## THE CRESCENT AT EBENEZER COMMERCIAL SITE & PHASE 2 APARTMENTS

Traffic Impact Study Ebenezer Road Knoxville, TN

A Traffic Impact Study for The Crescent at Ebenezer Commercial Site & Phase 2 Apartments

Submitted to

## **Knoxville – Knox County Planning Commission**

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#### ATTACHMENTS

- 1 TRAFFIC COUNTS
- 2 ADT TRENDS
- 3 TRIP GENERATION
- 4 SIGNAL TIMING
- 5 INTERSECTION WORKSHEETS EXISTING AM/PM PEAKS
- 6 INTERSECTION WORKSHEETS BACKGROUND AM/PM PEAKS
- 7 INTERSECTION WORKSHEETS COMMERCIAL SITE AM/PM PEAKS
- 8 TURN LANE WARRANT ANALYSIS
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## **Executive Summary**

Crescent Bend Development, LLC is proposing a mixed use development located in Knox County, Tennessee. The project is located between the intersections of Ebenezer Road at Westland Drive (north) and Ebenezer Road at Westland Drive (south). The Crescent at Ebenezer Apartments – Phase 1 concept plan was approved in August 2018 for 249 apartment units and 180 assisted living units. The Crescent at Ebenezer Commercial concept plan was approved in July 2019 for a 13,000 SF commercial building with a drive-through window. Crescent Bend Development proposes to amend the Phase 1 concept plan to include 78 apartments instead of the 180 assisted living units. Construction is proposed to take place this year and this study assumes full build out for the development will occur in 2021.

The main entrance/exit for The Crescent at Ebenezer Commercial Site will connect to Crescent Lake Way, which is the proposed driveway location for the Crescent Bend Apartments located on Ebenezer Road. Also proposed is a full access entrance/exit with separate right and left turn lanes on Westland Drive and a rightin/right-out entrance/exit on Ebenezer Road. The Crescent at Ebenezer Apartments Phase 1 & 2 will enter/exit the development at the intersection of Westland Drive at Serene Breeze Way and Ebenezer Road at Crescent Lake Way.

The property at the corner of Ebenezer Road at Westland Drive (north) has a concept plan that was approved for a Weigel's convenience market with gasoline pumps by the Knoxville-Knox County Planning Commission on July 12, 2012. The Weigel's will share access with The Crescent at Ebenezer Commercial Site and therefore was included in the traffic impact study.

In order to maintain or provide an acceptable level-of-service for each of the intersections studied, some recommendations are presented.

#### Ebenezer Road @ Westland Drive (north)

After the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments the signalized intersection of Ebenezer Road at Westland Drive (north) will continue to operate at a LOS D during the AM peak hour and a LOS C during the PM peak hour using the existing signal timing provided by Knox County.

The LOS D during the AM peak hour is caused by the westbound thru/right lane having a volume to capacity ratio greater than 1.0. This is the case for the existing traffic volumes and the increase in delay caused by The Crescent at Ebenezer Commercial Site & Phase 2 Apartments is expected to be minimal.

#### Ebenezer Road @ Westland Drive (south)

After the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments the signalized intersection of Ebenezer Road at Westland Drive (south) will operate at a LOS B during the AM peak hour and a LOS D during the PM peak hour using the existing signal timing provided by Knox County.

The eastbound double left turn lanes operate at a LOS C during the existing traffic conditions and a LOS F during both the background traffic conditions and after the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments. The delay is caused by the turn lanes having a volume to capacity ratio greater than 1.0 and a queue storage ratio of greater than 2.0. The increase in delay caused by The Crescent at Ebenezer Commercial Site & Phase 2 Apartments is expected to be minimal.

#### Ebenezer Road @ Driveway Connection

Knox County Engineering and Public Works recommended that the Ebenezer Road driveway be a right-in/right-out driveway connection.

#### Ebenezer Road @ Crescent Lake Way

After the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments the westbound approach (Crescent Lake Way) will operate at a LOS E during the AM peak hour and a LOS D during the PM peak hours and the southbound approach (Ebenezer Road) will operate at a LOS C during the AM peak hour and a LOS B during the PM peak hour.

#### Westland Drive @ Commercial Driveway Connection

After the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments the westbound approach (Westland Drive) will continue to operate at a LOS A during both the AM and PM peak hours and the northbound approach (Commercial Driveway) will operate at a LOS D during the AM peak hour and a LOS F during the PM peak hour.

The capacity analyses shows that the 95% queue length at the full buildout at the signalized intersection of Ebenezer Road at Westland Drive (north) will block the proposed commercial driveway connection for a portion of time during both the AM and PM peak hours.

#### Westland Drive @ Serene Breeze Way

As a part of the construction of The Crescent at Ebenezer Apartments – Phase 1 a westbound left turn lane with a 75 foot storage length was installed at the intersection of Westland Drive at Serene Breeze Way. The unsignalized intersection capacity analysis shows the existing storage at the intersection is adequate and no change is necessary.

## 1 Introduction

## **1.1 Project Description**

This report provides a summary of a traffic impact study that was performed for The Crescent at Ebenezer Commercial Site & Phase 2 Apartment Development. The project is located between the intersections of Ebenezer Road at Westland Drive (north) and Ebenezer Road at Westland Drive (south) in Knox County, Tennessee. The Crescent at Ebenezer Apartments – Phase 1 concept plan was approved in August 2018 for 249 apartment units and 180 assisted living units. The Crescent at Ebenezer Commercial concept plan was approved in July 2019 for a 13,000 SF commercial building with a drive-through window. Crescent Bend Development proposes to amend the Phase 1 concept plan to include 78 apartments instead of the 180 assisted living units. The location of the site is shown in Figure 1.

The full buildout of the commercial development includes six separate modules available for lease. Module 1 & 2 are a combined 3,434 SF coffee shop with a drive-through window. Module 3 is a 2,007 SF nail salon. Module 4 & 6 are separate fast casual restaurants with a total of 4,853 SF and Module 5 is a 2,800 Sf medical/dental office building. Construction for the Crescent Commercial Site started in 2019 and this study assumes full build out for the development will occur in 2021. FMA assumed a full build out for the phase 2 apartment development will also occur in 2021.

The main entrance/exit for The Crescent at Ebenezer Commercial Site will connect to Crescent Lake Way, which is the proposed driveway location for the Crescent Bend Apartments located on Ebenezer Road. Also proposed is a full access entrance/exit with separate right and left turn lanes on Westland Drive and a rightin/right-out entrance/exit on Ebenezer Road. The proposed site layout is shown in Figure 2.

The Crescent at Ebenezer Apartments – Phase 2 will share the same driveway connections as The Crescent at Ebenezer Apartments – Phase 1. Traffic will enter/exit from both the intersection of Westland Drive at Serene Breeze Way and Ebenezer Road at Crescent Lake Way.

The purpose of this study is to evaluate the impacts to the traffic conditions caused by the proposed development. The Crescent at Ebenezer Commercial Site & Phase 2 Traffic Impact Study May 19, 2021



Figure 1: Location Map

The Crescent at Ebenezer Commercial Site & Phase 2 Traffic Impact Study May 19, 2021





Figure 2: Site Plan

## **1.2 Existing Site Conditions**

Crescent Lake Way is located approximately 235 feet north of the intersection of Westland Drive (south) and approximately 735 feet south of the intersection of Westland Drive (north). The roadway has a width of approximately 40 feet with separate right and left turn lanes.

The additional right-in/right-out driveway connection to Ebenezer Road is located approximately 310 feet south of the intersection of Westland Drive (north).

The proposed driveway connection to Westland Drive is located approximately 435 feet south of Serene Breeze Way (The Crescent at Ebenezer Apartments driveway connection) and approximately 250 feet north of the intersection of Ebenezer Road at Westland Drive (north). The proposed driveway has a width of 30 feet with separate right and left turn lanes.

There is also a private driveway connection at 1040 Ebenezer road located approximately 195 feet north of the intersection of Westland Drive (south). The house and driveway are expected to be removed as a part of phase 1 of The Crescent at Ebenezer apartment development.

Westland Drive east of the intersection of Ebenezer Road is a two-lane road. Westland Drive west of the intersection of Ebenezer Road is a three-lane road with a two-way left turn lane. The Knoxville-Knox County Planning Commission classifies Westland Drive as a minor arterial (with an 88 foot ROW) per the Major Road Plan. The posted speed limit on Westland Drive is 40 mph.

Ebenezer Road is a five-lane road with a two-way left turn lane at the existing driveway connection. The Knoxville-Knox County Planning Commission classifies Ebenezer Road at the location of the development between S Peters Road and S Northshore Drive as a minor arterial (with a 100 foot ROW) per the Major Road Plan. The posted speed limit on Ebenezer Road is 45 mph.

The existing sidewalk on Ebenezer Road extends northbound to the intersection of S Peters Road at Kingston Pike and southbound to the intersection with S Northshore Drive. The existing sidewalk on Westland Drive (north) extends 425 feet eastbound from the intersection with Ebenezer Road.

Aerial photos of the existing intersections are included in Attachment 9.

## 2 Existing Traffic Volumes

FMA conducted a turning movement count at the intersection of Ebenezer Road at Westland Drive (north) on Thursday May 10, 2018. FMA also conducted a turning movement count at the intersection of Ebenezer Road at Westland Drive (south) on Thursday May 17, 2018.

The current AM peak hour and PM peak hour were determined using the turning movement count that FMA conducted. At the intersection of Ebenezer Road at Westland Drive (north) the AM peak hour occurred between 7:15 am and 8:15 am, and the PM peak hour occurred between 5:00 pm and 6:00 pm. At the intersection of Ebenezer Road at Westland Drive (south) the AM peak hour occurred between 7:30 am and 8:30 am, and the PM peak hour occurred between 5:00 pm and 6:00 pm.

The existing volumes including the AM and PM peak hour traffic volumes at the count locations are shown in Figure 3, and the count data collected is included in Attachment 1.



Figure 3: 2018 Existing Peak Hour Traffic

## 3 Background Growth

The Tennessee Department of Transportation (TDOT) and the Knoxville Regional Transportation Planning Organization (TPO) maintain count stations in the vicinity of the proposed development.

Knoxville TPO count station ID: 093M002 is located on Westland Drive 1000 feet east of Villa Crest Drive and northeast of the proposed development. The annual traffic growth rate for this station over the last five years is approximately 2.90% and the 2017 ADT was 9,870 vehicles per day.

Knoxville TPO count station ID: 093M001 is located on Westland Drive 100 feet east of Cloverhill Road and west of the proposed development. The annual growth rate for this station over the last five years is approximately 2.85% and the 2017 ADT was 12,110 vehicles per day.

TDOT count station #000286 is located on Ebenezer Road south of the intersection with Westland Drive. The annual growth rate for this station over the last ten years is approximately -1.02%. However the ADT has started to increase again and the annual growth rate for this station over the last four years is approximately 0.54%. The 2017 ADT was 14,691 vehicles per day.

For the purpose of this study, an annual growth rate of 2.0% was assumed for traffic at both intersections of Ebenezer Road at Westland Drive until full occupancy is reached in 2021. Attachment 2 shows the trend line growth charts for the Knoxville TPO and TDOT count stations.

Figure 4 demonstrates the projected background peak hour volumes at the intersections after applying the background growth rate to the existing conditions.



Figure 4: 2021 Background Peak Hour Traffic

## 3.1 The Crescent at Ebenezer

A Level I traffic impact study was completed for The Crescent at Ebenezer development located between the intersections of Ebenezer Road at Westland Drive (north) and Ebenezer Road at Westland Drive (south) within Knox County. "The Crescent at Ebenezer Traffic Impact Study" was prepared by Fulghum, MacIndoe & Associates dated August 27, 2018 and Knoxville-Knox County Planning Commission approved the concept plan on September 13, 2018.

The Crescent at Ebenezer is a residential development with a combination of apartment buildings and senior adult housing units. The full buildout of the development will consist of 249 apartment units and 180 independent living units. The anticipated completion date was the year 2021.

The main entrance/exit for The Crescent at Ebenezer will connect to the existing driveway connection for the Cedar Row Nursery (Crescent Lake Way) located on Ebenezer Road. A second entrance/exit will connect to a proposed driveway location (Serene Breeze Way) on Westland Drive.

FMA recommended the installation of a northbound right turn lane at the intersection of Ebenezer Road at Crescent Lake Way to be built during the phase 1 (apartment development) construction and the installation of a westbound left turn lane at the intersection of Westland Drive at Serene Breeze Way be built during the phase 2 (independent living development) construction.

The total combined trips generated by The Crescent at Ebenezer was estimated to be 2,724 daily trips. The estimated trips are 160 trips during the AM peak hour and 222 trips during the PM peak hour. A trip generation summary is shown in Table 3.1-1.

