.5s)	C (27	'.2s)	
Alternative	2030		C (24.0s)			C (20.4s)			B (17.2s)			C (26.9s)		C (22.4s)
		В	С	С	В			В	В	В	В	В	В	
		(18.8s)	(29.3s)	(28.0s)	(19.4s)	C (25.	1s)	(12.0s)	(12.0s)	(11.6s)	(16.8s)	(19.1s)	(17.9s)	
	2007		C (25.6s)			C (22.4s)			B (11.9s)			B (18.8s)		B (19.4s)
		В	С	С	С			В	В	В	С	С	С	
Feasible		(19.0s)	(23.7s)	(23.1s)	(20.1s)	C (21.	0s)	(17.3s)	(17.1s)	(16.5s)	(21.9s)	(25.3s)	(23.4s)	
Alternative	2030		C (22.0s)			C (20.6s)			B (17.0s)			C (24.8)		C (21.2s)

Table 10: Capacity Analyses Results for AM Peak

It is seen that the worst LOS of the three alternatives occurs during the 2030 analysis year of the no build alternative; however, this LOS improves to a C with an average control delay of 32.9 seconds under the feasible alternative. Overall, the intersection appears to perform well during the AM peak, except for some minor lane group delays. For the through-right lane group on Race Road, it is noted that an optimized timing will improve the delay in that lane group by almost 15 seconds, while the feasible alternative will change the D LOS to a B in 2007 and a very acceptable C LOS in 2030. Similarly, the eastbound approach on Bridgetown Road is projected to operate with a delay of almost 33 seconds in 2030 under the no build alternative, while both the feasible alternative and optimized timing alternative project a delay in the mid 20s. Similar improvements are seen on the other three approaches, while the northbound LOS improves to a B under both the optimized timing alternative and feasible alternative.

The overall intersection LOS for the AM peak is seen under the Feasible Alternative; however, an optimized timing will also produce an acceptable LOS, and the no build alternative will also retain an LOS of C in the 2030 design year.

Noon Peak

The commercial nature of the Glenway Avenue corridor necessitates that a capacity analysis be completed during the noon peak period. This analysis has been completed, and a summary of the analysis can be seen in *Table 11*.

The noon peak period has a much greater effect on capacity at the intersection. The No Build Alternative has a current LOS of D during this period, and the 2030 LOS for the no build alternative is seen to be an E, which suggests that the flow of traffic at the intersection will deteriorate to an unstable flow by 2030 if no action is taken. An optimized timing plan for the intersection will improve the current LOS to a C; however, by 2030 an optimized timing plan will only produce an intersection LOS of D with a delay of approximately 44 seconds. The feasible alternative would produce an acceptable LOS of C with a delay of 27 seconds in its build year, while by 2030 the LOS would remain a C with a delay of about 33 seconds. The 2030 delay for the feasible alternative is about 20 seconds better than if no action would be taken at all, and 10 seconds better than if only the timing was optimized.

It is also noted that certain movements have a very poor LOS during the Noon Peak. It is observed that the southbound left turn lane degrades to a level of service of F with a control delay of 226 seconds in 2030 under the no build alternative. The optimized timing will only be able to improve this LOS to an E, while the feasible alternative will improve the LOS to a C. Similarly, the northbound left turn is currently operating with an LOS of F with a delay that is expected to degrade from 88 seconds in 2007 to 174 seconds in 2030. An optimized timing plan for the intersection would be able to improve the LOS of the left turn to a D in 2007, but by 2030 the LOS would degrade to a borderline E that is on the verge of being an F. The feasible alternative would improve the LOS to a D with control delay of 36 seconds in 2007, to an LOS of D with a delay of 54 seconds in 2030. While the delay may approach the realm of unstable flow, this delay is a definite

improvement for the amount of right of way (ROW) acquisition involved in its construction.

PM Peak

From a volume standpoint, the PM peak period is the busiest of the three peak periods. The PM peak also has its own distinct traffic patterns and movements that differentiate itself from the AM and Noon Peak. For these reasons, it is imperative that capacity analyses are completed for the PM peak. These analyses have been completed, and the results of the analyses can be found in *Table 12*.

Being the busiest peak period, it is expected that the PM peak should have the highest delays and worst levels of service. As expected the no build alternative finds that the worst intersection delay occurs during the PM peak. With a delay of 67 seconds, the intersection currently operates at a LOS of E. This delay is projected to increase to 88 seconds by 2030, which will create a jammed state at the intersection in addition to a LOS of F. These levels of service are unacceptable, and further capacity analysis shows that optimized timings will do not enough to improve the capacity at the intersection. An optimized timing plan will yield a LOS that is precariously close to an E under the current volumes and geometrics. By 2030 an optimized timing plan would yield a LOS of E with a delay of 74.5 seconds. This LOS would be little comfort to motorists delayed at the intersection. The feasible alternative would yield a LOS of C under the current volumes, and during the design year the level of service would remain a C for the feasible alternative at the intersection.

The feasible alternative also makes great improvements for certain lane groups. It is observed that the southbound through-right lane group operates at a LOS of F during the PM peak. While an optimized timing will produce a LOS of E for that lane group, the feasible alternative will improve the LOS to C in 2007 and a D in 2030, which is a great improvement over the projected delay of 140 seconds seen for the no build alternative in 2030. The entire Race Road approach's delay in 2030 would improve by over 100 seconds if the feasible alternative was implemented. Similar improvements can be seen for other approaches, especially the westbound through-right lane group. Under the feasible alternative, the delay would improve to 39 seconds from 87 seconds under the no build alternative.

					Level of Service (Delay)									
	Analysis	Brid	getown Rd.	(EB)	Bridge	etown Rd. (WB)	Gler	nway Ave. (I	NB)	R	ace Rd. (SB)	
Alternative	Year	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Intersection
		С	D	D	С			F	D	C	D			
		(24.0s)	(37.7s)	(43.6s)	(28.3s)	D (40.	2s)	(87.5s)	(36.5s)	(24.7s)	(42.0s)	D (43	8.5s)	
	2007		D (36.8s)			C (34.3s)			D (45.1s)			D (43.4s)		D (40.9s)
		С	D	D	D			F	D	C	F			
No Build		(27.0s)	(39.2s)	(48.4s)	(45.0s)	D (42.	7s)	(173.8s)	(45.8s)	(25.5s)	(225.7s)	D (46	5.7s)	
Alternative	2030		D (40.0s)			D (43.8s)			E (69.8s)			E (59.6s)		E (56.0s)
		С	С	С	D			D	С	В	С			
		(20.7s)	(25.8s)	(33.3s)	(39.9s)	C (28.	7s)	(41.6s)	(25.7s)	(15.7s)	(27.8s)	D (38	8.1s)	
No Build /	2007		C (27.6s)			C (34.2s)			C (26.9s)			D (37.3s)		C (30.9s)
Optimized		С	С	D	Ε			Ε	D	В	Ε			
Timing		(27.5s)	(31.3s)	(51.6s)	(65.2s)	D (37.	7s)	(79.2s)	(35.4s)	(17.1s)	(69.1s)	D (45	5.4s)	
Alternative	2030		D (38.7s)			D (51.3s)			D (41.0s)			D (47.1s)		D (43.8s)
		В	С	С	D			D	В	В	С	С	С	
		(18.9s)	(28.1s)	(34.2s)	(50.7s)	C (26.	1s)	(36.1s)	(15.6s)	(15.7s)	(23.0s)	(26.1s)	(22.5s)	
	2007		C (28.4s)			D (38.2s)			C (20.2s)			C (25.4s)		C (26.6s)
		В	С	D	D			D	В	В	С	D	С	
Feasible		(17.6s)	(31.2s)	(46.1s)	(52.0s)	C (27.	8s)	(53.4s)	(17.9s)	(18.0s)	(29.5s)	(38.9s)	(27.4s)	
Alternative	2030		C (34.0s)			D (39.7s)			C (25.9s)			D (36.9s)		C (32.9s)

Table 11: Capacity Analyses Results for Noon Peak

		Level of Service (Delay)													
	Analysis	Bridg	getown Rd. ((EB)	Bridg	etown Rd. (WB)	Glen	nway Ave. (N	NB)	R	Race Rd. (SE	5)		
Alternative	Year	Left	Through	Right	Left	Left Through Right I		Left Through Right		Left	Through Right		Intersection		
		Ε	D	D	С			F	D	С	D				
		(68.6s)	(36.9s)	(37.2s)	(24.4s)	$\frac{E(61.8s)}{D(48.6s)}$ ((126.7s) (35.8s) (25.3s)			(36.4s)				
	2007		D (47.8s)						D (52.9s)			F (103.5s)		E (66.5s)	
		F	D	D	С			F	D	С	Ε				
No Build		(107.8s)	(37.9s)	(38.4s)	(27.3s)	(27.3s) $F(86.9s)$		(174.6s)	(44.2s)	(44.2s) (26.3s)		(68.6s) F (143			
Alternative	2030		E (61.7s)		E (65.8s)				E (68.0s)			F (88.0s)			
		F	С	С	D			F	С	В	С				
	2007	(139.0s)	(30.5s)	(31.1s)	(36.7s)	F (101	.6s)	(81.4s)	(20.7s)	(14.9s)	(21.8s)	E (56	.8s)		
No Build /		E (67.8s)			E (78.6s)				C (32.4s)			D (54.9s)			
Optimized	2007	F	D	D	D			F	С	В	С				
Timing		(124.3s)	(36.5s)	(37.5s)	(49.0s)	F (165	.7s)	(190.7s)	(26.6s)	(17.1s)	(25.2s)	E (63	.7s)		
Alternative	2030		E (66.5s)			F (124.4s)			E (59.8s)		E (62.4s)			E (74.5s)	
		С	D	D	С			С	В	В	С	C	С		
		(26.3s)	(35.3s)	(38.6s)	(27.2s)	D (35.	.7s)	(30.3s)	(13.1s)	(13.5s)	(21.4s)	(32.2s)	(25.2s)		
	2007		C (33.3s)		C (32.7s)			B (16.9s)			C (27.0s)				
		D	D	D	D			D	В	В	С	D	С		
Feasible		(39.2s)	(38.4s)	(46.8s)	(41.7s)	D (38.	.8s)	(49.3s)	(14.7s)	(15.4s)	(24.0s)	(42.4s)	(37.2s)		
Alternative	2030		D (41.3s)			D (39.8s)			C (22.4s)			D (38.8s)			

Table 12: Capacity Analyses Results for PM Peak

VI. Recommendations

After analyzing the three alternatives, short term and long term recommendations have been prepared for the intersection. In the short term outlook, it is recommended that the signal phasing and timing be optimized for each peak period. Optimization of the signal reduces the delay of the intersection by about 10 seconds for each peak period. This raises the LOS of the intersection from D to C in the noon peak, and form E to D in the PM peak. Ultimately in the long term outlook it is recommended that the geometry of the intersection be altered and the signal be optimized for the improved intersection.

Short Term Recommendations

• Optimize signal phasing and timing for each peak period

Long Term Recommendations

All lanes at the intersection will be widened to 12 feet and shifted as needed to accommodate the following intersection improvements. *Southbound Race Rd.*

- Remove the channelized right turn lane
- Add a second northbound receiving lane
- Add a dedicated left turn lane with 100 feet of storage
- Add a dedicated right turn lane with 550 feet of storage

Northbound Glenway Ave.

- Remove the channelization of the right turn lane
- Modify the channelized right turn lane to become a drop right turn lane with 450 feet of storage
- Widen Glenway Ave. on the west side
- Add a second northbound through lane
- Extend the dedicated left turn lane to 450 feet of storage

Eastbound Bridgetown Rd.

- Remove the channelization of the right turn lane
- Modify the channelized right turn lane to become a drop right turn lane with 375 feet of storage
- Modify the travel lane to become a dedicated left turn lane with 375 feet of storage
- Widen Bridgetown Rd. on the north side
- Add a westbound receiving lane

Westbound Bridgetown Rd.

- Remove the inside eastbound receiving lane
- Modify the eastbound receiving lane to become a dedicated left turn lane with 325 feet of storage

Additional

• Mark crosswalks at each approach

VII. Appendices

Appendix A

Existing Signal Timing

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7 X ADDED INITIAL (SEC./ACT.)			1			_					
4 🗶 PASSAGE TIME	3.0	4,0	2	3.0	3.5	•	1	4.0	3.0	3.5	
8 BEFORE REDUCTION		20	>				ć	20			
9 TIME TO MIN.		35						35		1	
3 🔆 MIN. GAP		13.0	>		1	,		3.0		1	
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ADDED INITIAL - THIS IS TRUE MINIMUM ADDED INITIAL - THIS ADDS TO MINIM PASSAGE TIME - IN TENTH OF SECO BEFORE REDUCTION - TIME BEFORE TIME TO MIN TIME IN SECONDS MIN. GAP - IF NOT DESIRED THIS S PASSAGE TIME IN TENT MAX. 1 MAX. 1 YELLOW CLEARANCE RED CLEARANCE NITIALIZATION - TO INITIALIZE IN O FOR RING NO. 1, THE AND THEN ENTER. TO OBSERVE & CHANGE TIMING - P O FOR OPERATIONAL DISPLAY MODE - INTERSECTION <u>SR-264+Race</u> COUNTY Hamilton DISTRICT 9	NDS. REDUC TO HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL HOUL H	INITIA REDL D BE F SE WHEN SEC WHEN SEC (MOI), PUS INTER (ALUE "EN" SS " DR 2) SIGN	OF ICE. CONE CONE CONES CONES CONES CONES PUSI DR F VAL FER MONI	GAP GAP ET DS. ALL TER H "N PHAS CAL RESS VAL ITOR ITOR	IC./AC	T. IN ARTS AME PLACEI N MA DR PH INTER ND SE PH. INT. , / VAL S" ANI	IN VAL VAL ELE(T'', ETC UE	NTH SEC LUE ON A INIT INIT IT.", 1 _ 2 (CTED THEN C.); AND SELEC <u>9</u>	OF SE AS ANOTH IAL. THEN MIN. C RING PHAS TO CH THEN CT RI	ER OI SE No., IANGE	

Appendix B

Turning Movement Counts

Count Dates: July 27 & 30, 2007 Count Days: Priday & Monday Count By: Kellie Kammer Weather: Sunny & Hot

Hamilton County Bngineer's Office William W. Brayshaw, P.B.-P.S. Hamilton County Bngineer **** Traffic Department ****

Study Name: 264RACB Site Code : 0000000 Start Date: 07/27/07 Page : 1

		•														··· J ··		
								l	Inshifte	eđ								
Race Road					Bridget	own Roa	d		Glenway	(SR 26	4)		Bridgetown (SR 264)					
		FLOW NO	rcn			FLOW RS	st			From Sc	uth			From We				
	Start																	Intvl.
	Time	Left	Thru	Right	Peds	Left	Thru	Right	. Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Total
	Grp 1	1.430	1.430	1.430	1.430	1.430	1.430	1,430	1.430	1.430	1.430	1.430	1.430	1.430	1.430	1,430	1.430	
	07/27/0	ļ																
	06:00	470	9861	1823	0	2783	3539	682	0	2750	8949	2916	0	2801	3824	3205	0	43603
	∛ Apr.	3.8	81.1	14.9	-	39.7	50.5	9.7	-	18.8	61.2	19.9	-	28.4	38.9	32.6	-	-
	% Int.	1.0	22.6	4.1	-	6.3	8.1	1.5	-	6.3	20.5	6.6	-	6.4	8.7	7.3	-	-

	Race Road		
	9861 12432		
	1823 479	[
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	24586		
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Bridgetown (SR 264)			
Distage cown (3h 20-17			
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8112 -	07/27/07		<u>~ 682</u>
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	13849 8949		
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	GIENWAY (SR 264)		

24 Hour Count (Factor = 1.43)

Bridgetown, Glenway (S.R. 264) & Race Road

Green Township

2007 Manual Traffic Count

Count Dates: July 27 & 30, 2007 Count Days: Friday & Monday Count By: Kellie Kammer Weather: Sunny & Hot

Hamilton County Engineer's Office William W. Brayshaw, P.B.-P.S. Hamilton County Engineer **** Traffic Department ****