# Table 3.1-1The Crescent at EbenezerTrip Generation Summary

Land Use	Density	Daily Trips	AM Pe Enter	eak Hour Exit	PM Pe Enter	ak Hour Exit
	1	he Crescent at	Ebenezer			
Apartments (Local Trip Gen Study)	249 Units	2,167	27	97	97	80
Senior Adult Housing (LUC 252)	180 Units	557	12	24	24	21
The Crescent at Ebenez	er	2,724	39	121	121	101

Figure 5 shows the combined peak hour site traffic for The Crescent at Ebenezer apartment and senior adult housing trips.



Figure 5: Apartment & Senior Adult Housing Peak Hour Site Traffic

## 3.2 Weigel's

A Level I traffic impact study was done for Ebenezer Road at Westland Drive Weigel's located within Knox County. The "Ebenezer Road - Westland Drive Weigel's Convenience Store Traffic Impact Study" was prepared by CDM Smith dated May 21, 2012.

The proposed project is a 3,997 SF Weigel's convenience store with 16 fueling stations. A full access driveway connection is proposed for the Weigel's site from both Ebenezer Road and Westland Drive.

CDM Smith had the following recommendations:

- Minimize landscaping, using low growing vegetation, and signing at the proposed street access to insure that safe sight distance is maintained.
- Extend the planned northbound right-turn lane on Ebenezer Road for Westland Drive approximately another 100 feet to be also used by traffic entering the Weigel's convenience store.
- Provide separate left and right turn lanes from the site access.
- Post STOP signs (R1-1) for exiting traffic from the site driveways.
- Intersection design should conform to the recommended standards and practices of the Tennessee Department of Transportation, American Association of State Highway and Transportation Officials, the Institute of Transportation Engineers and the Knox County, Department of Engineering and Public Works.

Knoxville-Knox County Planning Commission approved the concept plan on July 12, 2012. Knox County Engineering and Public Works recommended that the Westland Road driveway connection remain a full access driveway and that the Ebenezer Road driveway be revised to a right-in/right-out driveway connection.

Due to the changes in the site access FMA recalculated the trip generation and trip distribution for the Weigel's convenience market with gasoline pumps and using the equations provided in the *Trip Generation*, 10<sup>th</sup> Edition, published by the Institute of Transportation Engineers. Site trips were calculated for a convenience market with gasoline pumps (Land Use 853) for a 3,997 SF building and up to 16 fueling stations. A pass-by rate reduction of 65% was used for Land Use 853 as recommended by the Knoxville-Knox County Planning Commission.

The total combined trips generated by the Weigel's Gasoline/Service Station was estimated to be 2,495 daily trips. The estimated trips are 56 new trips during the AM peak hour and 68 new trips during the PM peak hour. A trip generation summary is shown in Table 3.2-1 and the land use worksheets are included in Attachment 3.

Table 3.2-1
Weigel's Gasoline/Service Station
<b>Trip Generation Summary</b>

Land Use	Density	Daily Trips	AM Pe Enter	eak Hour Exit	PM Pe Enter	ak Hour Exit
Weigel's Gasoline/Service Station						
Weigel's (LUC 853)	3,997 SF	2,495	81	81	99	99
65% Pass-By Red 35% New Trips	uction	1,622 873	53 28	53 28	64 34	64 34

Figure 6 shows the Weigel's AM & PM peak hour trip distribution and Figures 7 and 8 show the Weigel's AM & PM peak hour trip distribution pass-by trips.

Figure 9 shows the Weigel's peak hour traffic and Figure 10 shows the Weigel's pass-by trips.

Figure 11 shows the background peak hour combined traffic including the 2021 background traffic, peak hour site traffic from the Crescent at Ebenezer apartment and senior adult living development and the peak hour site traffic from the Weigel's.



Figure 6: Weigel's AM & PM Peak Hour Trip Distribution



Figure 7: Weigel's AM Peak Hour Trip Distribution Pass-By Trips



Figure 8: Weigel's PM Peak Hour Trip Distribution Pass-By Trips



Figure 9: Weigel's Peak Hour Site Traffic



Figure 10: Weigel's Peak Hour Pass-By Trips



Figure 11: Background Peak Hour Combined Traffic

## 4 Trip Generation and Trip Distribution

FMA updated the trip generation for The Crescent at Ebenezer Commercial Site to reflect the tenants for the commercial building. The most updated tenant information for The Crescent at Ebenezer Commercial Site shows six modules to be leased. Module 1 & 2 are a combined 3,434 SF coffee shop with a drive-through window or Land Use 937. Module 3 is a 2,007 SF nail salon or Land Use 918. Module 4 is a 2,053 SF fast casual restaurant (Donato's Pizza) or LUC 930. Module 5 is a 2,800 SF Medical/Dental Office Building or Land Use 720 and Module 6 is a 2,800 SF fast casual restaurant or Land Use 930.

The equations and average rates provided in the *Trip Generation*, 10<sup>th</sup> Edition, published by the Institute of Transportation Engineers were used to calculate the expected site trips using the coffee/donut shop with drive-through window (Land Use 937), Hair Salon (Land Use 918), Medical-Dental Office Building (Land Use 720) and Fast Casual Restaurant (Land Use 930).

A pass-by trip occurs when a proposed development diverts traffic that is already traveling on a street adjacent to the site. A pass-by rate reduction of 40% was used for coffee/donut shop with a drive-through window or Land Use 937 and for the fast casual restaurant or Land Use 930 as referenced by the Memorandum issued by the Knoxville-Knox County Planning Commission and dated March 10, 1997.

The land use worksheets are included in Attachment 3.

An internal trip reduction of 10% was assumed for the commercial development to account for trips between land uses.

The total combined new trips generated by The Crescent at Ebenezer Commercial Site were estimated to be 1,608 new daily trips, 149 trips during the AM peak hour and 91 trips during the PM peak hour. The total combined new trips generated by The Crescent at Ebenezer Apartments – Phase 2 were estimated to be 206 new daily trips, 6 trips during the AM peak hour and 17 trips during the PM peak hour. A trip generation summary is shown in Table 4-1.

## Table 4-1The Crescent at EbenezerTrip Generation Summary

Land Use	Density	Daily	AM Peak Hour		PM Peak Hour	
		Trips	Enter	Exit	Enter	Exit
	The Creso	ent at Ebeneze	er Commerc	cial Site		
Coffee/Donut Shop w/ Drive Through Window (LUC 937)	3,434 SF / 60 Seats	2,817	128	118	33	40
10% Internal Reduction 40% Pass-By Reduction		-282 1,014	-13 46	-12 42	-3 12	-4 14
Hair Salon (LUC 918)	2,007 SF	-	2	0	1	2
10% Internal Reduction		-	0	0	0	0
Medical-Dental Office (LUC 720)	2,800 SF	97	7	2	3	9
10% Internal Reduction		-10	-1	0	0	-1
Fast Casual Restaurant (LUC 720)	4,853 SF	1,530	7	3	38	31
10% Internal Reduction 40% Pass-By Trips		-153 1,377	-1 2	0 1	-4 14	-3 11
Phase 2 – Pass-By Trips Phase 2 - New Trips		2,391 1,608	48 81	43 68	26 42	25 49
	The Cresce	nt at Ebenezer	Apartments	s Phase 2		
	ŀ	Approved Land	Use 2019			
Senior Adult Housing (LUC 252)	180 Units	557	12	24	24	21
		Proposed Land	Use 2021			
Phase 2 - Apartments (Local Trip Gen Study)	78 Units	763	9	33	34	28

-3

9

206

Additional Trips

7

10

Ebenezer Road at the existing driveway connection has a trip distribution of 67% northbound and 33% southbound during the AM peak hour and 40% northbound and 60% southbound during the PM peak hour.

Westland Drive at the proposed commercial driveway connection has a trip distribution of 45% eastbound and 55% westbound during the AM peak hour and 50% eastbound and 50% westbound during the PM peak hour.

The directional distribution of the traffic generated by The Crescent at Ebenezer Commercial Site was determined using the existing traffic volumes in combination with the concept plan layout. Crescent Lake Way was designed to operate as the main entrance/exit to the commercial development.

It was assumed that 20% of traffic would enter/exit using the Westland Drive commercial driveway connection and 80% of traffic would enter/exit using Crescent Lake Way. This assumption was made after measuring the existing traffic volume which is split 60% Ebenezer Road to/from the south, 25% Ebenezer Road to/from the north and 15% Westland Drive.

Figure 12 shows the commercial site AM & PM peak hour trip distribution and Figures 13 and 14 show the commercial site AM & PM peak hour trip distribution pass-by trips.

Figure 15 shows the commercial site peak hour traffic, Figure 16 shows the commercial site pass-by trips and Figure 17 shows the full buildout peak hour combined traffic.

The directional distribution of the traffic generated by The Crescent at Ebenezer Apartments – Phase 2 was determined using the previously approved trip generation for The Crescent at Ebenezer Apartments – Phase 1. FMA referenced Figure 5: AM Peak Hour Trip Distribution Westland Driveway, Figure 5A: AM Peak Hour Trip Distribution Ebenezer Driveway, Figure 6: PM Peak Hour Trip Distribution Ebenezer Driveway and Figure 6A: PM Peak Hour Trip Distribution Ebenezer Driveway from "The Crescent at Ebenezer Traffic Impact Study" dated August 27, 2018. Figure 18 shows the Phase 2 Apartments peak hour site traffic and Figure 19 shows the Phase 2 Apartments peak hour combined traffic.



Figure 12: Commercial AM & PM Peak Hour Trip Distribution



Figure 13: Commercial AM Peak Hour Trip Distribution Pass-By Trips



Figure 14: Commercial PM Peak Hour Trip Distribution Pass-By Trips



Figure 15: Commercial Peak Hour Site Traffic



Figure 16: Commercial Peak Hour Pass-By Trips



Figure 17: Full Buildout Peak Hour Combined Traffic



Figure 18: Phase 2 Apartments Peak Hour Site Traffic



Figure 19: Phase 2 Apartments Peak Hour Combined Traffic
## 5 **Projected Capacity and Level of Service**

Unsignalized intersection capacity analyses were performed using the Highway Capacity Software (HCS7) for the AM and PM peak hours to evaluate the traffic conditions at the intersections of Ebenezer Road at the proposed driveway connection, Ebenezer Road at Crescent Lake Way and Westland Drive at the proposed commercial driveway location.

Signalized intersection capacity analyses were performed using Highway Capacity Software (HCS7) with the existing signal timing for the AM and PM peak hours to evaluate the traffic conditions at both intersections of Ebenezer Road at Westland Drive. The existing signal timing was provided by Knox County and is included in Attachment 4.

The results from the analyses are expressed with a term "level of service" (LOS), which is based on the amount of delay experienced at the intersection. The LOS index ranges from LOS A, indicating excellent traffic conditions with minimal delay, to LOS F indicating very congested conditions with excessive delay. LOS D generally is considered the minimum acceptable condition in urban areas. The HCS7 worksheets are included in Attachments 5, 6, 7 and 10.

Table 5-1 shows the results of the capacity analyses.