Study Name: 264RACB Site Code : 0000000 Start Date: 07/27/07 Page : 1

							01	nshift	ed									
Race Road					Bridget	own Roa	d		Glenway	(SR 26	4)		Bridgetown (SR 264)					
From North						st			From So	uth			From We					
Start																1	Intvl.	
 Time	Left	Thru	Right	Peds	Left	Thru	Right.	Peds	Left	Thru	Right	Peds	<u>Lef</u> t	Thru	Right	Peds	Total	
07/27/01	7						•								-			
06:00	329	6896	1275	0	1946	2475	477	0	1923	6258	2039	0	1959	2674	2241	0	30492	
% Apr.	3.8	81,1	15.0	-	39.7	50.5	9.7	•	18.8	61.2	19.9	-	28.4	38.9	32.6	-	-	
∦ Int.	1.0	22.6	4.1	-	6.3	8.1	1.5		6.3	20.5	6.6	-	6.4	8.7	7.3	-	-	
					1				1							r I		



12 Hour Count

Bridgetown, Glenway (S.R. 264) & Race Road

Green Township

2007 Manual Traffic Count

Traffic Count Performed by Hamilton County Engineer's Office July 27 & 30, 2007

		Race Road		Bri	dgetown Ro	bad	Gl	enway Aver	nue	Br	dgetown Ro			
	:	Southbound	ł		Westbound			Northbound	ł		Eastbound		Interval	Hourly
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total	Total
6:00 AM	1	38	1	2	6	2	6	39	10	30	20	22	177	-
6:15 AM	4	52	3	7	5	4	3	50	19	43	28	22	240	-
6:30 AM	1	69	8	10	9	7	1	63	9	43	40	29	289	-
6:45 AM	1	84	8	8	14	2	9	76	7	45	47	44	345	1051
7:00 AM	4	61	13	16	19	6	10	69	26	76	64	34	398	1272
7:15 AM	7	96	13	17	25	5	17	85	20	55	91	22	453	1485
7:30 AM	6	104	21	19	27	8	14	85	16	59	68	32	459	1655
7:45 AM	4	140	28	17	30	9	8	88	38	58	64	46	530	1840
8:00 AM	7	124	26	34	25	6	18	98	31	48	52	44	513	1955
8:15 AM	5	121	33	35	38	5	23	97	34	53	57	34	535	2037
8:30 AM	7	130	25	35	23	7	16	82	25	35	62	38	485	2063
8:45 AM	5	128	17	43	41	4	18	105	35	36	66	49	547	2080
9:00 AM	9	113	20	42	29	8	29	83	33	34	41	40	481	2048
9:15 AM	3	115	24	30	39	6	37	94	28	35	51	54	516	2029
9:30 AM	9	116	20	27	38	7	23	126	34	31	37	44	512	2056
9:45 AM	7	107	23	33	46	9	36	105	38	27	58	53	542	2051
10:00 AM	9	116	30	36	41	9	34	95	28	25	46	39	508	2078
10:15 AM	8	119	22	31	42	9	27	120	32	34	47	39	530	2092
10:30 AM	9	143	18	37	37	9	31	118	37	24	41	39	543	2123
10:45 AM	6	126	24	45	44	4	43	130	42	26	46	61	597	2178
11:00 AM	4	137	23	37	47	12	38	127	29	40	55	53	602	2272
11:15 AM	4	147	29	36	58	8	51	142	30	30	48	43	626	2368
11:30 AM	6	123	15	58	50	10	53	148	40	28	55	57	643	2468
11:45 AM	5	124	23	46	43		58	165	55	44	42	46	659	2530
12:00 PM	7	145	11	52	62	13	53	142	25	42	65	53	670	2598
12:15 PM	10	135	23	81	58	19	54	126	51	45	68	47	717	2689
12:30 PM	10	172	19	52	53	11	68	120	56	48	59	60	774	2820
12:45 PM	10	171	24	41	64	12	71	162	68	46	61	81	811	2972
1:00 PM	10	138	23	43	64	16	62	164	74	30	58	50	737	3039
1:15 PM	.0	144	31	42	74	10	50	136	52	33	50	57	688	3010
1:30 PM	7	173	13	47	59	7	67	158	69	43	54	63	760	2996
1:45 PM	11	136	29	54	65	21	50	173	73	41	54	46	753	2938
2:00 PM	8	169	40	30	57	9	56	151	46	39	56	48	700	2910
2:00 PM	8	183	30	40	59	17	57	172	59	38	57	50	700	2010
2:30 PM	10	158	18	46	66	14	65	165	46	46	52	52	738	2970
2:45 PM	.0	189	30	58	69	22	45	100	53	33	65	61	823	3040
3:00 PM	11	170	33	44	67	8	58	182	59	29	67	43	771	3102
3:15 PM	6	175	29	69	57	13	43	102	73	47	56		795	3127
3:30 PM	8	173	37	50	54	7	40	172	54	41	77	62	755	31/0
3:45 PM	8	196	49	38	76	10	69	162	45	30	74	47	813	3130
3.43 T M	11	212	43	52	70	10	27	102	40	24	74	47	013	2195
4.00 PM	5	212	25	53	C0 NQ	5	57	100	16	34 24	F0	40	705	3105
4.30 PM	10	197	57	57	04	0	52	1/4	40	54	59	47	870	3205
4.30 PW	10	220	57	60	94	9	57	141	40	51	57	40	826	3295
5.00 PM	4	192	40	51	73	20	57	100	00	50	57	43	030	3356
5:15 DM	10	107	52	51	105	20	47 54	100	00	01	01	47	000	2442
5.30 PM	0	107	47	51	105	14	- 51	100	00 56	52	40	30	00 I 01 1	3302
5:45 DM	0	10/	40	01 50	90	1/	40 E1	140	40	52	55	47	011	2255
J.43 FIVI	220	213	1075	1046	2475	10	1000	6259	2020	1050	2674	2044	20402	3305
i ulai.	329	0090	12/3	1940	24/3	4//	1923	0200	2039	1959	20/4	2241	30492	
Appendix C

Crash Data

2004 Crash Report

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William W. Brayshaw PE - PS The Hamilton County Engineer's Traffic Department

Source	Report	t# Date	Day	Time Twp	Address	Road	Intersects	Distance/Dir.	Inj P	ba	Fat	Crash Type	Comments
Hamco	6411	10/2/2004	SA	13:15 Gr	3801 Ra	ice	Bridgetown & Glenway	0	0	0	0	Rear End	SB - ACD
Green	2057	12/7/2004	DT	17:50 Gr	3801 Ra	ICe	Bridgetown & Glenway	0	0	0	0	Rear End	SB - ACD
Green	1274	8/6/2004	FR	12:37 Gr	3801 Ra	Ce	Bridgetown & Glenway	0	0	0	0	Rear End	WB - ACD
Green	758	5/14/2004	FR	16:20 Gr	3801 Ra	Ce	Bridgetown & Glenway	0	0	0	0	Rear End	SB - ACD
Green	1450	9/3/2004	FR	15:38 Gr	3801 Ra	ICe	Bridgetown & Glenway	0	0	0	0	Sideswipe/Passing	SB improper lane chg
Hamco	6749	10/14/2004	ΗL	17:15 Gr	3801 Ra	ICE	Bridgetown & Glenway	0	0	0	0	Rear End	SB - ACD
Green	95	1/16/2004	ЦЦ	20:18 Gr	3801 Re	tce	Bridgetown & Glenway	0	0	0	0	Rear End	SB - ACD
Green	1539	9/20/2004	MO	15:44 Gr	3814 Re	toe	Bridgetown & Glenway	100 N	0	0	0	Rear End	SB - ACD
Hamco	6508	10/6/2004	WE	20:07 Gr	3814 Re	ce	Bridgetown & Glenway	100 N	0	0	0	Rear End	NB-ACD mult.pileup
Hamco	6416	10/2/2004	SA	20:55 Gr	3818 Re	ce	Bridgetown & Glenway	125 N	0	0	0	Rear End	NB - ACD
Hamco	5879	9/9/2004	Ħ	18:20 Gr	4555 Br	idgetown	Glenway & Race	100 E	0	0	0	Rear End	EB - ACD
Hamco	374	1/16/2004	FR	12:15 Gr	5500 Br	idgetown SR 264	Glenway & Race	0	0	0	0	Rear End	WB - ACD
Hamco	3226	5/22/2004	SA	10:40 Gr	5500 Br	idgetown SR 264	Glenway & Race	0	0	0	0	Rear End	SB - ACD
Green	588	4/15/2004	ΗĻ	18:07 Gr	5500 Br	idgetown SR 264	Glenway & Race	0	0	0	0	Left Turn	WB to SB into EB
Green	335	2/27/2004	FR	16:50 Gr	5500 Br	idgetown SR 264	Glenway & Race	0	0	0	0	Rear End	EB - ACD
Green	249	2/10/2004	DT	11:40 Gr	5500 Br	idgetown SR 264	Glenway & Race	Ō	0	0	0	Rear End	WB-ACD mult.pileup
Hamco	1241	2/24/2004	UT	14:40 Gr	5500 Br	idgetown SR 264	Glenway & Race	0	0	0	0	Rear End	WB - ACD
Green	128	1/23/2004	FR	11:25 Gr	5500 Br	idgetown SR 264	Glenway & Race	0	0	0	0	Rear End	EB - ACD
Green	695	5/2/2004	МО	14:30 Gr	5500 Br	idgetown SR 264	Glenway & Race	0	0	0	0	Left Turn	SB to EB into NB
Hamco	381	1/16/2004	FR	22:22 Gr	5500 Br	idgetown SR 264	Glenway & Race	0	0	2	0	Angle	NB ran red into EB

Friday, August 24, 2007

Page 1 of 3

2004 Crash Report

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William W. Brayshaw PE - PS The Hamilton County Engineer's Traffic Department

Source	Report	# Date	Day	Time Twp	Address	Road	Intersects	Distance/Dir.	Inj F	bed	Fat	Crash Type	Comments
Green	19	1/4/2004	SU	13:17 Gr	5500 Brid	getown SR 264	Glenway & Race	0	0	0	0	Rear End	WB-ACD mult pileup
Green	245	2/9/2004	MO	18:58 Gr	5500 Brid	getown SR 264	Glenway & Race	0	0	0	0	Left Turn	EB to NB into WB
Green	1129	7/10/2004	SA	23:40 Gr	5500 Brid	getown SR 264	Glenway & Race	0	0	0	0	Sideswipe/Passing	WB improper lane chg
Hamco	4179	6/28/2004	MO	15:47 Gr	5500 Brid	getown SR 264	Glenway & Race	0	0	0	o	Rear End	EB - ACD
Hamco	4198	6/29/2004	T	11:20 Gr	5500 Brid	getown SR 264	Glenway & Race	0	0	0	0	Angle	WB into SB
Hamco	334	1/14/2004	WE	16:00 Gr	5500 Brid	getown SR 264	Glenway & Race	0	0	0	0	Rear End	WB - ACD
Green	1853	11/6/2004	SA	13:45 Gr	5500 Brid	getown SR 264	Glenway & Race	0	0	0	0	Left Turn	WB to SB into EB
Green	1835	11/3/2004	WE	15:52 Gr	5500 Brid	getown SR 264	Glenway & Race	0	0	0	0	Rear End	NB - ACD
Hamco	4826	7/27/2004	JT.	17:30 Gr	5508 Brìd	getown SR 264	Glenway & Race	80 W	0	0	0	Rear End	WB - ACD
Hamco	3125	5/18/2004	TU	15:30 Gr	5510 Brid	getown SR 264	Glenway & Race	100 W	0	0	0	Rear End	NB - ACD
Hamco	9003 1	2/27/2004	MO	16:51 Gr	6645 Gler	1way SR 264	Bridgetown & Race	50 S	0	0	0	Rear End	NB - ACD
Hamco	4737	7/24/2004	SA	0:05 Gr	6645 Gler	1way SR 264	Bridgetown & Race	50 S	0	0	0	Rear End	SB - ACD
Hamco	2765	5/4/2004	TU	15:55 Gr	6645 Gler	1way SR 264	Bridgetown & Race	50 S	-	0	0	Rear End	SB - ACD
Green	1957 1	11/22/2004	MO	12:20 Gr	6650 Gler	nway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
Green	62	1/9/2004	FR	14:33 Gr	6650 Gler	1way SR 264	Bridgetown & Race	0	0	0	0	Rear End	SB - ACD
Green	93	1/15/2004	Ħ	12:30 Gr	6650 Gler	1way SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
Green	102	1/17/2004	SA	12:47 Gr	6650 Gler	nway SR 264	Bridgetown & Race	0	0	0	0	Rear End	SB - ACD
Green	772	5/16/2004	SU	21:30 Gr	6650 Gler	nway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
Green	1255	8/4/2004	WE	15:30 Gr	6650 Gler	nway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
Hamco	4742	7/24/2004	SA	15:40 Gr	6650 Gler	nway SR 264	Bridgetown & Race	0	0	0	0	Rear End	EB - ACD

Friday, August 24, 2007

Page 2 of 3

Green 565 4.12.2004 51 0.33 Bidgerowa K Rade 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <	Green 656 Green 1635	4/25/2004			/inut con wound	Increase	Distance/Dir.	Im P	ea 1	E.	Crash type	Comments
Geen 153 10 123 0.1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Green 1635		SU	0:43 Gr	6650 Glenway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
		10/8/2004	FR	11:53 Gr	6650 Glenway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD

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2004 Crash Report

2005 Crash Report

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William W. Brayshaw PE - PS The Hamilton County Engineer's Traffic Department

Source	Repor	t # Date	Day	Time Twp	Address Road	Inter	sects	Distance/Dir.	Inj I	ed	Fat	Crash Type	Comments
Hamco	6633	10/14/2005	FR	12:59 Gr	Race	Bridge	stown & Glenway	100 N	0	0	0	Left Tum	NB to WB into SB
Green	1949	12/5/2005	OM	19:10 Gr	3800 Race	Bridge	etown & Glenway	0	0	0	0	Rear End	SB - ACD
Hamco	2089	3/29/2005	1U T	15:00 Gr	3801 Race	Bridge	etown & Glenway	0	0	0	0	Rear End	SB - ACD
Green	177	1/27/2005	ΗF	18:51 Gr	3801 Race	Bridge	etown & Glenway	0	0	0	0	Rear End	SB - ACD
Green	842	5/29/2005	SA	14:16 Gr	3801 Race	Bridge	etown & Glenway	0	0	0	0	Rear End	SB - ACD
Green	530	4/1/2005	FR	23:55 Gr	3801 Race	Bridge	etown & Glenway	0	0	0	0	Rear End	SB - ACD
Green	1000	7/2/2005	SA	16:30 Gr	3801 Race	Bridge	etown & Glenway	0	0	0	0	Rear End	SB - ACD
Hamco	72	1/4/2005	TU	19:03 Gr	3801 Race	Bridge	etown & Glenway	0	0	0	0	Rear End	SB - ACD
Hamco	3162	5/14/2005	SA	1:50 Gr	3801 Race	Bridge	etown & Gìenway	0	0	0	0	Left Turn	NB to WB into SB
Green	1192	8/7/2005	SU	19:13 Gr	3801 Race	Bridge	etown & Glenway	0	0	0	0	Rear End	NB - ACD
Hamco	1386	2/26/2005	SA	14:50 Gr	3801 Race	Bridge	etown & Glenway	0	0	0	0	Rear End	SB - ACD
Hamco	4522	7/13/2005	WE	12:16 Gr	3801 Race	Bridge	etown & Glenway	0	0	0	0	Rear End	NB - ACD
Hamco	5848	9/9/2005	FR	6:45 Gr	4560 Bridgetown	Glenv	vay & Race	85 E	0	7	0	Pedestrian Action	EB into pedestrian
Green	487	3/22/2005	ΤU	10 [.] 05 Gr	4599 Bridgetown SR	264 Glenv	vay & Race	0	0	0	0	Rear End	SB - ACD
Hamco	6489	10/8/2005	SA	11:19 Gr	4599 Bridgetown SR	1 264 Glenv	vay & Race	0	0	0	0	Left Turn	WB to SB into EB
Green	1973	12/9/2005	FR	17:31 Gr	4599 Bridgetown SR	t 264 Glenv	vay & Race	0	0	0	0	Left Turn	WB to SB into EB
Green	1519	10/1/2005	SA	14:48 Gr	4599 Bridgetown SR	264 Glenv	vay & Race	0	0	0	0	Angle	NB into WB
Hamco	1412	2/27/2005	SU	12:35 Gr	4599 Bridgetown SR	t 264 Glenv	vay & Race	0	0	0	0	Angle	NB @ SS into WB
Hamco	7720	11/22/2005	TU	12:43 Gr	4599 Bridgetown SR	264 Glenv	vay & Race	0	0	0	0	Rear End	SB - ACD
Green	1874	11/26/2005	SA	13:00 Gr	4599 Bridgetown SR	264 Glenv	vay & Race	O	-	0	0	Rear End	EB - ACD

Wednesday, August 22, 2007

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2005 Crash Report William W. Brayshaw PE - PS The Hamilton County Engineer's Traffic Department

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Source	Repor	t # Date	Day	Time Twp	Address Road	Intersects	Distance/Dir.	Inj Pe	l pa	^r at	Crash Type	Comments
Hamco	3002	5/8/2005	SU	17:11 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Rear End	WB - ACD
Hamco	8296	12/12/2005	MO	11:28 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Rear End	SB - ACD
Hamco	4987	8/1/2005	OM	17:45 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Sideswipe/Passing	SB improper lane chg
Hamco	5087	8/5/2005	FR	17:00 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Rear End	WB - ACD
Green	066	6/30/2005	ΗĽ	22:11 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Left Turn	WB to SB into EB&NB
Green	1073	7/15/2005	FR	18:33 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Rear End	SB - ACD
Green	1409	9/12/2005	MO	11:20 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Rear End	WB-ACD mult.pileup
Hamco	7854	11/24/2005	Η	19:00 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Improper Backing	Back down WB lane
Hamco	7215	11/3/2005	Ħ	11:03 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Rear End	WB-ACD mult.pileup
Hamco	7569	11/16/2005	WE	20:15 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Rear End	SB - ACD
Green	1236	8/12/2005	Ϋ́	19:34 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Angle	WB into SB
Hamco	2743	4/27/2005	WE	22:33 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Left Turn	EB to NB into WB
Green	1686	10/25/2005	Ę	7:46 Gr	5500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Rear End	WB - ACD
Green	1135	7/20/2005	1 U	22:12 Gr	5500 Bridgetown SR 264	Glenway & Race	0	ο	0	0	Rear End	SB - ACD
Hamco	7884	11/29/2005	TU	6:57 Gr	5500 Bridgetown SR 264	Glenway & Race	0	-	0	0	Left Turn	EB to NB into WB
Hamco	4802	7/25/2005	MO	11:40 Gr	5501 Bridgetown SR 264	Glenway & Race	0	0	0	0	Rear End	SB - ACD
Hamco	5329	8/16/2005	1 U	11:56 Gr	5501 Bridgetown SR 264	Glenway & Race	0	0	0	0	Rear End	SB - ACD
Green	1718	10/29/2005	SA	9:40 Gr	6500 Bridgetown SR 264	Glenway & Race	0	0	0	0	Rear End	SB - ACD
Hamco	5952	9/14/2005	WE	9:10 Gr	6610 Glenway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
Green	139	1/22/2005	SA	18:23 Gr	6610 Glenway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD

2005 Crash Report William W. Brayshaw PE - PS The Hamilton County Engineer's Traffic Department

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Source	Repor	t# Date	Day	Time Twp	Address Road	Intersects	Distance/Dir.	Inj P	ed 1	^F at	Crash Type	Comments
Green	1996	12/12/2005	QM	15:19 Gr	6610 Glenway SR 264	Bridgetown & Race	0	0	0	0	Rear End	SB - ACD
Green	1557	10/9/2005	SU	13:06 Gr	6610 Glenway SR 264	Bridgetown & Race	0	0	0	0	Sideswipe/Passing	NB improper lane chg
Green	307	2/16/2005	WE	12:40 Gr	6610 Glenway SR 264	Bridgetown & Race	0	*	0	0	Left Turn	SB ran red into NW
Green	1078	7/16/2005	SA	16:07 Gr	6610 Glenway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
Hamco	6239	9/26/2005	MO	15:38 Gr	6610 Glenway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
Hamco	4555	7/14/2005	Η	9:55 Gr	6610 Glenway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
Hamco	2787	4/29/2005	ЯŖ	20:33 Gr	6610 Glenway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
Hamco	2994	5/7/2005	SA	21:27 Gr	6610 Glenway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
Hamco	3219	5/17/2005	5	12:10 Gr	6610 Glenway SR 264	Bridgetown & Race	0	0	0	0	Improper Backing	Back down NB lane
Hamco	6476	10/7/2005	FR	14:55 Gr	6610 Glenway SR 264	Bridgetown & Race	0	0	0	0	Rear End	NB - ACD
Green	2121	12/30/2005	ЧЧ	13:35 Gr	6611 Glenway SR 264	Bridgetown & Race	235 S	~	0	0	Rear End	NB - ACD

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2006 Crash Report

Sideswipe/Passing WB improper lane chg SB ran red into WB NB to WB into SB Park car hit & run Comments WB - ACD WB - ACD SB - ACD Crash Type Fixed Object Rear End Left Turn Rear End Angle Fat0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Inj Ped 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ó 0 0 0 0 0 0 0 0 0 0 c Ċ 0 0 C 0 0 0 0 0 Distance/Dir. ш ш ш 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 85 85 85 Bridgetown & Glenway Bridgetown & Glenway Bridgetown & Glenway Bridgetown & Glenway Bridgetown & Gleaway Bridgetown & Glenway Glenway & Race Glenway & Race Glenway & Race Intersects 4560 Bridgetown 4560 Bridgetown 4560 Bridgetown Source Report # Date Day Time Twp Address Road 3801 Race 2/20/2006 MO 18:51 Gr 9:26 Gr 16:04 Gr 16:48 Gr 18:01 Gr 14:00 Gr 15:26 Gr 8:40 Gr 17:30 Gr 8:00 Gr δ ნ 14:13 Gr 16:25 Gr 14:40 Gr 19:35 Gr 16:05 Gr ნ 12:51 Gr 15:19 Gr 9:02 18:54 ŤΗ БŖ SA ОM МО Η ğ SA WE 5 ОМ ΗĻ 2 К Ę SA SU Ř SA 2/27/2006 8/11/2006 8/21/2006 3/30/2006 2/14/2006 9/28/2006 8/22/2006 7/1/2006 3/4/2006 2/22/2006 1743 11/21/2006 12/1/2006 8051 12/21/2006 9/16/2006 5/8/2006 8/5/2006 8/28/2006 12/3/2006 6162 10/13/2006 1120 5016 268 1177 5789 5547 1177 475 1105 5199 1804 1794 949 318 666 4642 229 Hamco Hamco Hamco Green Hamco Green Hamco Green Green Green Green Green Hamco Hamco Green Hamco Hamco Green Green Green

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2006 Crash Report

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William W. Brayshaw PE - PS The Hamilton County Engineer's Traffic Department

Source	Repor	t # Date	Day	Time Twp	Address	Road	Intersects	Distance/Dir.	Inj F	pa	Fat	Crash Type	Comments
Green	1597	10/25/2006	WE	9:50 Gr	4599 Bri	dgetown SR 264	Glenway & Race	0	0	0	0	Rear End	EB - ACD
Hamco	1301	3/6/2006	MO	19:41 Gr	4599 Bri	dgetown SR 264	Glenway & Race	0	0	0	0	Sideswipe/Passing	EB improper lane chg
Hamco	2706	5/10/2006	WE	9:36 Gr	4599 Bri	dgetown SR 264	Glenway & Race	0	0	0	0	teft Turn	WB to SB into EB
Green	1607	10/31/2006	٦U	14:10 Gr	4599 Bri	dgetown SR 264	Glenway & Race	0	0	0	0	Rear End	EB - ACD
Green	1587	10/28/2006	SA	9:42 Gr	4599 Bri	dgetown SR 264	Glenway & Race	0	0	0	0	Improper Backing	Back down EB lane
Green	276	2/21/2006	IT	19:52 Gr	4599 Bri	dgetown SR 264	Gienway & Race	0	0	0	0	Rear End	SB - ACD
Hamco	6729	11/2/2006	Ħ	12:15 Gr	4599 Bri	dgetown SR 264	Glenway & Race	0	0	0	0	Angle	NB into EB
Green	467	3/27/2006	MO	18:56 Gr	5500 Bri	dgetown SR 264	Glenway & Race	0	0	0	0	Rear End	EB - ACD
Green	327	3/6/2006	MO	11:20 Gr	5500 Bri	dgetown SR 264	Glenway & Race	0	0	0	0	Rear End	SB - ACD
Green	996	7/5/2006	WE	20:01 Gr	5500 Bri	dgetown SR 264	Gienway & Race	0	ი	0	0	Left Turn	WB to SB into EB
Green	1014	7/16/2006	SU	21:37 Gr	5500 Brì	dgetown SR 264	Glenway & Race	C	0	0	0	Angle	SB ran red into EB
Green	1193	8/26/2006	SA	11:40 Gr	5500 Brí	dgetown SR 264	Glenway & Race	0	0	0	0	Rear End	SB - ACD
Green	1589	10/30/2006	MO	11:33 Gr	5501 Bri	dgetown SR 264	Glenway & Race	0	0	0	0	Rear End	EB - ACD
Hamco	1224	3/2/2006	ΗL	19:27 Gr	6610 Glé	enway SR 264	Bridgetown & Race	0	0	0	0	Left Turn	NB to WB into SB
Green	124	1/27/2006	FR	18:05 Gr	6610 Glé	enway SR 264	Bridgetown & Race	0	4	0	0	Left Turn	WB to SB into EB
Green	523	4/8/2006	SA	15:09 Gr	6610 Gł	enway SR 264	Bridgetown & Race	o	0	0	0	Rear End	NB - ACD
Green	54	1/13/2006	FR	22:41 Gr	6610 GIE	enway SR 264	Bridgetown & Race	0	0	0	0	Left Turn	NB to WB into SB
Green	1043	7/26/2006	WE	16:30 Gr	6610 Gl	enway SR 264	Bridgetown & Race	0	0	0	0	Rear End	SB - ACD
Hamco	7912	12/16/2006	SA	23:20 Gr	6610 GI	enway SR 264	Bridgetown & Race	0	۰	0	0	Left Turn	NB to WB into SB
Green	1001	7/11/2006	TU	13:40 Gr	6610 Glé	∋nway SR 264	Bridgetown & Race	0		0	0	Fail to Control	WB tin EB & NB

Wednesday, August 22, 2007

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				e 3 of 3
		Comments	SB - ACD	Pag
		Crash Type	Rear End	A STREET MANAGEMENT
		Fat	0	No. in co
		Inj Ped	o o	and the second second
		Distance/Dir.	535 S	
	r's Traffic Department	Intersects	Bridgetown & Race	
Report	lamilton County Enginee	Address Road	6611 Glanway SR 264	
ash	PS The H	y Time Twp	3.50 Gr	
96 Cri	V. Brayshaw PE -	eport # Date Da	968 12/29/2006 Ft	August 22, 2007
20(William I	Source R	Green	Wednesday,

Appendix D

Parking Analysis

Parking Analysis

	Existing			Minimum Stall	Required Spaces
Property	Parking	Spots Impacted	Building SQFT	Req.	Per Zoning
Walgreens	69	39	12347	61.735	62
Steak n' Shake	57	12	3726	37.26	37
Sherwin Williams	28	12	6131	15.3275	15
Enterprise	59*	36	1544	3.86	4
Wagon Wheel	14	0	1616	16.16	16

*Most is for car storage, plenty of customer parking

Appendix E

Capacity Analysis

No Build Alternative

				Н	CS2)00 "	[™] DE	TAILE	DI	REI	POR	Т						
General Inf	ormation							Site In	forı	mati	ion							
Analyst Agency or C Date Perforn Time Perioc	Zhixia Co. UC med 2007-1 I AM Pe	& Qi 11-1 eak	ingyi					Interse Area Ty Jurisdic Analysi Project	ctio ype ctior s Y ID	n n 'ear	Glen All ot Ham 2007 Exist	wa the litc ing	y/Bridg r areas on Coul g Cond	geto S nty ition	wn/l	Race		
Volume and	d Timing In	nput																
				El	B			WB					NB				SB	
Number of I		-+	LT			T.			╀	RT			TH		2T	LT	TH	RT
	anes, N ₁	_	1	1			1		┢	0	1		1 			1	2	0
	(mb)	-+	L	/	F	۲ ۲	L	1R	+				1	F	۲ ۲	L	TR 500	101
			172	23/	/ 16	5	147	127	+	22	/5		382	12	25	24	503	101
% neavy ve		v	0	0)	0	0		0	0		0	()	0	0	0
Protimod (P		h h	0.81	0.9	0 0.8	34	0.85	0.77).79	0.82		0.91	0.8	39	0.86	0.97	0.77
(A)		iu	Α	A	4	l I	А	A		Α	Α		А	4	١	А	А	Α
Start-up lost	t time, I ₁		2.0	2.0) 2.	0	2.0	2.0			2.0		2.0	2.	0	2.0	2.0	
Extension o green, e	f effective		2.0	2.0) 2.	0	2.0	2.0			2.0		2.0	2.	0	2.0	2.0	
Arrival type,	AT	Ī	3	3	3	}	3	3	Τ		3		3	3	}	3	3	
Unit extensi	on, UE	Ĩ	3.0	3.0) 3.	0	3.0	3.0	T		3.0)	3.0	3	.0	3.0	3.0	
Filtering/me	tering, I	ŀ	1.000	1.00	0 1.0	000	1.000	1.000			1.00	0	1.000	1.0	000	1.000	1.000	
Initial unmet	demand, C	ک ^ه	0.0	0.0) 0.	0	0.0	0.0			0.0		0.0	0.	0	0.0	0.0	
Ped / Bike / volumes	RTOR		0	0	C		0	0		0	0			C)	0	0	0
Lane width			9.0	9.0) 10	.0	12.0	11.0	Τ		12.0)	12.0	11	.0	10.0	11.0	
Parking / Gr	ade / Parki	ng	Ν	-5	<u>۸</u>	/	Ν	-1	Τ	Ν	Ν		1	Λ	I	N	-3	N
Parking maneuvers, N _m Buses stopping, N _B																		
Parking maneuvers, N _m Buses stopping, N _B			0	0	0)	0	0			0		0	(2	0	0	
Buses stopping, N _B Min. time for pedestrians				13.	2			13.2					3.2				13.2	
Phasing	Excl. Left	E١	N Per	m	03			04	N	NB C	Only	١	IS Per	m		07	0	8
Timing	G = 16.0	G	= 40.	0 (G =		G =		G	= 1	4.0	G	= 40.	0	G =	-	G =	
Duration of	Y = 4.5	Y =	= 5.5 25	`	Y =		Y =		Y :	= 4	.5	Y C	= 5.5	nat	Y =	- 130	Y =	
	n Canacity	<u> </u>	ntrol	Dolai	/ and	105		rminat	ion	,				nyı	n, c	- 150	.0	
	o Capacity,	001	1001	EB	, and		Dell	WB	1011	<u> </u>			NB				SB	
		LT	- I T	ГН	RT	Ţ	T	TH	R	т	LT	L	TH	R	Г	LT	TH	RT
Adjusted flo	w rate, v	212	2	63	196	1	73	193			91	Ľ	420	14	0	28	650	
Lane group	capacity, c	494	\$ 5	39	475	47	78	556			331	8	351	69	9	286	1059	
v/c ratio, X		0.43	3 0.	49	0.41	0.	36	0.35		0).27	0).49	0.2	0	0.10	0.61	
		0.47	7 0.	31	0.31	0.	47	0.31		0).45	C).45	0.4	5	0.31	0.31	

Total green ratio, g/C											
Uniform delay, d ₁	21.8	36.7	35.7	21.6	34.9	22.6	25.3	21.6	32.1	38.4	
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Delay calibration, k	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.20	
Incremental delay, d ₂	0.6	0.7	0.6	0.5	0.4	0.5	0.5	0.1	0.2	1.1	
Initial queue delay, d_3											
Control delay	22.4	37.4	36.3	22.1	35.3	23.1	25.7	21.8	32.3	39.5	
Lane group LOS	С	D	D	С	D	С	С	С	С	D	
Approach delay	32	2.3		2	9.0	2	4.5			39.2	
Approach LOS	(0			С		С			D	
Intersection delay	31	1.6		$X_{c} =$	0.62	Interse	ction LC	S		С	