#### Table 5-1 Intersection Analysis Level of Service (LOS) Summary

	Delay (sec)/LOS
nezer Road @ Westland	Drive (north) (Existing 2018)
Intersection	36.8 / D
Intersection	14.4 / B
nezer Road @ Westland	Drive (south) (Existing 2018)
Intersection	15.4 / B
Intersection	26.2 / C
zer Road @ Westland [	Drive (north) (Background 2021)
Intersection	53.4 / D
Intersection	20.2 / C
zer Road @ Westland [	Drive (south) (Background 2021)
Intersection	17.8 / B
Intersection	44.1 / D
zer Road @ Driveway	Connection (Background 2021)
WB Approach	12.1 / B
WB Approach	9.7 / A
ezer Road @ Crescent	Lake Way (Background 2021)
WB Approach SB Approach	22.0 / C 16.6 / C
WB Approach SB Approach	15.5 / C 12.0 / B
d Drive @ Commercial	Driveway Connection (Background 2021)
WB Approach NB Approach	8.6 / A 24.5 / C
WB Approach	9.4 / A
	Intersection Intersection Intersection Intersection Intersection Intersection Intersection Intersection Intersection Intersection Intersection Intersection Zer Road @ Westland I Intersection Intersection VB Approach WB Approach WB Approach SB Approach SB Approach SB Approach SB Approach SB Approach SB Approach SB Approach SB Approach

Ebenezer Road @	Westland Drive (north	) (Commercial Site 2021)						
AM Peak	Intersection	54.1 / D						
PM Peak	Intersection	20.3 / C						
Ebenezer Road @	Westland Drive (south	) (Commercial Site 2021)						
AM Peak	Intersection	18.1 / B						
PM Peak	Intersection	45.7 / D						
Ebenezer Road @ Driveway Connection (Commercial Site 2021)								
AM Peak	WB Approach	12.3 / B						
PM Peak	WB Approach	9.8 / A						
Ebenezer Road @	© Crescent Lake Way (C	ommercial Site 2021)						
AM Peak	WB Approach SB Approach	46.7 / E 19.1 / C						
PM Peak	WB Approach SB Approach	30.5 / D 12.5 / B						
Westland Drive (	② Commercial Drivewa	y Connection (Commercial Site 2021)						
AM Peak	WB Approach NB Approach	8.7 / A 24.9 / C						
PM Peak	WB Approach NB Approach	9.5 / A 51.8 / F						
Ebenezer Road @	Westland Drive (north	ı) (Phase 2 - Apartments 2021)						
AM Peak	Intersection	54.4 / D						
PM Peak	Intersection	20.3 / C						
Ebenezer Road @	Westland Drive (south	ı) (Phase 2 - Apartments 2021)						
AM Peak	Intersection	18.1 / B						
PM Peak	Intersection	46.0 / D						
Ebenezer Road @	Driveway Connection	(Phase 2 - Apartments 2021)						
AM Peak	WB Approach	12.3 / B						
PM Peak	WB Approach	9.8 / A						

Ebenezer Road @ C	Ebenezer Road @ Crescent Lake Way (Phase 2 - Apartments 2021)								
AM Peak	WB Approach SB Approach	46.6 / E 19.0 / C							
PM Peak	WB Approach SB Approach	30.4 / D 12.6 / B							
Westland Drive @	Westland Drive @ Commercial Driveway Connection (Phase 2 - Apartments 2021)								
AM Peak	WB Approach NB Approach	8.7 / A 25.0 / D							
PM Peak	WB Approach NB Approach	9.5 / A 52.3 / F							
Westland Drive @	Serene Breeze Way (	Phase 2 - Apartments 2021)							
AM Peak	WB Approach NB Approach	8.6 / A 21.6 / C							
PM Peak	WB Approach NB Approach								

## 6 Turn Lane Warrant Analysis

The intersection of Westland Drive at the commercial driveway connection and the intersection of Ebenezer Road at the driveway connection were evaluated to determine if a right turn lane is warranted. The Knox County Department of Engineering and Public Works handbook, "Access Control and Driveway Design Policy," was used to analyze the information. After the completion of the Crescent at Ebenezer Commercial Site both a right turn lane on Westland Drive at the commercial driveway location and on Ebenezer Road at the driveway location are warranted. The turn lane warrant worksheets and analysis are included in Attachment 8.

The intersection of Ebenezer Road at Crescent Lake Way was not evaluated to determine if a turn lane is warranted. There is an existing two-way left turn lane on Ebenezer Road and a right turn lane is being built as a part of The Crescent at Ebenezer apartment development.

## 7 Conclusions and Recommendations

## 7.1 Ebenezer Road @ Westland Drive (north)

The existing traffic conditions at the signalized intersection of Ebenezer Road at Westland Drive (north) operate at a LOS D during the AM peak hour and a LOS B during the PM peak hour using the existing signal timing provided by Knox County.

The background traffic conditions at the signalized intersection of Ebenezer Road at Westland Drive (north) operate at a LOS D during AM peak hour and a LOS C during the PM peak hour using the existing signal timing provided by Knox County.

After the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments the signalized intersection of Ebenezer Road at Westland Drive (north) will continue to operate at a LOS D during the AM peak hour and a LOS C during the PM peak hour using the existing signal timing provided by Knox County.

The LOS D during the AM peak hour is caused by the westbound thru/right lane having a volume to capacity ratio greater than 1.0. This is the case for the existing traffic volumes and the increase in delay caused by The Crescent at Ebenezer Commercial Site & Phase 2 Apartments is expected to be minimal.

## 7.2 Ebenezer Road @ Westland Drive (south)

The existing traffic conditions at the signalized intersection of Ebenezer Road at Westland Drive (south) operate at a LOS B during the AM peak hour and a LOS C during the PM peak hour using the existing signal timing provided by Knox County.

The background traffic conditions at the signalized intersection of Ebenezer Road at Westland Drive (south) operate at a LOS B during the AM peak hour and a LOS D during the PM peak hour using the existing signal timing provided by Knox County.

After the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments the signalized intersection of Ebenezer Road at Westland Drive (south) will operate at a LOS B during the AM peak hour and a LOS D during the PM peak hour using the existing signal timing provided by Knox County.

The eastbound double left turn lanes operate at a LOS C during the existing traffic conditions and a LOS F during both the background traffic conditions and after the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments. The delay is caused by the turn lanes having a volume to capacity ratio greater than

1.0 and a queue storage ratio of greater than 2.0. The increase in delay caused by The Crescent at Ebenezer Commercial Site & Phase 2 Apartments is expected to be minimal.

## 7.3 Ebenezer Road @ Driveway Connection

Knox County Engineering and Public Works recommended that the Ebenezer Road driveway be a right-in/right-out driveway connection.

The background traffic conditions at the intersection of Ebenezer Road at the Driveway Connection for the westbound approach will operate at a LOS B during the AM peak hour and a LOS A during the PM peak hour.

After the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments the westbound approach will continue to operate at a LOS B during the AM peak hour and a LOS A during the PM peak hour.

A northbound right turn lane is warranted at the intersection of Ebenezer Road at the driveway connection during both the AM and PM peak hours after the completion of the Weigel's convenience market with gasoline pumps. CDM Smith's recommendation was to "extend the planned northbound right-turn lane on Ebenezer Road for Westland Drive approximately another 100 feet to be also used by traffic entering the Weigel's convenience store." A sketch of the right-turn lane layout is included in Attachment 8. The turn lane improvements are expected to be installed prior to the construction of the Weigel's.

## 7.4 Ebenezer Road @ Crescent Lake Way

The background traffic conditions at the intersection of Ebenezer Road at the Crescent Lake Way for the westbound approach will operate at a LOS C during both the AM and PM peak hours and the southbound approach will operate at a LOS C during the AM peak hour and a LOS B during the PM peak hour.

After the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments the westbound approach (Ebenezer Road) will operate at a LOS E during the AM peak hour and a LOS D during the PM peak hours and the southbound approach (Crescent Lake Way) will operate at a LOS C during the AM peak hour and a LOS B during the PM peak hour.

The unsignalized intersection capacity analyses shows a 95% queue length after the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments at Crescent Lake Way of approximately four car lengths during the AM peak hour and two car lengths during the PM peak hour; therefore the existing storage at the intersection is adequate and no change is necessary.

It is estimated based on field observations that the intersection of Ebenezer Road at Crescent Lake Way is blocked by the traffic from the signalized intersection of Ebenezer Road at Westland Drive (north) and Ebenezer Road at Westland Drive (south) approximately 50% during the AM peak hour and 20% during the PM peak hour.

## 7.5 Westland Drive @ Commercial Driveway Connection

The background traffic conditions at the intersection of Westland Drive at the driveway connection for the westbound approach (Westland Drive) will operate at a LOS A during both the AM and PM peak hours and the northbound approach (Commercial Driveway) will operate at a LOS C during the AM peak hour and a LOS E during the PM peak hour.

After the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments the westbound approach (Westland Drive) will continue to operate at a LOS A during both the AM and PM peak hours and the northbound approach (Commercial Driveway) will operate at a LOS D during the AM peak hour and a LOS F during the PM peak hour.

The unsignalized intersection capacity analyses shows a 95% queue length at the full buildout for the commercial driveway connection of approximately 2 car lengths during the AM peak hour and approximately 3 car lengths during the PM peak hour; therefore the existing storage at the intersection is adequate and no change is necessary.

The signalized intersection capacity analyses shows a 95% queue length at the full buildout at the intersection of Ebenezer Road at Westland Drive (north) of 1,023 feet at the westbound thru/right lane and 156 feet at the westbound left turn lanes during the AM peak hour and 227 feet at the westbound thru/right lane and 323 feet for the westbound left turn lanes during the PM peak hour. Thus the queue from the signalized intersections of Ebenezer Road at Westland Drive (north) will block the proposed commercial driveway connection for a portion of time during both the AM and PM peak hours.

Westland Drive is classified as a minor arterial. The minimum intersection spacing required for an arterial is 400 feet per the "Minimum Subdivision Regulations" for Knoxville and Knox County. The nearest road intersection to the proposed commercial driveway connection is currently 250 feet east at the intersection of Ebenezer Road. This intersection does not meet the required 400 feet spacing; however, given the constraints this location was determined to be the best fit and has been coordinated with Knox County Engineering & Public Works.

An eastbound right turn lane is warranted at the intersection of Westland Drive at the commercial driveway connection during the PM peak hour after the completion of the Weigel's convenience market with gasoline pumps.

### 7.6 Westland Drive @ Serene Breeze Way

FMA referenced "The Crescent at Ebenezer Traffic Impact Study" dated August 27, 2018 Table 5-1 Intersection Analysis Level of Service (LOS) Summary in order to determine the result of amending the The Crescent at Ebenezer Phase 2 from 180 assisted living units to 78 apartment units.

After the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments the westbound approach (Westland Drive) will operate at a LOS A during both the AM and PM peak hours and the northbound approach (Serene Breeze Way) will operate at a LOS C during the AM peak hour and a LOS D during the PM peak hour.

Amending the land use from 180 assisted living units to 78 apartments units will cause no change to the westbound approach and add approximately 0.1 seconds of delay to the northbound approach during the AM peak hour and reduce the delay by 1.7 seconds of delay during the PM peak hour.

The unsignalized intersection capacity analyses shows a 95% queue length after the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments at Crescent Lake Way of approximately two car lengths during the peak hours; therefore the existing storage at the intersection is adequate and no change is necessary.

"The Crescent at Ebenezer Traffic Impact Study" concluded that a westbound left turn on Westland Drive is warranted after the full buildout of The Crescent at Ebenezer. As a part of the construction of The Crescent at Ebenezer Apartments – Phase 1 a westbound left turn lane with a 75 foot storage length was installed at the intersection of Westland Drive at Serene Breeze Way.

The unsignalized intersection capacity analyses shows a 95% queue length after the completion of The Crescent at Ebenezer Commercial Site & Phase 2 Apartments for the westbound left turn lane at the intersection of Westland Drive at Serene Breeze Way of less than one car length during both the AM and PM peak hours; therefore the existing storage at the intersection is adequate and no change is necessary.

#### Attachment 1 Traffic Counts

#### Project: The Crescent at Ebenezer Intersection: Ebenezer Road at Westland Drive / Ebenezer United Methodist Church Date Conducted: 05/10/2018