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					НС	<u>S200</u>	<i>0</i> ™ D	ET	AILE	D R	EP	OR	Γ						
General Inf	formation								Site In	forma	atic	on							
Analyst Agency or C Date Perfor Time Perioc	Zhixia Co. UC med 2007-1 d Noon I	& Q 11-1 Pea	ìingyi k					 	nterse Area Ty Jurisdic Analysi Project	ction /pe ction s Yea ID	ar 2	Glenv All otl Hamli 2007 Existi	va he lito	y/Bridg r areas n Cour r Cond	geto S nty ition	wn/l	Race		
Volume an	d Timing In	iput	t																
				- T -	<u>B</u>		-				T		_	NB					БТ
Number of I	anes, N ₁		 1			1	1		1		1	 1		1		1	1	2	0
Lane group	1		L	7	-	R	L		TR	┢		L		Т	F	2	L	TR	
Volume, V (vph)		169	24	46	238	21	7	239	58	3	255		622	24	19	41	616	89
% Heavy ve	hicles, %H	V	0	1)	0	0		0	0		0		0	C)	0	0	0
Peak-hour f	actor, PHF		0.88	0.	90	0.73	0.6	7	0.93	0.7	6	0.90		0.91	0.8	34	0.68	0.90	0.77
Pretimed (P (A)) or actuate	d	А	4	Ą	A	A		A	A		А		A	4	١	А	А	А
Start-up los	t time, l ₁		2.0	2.	0	2.0	2.0)	2.0			2.0		2.0	2.	0	2.0	2.0	
Extension o green, e	f effective		2.0	2.	0	2.0	2.0)	2.0			2.0		2.0	2.	0	2.0	2.0	
Arrival type,	, AT		3		3	3	3		3			3		3	3	}	3	3	
Unit extensi	ion, UE		3.0	3.	0	3.0	3.()	3.0			3.0		3.0	3.	.0	3.0	3.0	
Filtering/me	tering, I		1.000) 1.0	000	1.00	0 1.0	00	1.000			1.000	0	1.000	1.0	000	1.000	1.000	
Initial unme	t demand, C	ک <mark>ہ</mark>	0.0	0.	0	0.0	0.0)	0.0			0.0		0.0	0.	0	0.0	0.0	
Ped / Bike / volumes	RTOR		0	C)	0	0		о	0		0			C)	о	о	о
Lane width			9.0	9.	0	10.0	12.	0	11.0			12.0		12.0	11	.0	10.0	11.0	
Parking / G	rade / Parki	ng	Ν		5	Ν	Ν		-1	N	'	Ν		1	٨	I	N	-3	N
Parking ma	n																		
Buses stop		0	()	0	0		0			0		0	()	0	0		
Min. time fo G _p	ns,		1:	3.2				13.2					3.2				13.2		
Phasing	Excl. Left	E	W Pe	erm		03		C)4	NB	Or	nly	Ν	IS Peri	m		07	0	8
Timing	G = 16.0 Y = 4.5	G Y	= 40 = 5.8).0 5	G = Y =	=	G Y	=		G = Y =	14 4.3	4.0 5	G Y	= 40.0 = 5.5	0	G = Y =	=	G = Y =	
Duration of	Analysis, T	= 0	.25									Î	C	ycle Le	engt	h, C	= 130).0	
Lane Grou	p Capacity,	Co	ontrol	Dela	ay, a	nd L	OS De	ete	rminat	ion	-						1		
			гΓ	EB TH		रा	LT	Т	WB TH	RT		LT	Г	NB TH	R	Г	LT	SB TH	RT
Adjusted flo	w rate, v	19	2 2	273	3.	26	324	Ţ	333		2	83	6	684	29	6	60	800	
Lane group	capacity, c	38	7 {	539	4	75	470	Ţ	549		2	80	ε	351	69	9	113	1068	
v/c ratio, X		0.5	i0 ().51	0.	69	0.69	(0.61		1.	01	0	.80	0.4	2	0.53	0.75	
		0.4	7 ().31	0.	31	0.47	(0.31		0.	45	0	.45	0.4	5	0.31	0.31	

Total green ratio, g/C											
Uniform delay, d ₁	23.0	36.9	39.5	24.0	38.3	31.0	30.8	24.3	37.2	40.5	
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Delay calibration, k	0.11	0.12	0.26	0.26	0.19	0.50	0.35	0.11	0.13	0.30	
Incremental delay, d ₂	1.0	0.8	4.1	4.3	1.9	56.5	5.6	0.4	4.7	3.0	
Initial queue delay, d ₃											
Control delay	24.0	37.7	43.6	28.3	40.2	87.5	36.5	24.7	42.0	43.5	
Lane group LOS	С	D	D	С	D	F	D	С	D	D	
Approach delay	36	6.8		3	4.3	4	5.1			43.4	
Approach LOS	Ľ)			С		D			D	
Intersection delay	40).9		$X_{c} =$	0.91	Interse	ction LC	S		D	

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					HCS	<u>S200</u>	0 [™] DE	ΕT	AILE	D R	EP	ORT	Γ						
General Inf	formation							5	Site In	form	atio	on							
Analyst Agency or C Date Perfor Time Perioc	Zhixia Co. UC med 2007-1 d PM Pe	& C 11-1 eak	Qingyi					lı A A F	nterse Area Ty Iurisdic Analysi Project	ction /pe ction s Yea ID	ar .	Glenv All otl Haml 2007 Existi	va he ito	y/Bridg r areas n Cour r Cond	geto S nty itior	own/l	Race		
Volume an	d Timing In	iput	t														ŵ.		
				- E	B		+		WB		_			NB				SB	БЪТ
Number of I	anes, N ₁		1			1 1	1		1	0 	1	1		1	R 1	1 1	1	2	0
Lane group			L	7	-	R	L		TR			L		Т	F	२	L	TR	
Volume, V (vph)		201	22	26	186	234		363	59	9	224		641	24	14	32	828	204
% Heavy ve	hicles, %H	V	0	1)	0	0		0	0		0		0	6)	0	0	0
Peak-hour f	actor, PHF		0.82	0.:	91	0.83	0.85	5	0.86	0.7	' 4	0.81		0.95	0.7	76	0.80	0.92	0.77
Pretimed (P (A)) or actuate	d	A	4	٩	А	A		A	A		A		A	4	ł	А	А	А
Start-up los	t time, I ₁		2.0	2.	0	2.0	2.0		2.0			2.0		2.0	2.	0	2.0	2.0	
Extension o green, e	f effective		2.0	2.	0	2.0	2.0		2.0			2.0		2.0	2.	0	2.0	2.0	
Arrival type,	, AT 3 3 3 3								3			3		3	3	3	3	3	
Unit extensi	on, UE		3.0	3 3 3 3 3 3.0 3.0 3.0 3.0 3.0								3.0		3.0	3	.0	3.0	3.0	
Filtering/me	tering, I		1.000	1.0	000	1.00	0 1.00	0	1.000	,		1.000	0	1.000	1.0	000	1.000	1.000	
Initial unmet	t demand, C	ک ^ه	0.0	0.	0	0.0	0.0		0.0			0.0		0.0	0.	0	0.0	0.0	
Ped / Bike / volumes	RTOR		0	C)	0	0		0	0		0			C)	0	0	0
Lane width			9.0	9.	0	10.0	12.0)	11.0			12.0		12.0	11	.0	10.0	11.0	
Parking / Gi	rade / Parki	ng	Ν	-	5	N	N		-1	N	I	N		1	Λ	I	N	-3	N
Parking ma	neuvers, N _n	n																	
Buses stopp	oing, N _B		0	()	0	0		0			0		0	(0	0	0	
Min. time fo G _p	r pedestriar	ns,		1:	3.2				13.2					3.2				13.2	
Phasing	Excl. Left	E	W Pe	rm		03		0	4	NB	0	nly	Ν	IS Peri	m		07	0	8
Timing	G = 16.0 Y = 4.5	G Y	= 40 = 5.5	.0 ;	G = Y =	= :	G = Y =	=		G = Y =	1- 4.:	4.0 5	G Y	= 40. = 5.5	0	G = Y =	=	G = Y =	
Duration of	Duration of Analysis, $T = 0.25$											ĺ	C	ycle Le	engt	h, C	= 130).0	
Lane Grou	Lane Group Capacity, Control Delay, and LOS D									ion	1								
	LT TH RT LT							\ T	WB TH	RT	$\left \right $	LT	Γ	NB TH	R	Г	LT	SB TH	RT
Adjusted flo	w rate, v	5 2	48	2	24	275	ŧ	502		2	77	6	675	32	1	40	1165		
Lane group	capacity, c	26	8 5	39	4	75	491	ŧ	554		2	51	ε	351	69	9	119	1055	
v/c ratio, X		0.9	01 0	.46	0.	47	0.56	0).91		1.	.10	0	.79	0.4	6	0.34	1.10	
		0.4	17 0	.31	0.	31	0.47	0).31		0.	.45	0	.45	0.4	5	0.31	0.31	

Total green ratio, g/C											
Uniform delay, d ₁	35.3	36.3	36.4	22.9	43.2	39.3	30.6	24.8	34.7	45.0	
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Delay calibration, k	0.43	0.11	0.11	0.16	0.43	0.50	0.34	0.11	0.11	0.50	
Incremental delay, d ₂	33.3	0.6	0.7	1.5	18.6	87.4	5.2	0.5	1.7	60.9	
Initial queue delay, d ₃											
Control delay	68.6	36.9	37.2	24.4	61.8	126.7	35.8	25.3	36.4	105.9	
Lane group LOS	E	D	D	С	E	F	D	С	D	F	
Approach delay	47	7.8		4	8.6	5	2.9		1	103.5	
Approach LOS	Ĺ	2			D		D			F	
Intersection delay	66	D 66.5		$X_{c} =$	1.15	Interse	ction LC	S		Ε	

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					нс	S200	<i>0</i> [™] D	ET	AILE	DR	EP	ORT	Γ_						
General Int	formation							ļ	Site In	forma	atic	on							
Analyst Agency or 0 Date Perfor Time Perioo	Zhixia Co. UC med 2007-1 d AM Pe	& Q 11-1 eak	ingyi					 	ntersed Area Ty Jurisdic Analysi Project	ction /pe ction s Yea ID	ar 2	Glenv All oth Hamli 2030 Existi	vay her itor ng	y/Bridg r areas n Cour cond	geto s nty ition	wn/l	Race		
Volume an	d Timing In	nput															1		
			1 7	- T	<u>B</u>		<u> </u>	_			F		_	NB					БТ
Number of I	anes, N ₁		1	1		1	1		1	0	1	1	┥	1	1	1	1	2	0
Lane group	•		L	7	-	R	L		TR			L	↑	Т	F	2	L	TR	
Volume, V ((vph)		192	26	6	185	164	1	143	25	5	84	┪	429	14	40	28	565	113
% Heavy ve	hicles, %H	V	0	()	0	0		0	0		0	Ť	0	C)	0	0	0
Peak-hour f	actor, PHF		0.81	0.	90	0.84	0.8	5	0.78	0.7	78	0.82	T	0.91	0.9	90	0.88	0.97	0.76
Pretimed (P (A)) or actuate	d	А	1	Ą	A	A		A	A		А	Ĩ	A	4	١	А	А	А
Start-up los	t time, l ₁		2.0	2.	0	2.0	2.0)	2.0			2.0	T	2.0	2.	0	2.0	2.0	
Extension o green, e	f effective		2.0	2.	0	2.0	2.0)	2.0			2.0		2.0	2.	0	2.0	2.0	
Arrival type,	, AT	3 3 3 3							3			3	T	3	3	}	3	3	
Unit extensi	ion, UE		3 3 3 3 3 3.0 3.0 3.0 3.0 3.0						3.0			3.0		3.0	3.	.0	3.0	3.0	
Filtering/me	etering, I		1.000	1.0	000	1.00	0 1.00	00	1.000			1.000	2	1.000	1.0	000	1.000	1.000	
Initial unme	t demand, C	ک <mark>ہ</mark>	0.0	0.	0	0.0	0.0)	0.0			0.0		0.0	0.	0	0.0	0.0	
Ped / Bike / volumes	RTOR		0	C)	0	0		0	0		0			C)	0	0	0
Lane width			9.0	9.	0	10.0	12.	0	11.0			12.0		12.0	11	.0	10.0	11.0	
Parking / G	rade / Parki	ng	Ν		5	N	N		-1	N	1	N		1	٨	I	N	-3	N
Parking ma	neuvers, N _n	n																	
Buses stop	oing, N _B		0	()	0	0		0			0		0	()	0	0	
Min. time fo G _p	r pedestriar	ns,		13	3.2				13.2					3.2				13.2	
Phasing	Excl. Left	E	W Pe	rm		03		С)4	NB	i Oi	nly	Ν	IS Peri	n		07	0	8
Timing	G = 16.0 Y = 4.5	G Y	= 40 = 5.5	.0 ;	G = Y =	=	G Y	=		G = Y =	14 4.3	4.0 5	G Y :	= 40. = 5.5	0	G = Y =	=	G = Y =	
Duration of	Duration of Analysis, $T = 0.25$												Су	/cle Le	engt	h, C	= 130).0	
Lane Grou	Lane Group Capacity, Control Delay, and LOS D									ion	1						2		
	LT TH RT LT							T	WB TH	RT	┝	IT	–	NB TH	R	г		SB TH	RT
Adjusted flo	w rate, v	7 2	96	2	20	<u> </u>		215		1	02	4	71	150	6	32	731		
Lane group	capacity, c	470	6 5	39	4	75	451	1	555		3	03	8	851	699	9	264	1059	
v/c ratio, X		0.5	0 0	.55	0.	46	0.43	0	0.39		0.	34	0.	.55	0.2	2	0.12	0.69	
		0.4	7 0	.31	0.	31	0.47	0	0.31		0.	45	0.	.45	0.4	5	0.31	0.31	

Total green ratio, g/C												
Uniform delay, d ₁	22.4	37.5	36.3	22.3	35.4		23.5	26.2	21.9	32.4	39.6	
Progression factor, PF	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	
Delay calibration, k	0.11	0.15	0.11	0.11	0.11		0.11	0.15	0.11	0.11	0.26	
Incremental delay, d ₂	0.8	1.2	0.7	0.7	0.5		0.7	0.8	0.2	0.2	1.9	
Initial queue delay, d ₃												
Control delay	23.2	38.7	37.0	22.9	35.8		24.2	27.0	22.0	32.6	41.5	
Lane group LOS	С	D	D	С	D		С	С	С	С	D	
Approach delay	33	3.3		2	9.7	-	2	5.5			41.1	-
Approach LOS	(0			С			С			D	
Intersection delay	32	2.9		$X_{c} =$	0.68		Interse	ction LC	S		С	

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					НС	<u>S200</u>	<u>0</u> ™ D	E	AILE	D R	EP	ORI	Γ						
General Inf	formation								Site In	forma	atic	on							
Analyst Agency or C Date Perfor Time Perioc	Zhixia Co. UC med 2007-1 d Noon I	& C 11-1 Pea	∖ingyi k						Intersed Area Ty Jurisdic Analysi Project	ction /pe ction s Yea ID	ar 2	Glenv All otl Hamli 2030 Existi	va he ito ing	y/Bridg r areas n Cour g Cond	geto S nty ition	wn/l	Race		
Volume an	d Timing In	iput	t																
				- T	<u>B</u>			_			Ŧ								БТ
Number of I	anes, N ₁		1 L I	1		1		1	1		1	1		1		1	1	2	0
Lane group	1		L	7	-	R	L		TR	┢		L		Т	F	2	L	TR	
Volume, V ((vph)		191	27	75	267	24	3	268	64	1	287		698	27	79	46	692	100
% Heavy ve	hicles, %H	V	0	1)	0	C)	0	0		0		0	C)	0	0	0
Peak-hour f	actor, PHF		0.88	0.	90	0.73	0.6	67	0.93	0.7	6	0.90		0.91	0.8	34	0.68	0.90	0.93
Pretimed (P (A)) or actuate	d	А	4	4	А	A		А	A		А		А	4	l	А	А	А
Start-up los	t time, l ₁		2.0	2.	0	2.0	2.	0	2.0			2.0		2.0	2.	0	2.0	2.0	
Extension o green, e	f effective		2.0	2.	0	2.0	2.	0	2.0			2.0		2.0	2.	0	2.0	2.0	
Arrival type	l type, AT 3 3 3							•	3			3		3	3	}	3	3	
Unit extensi	ion, UE		3.0 3.0 3.0 3.0 3.0						3.0			3.0		3.0	3.	.0	3.0	3.0	
Filtering/me	etering, I		1.000) 1.(000	1.00	0 1.0	00	1.000			1.000	0	1.000	1.0	000	1.000	1.000	
Initial unme	t demand, C	ک _ه	0.0	0.	0	0.0	0.	0	0.0			0.0		0.0	0.	0	0.0	0.0	
Ped / Bike / volumes	RTOR		0	C)	0	С)	0	0		0			C)	о	о	о
Lane width			9.0	9.	0	10.0	12	.0	11.0			12.0		12.0	11	.0	10.0	11.0	
Parking / G	rade / Parki	ng	Ν		5	Ν	٨	1	-1	N	1	Ν		1	٨	I	N	-3	N
Parking ma	neuvers, N _n	n																	
Buses stop	oing, N _B		0	()	0	0		0			0		0	()	0	0	
Min. time fo G _p	r pedestriar	IS,		1:	3.2				13.2					3.2				13.2	
Phasing	Excl. Left	E	W Pe	rm		03		()4	NB	Or	nly	Ν	IS Peri	m		07	0	8
Timing	G = 16.0 Y = 4.5	G Y	= 40 = 5.5	9.0 5	G = Y =	=	G Y	=		G = Y =	14 4.3	4.0 5	G Y	= 40.0 = 5.5	0	G = Y =	=	G = Y =	
Duration of	Duration of Analysis, $T = 0.25$												C	ycle Le	ngt	h, C	= 130).0	
Lane Grou	Lane Group Capacity, Control Delay, and LOS D									ion	1						<i>.</i>		
	ЕВ LT ТН							Т	WB TH	RT	$\left \right $	LT	Γ	NB TH	R	Г	LT	SB TH	RT
Adjusted flo	w rate, v	21	7 3	306	3	66	363	Ţ	372	-	3	19	7	767	332	2	68	877	
Lane group	capacity, c	35	8 5	539	4	75	443		549		2	57	E	351	699	9	57	1072	
v/c ratio, X		0.6	61 C	.57	0.	77	0.82	(0.68		1.	24	0	0.90	0.4	7	1.19	0.82	
		0.4	17 C	.31	0.	31	0.47	(0.31		0.	45	0	0.45	0.4	5	0.31	0.31	

Total green ratio, g/C												
Uniform delay, d ₁	24.1	37.7	40.8	33.4	39.4		36.7	33.1	25.0	45.0	41.6	
Progression factor, PF	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	
Delay calibration, k	0.19	0.16	0.32	0.36	0.25		0.50	0.42	0.11	0.50	0.36	
Incremental delay, d ₂	2.9	1.4	7.6	11.6	3.3		137.1	12.7	0.5	180.7	5.1	
Initial queue delay, d ₃												
Control delay	27.0	39.2	48.4	45.0	42.7		173.8	45.8	25.5	225.7	46.7	
Lane group LOS	С	D	D	D	D		F	D	С	F	D	
Approach delay	40).0		4	3.8	-	6	9.8			59.6	
Approach LOS	Ĺ	כ			D			E			Е	
Intersection delay	56	5.0		$X_{c} =$	1.31		Interse	ction LC	S		E	

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					HC	<u>S200</u>	<i>0</i> [™] D	ET	AILE	D R	EP	OR	Γ						
General Int	formation							ļ	Site Int	forma	atio	on							
Analyst Agency or 0 Date Perfor Time Period	Zhixia Co. UC med 2007-1 d PM Pe	& G 11-1 eak)ingyi					 	ntersed Area Ty Jurisdic Analysi Project	ction /pe ction s Yea ID	ar 2	Glenv All otl Hamli 2030 Existi	va hei ito	y/Bridg r areas n Cour r Condi	geto S nty ition	wn/l	Race		
Volume an	d Timing In	iput	t																
				- T -	<u>B</u>		<u> </u>				F		_	NB					
Number of I	anes, N ₁		 1			1 RT	1		1		1	1		1 1		1	1	2	0
Lane group	I		L	7	-	R	L		TR	┢		L		Т	F	7	L	TR	
Volume, V (vph)		225	25	54	209	262	2	408	66	6	251		719	27	74	35	930	229
% Heavy ve	hicles, %H	V	0)	0	0		0	0		0		0	C)	0	0	0
Peak-hour f	actor, PHF		0.83	0.	91	0.83	0.8	5	0.86	0.7	75	0.81	٦	0.95	0.7	76	0.80	0.92	0.89
Pretimed (P (A)) or actuate	d	А	4	Ą	A	A		A	A		А		A	4	١	А	А	А
Start-up los	t time, l ₁		2.0	2.	0	2.0	2.0)	2.0			2.0		2.0	2.	0	2.0	2.0	
Extension o green, e	f effective		2.0	2.	0	2.0	2.0)	2.0			2.0		2.0	2.	0	2.0	2.0	
Arrival type	al type, AT 3 3						3		3			3	Ī	3	3	}	3	3	
Unit extensi	ion, UE		3.0	3.0	3.0)	3.0			3.0	Ī	3.0	3.	.0	3.0	3.0			
Filtering/me	tering, I		1.000) 1.0	000	1.00	0 1.00	00	1.000			1.000	2	1.000	1.0	000	1.000	1.000	
Initial unme	t demand, C	ک <mark>ہ</mark>	0.0	0.	0	0.0	0.0)	0.0			0.0		0.0	0.	0	0.0	0.0	
Ped / Bike / volumes	RTOR		0	C)	0	0		0	0		0			C)	о	о	0
Lane width			9.0	9.	0	10.0	12.	0	11.0			12.0		12.0	11	.0	10.0	11.0	
Parking / G	rade / Parki	ng	Ν		5	Ν	N		-1	N	1	Ν		1	٨	I	Ν	-3	N
Parking ma	neuvers, N _n	n																	
Buses stop	oing, N _B		0	()	0	0		0			0		0	()	0	0	
Min. time fo G _p	r pedestriar	IS,		13	3.2				13.2					3.2				13.2	
Phasing	Excl. Left	E	W Pe	erm		03		С)4	NB	O	nly	Ν	IS Perr	m		07	0	8
Timing	G = 16.0 Y = 4.5	G Y	= 40 = 5.8).0 5	G = Y =	:	G Y	=		G = Y =	14 4.3	4.0 5	G Y	= 40.0 = 5.5	0	G = Y =	=	G = Y =	
Duration of	Duration of Analysis, $T = 0.25$												Су	ycle Le	engt	h, C	= 130).0	
Lane Grou	Lane Group Capacity, Control Delay, and LOS D								rminat	ion	1						<i>.</i>		
	LT						LT	Т	wb th 1	RT	┢	LT	Γ	NB TH	R	Г	LT	SB TH	RT
Adjusted flo	w rate, v	27	1 2	279	2	52	308	Ţ	562	-	3	10	7	757	36	1	44	1268	
Lane group	capacity, c	26	0 8	539	4	75	465		554		2	51	8	351	699	9	63	1059	
v/c ratio, X		1.0	4 ().52	0.	53	0.66	1	1.01		1.	24	0	.89	0.5	2	0.70	1.20	
		0.4	۲ C).31	0.	31	0.47	0	0.31		0.	45	0	.45	0.4	5	0.31	0.31	

Total green ratio, g/C											
Uniform delay, d ₁	40.5	37.1	37.2	23.8	45.0	39.3	32.8	25.6	39.7	45.0	
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Delay calibration, k	0.50	0.12	0.13	0.24	0.50	0.50	0.41	0.12	0.26	0.50	
Incremental delay, d ₂	67.3	0.9	1.1	3.5	41.9	135.2	11.5	0.7	28.9	98.1	
Initial queue delay, d ₃											
Control delay	107.8	37.9	38.4	27.3	86.9	174.6	44.2	26.3	68.6	143.1	
Lane group LOS	F	D	D	С	F	F	D	С	Е	F	
Approach delay	61	1.7		6	5.8	6	8.0		1	140.6	
Approach LOS	E	Ξ			E		E			F	
Intersection delay	88	3.0		$X_{c} =$	1.46	Interse	ction LC	S		F	

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No Build Alternative – Optimized Timing

				Н	CS200	0 ™	DET	AILE	DF	REP	OR	Г							
General Inf	ormation								Site In	forn	natio	on							
Analyst Agency or C Date Perfor Time Perioc	Zhixia Co. UC med 2007-1 I AM Pe	& G 11-1 eak)ingyi	i					Interse Area Ty Jurisdic Analysi Project	ctior ype ction is Ye ID	n ear	Glen All ot Hami 2007 Exist Optin	wa he litc ing niz	ay/Bridg er areas on Cour g Condi zed Tim	ition	wn/l ns -	Race		
Volume an	d Timing In	put	-									- /							
					EB		┦	1 -	WB	- T - F								SB	DT
Number of I	anes, N ₁		1	┢	1	1	┤	1	1		0	1		1		1	1	2	0
Lane group	1		L	╈	Т	R		L	TR	╈		L		Т	F	2	L	TR	
Volume, V (vph)		172		237	165		147	127	2	22	75		382	12	25	24	503	101
% Heavy ve	hicles, %H	V	0	╈	0	0	Ť	0	0		0	0		0	6)	0	0	0
Peak-hour f	actor, PHF		0.81	1	0.90	0.84	1	0.85	0.77	0.	79	0.82)	0.91	0.8	3 9	0.86	0.97	0.77
Pretimed (P (A)) or actuate	d	А	T	A	A	T	A	A	7	A	А		А	4	ł	А	А	A
Start-up lost	t time, I ₁		2.0		2.0	2.0	Í	2.0	2.0			2.0		2.0	2.	0	2.0	2.0	
Extension o green, e	f effective		2.0		2.0	2.0		2.0	2.0			2.0		2.0	2.	0	2.0	2.0	
Arrival type,	AT	3				3	Ť	3	3	Τ		3		3	3	}	3	3	
Unit extensi	on, UE	= <u>3</u> .0				3.0	Ĩ	3.0	3.0			3.0		3.0	3	.0	3.0	3.0	
Filtering/me	tering, I		1.00	0 1	1.00	0 1.00	0 1	1.000	1.000			1.00	0	1.000	1.0	000	1.000	1.000	
Initial unmet	t demand, C	۶ _b	0.0		0.0	0.0		0.0	0.0			0.0		0.0	0.	0	0.0	0.0	
Ped / Bike / volumes	RTOR		0		0	0		0	0		0	0			C)	0	0	0
Lane width			9.0	Τ	9.0	10.0	ŀ	12.0	11.0	Τ		12.0)	12.0	11	.0	10.0	11.0	
Parking / Gr	ade / Parki	ng	Ν		-5	N		Ν	-1		N	Ν		1	^	J	N	-3	Ν
Parking mai	neuvers, N _n	ı																	
Buses stopp	oing, N _B		0		0	0		0	0			0		0	(0	0	0	
Min. time fo G _p	r pedestriar	IS,			13.2	2			13.2					3.2				13.2	
Phasing	Excl. Left	E	W Pe	ərm		03		()4	N	ΒO	nly	١	VS Perr	n		07	0	8
Timing	G = 7.5	G	= 20	6.0	G	i =	_	G =		G =	= 5.	5	G	= 31.0	2	G =	-	G =	
$Y = 4.5 \qquad Y = 5.5$ Duration of Analysis T = 0.25					Y	=		Y =		Y =	= 4.	5	Y C	= 5.5	nat	Y = h C	- 901	Y =	
Lane Group Capacity, Control Delay, and							0.5	Dete	rminat	ion					ngt	n, o	_ 50.0		
	e capacity,			EE	у , В			2010	WB					NB				SB	
	Ľ	T	TH	1	RT	Ľ	T	TH	RT		LT		TH	R	Г	LT	TH	RT	
Adjusted flo	w rate, v	21	2	263	3	196	17	3	193		<u> </u>	91	Ľ	420	14	0	28	650	
Lane group	capacity, c	42	2	506	3	446	39	9	522		2	95	8	361	70	7	320	1186	
v/c ratio, X		0.5	0	0.52	2	0.44	0.4	#3 (0.37		0.	.31	10).49	0.2	0	0.09	0.55	

Total green ratio, g/C	0.42	0.29	0.29	0.42	0.29	0.46	0.46	0.46	0.34	0.34	
Uniform delay, d ₁	19.4	26.8	26.1	17.4	25.5	15.3	17.1	14.7	19.9	23.8	
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Delay calibration, k	0.11	0.13	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.15	
Incremental delay, d ₂	1.0	1.0	0.7	0.8	0.4	0.6	0.4	0.1	0.1	0.5	
Initial queue delay, d ₃											
Control delay	20.4	27.7	26.8	18.1	25.9	15.9	17.6	14.8	20.1	24.4	
Lane group LOS	С	С	С	В	С	В	В	В	С	С	
Approach delay	25	5.1		2	2.2	1	6.7			24.2	
Approach LOS	(0			С		В			С	
Intersection delay	22	2.1		$X_{c} =$	0.63	Interse	ction LC	S		С	

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				ŀ	ICS	52000	™ DE	TAIL	_E[) RE	PO	RT						
General Inf	ormation							Site	Infe	orma	tion							
Analyst Agency or C Date Perfort Time Perioc	Zhixia Co. UC med 2007-1 I Noon I	& Q 11-1 Peal	ingyi k					Inter Area Juris Anal Proje	sec Ty dict ysis	tion pe tion S Yea	Gl All Ha r 20 Ex Op	enwa l othe amlite 07 kisting otimiz	ay/Bridg er areas on Cour g Condi zed Tim	itior	own/l	Race		
Volume and	d Timing In	put														a		
			1 T		B	Бт		<u> </u>	/B	го І		<u>, </u>		Гг	<u>, </u>		SB	БТ
Number of I	anes, N ₁		1	1		1	1	1		0		<u> </u>	1		1	1	2	0
Lane group			L	7		R	L	TI	R			L	Т	F	7	L	TR	
Volume, V (vph)		169	24	6	238	217	23	9	58	2	55	622	24	19	41	616	89
% Heavy ve	hicles, %H	V	0	0)	0	0	0)	0		0	0	6)	0	0	0
Peak-hour f	actor, PHF		0.88	0.9	90	0.73	0.67	0.9	93	0.76	3 O.	.90	0.91	0.8	84	0.68	0.90	0.77
Pretimed (P (A)) or actuate	d	A	A		А	A	A		A	ļ	A	A	4	ł	А	А	А
Start-up lost	t time, I ₁		2.0	2.	0	2.0	2.0	2.	0		2	2.0	2.0	2.	0	2.0	2.0	
Extension o green, e	f effective		2.0	2.	0	2.0	2.0	2.	0		2	2.0	2.0	2.	0	2.0	2.0	
Arrival type,	AT		3	3	}	3	3	3	}			3	3	3	3	3	3	
Unit extensi	on, UE		3.0	3.	0	3.0	3.0	3.	.0		3	3.0	3.0	3	.0	3.0	3.0	
Filtering/me	tering, I		1.000	1.0	000	1.000	1.000) 1.0	000		1.	000	1.000	1.0	000	1.000	1.000	
Initial unmet	t demand, C	ک <mark>ہ</mark>	0.0	0.	0	0.0	0.0	0.	0		0	0.0	0.0	0.	0	0.0	0.0	
Ped / Bike / volumes	RTOR		0	0		0	0	0)	0		0		0)	0	0	0
Lane width			9.0	9.	0	10.0	12.0	11.	.0		12	2.0	12.0	11	.0	10.0	11.0	
Parking / Gr	ade / Parki	ng	Ν	-5	5	N	N	- 1	1	N		N	1	^	V	N	-3	N
Parking mai	neuvers, N _n	n																
Buses stopp	oing, N _B		0	0		0	0	()			0	0	(0	0	0	
Min. time fo G _p	r pedestriar	ıs,		13	8.2			13	.2				3.2				13.2	
Phasing	Excl. Left	E	W Pe	rm		03		04		NB	Only	<u> </u>	NS Peri	n		07	0	8
Timing	G = 6.5	G	= 22	.5	G =	:	G =		_	G =	10.0) (3	b = 21.0)	G =	-	G =	
$Y = 4.5 \qquad Y = 5.5$ Duration of Analysis T = 0.25					Y =		Y =			Y =	4.5		= 5.5	nat	Y =	= 80	Y =	
Lane Grou	Lane Group Capacity, Control Delay, and							rmir	nati	on				ngt	n, o	_ 00.		
	e capacity,			EB	, , .		0 2010	WB	laci				NB				SB	
	L		TH	F	RT	LT	TH		RT	LT		TH	R	T	LT	TH	RT	
Adjusted flo	djusted flow rate, v 192					26 3	324	333	\downarrow		283		684	29	6	60	800	
Lane group	capacity, c	300	6 4	193	4	35 3	83	501	+		320	<u>}</u>	839	68	9	125	911	<u> </u>
v/c ratio, X		0.6	3 0	.55	0.	75 0	.85	0.66	╉		0.88	3 (0.82	0.4	3	0.48	0.88	