		beneze	r UMC			Nestland	Drive			beneze	er Road			Ebeneze	er Road		
		Eastbo				Westb				Northk				South			
Start	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Int. Total
7:00 AM	0	1	0	1	32	0	37	69	0	161	40	201	12	102	0	114	385
7:15 AM	0	0	0	0	68	0	68	136	0	306	61	367	15	146	0	161	664
7:30 AM	0	0	0	0	51	0	93	144	0	406	101	507	39	167	0	206	857
7:45 AM	2	0	0	2	57	2	91	150	0	449	78	527	32	138	0	170	849
Total	2	1	0	3	208	2	289	499	0	1322	280	1602	98	553	0	651	2755
8:00 AM	0	0	3	3	59	0	85	144	3	399	120	522	36	163	0	199	868
8:15 AM	0	0	0	0	50	0	47	97	0	265	73	338	32	174	1	207	642
8:30 AM 8:45 AM	0	0 0	0 0	0	61 47	0 0	54 51	115 98	0 0	211 192	91 65	302 257	20 18	128 112	1 0	149 130	566 485
Total	0	0	3	3	217	0	237	454	3	1067	349	1419	106	577	2	685	2561
TOtal	0	0	3	2	217	0	237	404	3	1007	349	1419	100	377	2	005	2301
11:00 AM	2	0	0	2	35	0	29	64	1	141	44	186	30	133	0	163	415
11:15 AM	1	0	0	1	35	0	29	64	0	134	60	194	29	134	1	164	423
11:30 AM	0	0	0	0	34	0	41	75	0	138	47	185	32	142	1	175	435
11:45 AM	2	2	0	4	42	0	42	84	0	183	52	235	37	129	0	166	489
Total	5	2	0	7	146	0	141	287	1	596	203	800	128	538	2	668	1762
12:00 PM	7	2	0	9	38	0	45	83	1	126	37	164	24	151	0	175	431
12:15 PM	1	0	0	1	46	0	39	85	0	148	46	194	37	164	0	201	481
12:30 PM	2	1	2	5	50	1	32	83	1	150	39	190	38	164	1	203	481
12:45 PM	0	0	0	0	52	0	47	99	0	175	50	225	30	167	0	197	521
Total	10	3	2	15	186	1	163	350	2	599	172	773	129	646	1	776	1914
2:00 PM	0	0	0	ol	62	0	41	103	0	127	51	178	53	184	1	238	519
2:15 PM	0	0	0	0	70	0	32	102	0	143	40	183	41	191	1	233	518
2:30 PM	0	0	0	0	64	1	32	97	1	147	28	176	36	202	0	238	511
2:45 PM	1	0	0	1	72	0	42	114	0	185	47	232	45	176	2	223	570
Total	1	0	0	1	268	1	147	416	1	602	166	769	175	753	4	932	2118
3:00 PM	0	0	0	ol	53	0	52	105	0	193	49	242	40	186	0	226	573
3:15 PM	0	0	0	0	53	0	55	108	0	208	64	272	48	184	0	232	612
3:30 PM	0	1	1	2	83	0	56	139	0	169	37	206	54	242	1	297	644
3:45 PM	0	0	2	2	97	1	48	146	0	162	64	226	76	339	0	415	789
Total	0	1	3	4	286	1	211	498	0	732	214	946	218	951	1	1170	2618
4:00 PM	0	0	2	2	99	0	34	133	1	165	61	227	62	255	0	317	679
4:15 PM	1	1	0	2	72	0	43	115	1	187	77	265	59	259	0	318	700
4:30 PM	0	0	2	2	93	1	44	138	0	162	72	234	68	245	0	313	687
4:45 PM	0	0	0	0	106	1	47	154	0	181	99	280	74	277	0	351	785
Total	1	1	4	6	370	2	168	540	2	695	309	1006	263	1036	0	1299	2851
5:00 PM	1	0	0	1	129	1	49	179	2	189	78	269	75	309	2	386	835
5:15 PM	1	0	1	2	131	0	53	184	1	213	102	316	88	316	0	404	906
5:30 PM	1	1	1	3	126	0	36	162	2	224	83	309	80	308	2	390	864
5:45 PM	0	0	0	0	113	0	39	152	4	277	93	374	91	275	2	368	894
Total	3	1	2	6	499	1	177	677	9	903	356	1268	334	1208	6	1548	3499
	I -	,		act		Ē	1005		ار بر		4 = 0.5	co.c.l	امددا	1005	-		
Grand Total	6	4	12	22	1580	6	1082	2668	14	4719	1508	6241	1019	4325	9	5353	14284
Approach %	27.3 0.0	18.2 0.0	54.5 0.1	0.2	59.2	0.2 0.0	40.6 7.6	10 7	0.2 0.1	75.6 33.0	24.2 10.6	43.7	19.0 7.1	80.8 30.3	0.2 0.1	37.5	
Total %	0.0	0.0	0.1	0.2	11.1	0.0	7.0	18.7	0.1	33.0	10.0	43./	7.1	30.3	0.1	37.5	

#### **Project: The Crescent at Ebenezer**

Date Conducted: 5/10/2018

AM Peak Hour	7:15 AM - 8:15 AM	3238
PM Peak Hour	5:00 PM - 6:00 PM	3499

		Ebeneze	er UMC		,	Westlan	d Drive			Ebeneze	er Road		E	beneze	er Road		
		Eastb	ound			Westb	ound			North	bound			South	bound		
Start	Left	Thru	Right Ap	p. Tota	Left	Thru	Right h	op. Tota	Left	Thru	Right N	op. Tota	Left	Thru	Right	App. Tota	Int. Total
Peak Hour Analysis fro	m 7:00 Å	M to 9:0	00 AM														
AM Peak Hour begins	at 7:30 Al	М															
7:15 AM	0	0	0	0	68	0	68	136	0	306	61	367	15	146	0	161	664
7:30 AM	0	0	0	0	51	0	93	144	0	406	101	507	39	167	0	206	857
7:45 AM	2	0	0	2	57	2	91	150	0	449	78	527	32	138	0	170	849
8:00 AM	0	0	3	3	59	0	85	144	3	399	120	522	36	163	0	199	868
Total Volume	2	0	3	5	235	2	337	574	3	1560	360	1923	122	614	0	736	3238
Future (2% over 3 yrs)	2	0	3	-	249	2	358	-	3	1655	382	-	129	652	0		3436
PHF	0.25	-	0.25		0.86	0.25	0.91		0.25	0.87	0.75		0.78	0.92	-		0.93
Peak Hour Analysis fro	m 3:00 P/	M to 6:0	0 PM														
PM Peak Hour begins a	at 5:00 PN	Л															
5:00 PM	1	0	0	1	129	1	49	179	2	189	78	269	75	309	2	386	835
5:15 PM	1	0	1	2	131	0	53	184	1	213	102	316	88	316	0	404	906
5:30 PM	1	1	1	3	126	0	36	162	2	224	83	309	80	308	2	390	864
5:45 PM	0	0	0	0	113	0	39	152	4	277	93	374	91	275	2	368	894
Total Volume	3	1	2	6	499	1	177	677	9	903	356	1268	334	1208	6	1548	3499
Future (2% over 3 yrs)	3	1	2		530	1	188		10	958	378		354	1282	6		3713
PHF	0.75	0.25	0.50		0.95	0.25	0.83		0.56	0.81	0.87		0.92	0.96	0.75		0.97

#### Project: The Crescent at Ebenezer Intersection: Ebenezer Road at Westland Drive Date Conducted: 05/17/2018

	Wes	stland Driv	/e	Eben	ezer Roa	d	Eben			
	E	astbound		Noi	rthbound		Sou	uthbound		
Start	Left	Right	Total	Left	Thru	Total	Thru	Right	Total	Int. Total
7:00 AM	64	7	71	37	129	166	68	79	147	384
7:15 AM	97	11	108	27	196	223	76	164	240	571
7:30 AM	149	3	152	33	378	411	111	97	208	771
7:45 AM	168	4	172	34	331	365	130	72	202	739
Total	478	25	503	131	1034	1165	385	412	797	2465
8:00 AM	153	8	161	32	241	273	142	80	222	656
8:15 AM	112	12	124	32	199	231	134	85	219	574
8:30 AM	87	10	97	42	153	195	93	71	164	456
8:45 AM	79	14	93	29	154	183	99	51	150	426
Total	431	44	475	135	747	882	468	287	755	2112
11:00 AM	62	15	77	27	99	126	109	60	169	372
11:15 AM	73	15	88	13	126	139	110	71	181	408
11:30 AM	77	19	96	23	128	151	114	54	168	415
11:45 AM	52	15	67	20	143	163	125	61	186	416
Total	264	64	328	83	496	579	458	246	704	1611
	1									
12:00 PM	58	20	78	12	127	139	147	61	208	425
12:15 PM	72	21	93	21	123	144	132	94	226	463
12:30 PM	64	9	73	12	146	158	143	70	213	444
12:45 PM	52	18	70	21	133	154	160	84	244	468
Total	246	68	314	66	529	595	582	309	891	1800
	1									
2:00 PM	66	16	82	15	123	138	137	75	212	432
2:15 PM	54	17	71	19	111	130	154	93	247	448
2:30 PM	45	21	66	19	111	130	144	110	254	450
2:45 PM	66	34	100	33	170	203	142	105	247	550
Total	231	88	319	86	515	601	577	383	960	1880
			1			1			I	
3:00 PM	79	14	93	28	130	158	131	86	217	468
3:15 PM	103	31	134	23	154	177	165	103	268	579
3:30 PM	87	27	114	23	144	167	241	92	333	614
3:45 PM	69	20	89	20	139	159	289	138	427	675
Total	338	92	430	94	567	661	826	419	1245	2336
4.00 014	0.2	20	4 4 <b>-</b> 1	20	1 4 4	4 = 2	200	105	2421	(01
4:00 PM	83	32	115	29	144	173		105	313	
4:15 PM	90	43	133	25	164	189	211	128	339	661
4:30 PM	98 02	37	135	37	149 150	186	231	116 126	347	668 670
4:45 PM	93	40	133	29	159	188	232	126	358	679
Total	364	152	516	120	616	736	882	475	1357	2609
5:00 PM	109	4 5	154	38	157	195	234	1 5 0	392	741
5:00 PM 5:15 PM	98	45 46	154 144	38 27	157 179	206	234 291	158 184	392 475	825
5:30 PM	98 124	46 52	176	40	179	206	307	164 166	475 473	825 864
5:45 PM	98	32 39	137	40 36	175	215	232	138	370	731
Total	429	182	611	141	699	840	1064	646	1710	3161
TULAT	423	102		141	099	040	1004	040	1710	5101
Grand Total	2781	715	3496	856	5203	6059	5242	3177	8419	17974
Approach %	79.5	20.5	5 + 50	14.1	85.9	0055	62.3	37.7	5115	17 57 7
Total %	15.5	4.0	19.5	4.8	28.9	33.7	29.2	17.7	46.8	
	15.5	1.0	1.5.5	т.0	20.5	55.7	23.2	. / . /	10.0	

### **Project: The Crescent at Ebenezer Date Conducted: 5/17/2018**

AM Peak Hour	7:30 AM - 8:30 AM	2740
PM Peak Hour	5:00 PM - 6:00 PM	3161

	We	estland Dr	ive	Eb	enezer Ro	ad	Eb	ad		
	Eastbound			Ν	orthboun	d	S			
Start	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis from 7:00 AM to 9:00 AM										
AM Peak Hour begins at 7	:30 AM									
7:30 AM	149	3	152	33	378	411	111	97	208	771
7:45 AM	168	4	172	34	331	365	130	72	202	739
8:00 AM	153	8	161	32	241	273	142	80	222	656
8:15 AM	112	12	124	32	199	231	134	85	219	574
Total Volume	582	27	609	131	1149	1280	517	334	851	2740
Future (2% over 3 yrs)	618	29	-	139	1219		549	354		2908
PHF	0.87	0.56		0.96	0.76		0.91	0.86		0.89
Peak Hour Analysis from 3	:00 PM to 6:	00 PM								
PM Peak Hour begins at 5:	00 PM									
5:00 PM	109	45	154	38	157	195	234	158	392	741
5:15 PM	98	46	144	27	179	206	291	184	475	825
5:30 PM	124	52	176	40	175	215	307	166	473	864
5:45 PM	98	39	137	36	188	224	232	138	370	731
Total Volume	429	182	611	141	699	840	1064	646	1710	3161
Future (2% over 3 yrs)	455	193	-	150	742		1129	686		3354
PHF	0.86	0.88		0.88	0.93		0.87	0.88		0.91

## Attachment 2 ADT Trends



Most Recent Trend Li	ine Growth			
Year	ADT	Year	ADT	
2007	16355	2014	14456	
2017	14691	2017	14691	

**Annual Percent Growth** 

**Annual Percent Growth** 

-1.02%

0.54%



Annual Percent Growth

2.90%

		Adjusted
		Average Daily
	Year	Traffic
1	2001	7950
2	2002	8150
3	2003	7380
4	2004	0
5	2005	10094
6	2006	10080
7	2007	10330
8	2008	8730
9	2009	9670
10	2010	10190
11	2011	10580
12	2012	10600
13	2013	11010
14	2014	10680
15	2015	11070
16	2016	11480
17	2017	12110



Most Recent Trend	Line Growth
Year	ADT
2012	10600
2017	12110

Annual Percent Growth

2.85%

Project: Crescent Commercial - Phase 2 Date Conducted: 7/7/2019

Coffee/Donut Shop with Drive-Through Window (LUC 937) 3,434 SF / 60 Seats

#### **Average Daily Traffic**

Average Rate = 470.95 T = 820.38 \* (3.434) T = 2817

## Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m. T = 3.93(X) + 10.11T = 3.93(60 seats) + 10.11

T = 246

### Peak Hour of Adjacent Street Traffic One Hour Between 4 and 6 p.m.

Average Rate = 1.22T = 1.22 (60 seats) T = 73

		Percent		Number	
Time Period	Total Trips	Enter	Exit	Enter	Exit
Weekday (24 hours)	2817	50%	50%	1409	1409
AM Peak Hour	246	52%	48%	128	118
PM Peak Hour	73	45%	55%	33	40

#### Pass-By Trips 40%

		Percent		Number	
Time Period	Total Trips	Enter	Exit	Enter	Exit
Weekday (24 hours)	1127	50%	50%	563	563
AM Peak Hour	98	52%	48%	51	47
PM Peak Hour	29	45%	55%	13	16

#### New Trips 60%

		Percent		Number	
Time Period	Total Trips	Enter	Exit	Enter	Exit
Weekday (24 hours)	1690	50%	50%	845	845
AM Peak Hour	148	52%	48%	77	71
PM Peak Hour	44	45%	55%	20	24

Project: Crescent Commercial - Phase 2 Date Conducted: 2/18/2021

Medical-Dental Office Building (LUC 720) 2,800 SF

Average Daily TrafficAverage RateT = 38.42(X) - 87.62Average Rate = 34.8T = 38.42(2.80) - 87.62T = 34.8 \* (2.80)T = 20T = 97

Peak Hour of Adjacent Street Traffic One Hour Between 7 and 9 a.m. Ln(T) = 0.89 Ln(X) + 1.31Ln(T) = 0.89 Ln(2.80) + 1.31T = 9

### Peak Hour of Adjacent Street Traffic One Hour Between 4 and 6 p.m.

T = 3.39(X) + 2.02T = 3.39(2.80) + 2.02 T = 12

		Percent		Number	
Time Period	<b>Total Trips</b>	Enter	Exit	Enter	Exit
Weekday (24 hours)	97	50%	50%	49	49
AM Peak Hour	9	78%	22%	7	2
PM Peak Hour	12	28%	72%	3	9

Project: Crescent Commercial - Phase 2 Date Conducted: 2/19/2021

> Hair Salon (LUC 918) 2,007 SF

Peak Hour of Adjacent Street Traffic One Hour Between 7 and 9 a.m.