Total green ratio, g/C	0.42	0.28	0.28	0.42	0.28	0.44	0.44	0.44	0.26	0.26	
Uniform delay, d ₁	16.6	24.5	26.2	23.9	25.4	17.5	19.4	15.3	24.9	28.3	
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Delay calibration, k	0.21	0.15	0.30	0.38	0.24	0.41	0.36	0.11	0.11	0.40	
Incremental delay, d ₂	4.1	1.4	7.1	15.9	3.3	24.1	6.3	0.4	2.9	9.8	
Initial queue delay, d_3											
Control delay	20.7	25.8	33.3	39.9	28.7	41.6	25.7	15.7	27.8	38.1	
Lane group LOS	С	С	С	D	С	D	С	В	С	D	
Approach delay	27	7.6		3	4.2	2	6.9			37.3	
Approach LOS	(0			С		С			D	
Intersection delay	30).9		$X_{c} =$	0.81	Interse	ction LC	S		9 9.8 8 38.1 D 37.3 D C	

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					H	CS20	000	™ DE1	FAILE	D F	REP	ORT	Γ						
General Inf	ormation					Site In	forn	natio	on										
Analyst Agency or 0 Date Perfor Time Perioc		Interse Area T Jurisdio Analys Project	ea Type All other areas risdiction Hamliton County halysis Year 2007 roject ID Existing Conditions - Optimized Timing							Race									
Volume an					-														
			$-\tau$	·		} R	T	1 T			RT			NB TH	рт			SB Гтн	RT
Number of I	anes, N ₁		1		1	1		1	1	<u> </u>	0	1	┫	1	1	1	1	2	0
Lane group			L		Т	F	2	L	TR			L	╡	Т	F	2	L	TR	
Volume, V (vph)		201		226	18	6	234	363	1	59	224	┦	641	24	14	32	828	204
% Heavy ve	hicles, %H	V	0		0	0		0	0	T	0	0	T	0	0)	0	0	0
Peak-hour f	actor, PHF		0.82	2	0.91	0.8	3	0.85	0.86	0.	.74	0.81	T	0.95	0.7	76	0.80	0.92	0.77
Pretimed (P (A)) or actuate	d	А		A	A		А	A		A	A		A	4	ł	А	А	А
Start-up los	Start-up lost time, I ₁				2.0	2.	0	2.0	2.0			2.0		2.0	2.	0	2.0	2.0	
Extension of effective green, e 2.0				2.0	2.	0	2.0	2.0			2.0		2.0	2.0		2.0	2.0		
Arrival type, AT			3	T	3	3		3	3	T		3	T	3	3	3	3	3	
Unit extension, UE			3.0		3.0	3.0)	3.0	3.0			3.0	Τ	3.0	3	.0	3.0	3.0	
Filtering/metering, I			1.00	00	1.00	0 1.0	00	1.000	1.000)		1.000	2	1.000	1.0	000	1.000	1.000	
Initial unmet	t demand, C) _b	0.0		0.0	0.	0.0 0.0		0.0			0.0		0.0	0.	0	0.0	0.0	
Ped / Bike / volumes	RTOR		0	0		0		0	0		0	0			C)	0	0	0
Lane width			9.0	,	9.0	0 10.0		12.0	11.0			12.0		12.0 1		.0	10.0	11.0	
Parking / Gi	rade / Parkii	ng	N		-5	Ν	1	Ν	-1		Ν	Ν		1	Λ	I	N	-3	N
Parking ma	neuvers, N _n	า																	
Buses stopp	oing, N _B		0		0	0		0	0			0		0	(0	0	0	
Min. time fo G _p	r pedestriar	ıs,			13.2	2			13.2					3.2				13.2	
Phasing	Excl. Left	E	W P	ern	n	03		()4	N	BO	nly	Ν	S Perr	n		07	0	8
Timing	G = 7.0	G	= 2	3.0		6 = /		G =		G :	= 9.	5	G	= 30.8	5	G =	:	G =	
Duration of	n = 4.5 Analysis, T	= 0	.25	.5		=		1 =		<u> </u>	= 4.	5		= 5.5 /cle Le	ngt	_	= 90.0	0	
Lane Grou	p Capacity,	Сс	ontro	ol D	elay	, and	LOS	S Dete	rmina	tion									
			- 1	E	B	DT		- 1	WB			. –	r -	NB		,		SB	
Adjusted flo	w rate, v	∟ 24	י 5	24	- 8	кт 224	2	<u>-</u> 75	502		2	∟। '77	TH 675		КI 321		40	1165	KI
Lane group	capacity, c	21	0	44	8	395	3	57	461		2	74	9	35	768		185	1162	
v/c ratio, X		1.1	7	0.5	5	0.57	0.	77	1.09		1.	.01	0.	.72	0.4	2	0.22	1.00	
			- i				1						Ĺ	- İ				İ	

Total green ratio, g/C	0.38	0.26	0.26	0.38	0.26	0.49	0.49	0.49	0.34	0.34	
Uniform delay, d ₁	24.6	29.0	29.2	26.8	33.5	24.2	17.9	14.5	21.2	29.8	
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Delay calibration, k	0.50	0.15	0.16	0.32	0.50	0.50	0.28	0.11	0.11	0.50	
Incremental delay, d ₂	114.4	1.5	1.9	9.9	68.1	57.2	2.8	0.4	0.6	27.0	
Initial queue delay, d ₃											
Control delay	139.0	30.5	31.1	36.7	101.6	81.4	20.7	14.9	21.8	56.8	
Lane group LOS	F	С	С	D	F	F	С	В	С	Е	
Approach delay	67	7.8		7	8.6	3	2.4			55.6	
Approach LOS	E	Ξ			E		С			Е	
Intersection delay	54	1.9		$X_{c} =$	1.18	Interse	ction LO	S		D	

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					HCS	S200	<i>0</i> ™ [DE	TAILE	DR	EP	ORT	-					
General Int	formation								Site In	form	atic	on						
Analyst Agency or 0 Date Perfor Time Perioo		Interse Area Ty Jurisdio Analysi Project	rea Type All other areas risdiction Hamliton County nalysis Year 2030 roject ID Existing Conditions						Race									
Volume an	d Timing In	nput																
					EB					WB				-			SB	
Number of I	anes, N ₁		 1		<u>н</u> (1 1		_ I 1	1 1		I	1 LI	H	╈	RT 1	1	2 1H	
Lane group	1		L	17	Г	R		L	TR			L	Т	╈	R	L	TR	
Volume, V ((vph)		192	20	66	185	1	64	143	25		84	429	1	40	28	565	113
% Heavy ve	hicles, %H	V	0	1)	0		0	0	0		0	0		0	0	0	0
Peak-hour f	actor, PHF		0.81	0.	90	0.84	! O.	85	0.78	0.7	78	0.82	0.91	0	.90	0.88	0.97	0.76
Pretimed (P (A)) or actuate	d	A	/	4	A	/	4	A	A		А	A		A	А	А	А
Start-up los	t time, I ₁		2.0	2	.0	2.0	2	.0	2.0			2.0	2.0	2	2.0	2.0	2.0	
Extension o green, e	of effective		2.0	2	.0	0 2.0		.0	2.0			2.0	2.0	2	2.0	2.0	2.0	
Arrival type	, AT		3		3 3			3	3			3	3	Í	3	3	3	
Unit extensi	ion, UE		3.0	3	3.0 3.0		3	.0	3.0	1		3.0	3.0		3.0	3.0	3.0	
Filtering/me	Filtering/metering, I		1.000	1.0	000	1.00	0 1.	000	1.000	,		1.000) 1.00	0 1.	000	1.000	1.000	
Initial unmet demand, Q _b		ک <mark>ہ</mark>	0.0	0	.0	0.0	0	.0	0.0			0.0	0.0	(0.0	0.0	0.0	
Ped / Bike / volumes	RTOR		0	0		0		0	0	0		0			0	0	0	0
Lane width			9.0	9.0		10.0		2.0	11.0				12.0	1	1.0	10.0	11.0	
Parking / G	rade / Parki	ng	Ν	-	5	N	1	N	-1	N	1	Ν	1		Ν	N	-3	N
Parking ma	neuvers, N _n	n																
Buses stop	ping, N _B		0	() 0		0		0			0	0		0	0	0	
Min. time fo G _p	r pedestriar	IS,		1.	3.2				13.2				3.2			13.2		
Phasing	Excl. Left	E	W Pe	rm		03		(04	NB	O	nly	NS Pe	erm		07	0	8
Timing	G = 7.5 Y = 4.5	G Y	= 22 = 5.5	.5 ;	G = Y =	=	<u>ר</u> ו	G = (=		G = Y =	6. 4.:	0 5	G = 2 Y = 5.	4.0 5	G = Y =	=	G = Y =	
Duration of	Analysis, T	= 0.	.25										Cycle	_eng	jth, C	s = 80.	0	
Lane Grou	p Capacity,	Co	ntrol	Dela	ay, a	nd L	OS E	Dete	erminat	ion						ũ.		
			гГ	EB TH		₹Т	LT		WB TH	RT		LT	NB TH	1 <u>В</u> н Грт			SB TH	RT
Adjusted flo	ow rate, v	23	7 2	96	2	20	193	╡	215		1	02	471	1	56	32	731	
Lane group	capacity, c	418	8 4	93	4	435		387 १			2	53	815	67	70	265	1032	
v/c ratio, X		0.5	7 0	.60	0.	51	0.50)	0.42		0.	40	0.58	0.	23	0.12	0.71	
		0.4	3 0	.28	0.	28	0.43		0.28		0.	43	0.43	0.	43	0.30	0.30	

Total green ratio, g/C													
Uniform delay, d ₁	17.6	24.9	24.1	15.4	23.5	15.4	17.2	14.4	20.3	24.9			
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			
Delay calibration, k	0.16	0.19	0.11	0.11	0.11	0.11	0.17	0.11	0.11	0.27			
Incremental delay, d ₂	1.8	2.0	1.0	1.0	0.6	1.1	1.0	0.2	0.2	2.3			
Initial queue delay, d ₃													
Control delay	19.4	26.9	25.1	16.5	24.0	16.5	18.3	14.6	20.5	27.2			
Lane group LOS	В	С	С	В	С	В	В	В	С	С			
Approach delay	24	4.0		2	0.4	1	7.2			26.9			
Approach LOS	(0			С		В						
Intersection delay	22	2.4		$X_{c} =$	0.73	Interse	ction LC	S		20.5 27.2 C C 26.9 C C C			

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					H	CS20	000	[™] DE1	FAILE	D	REF	POR	Т						
General Information Site Information Intersection Glenway/Bridgetown/																			
Analyst Zhixia & Qingyi Agency or Co. UC Date Performed 2007-11-1 Time Period Noon Peak										rea Type All other areas risdiction Hamliton County nalysis Year 2030 roject ID Existing Conditions - Optimized Timing									
Volume an									<u></u>										
				· 1		3	т		WB Ттн					NB TH	I RT			SB Гтн	RT
Number of I	anes, N ₁		1		1	1		1	1	╈	0	1		1		1	1	2	0
Lane group			L	Î	Т	F	?	L	TR	↑		L		Т	F	7	L	TR	
Volume, V (vph)		191		275	26	7	243	268	┢	64	287	,	698	27	79	46	692	100
% Heavy ve	hicles, %H	V	0		0	C		0	0		0	0		0	6)	0	0	0
Peak-hour f	actor, PHF		0.88	3	0.90) 0.7	73	0.67	0.93	[0.76	0.90)	0.91	0.8	34	0.68	0.90	0.93
Pretimed (P (A)) or actuate	ed A			Α	A		A	A		Α	А		А	4	ł	А	A	А
Start-up los	t time, I ₁		2.0		2.0	2.	0	2.0	2.0			2.0		2.0		0	2.0	2.0	
Extension o green, e	Extension of effective 2.0				2.0 2		0	2.0	2.0			2.0		2.0	2.0		2.0	2.0	
Arrival type, AT			3	Ī	3	3		3	3			3		3	3	}	3	3	
Unit extension, UE 3.0			Ĩ	3.0	3.	0	3.0	3.0			3.0)	3.0	3	.0	3.0	3.0		
Filtering/metering, I			1.00	00	1.00	0 1.0	00	1.000	1.000	2		1.00	0	1.000	1.0	000	1.000	1.000	
Initial unmet	t demand, C) _b	0.0		0.0	0.	0	0.0	0.0			0.0		0.0	0.	0	0.0	0.0	
Ped / Bike / volumes	RTOR		0	0		0		0	0		0	0			0)	0	0	0
Lane width			9.0	9.0 9.0		10.0		12.0	11.0			12.0)	12.0	11	.0	10.0	11.0	
Parking / Gi	rade / Parkiı	ng	N		-5	Λ	I	Ν	-1		Ν	Ν		1	Λ	J	N	-3	N
Parking ma	neuvers, N _n	า															<u> </u>		
Buses stopp	oing, N _B		0		0	0		0	0			0		0	(0	0	0	
Min. time fo G _p	r pedestriar	ıs,			13.2	2			13.2					3.2				13.2	
Phasing	Excl. Left	E	W P	ern	n	03		(04		NB O	nly	١	VS Perr	n		07	0	8
Timing	G = 9.0	G	= 2	2.5		<u>} =</u>		G =		G	b = 1	0.5 5	G	= 23.0	0	G =	-	G =	
Duration of	r = <i>4.5</i> Analysis, T	Y = 5.5 $Y = YT = 0.25$						ΥΞ		Ť	= 4.	.5	T C	= 5.5 vcle Le	engt	_ <u> </u>	= 85.0	<u> </u>	
Lane Grou	p Capacity,	Co	ontro	D D	elay	, and	LOS	S Dete	rmina	tior	n			,		, -		_	
				E	В	-		_ 1	WB				ĩ	NB		_		SB	
Adjusted flow rate v		21	Г 7	TI ,3∩	- 6	RT 366	<u> </u>	_T	TH 372			LT		TH 767	RT 332		LT 68	TH 877	RT
Lane group	capacity, c	29	5	46	4	409	3	75	472	┢		311		345	5 601		85	943	
v/c ratio, X		0.7	74	0.6	6	0.89	0.	97	0.79	┢	1	.03	6).91	0.4	8	0.80	0.93	
					_		╋			┢			┢				/	1	
Total green ratio, g/C	0.42	0.26	0.26	0.42	0.26	0.45	0.45	0.45	0.27	0.27									
-----------------------------------	-------	-------	-------	-----------	-------	---------	----------	-------	-------	-------	--								
Uniform delay, d ₁	18.3	27.8	30.1	27.2	29.0	21.4	21.9	16.5	28.9	30.2									
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000									
Delay calibration, k	0.29	0.23	0.42	0.48	0.33	0.50	0.43	0.11	0.34	0.45									
Incremental delay, d ₂	9.3	3.4	21.5	37.9	8.7	57.8	13.5	0.5	40.3	15.2									
Initial queue delay, d_3																			
Control delay	27.5	31.3	51.6	65.2	37.7	79.2	35.4	17.1	69.1	45.4									
Lane group LOS	С	С	D	E	D	E	D	В	Е	D									
Approach delay	38	3.7		5	1.3	4	1.0			47.1									
Approach LOS		2			D		D			D									
Intersection delay	43	3.8		$X_{c} =$	1.01	Interse	ction LC	S		D									