Average Rate = 1.21T = 1.21 \* (2.007)T = 2

Peak Hour of Adjacent Street Traffic One Hour Between 4 and 6 p.m. Average Rate = 1.45T = 1.45 \* (2.007)T = 3

		Percent		Percent Numbe		nber
Time Period	Total Trips	Enter	Exit	Enter	Exit	
Weekday (24 hours)	-	50%	50%	-	-	
AM Peak Hour	2	83%	17%	2	0	
PM Peak Hour	3	17%	83%	1	2	

Project: Crescent Commercial - Phase 2 Date Conducted: 3/1/2021

> Fast Casual Restaurant (LUC 930) 4,853 SF

#### **Average Daily Traffic**

Average Rate = 315.17 T = 315.17 \* (4.853) T = 1530

#### Peak Hour of Adjacent Street Traffic One Hour Between 7 and 9 a.m.

Average Rate = 2.07T = 2.07 \* (4.853)T = 10

#### Peak Hour of Adjacent Street Traffic One Hour Between 4 and 6 p.m.

Average Rate = 14.13T = 14.13 \* (4.853)T = 69

		Percent		Number	
Time Period	Total Trips	Enter	Exit	Enter	Exit
Weekday (24 hours)	1530	50%	50%	765	765
AM Peak Hour	10	67%	33%	7	3
PM Peak Hour	69	55%	45%	38	31

#### Pass-By Trips 40%

		Percent		Number	
Time Period	<b>Total Trips</b>	Enter	Exit	Enter	Exit
Weekday (24 hours)	612	50%	50%	306	306
AM Peak Hour	4	67%	33%	3	1
PM Peak Hour	28	55%	45%	15	12

#### New Trips 60%

		Percent		Number	
Time Period	<b>Total Trips</b>	Enter	Exit	Enter	Exit
Weekday (24 hours)	918	50%	50%	459	459
AM Peak Hour	6	67%	33%	4	2
PM Peak Hour	41	55%	45%	23	19

**Project: Westland and Ebenezer Development Date Conducted: 3/24/2021** 

> Local Apartment Trip Generation Study 78 Apartment Units

### **Average Daily Traffic**

 $T = 15.193 (X)^{0.899}$ T = 15.193 (78) ^0.899 T = 763

## Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m.

 $T = 0.758 (X) ^0.924$ T = 0.758 (78) ^0.924 T = 42

## T = 42

#### Peak Hour of Adjacent Street Traffic One Hour Between 4 and 6 p.m.

T = 0.669 (X) + 10.069T = 0.669 (78) + 10.069 T = 62

		Percent		Number	
Time Period	<b>Total Trips</b>	Enter	Exit	Enter	Exit
Weekday (24 hours)	763	50%	50%	382	382
AM Peak Hour	42	22%	78%	9	33
PM Peak Hour	62	55%	45%	34	28

**Project: Westland and Ebenezer Development Date Conducted: 7/7/2019** 

Gasoline/Service Station With Convenience Market - LUC 853 3,997 SF

#### **Average Daily Traffic**

Average Rate = 624.20 T = 624.20 (3.997) T = 2495

#### Peak Hour of Adjacent Street Traffic One Hour Between 7 and 9 a.m.

Average Rate = 40.59T = 40.59 (3.997) T = 162

#### Peak Hour of Adjacent Street Traffic One Hour Between 4 and 6 p.m.

Average Rate = 49.29 T = 49.29 (3.997) T = 197

		Percent		Number	
Time Period	<b>Total Trips</b>	Enter	Exit	Enter	Exit
Weekday (24 hours)	2495	50%	50%	1248	1248
AM Peak Hour	162	50%	50%	81	81
PM Peak Hour	197	50%	50%	99	99

#### Pass-By Trips 65%

		Percent		Nun	nber
Time Period	<b>Total Trips</b>	Enter	Exit	Enter	Exit
Weekday (24 hours)	1622	50%	50%	811	811
AM Peak Hour	105	50%	50%	53	53
PM Peak Hour	128	50%	50%	64	64

### New Trips 35%

		Percent		Number	
Time Period	<b>Total Trips</b>	Enter	Exit	Enter	Exit
Weekday (24 hours)	873	50%	50%	437	437
AM Peak Hour	57	50%	50%	28	28
PM Peak Hour	69	50%	50%	34	34

	Salon 18)
Vehicle Trip Ends vs:	1000 Sq. Ft. GFA
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	1
1000 Sq. Ft. GFA:	4
Directional Distribution:	Not Available

Vehicle	Trip	Generation	per	1000	Sq. Fl	t. GFA	

Average Rate	Range of Rates	Standard Deviation
1.21	1.21 - 1.21	*

#### **Data Plot and Equation**

Caution – Small Sample Size



40 Trip Generation Manual 10th Edition • Volume 2: Data • Services (Land Uses 900–999)



	Salon 18)
Vehicle Trip Ends vs:	1000 Sq. Ft. GFA
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	1
1000 Sq. Ft. GFA:	4
Directional Distribution:	17% entering, 83% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.45	1.45 - 1.45	*

#### **Data Plot and Equation**

Caution - Small Sample Size





Trip Generation Manual 10th Edition • Volume 2: Data • Services (Land Uses 900–999)

41

	<b>I Restaurant</b> 30)
Vehicle Trip Ends vs:	1000 Sq. Ft. GFA
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	1
1000 Sq. Ft. GFA:	3
	67% entering, 33% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.07	2.07 - 2.07	*

#### **Data Plot and Equation**

Caution - Small Sample Size



#### 62 Trip Generation Manual 10th Edition • Volume 2: Data • Services (Land Uses 900–999)

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	al Restaurant 30)
Vehicle Trip Ends vs:	1000 Sq. Ft. GFA
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	15
1000 Sq. Ft. GFA:	3
Directional Distribution:	55% entering, 45% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
14.13	5.94 - 34.83	7.72

#### **Data Plot and Equation**





Trip Generation Manual 10th Edition • Volume 2: Data • Services (Land Uses 900–999)

63

## **Fast Casual Restaurant**

(930)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA On a: Weekday

#### Setting/Location: General Urban/Suburban

Number of Studies: 1 1000 Sq. Ft. GFA: 3 Directional Distribution: 50% entering, 50% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
315.17	315.17 - 315.17	230

#### **Data Plot and Equation**

Caution - Small Sample Size





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61

### **Coffee/Donut Shop with Drive-Through Window** (937)

#### Vehicle Trip Ends vs: 1000 Sq. Ft. GFA On a: Weekday

Setting/Location:	General Urban/Suburban

Number of Studies:	2
1000 Sq. Ft. GFA:	2
Directional Distribution:	50% entering, 50% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
820.38	738.66 - 869.00	*

#### **Data Plot and Equation**

Caution - Small Sample Size





## Coffee/Donut Shop with Drive-Through Window (937)

Vehicle Trip Ends vs:	1000 Sq. Ft. GFA
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	61
1000 Sq. Ft. GFA:	2
 Directional Distribution:	51% entering, 49% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Ĩ	Average Rate	Range of Rates	Standard Deviation
	88.99	18.32 - 353.57	48.19

#### **Data Plot and Equation**



#### 232 Trip Generation Manual 10th Edition • Volume 2: Data • Services (Land Uses 900–999)

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## Coffee/Donut Shop with Drive-Through Window (937)

Vehicle Trip Ends vs:	1000 Sq. Ft. GFA
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	26
1000 Sq. Ft. GFA:	2
Directional Distribution:	50% entering, 50% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation	
43.38	2.09 - 92.31	18.88	

#### **Data Plot and Equation**





## Medical-Dental Office Building (720)

#### Vehicle Trip Ends vs: 1000 Sq. Ft. GFA On a: Weekday

Number of Studies:	28	
1000 Sq. Ft. GFA:	24	
Directional Distribution:	50% entering, 50% exiting	

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
34.80	9.14 - 100.75	9.79

#### **Data Plot and Equation**



#### 152 Trip Generation Manual 10th Edition • Volume 2: Data • Office (Land Uses 700-799)



	20)
Vehicle Trip Ends vs:	1000 Sq. Ft. GFA
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	44
1000 Sq. Ft. GFA:	32
Directional Distribution:	78% entering, 22% exiting

1000

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#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

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Average Rate	Range of Rates	Standard Deviation
2.78	0.85 - 14.30	1.28

#### **Data Plot and Equation**





Medical-Dental Office Building (720)	
Vehicle Trip Ends vs:	1000 Sq. Ft. GFA
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	65
1000 Sq. Ft. GFA:	28
Directional Distribution:	28% entering, 72% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.46	0.25 - 8.86	1.58

### **Data Plot and Equation**



#### Trip Generation Manual 10th Edition • Volume 2: Data • Office (Land Uses 700-799) 154



# Convenience Market with Gasoline Pumps (853)

## Vehicle Trip Ends vs: 1000 Sq. Ft. GFA

On a: Weekday

Setting/Location:	General Urban/Suburban
oottingicooution	wonen en en en en en en en

Number of Studies:	34
1000 Sq. Ft. GFA:	3
Directional Distribution:	50% entering, 50% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
624.20	115.13 - 1167.27	283.35

#### **Data Plot and Equation**



ite=

# Convenience Market with Gasoline Pumps (853)

Vehicl	e Trip Ends vs:	1000 Sq. Ft. GFA
	On a:	Weekday,
		Peak Hour of Adjacent Street Traffic,
		One Hour Between 7 and 9 a.m.
Se	tting/Location:	General Urban/Suburban
Nu	mber of Studies:	57
10	00 Sq. Ft. GFA:	3
Directio	nal Distribution:	50% entering, 50% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
40.59	6.30 - 104.76	19.18

#### **Data Plot and Equation**



#### 336 Trip Generation Manual 10th Edition • Volume 2: Data • Retail (Land Uses 800-899)

ite=

# Convenience Market with Gasoline Pumps (853)

Vehicle Trip Ends vs:	1000 Sq. Ft. GFA
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	67
1000 Sq. Ft. GFA:	3
Directional Distribution:	50% entering, 50% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
49.29	9.66 - 115.71	22.49

#### **Data Plot and Equation**




Attachment 4
Signal Timing

19

TIME BY PHASE (SEC) & FUNCTIONS

ZONE: D

Ebenezer Road at Westland Drive (north)

INTERSECTION: INSTALLATION DATE: PROGRAMMED BY: NOTES:

## LOCAL CONTROLLER PROGRAMMING

PF < TRAFFIC 10

PEEK 3000 SERIES

PEEK 3000

MASTER LOCATION:

MASTER TYPE:



#### CONTROLLER OPTIONS

6	20						
	1.2.911	6	8				
3.0	3.0	3.0	3.0				
4.0	4.5	3.0	3.5				
2.0	1.5	2.5	2.0				
	7	7	7				
	18	26	25				
							-
				-			-
	_	_					
			-	-		_	
						_	
-	-	-		-	-		
							-
		-					
			_			-	_
-			-	-	-		-
						_	
		_					_
	4.0	4.0     4.5       2.0     1.5       7	4.0         4.5         3.0           2.0         1.5         2.5           7         7	4.0         4.5         3.0         3.5           2.0         1.5         2.5         2.0           7         7         7	4.0         4.5         3.0         3.5           2.0         1.5         2.5         2.0           7         7         7	4.0         4.5         3.0         3.5            2.0         1.6         2.5         2.0             7         7         7	4.0     4.5     3.0     3.5         2.0     1.5     2.5     2.0         7     7     7



KNOX COUNTY DEPARTMENT OF ENGINEERING AND PUBLIC WORKS

Sheet 1 of 4

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INTERSECTION: INSTALLATION DATE: PROGRAMMED BY: NOTES:

DETECTOR	SETTINGS
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PEEK 3000 SERIES

**DETECTION DATA** 

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LOOPS		-														
VIDEO																

# DETECTOR ASSIGNMENTS

19

DETECTOR	1	2	3	4	5	6	7	8
DETECTOR 1	x							
DETECTOR 2		x						
DETECTOR 3			x					
DETECTOR 4				x				
DETECTOR 5					x			
DETECTOR 6						x		
DETECTOR 7							x	
DETECTOR 8								х

# **DETECTOR MODES & TIMING**

DETECTOR	DETECTOR MODE	DELAY TIME	STRETCH/ STOP BAR
1			
2			
3			
4			
5			
6			
7			
8			

# **DELAY INHIBITS**

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DETECTOR 1																
DETECTOR 2																
DETECTOR 3																
DETECTOR 4																
DETECTOR 5			120													
DETECTOR 6																
DETECTOR 7																
DETECTOR 8																



KNOX COUNTY DEPARTMENT OF ENGINEERING AND PUBLIC WORKS

Sheet 2 of 4

19

ZONE: D

Ebenezer Road at Westland Drive (north)

PHASE

PHASE 1 PHASE 2 PHASE 3 PHASE 4 PHASE 5 PHASE 6 PHASE 7 PHASE 8

INTERSECTION: INSTALLATION DATE: PROGRAMMED BY: NOTES:

Offset is referenced at beginning of yellow

PHASE	1	2	3	4	5	6	7	8
CYCLE 1/SPLIT 1	16	66	13	15	16	66	13	15
CYCLE 1/SPLIT 2								
CYCLE 2/SPLIT 1	30	46	15	29	30	46	15	29
CYCLE 2/SPLIT 2								
CYCLE 3/SPLIT 1	16	34	20	20	16	34	20	20
CYCLE 3/SPLIT 2								
CYCLE 4/SPLIT 1								
CYCLE 4/SPLIT 2								

# COORDINATION AND OPERATION



		DY	NAMI	сом	ITS			
PHASE/OVL	1/A	2/B	3/C	4/D	5/E	6/F	7/G	8/H
OMIT PHASE								
IF PHASE OR OVL ON								
OMIT PHASE								
IF PHASE OR OVL ON								
OMIT PHASE								
IF PHASE OR OVL ON								
OMIT PHASE								
IF PHASE OR OVL ON								

8

#### **OPERATING MODE**

FUNCTION	
AUTO PERM	
END OF MAIN ST	
ENHANCED PERM	
FIXED FORCE OFF	
YELLOW OFFSET	
CENTRAL OVERIDE	
NO PCL OFFSET ADJ	
OFFSET ENTRY IN %	
PERM-PA ENTRY IN %	
INVERT FREE IN	
SPLIT MATRIX	
4 SPLITS / CYCLE	
NO EARLY COORD PED	
CYCLE SOURCE	
SPLIT SOURCE	
OFFSET SOURCE	
FREE SOURCE	
FLASH SOURCE	
INTER. TOD REVERT	
TYPE OF PERM	
OFFSET SEEKING	
PED PERMISSIVE	
YIELD PERCENT	

## CYCLE LENGTH / DWELL / OFFSETS

CYCLE	1	2	3	4	5	6
CYCLE LENGTH	110	120	90			
MAX DWELL						
OFFSET 1	21	47	40			
OFFSET 2						
OFFSET 3						
OFFSET 4		in the				
OFFSET 5						

# PHASE REVERSAL

PATTERN	MODE	PHASES			
	MODE	LEAD	LAG		
_	_				

#### 

# Image: selection of the selection

#### COORD. PHASES

CYCLE	PHAS BE C	ES TO OORD
1	2	6
2		
3		
4		
5		
6		

## CYCLE / OFFSET / SPLIT / FREE TO TOD CIRCUITS

PLAN	С	/0/8	S / FRE	E	CKT	СКТ	СКТ	СКТ
1								
2								



KNOX COUNTY DEPARTMENT OF ENGINEERING AND PUBLIC WORKS

Sheet 3 of 4



ZONE: D

Ebenezer Road at Westland Drive (north)



TRAFFIC

PEEK 3000 SERIES

INTERSECTION: INSTALLATION DATE: PROGRAMMED BY: NOTES:

NOTES:

#### WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
1	2	1	1	1	1	1	2
2							
3							
4							
5							

## DAYLIGHT SAVINGS

	MONTH	W-O-M
SPRING	3	2
FALL	11	1

## CIRCUIT OVERRIDES

скт	SYM	ON/OFF/TOD

# TIME DEPENDENT

KEF
HH:MM





#### KNOX COUNTY DEPARTMENT OF ENGINEERING AND PUBLIC WORKS

DAY PLAN EVENTS

DAT FEAN EVENTS												
PLAN	HH:MM	CKT PLAN	C/O/S	скт	ON/OFF							
1	00:00	FREE										
1	06:30		1/1/1									
1	09:30		3/1/1									
1	14:30		2/1/1									
1	18:00		3/1/1									
1	21:00	FREE										
2	00:00	FREE										
2	09:00		3/1/1									
2	19:00	FREE										

#### Sheet 4 of 4

20

ZONE:

Ebenezer Road at Westland Drive (south)

INTERSECTION: INSTALLATION DATE: PROGRAMMED BY: NOTES:



PEEK 3000 SERIES

PEEK 3000

MASTER LOCATION:

MASTER TYPE:



WALK

PHASING SEQUENCE

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#### TIME BY PHASE (SEC) & FUNCTIONS

PHASE	1	2	3	4	5	6	7	8
INITIAL	6	16		8		16		
PASSAGE	3.0	5.0		3.0		5.0		
YELLOW	4.0	4.0		4.0		4.0		
RED CLEAR	2.0	2.0		2.0		2.0		
WALK		7		7				
PED CLEAR		23		22				
MAX 1	20	40		20		40		
MAX 2	12	20		20		20		
MAX 3 LIMIT								
MAX 3 ADJUST								
CNA 1								
CNA 2		-						
WALK REST MOD.								
FLASH WALK								
INHIBIT MAX								
PED RECYCLE						1		
MIN RECALL								
MAX RECALL								
PED RECALL								
SOFT RECALL								
NON-LOCK								
VEHICLE OMIT								
PED OMIT								
MAX OUTS		-		-				
TO ADJ MAX 3				_	_		1	-
GAP OUTS TO ADJ MAX 3								



KNOX COUNTY DEPARTMENT OF ENGINEERING AND PUBLIC WORKS

Sheet 1 of 4

1

WALK

DONT

# CONTROLLER OPTIONS



INTERSECTION: INSTALLATION DATE: PROGRAMMED BY: NOTES:

# **DETECTOR SETTINGS**



PEEK 3000 SERIES

# **DETECTION DATA**

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LOOPS																
VIDEO																

# DETECTOR ASSIGNMENTS

20

DETECTOR	1	2	3	4	5	6	7	8
DETECTOR 1	х							
DETECTOR 2		x						
DETECTOR 3			x					
DETECTOR 4				х				
DETECTOR 5					x			
DETECTOR 6						x		
DETECTOR 7							x	
DETECTOR 8		-						x

## **DETECTOR MODES & TIMING**

DETECTOR	DETECTOR MODE	DELAY TIME	STRETCH/ STOP BAR
1			
2			
3			
4			
5			
6			
7			
8			

# **DELAY INHIBITS**

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DETECTOR 1																
DETECTOR 2																
DETECTOR 3																
DETECTOR 4																
DETECTOR 5																
DETECTOR 6																
DETECTOR 7																
DETECTOR 8																



KNOX COUNTY DEPARTMENT OF ENGINEERING AND PUBLIC WORKS

20

ZONE: D Ebenezer Road at Westland Drive (south)

INTERSECTION: INSTALLATION DATE: PROGRAMMED BY: NOTES:

Offset is referenced at beginning of yellow

	HAS	EALL	UCA	TIONS	(SEC	<u>~</u>		
PHASE	1	2	3	4	5	6	7	8
CYCLE 1/SPLIT 1	18	58		34		76		34
CYCLE 1/SPLIT 2					4			
CYCLE 2/SPLIT 1	15	85		20		100		20
CYCLE 2/SPLIT 2								
CYCLE 3/SPLIT 1	18	44		28		62		28
CYCLE 3/SPLIT 2								
CYCLE 4/SPLIT 1								
CYCLE 4/SPLIT 2							14	

#### CYCLELENGTH / DWELL / OFFSETS

CYCLE	1	2	3	4	5	6
CYCLE LENGTH	110	120	90			
MAX DWELL						
OFFSET 1	31	76	44			
OFFSET 2						
OFFSET 3						
OFFSET 4						1
OFFSET 5						

# PHASES PATTERN MODE LEAD LAG

PHASE REVERSAL

COC	DRD.	PHAS	SES
01/0		PHAS	ES TO
CYC	LE	BE C	OORD

		E	UAL	ENTR	Y			
PHASE	1	2	3	4	5	6	7	8
PHASE 1								
PHASE 2								
PHASE 3								
PHASE 4								
PHASE 5								
PHASE 6				-				
PHASE 7								
PHASE 8	_							

CYCLE	PHASES TO BE COORD				
1	2	6			
2					
3					
4					
5					
6					

## CYCLE / OFFSET / SPLIT / FREE TO TOD CIRCUITS

PLAN	С	101	S / FRE	E	CKT	СКТ	СКТ	скт
1								I. T
2								



KNOX COUNTY DEPARTMENT OF ENGINEERING AND PUBLIC WORKS

DYNAMIC OMITS

PHASE/OVL	1/A	2/B	3/C	4/D	5/E	6/F	7/G	8/H
OMIT PHASE								1
IF PHASE OR OVL ON								
OMIT PHASE								
IF PHASE OR OVL ON								
OMIT PHASE								
IF PHASE OR OVL ON								
OMIT PHASE								
IF PHASE OR OVL ON								

COORDINATION AND OPERATION

TRAFFIC

PEEK 3000 SERIES

EK

PE

#### **OPERATING MODE**

OPERATING WC	
FUNCTION	
AUTO PERM	
END OF MAIN ST	
ENHANCED PERM	
FIXED FORCE OFF	
YELLOW OFFSET	
CENTRAL OVERIDE	
NO PCL OFFSET ADJ	
OFFSET ENTRY IN %	
PERM-PA ENTRY IN %	
INVERT FREE IN	
SPLIT MATRIX	
4 SPLITS / CYCLE	
NO EARLY COORD PED	
CYCLE SOURCE	
SPLIT SOURCE	
OFFSET SOURCE	
FREE SOURCE	
FLASH SOURCE	
INTER. TOD REVERT	
TYPE OF PERM	
OFFSET SEEKING	
PED PERMISSIVE	
YIELD PERCENT	







## Ebenezer Road at Westland Drive (south)



PEEK 3000 SERIES

INTERSECTION: INSTALLATION DATE: PROGRAMMED BY:

NOTES:

## WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
1	2	1	1	1	1	-	2
2							
3							
4							
5							

## DAYLIGHT SAVINGS

	MONTH	W-O-M	
SPRING	3	2	
FALL	11	1	

## **CIRCUIT OVERRIDES**

скт	SYM	ON/OFF/TOD

# 00:00 FREE 1 1/1/1 1 06:30 09:30 3/1/1 1 2/1/1 1 14:30 18:00 3/1/1 1 21:00 FREE 1 2 00:00 FREE 09:00 3/1/1 2 2 19:00 FREE