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					Η	CS2	2000	[™] DE	ΓAIL	.EC) RE	ΞP	ORT	-						
General Inf	ormation								Site	Info	orma	tio	on							
Analyst Agency or C Date Perfor Time Perioc	Zhixia Co. UC med 2007-1 I PM Pe	& C 11-1 eak	Qingy	ri					Inters Area Juris Analy Proje	sec Ty dict vsis	tion pe ion Yea D	(/ / / / / / /	Glenv All oth Hamli 2030 Existii Optim	vay ner itor ng nize	//Bridg areas n Cour Condi ed Tim	ition	wn/l ns -	Race		
Volume an	d Timing In	ipu	t																	
				<u> </u>	EE	3	рт			B	דם ו	_	1 7	_	NB	Гр			SB	БТ
Number of I	anes, N ₁		1	┥	1		1	1	1			·	1	╈	1		1	1	2	0
Lane group			L	╡	Т	╈	R	L	TF	2			L	╈	Т	F	2	L	TR	
Volume, V (vph)		225	;	254	1 2	209	262	40	8	66		251	╈	719	27	74	35	930	229
% Heavy ve	hicles, %H	V	0		0		0	0	0		0		0	Ť	0	6)	0	0	0
Peak-hour f	actor, PHF		0.83	3	0.91	1 0).83	0.85	0.8	6	0.75	5	0.81	1	0.95	0.7	76	0.80	0.92	0.89
Pretimed (P (A)) or actuate	d	Α		Α	T	A	A	A		A		A		A	4	ł	А	А	А
Start-up los	t time, I ₁		2.0		2.0		2.0	2.0	2.0	0			2.0	Ī	2.0	2.	0	2.0	2.0	
Extension o green, e	f effective		2.0		2.0	2	2.0	2.0	2.0	0			2.0		2.0	2.	0	2.0	2.0	
Arrival type,	AT		3	T	3	T	3	3	3				3	T	3	3	}	3	3	
Unit extensi	on, UE		3.0		3.0		3.0	3.0	3.	0			3.0	Τ	3.0	3	.0	3.0	3.0	
Filtering/me	tering, I		1.00	00	1.00	0 1	.000	1.000	1.0	00			1.000) (1.000	1.0	000	1.000	1.000	
Initial unmet	t demand, C	ک ^ه	0.0		0.0		0.0	0.0	0.0	0			0.0		0.0	0.	0	0.0	0.0	
Ped / Bike / volumes	RTOR		0		0		0	0	0		0		0			C)	0	0	0
Lane width			9.0		9.0	1	10.0	12.0	11.	0			12.0		12.0	11	.0	10.0	11.0	
Parking / Gr	ade / Parki	ng	N		-5		Ν	Ν	-1	r	N		Ν		1	Λ	I	N	-3	N
Parking mai	neuvers, N _n	n																		
Buses stopp	oing, N _B		0		0		0	0	0)			0		0	(0	0	0	
Min. time fo G _p	r pedestriar	ns,			13.2	2			13.	2					3.2				13.2	
Phasing	Excl. Left	E	W P	erm	n	0)3	(04	\Box	NB	Or	nly	N	S Perr	n		07	0	8
Timing	G = 10.0	G	= 2	5.0		<u> </u>		G =		┥	G =	9.0	0	G :	= 36.0	2	G =	-	G =	
Duration of	Y = 4.5 Analysis, T	= 0	Y = 5.5 Y =					Y =			Y =	4.5	>	Y =	= 5.5 cle Le	nat	Y = h. C	= 100	Y = 0.0	
Lane Grou	o Capacity.	Co	ontrol Delay, and LOS De						rmin	ati	on			<u> </u>	0.0 20	iigt	, e			
									WB						NB				SB	
Adjusted fla	w rate v	LT TH R 271 279 25							TH	+	RT	L	_T		FH	R	T	LT	TH	RT
		27	/	27	9	252	2 3	υø 50	302 4E4	╉		3	10		27 26	30	1 0	44	1208	
v/c ratio X	Sapacity, C	23 1 1	9	430 0 F	о И	0 64	5 0	38	401	╋		1	30	9	30 81	10	9 7	120	1239	
		<i>'.'</i>	5	0.0	-+	0.00	5 0.	00	1.20	╉		1	50	0.	01	0.4	/	0.50	1.02	

Total green ratio, g/C	0.39	0.25	0.25	0.39	0.25	0.50	0.50	0.50	0.36	0.36	
Uniform delay, d ₁	25.2	33.5	33.6	30.3	37.5	27.4	21.3	16.6	23.5	32.0	
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Delay calibration, k	0.50	0.22	0.23	0.39	0.50	0.50	0.35	0.11	0.11	0.50	
Incremental delay, d ₂	99.0	3.1	3.9	18.7	128.2	163.3	5.4	0.5	1.7	31.7	
Initial queue delay, d ₃											
Control delay	124.3	36.5	37.5	49.0	165.7	190.7	26.6	17.1	25.2	63.7	
Lane group LOS	F	D	D	D	F	F	С	В	С	Е	
Approach delay	66	6.5		12	24.4	5	9.8			62.4	
Approach LOS	E	Ξ			F		E			Е	
Intersection delay	74	4.5		$X_{c} =$	1.59	Interse	ction LO	S		E	

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Feasible Alternative

					нс	S200	0™ DI	ET/	AILE	D R	EF	POR	Г						
General Int	formation							Si	ite Int	form	ati	on							
Analyst Agency or 0 Date Perfor Time Perioo	DCM Co. UC med 2007- d AM P	-11-1 eak	1					In Ar Ju Ar Pr	iterseo rea Ty urisdic nalysi roject	ction /pe ction s Ye ID	ar	Glen All ot Haml 2007 LOS	way, her liton C	/Brid area Cou	geto s nty	wn	/Race		
Volume an	d Timing I	npu	t		_														
		ŀ	<u>.</u> т	E T T	B u	рт	┨╌┯		WB		т		_	NB TH		т		SB	Грт
Number of I	anes, N ₁		1	1		1	1	╡	2	0	1	1	╋	2	1	1	1	2	1
Lane group			L	7		R	L	Ĩ	TR	┢		L	┢	Т	R	2	L	Т	R
Volume, V ((vph)		172	23	7	165	147	·	127	22	2	75	3	382	12	5	24	503	101
% Heavy ve	hicles, %H	IV	0	0)	0	0	Í	0	0		0	T	0	0		0	0	0
Peak-hour f	actor, PHF	·	0.81	0.9	90	0.84	0.85	5 (0.77	0.7	'9	0.82	0	.91	0.8	89	0.86	0.97	0.77
Pretimed (P (A)) or actuate	ed	A	A		A	A		A	A		А	Τ	A	A		A	А	A
Start-up los	t time, I ₁	Ĩ	2.0	2.	0	2.0	2.0		2.0			2.0	2	2.0	2.0	0	2.0	2.0	2.0
Extension o green, e	f effective		2.0	2.	0	2.0	2.0		2.0			2.0	2	2.0	2.0	0	2.0	2.0	2.0
Arrival type	, AT		3	3	2	3	3	T	3			3	Τ	3	3		3	3	3
Unit extensi	ion, UE	Î	3.0	3.	0	3.0	3.0		3.0			3.0		3.0	3.	0	3.0	3.0	3.0
Filtering/me	etering, I	Î	1.000	1.0	00	1.000	1.00	0	1.000			1.000) 1.	.000	1.0	00	1.000	1.000	1.000
Initial unme	t demand, (Q _b	0.0	0.	0	0.0	0.0		0.0			0.0	0	0.0	0.0	0	0.0	0.0	0.0
Ped / Bike / volumes	RTOR		0	0		0	0		0	0		0			0		0	0	0
Lane width			12.0	12	.0	12.0	12.0)	12.0			12.0	1.	2.0	12.	0	12.0	12.0	12.0
Parking / G	rade / Park	ing	Ν	-5	5	Ν	N		-1	N	1	Ν		1	N		N	-3	N
Parking ma	neuvers, N	m																	
Buses stop	oing, N _B		0	0		0	0		0			0		0	C)	0	0	0
Min. time fo G _p	r pedestria	ns,		13	8.2				13.2					3.2				13.2	
Phasing	Excl. Left	E	W Per	m		03		04	1	NE	30	nly	NS	S Per	m		07		08
Timing	G = 7.0 Y = 4.5	G Y	= 18. = 5.5	5	G = Y =	=	G : Y :	=		G = Y =	5. 4.	.5 5	G = Y =	= 29. = 5.5	.0	G Y :	=	G = Y =	
Duration of	Analysis, T	= 0	1 = 5.5 1 = 1 0.25										Сус	cle Le	engt	h, C	C = 80	.0	
Lane Grou	p Capacity	γ, Co	ontrol	Dela	ay, a	nd LO	OS De	terr	minat	ion						1			
			E - 1 -	B		+	1 T		B	рт	_	т 1		B	рт	_		SB TU	DT
Adjusted flo	w rate, v	212	2 26	 33	6 1	173	19	3	17.1	9	1	420	<u>-</u>	140		28	519	131	
Lane group c	capacity,	431	45	50	38	3 3	337	82	3		38	38	175	5	783		355	1331	594
v/c ratio, X		0.49	9 0.8	58	0.5	51 C	.51	0.2	23		0.2	23	0.24	4 (0.18		0.08	0.39	0.22
					1			i —			-								

Total green ratio, g/C	0.38	0.23	0.23	0.38	0.23	0.49	0.49	0.49	0.36	0.36	0.36
Uniform delay, d ₁	17.9	27.3	26.8	18.1	25.0	11.6	11.9	11.5	16.7	18.9	17.7
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.11	0.18	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Incremental delay, d ₂	0.9	2.0	1.2	1.3	0.1	0.3	0.1	0.1	0.1	0.2	0.2
Initial queue delay, ${\rm d}_{\rm 3}$											
Control delay	18.8	29.3	28.0	19.4	25.1	12.0	12.0	11.6	16.8	19.1	17.9
Lane group LOS	В	С	С	В	С	В	В	В	В	В	В
Approach delay	25	5.6		2	2.4	1	1.9			18.8	
Approach LOS	(2			С		В			В	
Intersection delay	19	9.4		$X_{c} =$	0.57	Interse	ction LC	S		В	

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				ŀ	ICS	2000	[™] DE	TAILE	D R	EF	POR	Г						
General Inf	ormation							Site In	form	ati	on							
Analyst Agency or C Date Perfor Time Perioc	DCM Co. UC med 2007- I Noon	-11- Pea	1 ak					Interse Area T Jurisdi Analys Project	ction ype ction is Ye t ID	ar	Glent All ot Haml 2007 LOS	way hei litoi C	y/Brid r area n Cou	geto s nty	wn/	/Race		
Volume an	d Timing I	npu	it 🛛								r					·		
				E T TL	B	DT			Гр			-		D-	г		SB	Грт
Number of I	anes, N ₁		1	1		1	1	2		<u> </u>	1	╈	2	1	<u> </u>	1	2	1
Lane group			L	Т		R	L	TR	┼─		L	╈	Т	R		L	Т	R
Volume, V (vph)		169	24	6	238	217	239	58	3	255		622	24	9	41	616	89
% Heavy ve	hicles, %F	IV	0	0		0	0	0	0)	0	Ť	0	0		0	0	0
Peak-hour f	actor, PHF		0.88	0.9	0	0.73	0.67	0.93	0.7	76	0.90	1	0.91	0.8	4	0.68	0.90	0.77
Pretimed (P (A)) or actuat	ed	А	A		A	A	А	A		A	T	А	A		А	А	А
Start-up los	t time, I ₁		2.0	2.0)	2.0	2.0	2.0			2.0		2.0	2.0)	2.0	2.0	2.0
Extension o green, e	f effective		2.0	2.0)	2.0	2.0	2.0			2.0	T	2.0	2.0)	2.0	2.0	2.0
Arrival type,	AT		3	3		3	3	3			3	Ī	3	3		3	3	3
Unit extensi	on, UE		3.0	3.0)	3.0	3.0	3.0			3.0	T	3.0	3.	0	3.0	3.0	3.0
Filtering/me	tering, I		1.000	1.0	00 1	1.000	1.000	1.000	,		1.000) 1	1.000	1.0	00	1.000	1.000	1.000
Initial unmet	demand,	Q _b	0.0	0.0)	0.0	0.0	0.0			0.0		0.0	0.0)	0.0	0.0	0.0
Ped / Bike / volumes	RTOR		0	0		0	0	0	0)	0			0		0	0	0
Lane width			12.0	12.	0	12.0	12.0	12.0			12.0	T	12.0	12.	0	12.0	12.0	12.0
Parking / Gi	ade / Park	ing	N	-5		Ν	N	-1	Ν	I	Ν		1	N		N	-3	N
Parking ma	neuvers, N	m																
Buses stopp	oing, N _B		0	0		0	0	0			0		0	0)	0	0	0
Min. time fo G _p	r pedestria	ins,		13.	2			13.2					3.2				13.2	
Phasing	Excl. Left	t E	EW Per	m	_	03		04	NE	3 0	only	Ν	IS Per	m		07	(08
Timing	G = 7.0 Y = 4.5	Q Y	$\hat{b} = 25.$	0	G = Y =		G = Y =		G = Y =	: 9 4	.0 .5	G Y	= 29. = 5.5	0	G : Y :	=	G = Y =	
Duration of	Analysis, T	[= ().25	<u> </u>		1.			Ċy	ycle Le	engtl	h, C	C = 90	.0				
Lane Grou	o Capacity	/, Co	ontrol	Dela	y, al	nd LO	S Det	ermina	tion									
		 	E	B			T	WB Tu T	рт		<u>т</u> Г	N T		DT		17 1	SB TH	БТ
Adjusted flo	w rate, v	⊥ 19:	2 27	326	24	333	КΙ	28	- 1 33	68	34	<u>7</u> 296	┥	60	684	116		
Lane group c	capacity,	41	2 54	1	460) 30	65	975		33	31	17(00	759	╡	244	1183	528
v/c ratio, X		0.4	7 0.5	50	0.7	1 0.	89	0.34		0.8	85	0.4	40 ().39		0.25	0.58	0.22
P		ľ	I		•		1			•			1		1	1		I I

Total green ratio, g/C	0.41	0.28	0.28	0.41	0.28	0.47	0.47	0.47	0.32	0.32	0.32
Uniform delay, d ₁	18.1	27.3	29.2	28.4	25.9	17.0	15.5	15.4	22.5	25.4	22.2
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.11	0.11	0.27	0.41	0.11	0.39	0.11	0.11	0.11	0.17	0.11
Incremental delay, d ₂	0.8	0.8	5.0	22.3	0.2	19.2	0.2	0.3	0.5	0.7	0.2
Initial queue delay, d_3											
Control delay	18.9	28.1	34.2	50.7	26.1	36.1	15.6	15.7	23.0	26.1	22.5
Lane group LOS	В	С	С	D	С	D	В	В	С	С	С
Approach delay	28	3.4		3	8.2	2	0.2			25.4	
Approach LOS	(0			D		С			С	
Intersection delay	26	6.6		$X_{c} =$	0.80	Interse	ction LC	S		С	

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				ŀ	ICS	52000	[™] DE	TAILE	ED R	EF	POR	Т						
General Inf	ormation							Site In	form	ati	on							
Analyst Agency or C Date Perfor Time Perioc	DCM Co. UC med 2007- I PM P	-11- eak	1					Interse Area T Jurisdi Analys Projec	ction ype ction is Ye t ID	ar	Glen All ot Ham 2007 LOS	wa the litc C	ay/Brid er area on Cou	geto s inty	wn	/Race		
Volume an	d Timing l	npu	t								,					1		
				E T TL	B	DT				T			NB TU		т		SB	Грт
Number of I	anes, N		1	1	<u>'</u>	1	1	2		. <u> </u>)	1	┥	2	1	1	1	2	1
Lane group	1		L	Т		R	L	TR	╀		L		Т	R	2	L	Т	R
Volume, V (vph)		201	22	6	186	234	363	59	9	224		641	24	4	32	828	204
% Heavy ve	hicles, %F	IV	0	0		0	0	0	0)	0		0	0		0	0	0
Peak-hour f	actor, PHF		0.82	0.9	1	0.83	0.85	0.86	0.7	74	0.81		0.95	0.7	6	0.80	0.92	0.77
Pretimed (P (A)) or actuat	ed	А	A	Ī	A	A	A	A	١	A		A	A		А	А	А
Start-up los	t time, I ₁		2.0	2.0)	2.0	2.0	2.0			2.0		2.0	2.0	0	2.0	2.0	2.0
Extension o green, e	f effective		2.0	2.()	2.0	2.0	2.0			2.0		2.0	2.0	0	2.0	2.0	2.0
Arrival type,	AT		3	3		3	3	3			3		3	3		3	3	3
Unit extensi	on, UE		3.0	3.0	,	3.0	3.0	3.0			3.0	T	3.0	3.	0	3.0	3.0	3.0
Filtering/me	tering, I		1.000	1.0	00	1.000	1.000) 1.000	,		1.000	0	1.000	1.0	00	1.000	1.000	1.000
Initial unmet	t demand,	Q _b	0.0	0.0)	0.0	0.0	0.0			0.0		0.0	0.0	0	0.0	0.0	0.0
Ped / Bike / volumes	RTOR		0	0		0	0	0	C)	0			0		0	0	0
Lane width			12.0	12.	0	12.0	12.0	12.0	Τ		12.0		12.0	12.	0	12.0	12.0	12.0
Parking / Gi	rade / Park	ing	N	-5		Ν	N	-1	Λ	Ι	Ν		1	N		N	-3	N
Parking ma	neuvers, N	m																
Buses stopp	oing, N _B		0	0		0	0	0			0		0	C)	0	0	0
Min. time fo G _p	r pedestria	ns,		14.	7			14.7					3.2				13.2	
Phasing	Excl. Left	t E	EW Per	m		03		04	N	3 C	nly	١	VS Per	m		07		08
Timing	G = 10.5 Y = 4.5	Q Y	$\dot{b} = 15.$	0	G = Y =		G = Y =		G = Y =	= 1 : 4	1.0 5	G Y	i = 23	.5	G Y :	=	G = Y =	
Duration of	Analysis, T	= ().25					1.		.0	Ċ	ycle L	engt	<u> </u>	C = 80	.0		
Lane Grou	p Capacity	/, Co	ontrol	Dela	y, a	nd LO	S Det	ermina	tion									
			E	B			– 1	WB	рт		т I			рт			SB	БТ
Adjusted flo	w rate, v	_ ∟ 24:	1 5 24	<u>п</u> 18	к 224	1 L 4 2	<u>- 1</u> 75	502	RI	27	-1 77	6	75	<u>кі</u> 321		⊥ı 40	900	265
Lane group	capacity,	34	0 36	5	310	0 3	70	665		34	41	17	755	783		224	1079	481
v/c ratio, X		0.7	2 0.6	68	0.7	2 0.	74	0.75		0.	81	0.	38	0.41		0.18	0.83	0.55
I			1				ſ	T			T		ſ		ſ	T	Π	ר ו