#### TIME DEPENDENT SYNC REF

CYCLE	HH:MM
1	
2	
3	
4	
5	
6	
SYNC REF	





#### KNOX COUNTY DEPARTMENT OF ENGINEERING AND PUBLIC WORKS

Sheet 4 of 4

# DAY PLAN EVENTS

C/0/S

СКТ

ON/OFF

CKT PLAN

HH:MM

PLAN

		псэ	7 Sig	nalize	ea int	ersec		lesu	115 31	Immar	у				
Concret Inform	ation							1	Interes	otion Inf	o rm oti			4 년 49 1	b. L.
General Inform	ation									ction Inf	V	on	-	444	
Agency		FMA		A	in Date	E 10 4 10	040		Duratio		0.25	-	_		K_
Analyst		Addie Kirkham		1		e 5/31/2			Area Ty	/pe	Other	-			*
Jurisdiction		Knox County		Time F			ng AM F	'еак	PHF	<b>D</b> : 1	0.93		<b>XX</b>	W + E 0	+ + +
Urban Street		Ebenezer Road	A			2018			-	s Period	1> 7:0	00			<u>بر</u>
Intersection		Ebenezer Road at \		File Na		Existii	ng AM P	'eak_	Westlan	d (north)	.xus		_	<u>1111</u>	
Project Descrip	tion	223.013 The Cresc	ent at E	beneze	r									IN I 47	
Demand Inform	nation				EB			W	В		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			2	0	3	235	2	33	7 3	1560	360	122	614	0
·										<u> </u>					
Signal Informa	r			-	216	11	1			$\geq$					Ð-
Cycle, s	110.0	Reference Phase	2			51	۶Ŕ,	F	2	2		1	$\mathbf{Y}_{2}$ -	3	4
Offset, s	0	Reference Point	End	Green	5.9	65.1	0.6	0.3		.1 0.0					
Uncoordinated	No	Simult. Gap E/W	Off	Yellow		4.5	3.5	0.0	) 3.5	5 0.0				$\sim$	
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	2.0	2.0	0.0	) 2.(	) 0.0		5	6	7	
Timer Results				EBI		EBT	WB		WBT	NB		NBT	SBI		SBT
				3		8	7		<u>vvы</u> 4	IND		2	1	-	6
Assigned Phase	8					-				-					-
Case Number				1.2	_	4.0	1.3		4.0	+	_	5.3	1.0		4.0
Phase Duration	-	<b>`</b>		6.4 6.0		6.1	21.9		21.6		$\rightarrow$	71.6	10.4		82.0
-	hange Period,(Y+R c), s lax Allow Headway(MAH), s					5.5	6.0		6.0 4.3	-		6.5	4.5		6.5
Queue Clearan		· ·		3.9 2.1		4.4 2.2	4.3 4.6		4.3	-		0.0	4.1 5.0		0.0
Green Extensio				0.0		0.0	1.9		0.0	-		0.0	0.2		0.0
Phase Call Pro		(ge), s		0.06		0.09	1.00		1.00			0.0	0.2		0.0
Max Out Proba	-			0.00		0.09	0.09		1.00	-			0.90		
	onity			0.07		0.14	0.03	<b>,</b> 1	1.00				0.10		
Movement Gro	oup Res	sults			EB			WE	}		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow I	Rate ( v	), veh/h		2	3		253	328	;	3	1677	387	131	660	0
Adjusted Satura	ation Flo	ow Rate ( s ), veh/h/l	n	1781	1585		1730	158	7	774	1781	1585	1781	1870	0
Queue Service	Time ( g	gs), s		0.1	0.2		2.6	15.6	3	0.1	29.4	5.4	3.0	2.2	0.0
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		0.1	0.2		2.6	15.6	3	0.1	29.4	5.4	3.0	2.2	0.0
Green Ratio (g	,			0.00	0.01		0.15	0.14	ł	0.59	0.59	0.74	0.66	0.69	
Capacity (c), v	/eh/h			72	8		632	225		524	2108	1168	257	2568	
Volume-to-Capa	acity Ra	tio (X)		0.030	0.397		0.400	1.45	6	0.006	0.796	0.331	0.511	0.257	0.000
Back of Queue	(Q), ft/	(In ( 95 th percentile)		2.8	7		129.6	802.	3	0.9	264.4	170.8	63.3	31.6	0
Back of Queue	(Q), ve	eh/In ( 95 th percenti	le)	0.1	0.3		5.1	31.6	3	0.0	10.4	6.7	2.5	1.2	0.0
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.11	0.00		0.30	0.00	)	0.01	0.00	0.74	0.45	0.00	0.00
Uniform Delay	(d1), s/	/veh		54.5	54.5		38.3	44.6	6	4.7	7.8	12.7	14.3	1.6	
Incremental De	lay ( d 2	), s/veh		0.2	28.5		0.4	228.	3	0.0	3.2	0.8	1.6	0.2	0.0
Initial Queue De	elay ( <i>d</i>	з), s/veh		0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	ontrol Delay ( $d$ ), s/veh			54.7	82.9		38.7	272.	9	4.8	11.0	13.5	15.9	1.8	
Level of Service	evel of Service (LOS)			D	F		D	F		А	В	В	В	Α	
Approach Delay	Approach Delay, s/veh / LOS			71.6	5	E	171.	0	F	11.	5	В	4.1		A
Intersection De	Intersection Delay, s/veh / LOS					36	6.8						D		
					_										
	Multimodal Results				EB			WE		<u> </u>	NB	_		SB	_
	edestrian LOS Score / LOS					C	2.9		C	2.4		B	2.2	_	B
Bicycle LOS So	ore / LC	15		0.5		A	1.4		A	2.2		В	1.1		A

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HCS7<sup>™</sup> Streets Version 7.2.1

		HCS	1 SIG	nalize	a int	tersec	tion R	esi	lits	s sur	nmar	У				
Concret Inform	otion								In	101000	ion Inf	o rm otic			4741	ba L
General Inform	nation								<u> </u>			ormatic	on	- 1	44	4- <u>7</u>
Agency		FMA								uration,		0.25				R.
Analyst		Addie Kirkham				e May 3			<u> </u>	rea Typ	e	Other				4
Jurisdiction		Knox County		Time P			ng AM P	eak		HF		0.89			W + E	\$ →
Urban Street		Ebenezer Road				r 2018				nalysis		1> 7:0	00			म भ
Intersection		Ebenezer Road at \				Existir	ng AM P	eak_	We	estland	(south).	.xus			<u>1</u> ††	
Project Descrip	tion	223.013 The Cresco	ent at E	benezer											14149	1
Demand Inform	nation				EB			١٨	/B			NB			SB	
Approach Move				L	Т	R	L	_	т Т	R	L	T	R	L	T	R
Demand (v), v				582	<u> </u>	27		-			131	1149	_	<u> </u>	517	334
Demand ( V), V	CII/II			302		21					101	1140			011	004
Signal Informa	ation					1										
Cycle, s	110.0	Reference Phase	2	1	5 54		E.							<b>N</b>	-	$\prec$
Offset, s	0	Reference Point	End	Green		59.5	23.6	0.	^	0.0	0.0		1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		4.0	4.0	0.		0.0	0.0			L	~	
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.		0.0	0.0	-7	5	6	7	8
Timer Results				EBL	-	EBT	WBI	L	V	VBT	NBI		NBT	SBL	_	SBT
Assigned Phas	е					4					5		2			6
Case Number						9.0					1.0		4.0			8.3
Phase Duration	·					29.6					14.9	)	80.4			65.5
Change Period	nange Period, (Y+R c), s					6.0					6.0		6.0			6.0
Max Allow Hea	dway( <i>I</i>	<i>MAH</i> ), s				4.1					4.1		0.0			0.0
Queue Clearan	ce Time	e ( g s ), s				21.9					5.6					
Green Extensio	on Time	(g <sub>e</sub> ), s				1.7					0.3		0.0			0.0
Phase Call Pro	bability					1.00					0.99	9				
Max Out Proba	bility					0.53					0.00	)				
Mayamant Cr					<b>ED</b>			10/1	D			ND			00	
Movement Gro	-	suits			EB T	R		WI T	В	R		NB T	R	L	SB T	R
Approach Move				L 7	1	14	L		$\rightarrow$	ĸ	L 5	2	ĸ		6	16
		·) · · · · · · · · · · · · · · · · · ·												<u> </u>		
Adjusted Flow		•		654		30			$\rightarrow$		147	1291		<u> </u>	512	444
-		w Rate (s), veh/h/l	n	1730		1585					1781	1781			1870	1624
Queue Service		<b>-</b>		19.9		1.4			$\rightarrow$		3.6	7.5			20.5	13.2
Cycle Queue C		e Time ( <i>g c</i> ), s		19.9		1.4					3.6	7.5			20.5	13.2
Green Ratio ( g Capacity ( c ), v	· /			0.21		0.30			$\rightarrow$		0.64	0.68			0.54	0.54
Volume-to-Cap		tio (V)		741		468			+		418	2410			1013	879
·	· ·	(In ( 95 th percentile)		0.883 343.6		0.065			$\rightarrow$		0.352 58.4	0.536 80.7			0.506	0.506
		eh/In ( 95 th percentie)		13.5		0.9			+		2.3	3.2		<b></b>	8.1	7.3
		RQ) (95 th percent	,	1.25		0.9			+		0.61	0.00			0.00	0.00
			liie)						-					<u> </u>		
Uniform Delay				38.0		25.3			$\rightarrow$		10.5	2.1			8.9	8.9
Incremental De				9.3		0.1			-		0.5	0.9			1.8	2.1
Initial Queue D		•		0.0		0.0			_		0.0	0.0			0.0	0.0
Control Delay (				47.3		25.4			-		11.0	3.0			10.7	10.9
Level of Service		/1.08		D 46.2		C	0.0				B	A	Δ	10.0	B	B
Approach Dela	-			46.3		D	0.0				3.8		A	10.8	5	В
Intersection De	iay, s/ve	en / LOS				15	0.4							В		
Multimodal Re	sulte				EB			W	R			NB			SB	
		/105		2.9		С	2.7		5	С	0.7		А	2.4		В
				2.5		F	<u> </u>			~	1.7	_	В	1.3		A
210,010 200 00	strian LOS Score / LOS le LOS Score / LOS					•					1.1		5	1.5		