Total green ratio, g/C	0.38	0.19	0.19	0.38	0.19	0.49	0.49	0.49	0.29	0.29	0.29
Uniform delay, d ₁	19.1	30.3	30.5	19.3	30.8	16.4	12.9	13.1	21.1	26.4	23.8
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.28	0.25	0.28	0.30	0.31	0.35	0.11	0.11	0.11	0.37	0.15
Incremental delay, d ₂	7.3	5.0	8.1	7.9	4.9	13.9	0.1	0.4	0.4	5.8	1.4
Initial queue delay, ${\rm d}_{\rm 3}$											
Control delay	26.3	35.3	38.6	27.2	35.7	30.3	13.1	13.5	21.4	32.2	25.2
Lane group LOS	С	D	D	С	D	С	В	В	С	С	С
Approach delay	33	3.3		3	2.7	1	6.9			30.3	
Approach LOS	(0			С		В			С	
Intersection delay	27	7.0		$X_{c} =$	0.90	Interse	ction LC)S		С	

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					нс	S200	0 [™] DI	ETA	ILE	D R	EF	POR	Т						
General Int	formation							Site	e Inf	orm	ati	on							
Analyst Agency or 0 Date Perfor Time Perioo	DCM Co. UC med 2007- d AM P	-11-1 eak	,					Inte Are Juri Ana Pro	ersec a Ty isdic alysis ject	tion pe tion s Yea ID	ar	Glen All ot Hami 2030 LOS	wa the lito C	y/Briα r area n Coι	lgeto s inty	own	/Race		
Volume an	d Timing I	nput	t				1										1		
		┝	<u>। т</u>		в	RT	+	<u></u>	<u>VB</u> тн	I R'	T I	<u> </u>		NB TH	R	<u>т</u>		SB Гтн	RT
Number of I	anes, N ₁		1	1		1	1		2	0	<u> </u>	1	┪	2	1	1	1	2	1
Lane group	· · ·		L	T		R	L	7	R			L	Ť	Т	F	2	L	Т	R
Volume, V ((vph)	Ì	192	26	6	185	164	1.	43	25	5	84	Ť	429	14	40	28	565	113
% Heavy ve	hicles, %H	IV	0	0	,	0	0		0	0		0	Ť	0	0)	0	0	0
Peak-hour f	actor, PHF	·	0.81	0.9	90	0.84	0.85	5 0.	78	0.7	8	0.82		0.91	0.9	90	0.88	0.97	0.76
Pretimed (P (A)) or actuate	ed	A	A		A	A		A	A		А		A	4	١	A	А	A
Start-up los	t time, I ₁	ĺ	2.0	2.	0	2.0	2.0	2	2.0			2.0		2.0	2.	0	2.0	2.0	2.0
Extension o green, e	of effective		2.0	2.	0	2.0	2.0	2	2.0			2.0		2.0	2.	0	2.0	2.0	2.0
Arrival type	, AT		3	3	2	3	3		3			3		3	3	}	3	3	3
Unit extensi	ion, UE	Î	3.0	3.	0	3.0	3.0	3	3.0			3.0		3.0	3	.0	3.0	3.0	3.0
Filtering/me	etering, I		1.000	1.0	00	1.000	1.00	0 1.	000			1.000	0	1.000	1.0	000	1.000	1.000	1.000
Initial unme	t demand, (Q _b	0.0	0.	0	0.0	0.0	0	0.0			0.0		0.0	0.	0	0.0	0.0	0.0
Ped / Bike / volumes	RTOR		0	0		0	0		0	0		0			C)	0	0	0
Lane width			12.0	12.	.0	12.0	12.0) 12	2.0			12.0		12.0	12	.0	12.0	12.0	12.0
Parking / G	rade / Park	ing	Ν	-5	5	Ν	N	-	-1	N	'	Ν		1	٨	I	N	-3	N
Parking ma	neuvers, N	m																	
Buses stop	oing, N _B		0	0		0	0		0			0		0	()	0	0	0
Min. time fo G _p	r pedestria	ns,		14	.7			14	4.7					3.2				13.2	
Phasing	Excl. Left	E	W Per	m		03		04		NB	80	nly	Ν	IS Pe	rm		07		08
Timing	G = 5.5 Y = 4.5	G Y	= 30. = 5.5	5	G = Y =	=	G : Y :	=		G = Y =	5. 4.	.5 5	G Y	= 28 = 5.5	.5 5	G Y	=	G = Y =	
Duration of	Analysis, T	= 0	Y = 5.5 Y = Y 0.25 1 1										C	ycle L	eng	th, C	C = 90	.0	
Lane Grou	p Capacity	γ, Co	ontrol	Dela	ay, a	nd LO	OS De	term	inati	ion									
		$\left \right _{\tau \tau}$	<u>Е</u> • Т т	B H	R	┯╋	ΙT	WB Гтн		RT		τſ	1 Т	<u>NB</u> .н Т	RT	-	IT	SB TH	RT
Adjusted flo	w rate, v	LT TH RT LT 237 296 220 193						215	-+'		10)2	47	71	156		32	582	149
Lane group c	capacity,	507	7 66	60	56	1 3	397	1205	5		29	96	15	40	687		295	1163	519
v/c ratio, X		0.47	7 0.4	45	0.3	39 C	.49	0.18	;		0.3	34	0.3	31	0.23	}	0.11	0.50	0.29
					Î														

Total green ratio, g/C	0.45	0.34	0.34	0.45	0.34	0.43	0.43	0.43	0.32	0.32	0.32
Uniform delay, d ₁	18.3	23.2	22.7	19.2	20.9	16.6	17.0	16.3	21.8	25.0	23.1
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Incremental delay, d2	0.7	0.5	0.5	0.9	0.1	0.7	0.1	0.2	0.2	0.3	0.3
Initial queue delay, ${\rm d}_{\rm 3}$											
Control delay	19.0	23.7	23.1	20.1	21.0	17.3	17.1	16.5	21.9	25.3	23.4
Lane group LOS	В	С	С	С	С	В	В	В	С	С	С
Approach delay	22	2.0		2	0.6	1	7.0			24.8	
Approach LOS	(0			С		В			С	
Intersection delay	21	1.2		$X_{c} =$	0.57	Interse	ction LC	S		С	

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				ŀ	ICS	52000)™ DE	TAILE	ED R	REF	POR	Г					
General Inf	ormation							Site In	form	ati	on						
Analyst Agency or C Date Perfor Time Perioc	DCM Co. UC med 2007- I Noon	-11- Pea	1 ak					Interse Area T Jurisdi Analys Projec	ection ype ction is Ye t ID	ar	Glen All ot Hami 2030 LOS	way hei litoi C	y/Brid <u>(</u> r areas n Coul	getowi s nty	n/Race		
Volume an	d Timing I	npu	it 🛛								r						
				E T TI	B	DT				T		-		рт	+	SB	Грт
Number of I	anes, N ₁		1	1	<u> </u>	1	1	2		. <u> </u>)	1	╈	2	1	1	2	1
Lane group	1		L	T		R	L	TR	┼		L	╋	Т	R	L	Т	R
Volume, V (vph)		191	27	5	267	243	268	64	4	287	Ţ	698	279	46	692	100
% Heavy ve	hicles, %F	IV	0	0		0	0	0	0)	0	↑	0	0	0	0	0
Peak-hour f	actor, PHF		0.88	0.9	0	0.73	0.67	0.93	0.7	76	0.90	1	0.91	0.84	0.68	0.90	0.93
Pretimed (P (A)) or actuat	ed	А	A	Ī	A	A	А	A	١	A	T	A	A	A	А	А
Start-up los	t time, l ₁		2.0	2.0)	2.0	2.0	2.0			2.0	┢	2.0	2.0	2.0	2.0	2.0
Extension o green, e	f effective		2.0	2.(,	2.0	2.0	2.0			2.0	Ĩ	2.0	2.0	2.0	2.0	2.0
Arrival type,	AT		3	3		3	3	3			3	T	3	3	3	3	3
Unit extensi	on, UE		3.0	3.0)	3.0	3.0	3.0			3.0	↑	3.0	3.0	3.0	3.0	3.0
Filtering/me	tering, I		1.000	1.0	00	1.000	1.000) 1.000	,		1.000	2 1	1.000	1.000) 1.000	1.000	1.000
Initial unmet	t demand,	Q _b	0.0	0.0)	0.0	0.0	0.0			0.0	Τ	0.0	0.0	0.0	0.0	0.0
Ped / Bike / volumes	RTOR		0	0		0	0	0	0)	0			0	0	0	0
Lane width			12.0	12.	0	12.0	12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0
Parking / G	rade / Park	ing	N	-5		Ν	N	-1	Λ	Ι	N	T	1	N	N	-3	N
Parking ma	neuvers, N	m										Ĩ					
Buses stopp	oing, N _B		0	0		0	0	0			0		0	0	0	0	0
Min. time fo G _p	r pedestria	ns,		14	.7			14.7								13.2	
Phasing	Excl. Left	t E	EW Per	m		03		04	NE	ВΟ	nly	Ν	IS Per	m	07		08
Timing	G = 11.0 Y = 4.5	Q Y	$\dot{b} = 23.$.5	G = Y =		G = Y =	:	G =	= 1 = 4	3.0 5	G	= 22. = 5.5	5 G) = 	G = Y =	
Duration of	Analysis, T	Y = 5.5 $Y = 1T = 0.25$							<u> </u>			Cy	/cle Le	ength,	C = 90	0.0	
Lane Grou	p Capacity	/, Co	ontrol	Dela	y, a	nd LO	S Det	ermina	tion								
			E	EB		-	- 1	WB	DT		- 1	<u>ا</u>	NB	DT		SB	
Adjusted flo	LT TH RT L w rate, v 217 306 366 36							372	КI	3:	- I 19	76	7 I	<u>к</u> і 332	68	769	108
Lane group	capacity,	45	5 50)8	432	2 39	97	917		34	43	160	00	714	174	918	410
v/c ratio, X		0.4	8 0.6	60	0.8	5 0.	91	0.41		0.	93	0.4	48 ().46	0.39	0.84	0.26
1			I		1	I	1	I		I	I		1		1	I	1 I

Total green ratio, g/C	0.43	0.26	0.26	0.43	0.26		0.44	0.44	0.44	0.25	0.25	0.25
Uniform delay, d ₁	16.8	29.2	31.5	26.7	27.5		22.2	17.6	17.5	28.1	32.0	27.1
Progression factor, PF	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.11	0.19	0.38	0.43	0.11		0.45	0.11	0.11	0.11	0.37	0.11
Incremental delay, d2	0.8	2.0	14.5	25.3	0.3		31.2	0.2	0.5	1.5	6.9	0.3
Initial queue delay, d_3												
Control delay	17.6	31.2	46.1	52.0	27.8		53.4	17.9	18.0	29.5	38.9	27.4
Lane group LOS	В	С	D	D	С		D	В	В	С	D	С
Approach delay	34.0			39.7			2	5.9		36.9		
Approach LOS	С			D				С		D		
Intersection delay	32.9			X _c = 0.83			Interse	ction LC	S	С		

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HCS2000 [™] DETAILED REPORT																			
General Information Site Information																			
Analyst DCM Agency or Co. UC Date Performed 2007-11-1 Time Period PM Peak									Intersection Area Type Jurisdiction Analysis Year Project ID				Glenway/Bridgetown/Race All other areas Hamliton County 2030 LOS C						
Volume an																			
					EB TH DT					та						SB	Грт		
Number of I	anes, N		1	1		1	1	2		1	1		2	1	1	2	1		
Lane group	1		L	Т		R	L	TR	╀		L	┢	Т	R	L	Т	R		
Volume, V (vph)		225	254	4 2	209	262	408	66	6	251	7	19	274	35	930	229		
% Heavy ve	hicles, %F	IV	0	0		0	0	0	0		0	1	0	0	0	0	0		
Peak-hour f	actor, PHF		0.83	0.9	1 ().83	0.85	0.86	0.7	75	0.81	0.	95	0.76	0.80	0.92	0.89		
Pretimed (P) or actuated (A)		А	A		A	А	A	A		A	1,	A		A	А	A			
Start-up los	t time, I ₁		2.0	2.0		2.0	2.0	2.0			2.0	2	.0	2.0	2.0	2.0	2.0		
Extension of effective green, e		2.0	2.0	, ;	2.0	2.0	2.0	Τ		2.0	2	.0	2.0	2.0	2.0	2.0			
Arrival type, AT		3	3		3	3	3			3		3	3	3	3	3			
Unit extension, UE		3.0	3.0	, ,	3.0	3.0	3.0			3.0	3	3.0	3.0	3.0	3.0	3.0			
Filtering/metering, I		1.000	1.00	00 1	.000	1.000) 1.000)		1.000) 1.	000	1.000	1.000	1.000	1.000			
Initial unmet demand, Q _b		Q _b	0.0	0.0)	0.0	0.0	0.0			0.0	0	.0	0.0	0.0	0.0	0.0		
Ped / Bike / RTOR volumes			0	0	T	0	0	0	0		0	Τ		0	0	0	0		
Lane width			12.0	12.0	0 1	10.0	12.0	12.0	T		12.0	12	2.0	11.0	12.0	12.0	12.0		
Parking / Gi	rade / Park	ing	N	-5		Ν	N	-1	N		Ν	1	1	Ν	N	-3	N		
Parking ma	neuvers, N	m																	
Buses stopp	oing, N _B		0	0		0	0	0			0		0	0	0	0	0		
Min. time fo G _p	Min. time for pedestrians, G _p			14.7			14.7									13.2			
Phasing	Excl. Left	t E	EW Per	m	()3		04	NE	3 0	only	NS	Per	m	07		08		
Timing	Timing $G = 11.5$ $G = 18.5$			5	5 G = G =			= G = 1		: 1 4	$\begin{array}{c c} 13.0 & G = 27.0 \\ \hline 15 & V = 55 \end{array}$			0 G	G = G =				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									C = 90	.0									
Lane Group Capacity, Control Delay, and LOS Determination																			
			E	В			- 1	WB			- 1	NE	3	<u></u>		SB			
Adjusted flow rate v 27		 1 27	H 70	252		<u> </u> 18	1H 562	RI	2 L	_ 10	1H 757		RI 361		1011	RI 257			
Lane group capacity, 32		32	, 27 3 40	0	318	3	55	730		34	43	1780	, (768	211	1102	492		
v/c ratio, X		0.8	4 0.7	70	0.79) 0.	87	0.77		0.9	90	0.43	; ().47	0.21	0.92	0.52		
		1					ł								1				

Total green ratio, g/C	0.38	0.21	0.21	0.38	0.21		0.49	0.49	0.49	0.30	0.30	0.30
Uniform delay, d ₁	21.6	33.2	33.9	21.9	33.7		23.1	14.6	15.0	23.5	30.4	26.1
Progression factor, PF	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.37	0.26	0.34	0.40	0.32		0.42	0.11	0.11	0.11	0.44	0.13
Incremental delay, d ₂	17.5	5.3	12.8	19.8	5.0		26.1	0.2	0.5	0.5	12.0	1.0
Initial queue delay, d_3												
Control delay	39.2	38.4	46.8	41.7	38.8		49.3	14.7	15.4	24.0	42.4	27.2
Lane group LOS	D	D	D	D	D		D	В	В	С	D	С
Approach delay	41.3			39.8			2	2.4		38.8		
Approach LOS	D			D				С		D		
Intersection delay	34.1			X _c = 0.94			Interse	ction LC	S	С		

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