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General Information Agency         FMA Addis (Kitham         Analysis Date [531/2018         FMA FMA         Duration, h         0.25           Analysis         Addis (Kitham         Analysis Date [531/2018         Amalysis Parel Difference Parel Difference         0.97         Unit official Difference <th></th> <th></th> <th>псэ</th> <th>7 SIG</th> <th>nalize</th> <th>a int</th> <th>ersec</th> <th></th> <th>tesu</th> <th>iits 5</th> <th>umn</th> <th>nary</th> <th>/</th> <th></th> <th></th> <th></th> <th></th>			псэ	7 SIG	nalize	a int	ersec		tesu	iits 5	umn	nary	/				
Decrete introvince intermation         Interaction intermation         Interaction intermation         Interaction         Interac	O an anal hufam	(!								Intere	!				1 0	el Leta I	Niti
Analysic         Parial         Parial         Dimer         Dimer <thdimer< th=""> <thdi< td=""><td></td><td>hation</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>n</td><td>- 1</td><td></td><td></td></thdi<></thdimer<>		hation												n	- 1		
Jurisdetion       Knox County       Time Pend       Existing PM Peak       PHF       0.97         Uban Street       Ebenezer Road       analysis Var       2018       Analysis Period       1> 7.00         Intersaction       Ebenezer Road       at West       File Name       Existing PM Peak       NB       NB       NB         Project Description       223.013 The Crescent at Ebenezer       E       VB       NB       NB <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>E 10 A 10</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td>R.</td>							E 10 A 10								1		R.
Uhan Street       Ebenezer Road       Analysis Plaz       2018       Analysis Period       1>7.00         Intersection       Ebenezer Road at Westl       File Name       Existing PM Peak, Westland (north).us       S         Perioet Description       223.013 The Cressont at Ebenezer       Ebenezer Road       No       N					1						уре				-		→ 
Intersection       Elemezer Road at Westi       File Name       Existing PM Peak_Westiand (north).sus       Image Project Description       Image Project Descript			,					ng PM F	'eak							w+== 0	
Project Description         223.013 The Crescent at Ebenezer         EB         V/B         NB         SB           Approach Movement         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         R         L         T         R         L         T         R         L         T         R         L         R         L         R         L         R         L         R         L         R														00			¥ •
Demand Information         EB         WB         NB         SB           Approach Movement         L         T         R         R         T							Existi	ng PM F	eak_	Westla	nd (no	orth).	kus			<u>1111</u>	
Approach Movement       L       T       R <thl< th=""> <thl< th=""> <thl< th=""></thl<></thl<></thl<>	Project Descrip	tion	223.013 The Cresc	ent at E	beneze	r										14147	
Demand ( v), velvh         3         1         2         499         1         177         9         903         356         334         1208         6           Signal Information Cycle, s         120.0         Reference Phase         2         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         4         0.0         7         3         1.7         4         0.0         1.3         4.0         5.3         1.0         4.0         4.0         4.0         4.3         4.0         5.3         1.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0<	Demand Inform	nation				EB			W	B			NB			SB	
Signal Information Cycle, s         120.0         Reference Phase         2           Offset, s         0         Reference Phase         2           Offset, s         0         Reference Pint         Edb         66         0.6         0.5         17.4         0.0           Force Mode         Fixed         Simult. Gap EW         On         Red         1.5         2.0         1.0         2.0         1.0           Timer Results         EBL         EBT         WBL         WBT         NBL         NBT         SBL         SBT           Assigned Phase         3         8         7         4         2         1         6           Case Number         1.2         4.0         1.3         4.0         5.3         1.0         4.0           Phase Duration, s         6.6         6.1         1.24         4.2         0.0         4.1         0.0           Queue Clearance Time (g +), s         3.9         4.3         4.2         4.2         0.0         1.3         0.0           Max Allow Headway (MAH), s         3.9         4.3         4.2         4.2         0.0         1.3         0.0           Phase Call Probabiliy         0.10         0.10	Approach Move	ement			L	Т	R	L	٦	- F	र	L	Т	R	L	Т	R
	Demand (v), v	reh/h			3	1	2	499	1	17	77	9	903	356	334	1208	6
						1 111		-			_						_
Offset s         O         Reference Point         End Uncoordinated         Samut. Gap EW         Off Yellow         3.0         4.5         3.5         0.0         1.0         4.0         1.3         4.0         5.3         1.0         4.0         4.0         1.3         4.0         5.3         1.0         4.0         4.0         1.0         4.0         1.0         4.0         1.				-	-	245	- Refer	2	La				ļ		-		$\rightarrow$
Onset, so         O         Relation of Market Set W         O         Relation of Market Set W         O         Solution of Market Set W         O         Relation of Market Set W         O         Set W         Set W </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>51</td> <td>₽Ŕ –</td> <td>Г</td> <td>2</td> <td>2</td> <td></td> <td></td> <td>1</td> <td><b>Y</b><sub>2</sub>-</td> <td>3</td> <td>4</td>							51	₽Ŕ –	Г	2	2			1	<b>Y</b> <sub>2</sub> -	3	4
Force Mode       Fixed       Simult. Gap N/S       On       Red       1.5       2.0       2.0       0.0       4.0       0.0       0.0       2.0       0.0       4.0       4.0       4.0       4.0       4.0       4.0       4.0       4.0       4.0       4.0       4.0       4.0       4.0       4.0       4.0       0.0       4.0       4.0       4.0       4.0       4.0       4.0       4.0       0.0       4.0       4.0       4.0       6.0       6.5       4.5       6.5       6.5       4.0       4.0       0.0       4.0       4.0       6.0       6.0       6.0       6.0 <th< td=""><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td>0.5</td><td></td><td></td><td>0.0</td><td></td><td></td><td></td><td></td><td></td></th<>		-							0.5			0.0					
Timer Results         EBL         EBL         WBL         WBT         NBL         NBT         SBL         SBT           Assigned Phase         3         8         7         4         2         1         6           Case Number         1.2         4.0         1.3         4.0         5.3         1.0         4.0           Phase Duration, s         6.6         6.1         23.4         22.9         73.1         17.4         90.5           Change Period (J YHz), s         3.9         4.3         4.2         4.2         0.0         4.1         0.0           Queue Clearance Time (g *), s         0.0         0.00         2.6         2.7         0.0         1.3         0.0           Max Out Probability         0.10         0.10         0.00         0.02         0.01         0.00         1.00         -         1.00         -           Max Out Probability         0.00         0.00         0.00         0.00         0.00         0.00         0.00         -         1.00         -         Asigned Movement         1         1         T         R         L         T         R         1.6         1.6         1.6           Adjusted Flow Rasults<	L		· · ·														
Assigned Phase       3       8       7       4 $\blacksquare$ 2       1       6         Case Number       1.2       4.0       1.3       4.0       5.3       1.0       4.0         Phase Duration, s       6.6       6.1       23.4       22.9       73.1       17.4       90.5         Change Period, (Y+R c), s       6.0       5.5       6.0       6.0       6.5       4.5       6.5         Max Alow Headway (MAH), s       3.9       4.3       4.2       4.2       0.0       4.1       0.0         Queue Clearance Time (g *), s       0.0       0.0       2.2       14.8       12.3       11.6       -         Green Extension Time (g *), s       0.00       0.00       0.02       0.01       1.00       -       0.00       1.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -	Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	2.0	2.0	0.0	)  2.	0	0.0		5	6	7	8
Assigned Phase       3       8       7       4 $\blacksquare$ 2       1       6         Case Number       1.2       4.0       1.3       4.0       5.3       1.0       4.0         Phase Duration, s       6.6       6.1       23.4       22.9       73.1       17.4       90.5         Change Period, (Y+R c), s       6.0       5.5       6.0       6.0       6.5       4.5       6.5         Max Alow Headway (MAH), s       3.9       4.3       4.2       4.2       0.0       4.1       0.0         Queue Clearance Time (g *), s       0.0       0.0       2.2       14.8       12.3       11.6       -         Green Extension Time (g *), s       0.00       0.00       0.02       0.01       1.00       -       0.00       1.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -       0.00       -	Timer Reculto				EDI		EDT	\//P		\//DT		NDI		NDT	CDI		SPT
Case Number         1.2         4.0         1.3         4.0 $\blacksquare$ 5.3         1.0         4.0           Phase Duration, s         6.6         6.1         23.4         22.9         73.1         17.4         90.5           Change Period, (Y+R_c), s         6.0         5.5         6.0         6.0         6.5         4.5         6.5           Max Allow Headway (MAH), s         3.9         4.3         4.2         4.2         0.0         4.1         0.0           Queue Clearance Time (g *), s         0.0         0.0         2.6         2.7         0.0         1.3         0.0           Phase Call Probability         0.10         0.10         0.00         0.02         0.01         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         0.00         0.02         0.01         1.00						-					+-	INDL					
Phase Duration, s       6.6       6.1       23.4       22.9       73.1       17.4       90.5         Change Period, (YAR), s       6.0       5.5       6.0       6.0       6.5       4.5       6.5         Max Allow Headway (MAH), s       3.9       4.3       4.2       4.2       0.0       4.1       0.0         Queue Clearance Time (g o), s       0.2       14.8       12.3       11.6       1.00       0.0P         Green Extension Time (g o), s       0.0       0.0       2.6       2.7       0.0       1.3       0.0         Max Out Probability       0.10       0.10       1.00       0.99	-	e					-	· · ·			+		_				-
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									_		+						
Max Allow Headway (MAH), s       3.9       4.3       4.2       4.2       4.2       0.0       4.1       0.0         Queue Clearance Time (g $\varepsilon$ ), s       2.2       2.2       14.8       12.3       Image Clearance Time (g $\varepsilon$ ), s       0.0       11.6       Image Clear Clearance Time (g $\varepsilon$ ), s       0.0       0.0       2.6       2.7       0.0       1.3       0.0         Max Out Probability       0.00       0.00       0.00       0.02       0.01       0.00       0.01       0.00       0.01       0.00       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01			<b>`</b>			_					+		_				
Queue Clearance Time ( $g \circ$ ), s         2.2         14.8         12.3         Image: Second S	-	• · ·									+		_				
Green Extension Time ( $g \circ$ ), s         0.0         0.0         2.6         2.7         0.0         1.3         0.0           Phase Call Probability         0.0         0.01         1.8         0.01         1.8         0.01         1.8         0.01         1.8         0.01         1.8         0.01         1.8         0.01         1.8         0.01         1.8         0.01         1.8         0.01         1.8         0.01         1.8         0.01         1.8         0.01         1.8         0.01         0.01         1.8         0.01         1.8         0.01         1.8         0.01											+			0.0			0.0
Phase Call Probability       0.10       1.00       0.99       Image: Call Probability       1.00       1.											+		_	0.0			0.0
Max Out Probability0.000.000.000.020.01 $\blacksquare$ <			(ge), s								+		_	0.0			0.0
Movement Group Results       L       T       R <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>_</td> <td></td> <td>+</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		-							_		+						
Approach MovementLTR </td <td>Max Out Proba</td> <td>DIIITY</td> <td></td> <td></td> <td>0.00</td> <td>)</td> <td>0.00</td> <td>0.02</td> <td>2</td> <td>0.01</td> <td></td> <td></td> <td></td> <td></td> <td>0.00</td> <td>)</td> <td></td>	Max Out Proba	DIIITY			0.00	)	0.00	0.02	2	0.01					0.00	)	
Assigned Movement3818741452121616Adsigned Flow Rate (v), veh/h335141469931367344626625Adjusted Saturation Flow Rate (s), veh/h/ln178116701730158744417811585178118701867Queue Service Time (g e), s0.20.212.810.30.712.57.09.64.84.8Cycle Queue Clearance Time (g e), s0.010.0150.140.560.560.700.680.700.70Capacity (c), veh/h6986222243061977111052213.091307Volume-to-Capacity Ratio (X)0.0450.3770.8270.550.0300.4710.310.6590.4780.478Back of Queue (Q), tyln (95 th percentile)4.5729.81863.7182.167.1148.86669Back of Queue (Q), s/veh0.950.370.8270.6580.000.040.000.291.060.000.00Uniform Delay (d 1), s/veh59.359.445.046.07.08.68.59.31.41.4Intial Queue Delay (d 3), s/veh0.00.00.00.00.00.00.00.00.00.00.0Intiral Queue Delay, s/veh / LOSEFDDAAA <td< td=""><td>Movement Gro</td><td>oup Res</td><td>sults</td><td></td><td></td><td>EB</td><td>_</td><td></td><td>WE</td><td>3</td><td>T</td><td></td><td>NB</td><td></td><td></td><td>SB</td><td></td></td<>	Movement Gro	oup Res	sults			EB	_		WE	3	T		NB			SB	
Adjusted Flow Rate (v), veh/h335141469931367344626625Adjusted Saturation Flow Rate (s), veh/h/ln178116701730158744417811585178118701867Queue Service Time (g $\circ$ ), s0.20.212.810.30.712.57.09.64.84.8Cycle Queue Clearance Time (g $\circ$ ), s0.20.212.810.30.712.57.09.64.84.8Green Ratio (g/C)0.010.000.150.140.560.560.700.680.700.70Capacity (c), veh/h6986222243061977111052213.091307Volume-to-Capacity Ratio (X)0.0450.3770.8270.6550.0300.4710.3310.6590.4780.478Back of Queue (Q), veh/ln (95 th percentile)0.20.311.47.30.17.22.65.92.72.7Queue Storage Ratio (RQ) (95 th percentile)0.180.000.680.000.040.000.000.00Uniform Delay (d $\tau$ ), s/veh0.326.32.93.20.20.80.81.41.31.3Intital Queue Delay (d $z$ ), s/veh0.00.00.00.00.00.00.00.00.00.0Control Delay, s/veh / LOSEFDDAAABAA </td <td>Approach Move</td> <td>ement</td> <td></td> <td></td> <td>L</td> <td>Т</td> <td>R</td> <td>L</td> <td>Т</td> <td>R</td> <td></td> <td>L</td> <td>Т</td> <td>R</td> <td>L</td> <td>Т</td> <td>R</td>	Approach Move	ement			L	Т	R	L	Т	R		L	Т	R	L	Т	R
Adjusted Saturation Flow Rate (s), veh/h/ln       1781       1670       M       1730       1587       M       444       1781       1585       1781       1870       1867         Queue Service Time (gs), s       0.2       0.2       12.8       10.3       0.7       12.5       7.0       9.6       4.8       4.8         Cycle Queue Clearance Time (gc), s       0.2       0.2       12.8       10.3       0.7       12.5       7.0       9.6       4.8       4.8         Green Ratio (g/C)       0.01       0.00       0.01       0.14       0.15       0.14       0.56       0.56       0.70       0.68       0.70       1307         Volume-to-Capacity Ratio (X)       0.045       0.377       0.827       0.655       0.030       0.471       0.331       0.659       0.478       0.478         Back of Queue (Q), th/ln (95 th percentile)       4.5       7       29.8       186       3.7       182.1       67.1       148.8       68       66.9         Back of Queue (Q), th/ln (95 th percentile)       0.2       0.3       11.4       7.3       0.1       7.2       2.6       5.9       2.7       2.7         Queue Storage Ratio (RQ) (95 th percentile)       0.1       0.0	Assigned Move	ment			3	8	18	7	4	14		5	2	12	1	6	16
Adjusted Saturation Flow Rate (s), veh/h/ln       1781       1670       M       1730       1587       M       444       1781       1585       1781       1870       1867         Queue Service Time (gs), s       0.2       0.2       12.8       10.3       0.7       12.5       7.0       9.6       4.8       4.8         Cycle Queue Clearance Time (gc), s       0.2       0.2       12.8       10.3       0.7       12.5       7.0       9.6       4.8       4.8         Green Ratio (g/C)       0.01       0.00       0.01       0.14       0.15       0.14       0.56       0.56       0.70       0.68       0.70       1307         Volume-to-Capacity Ratio (X)       0.045       0.377       0.827       0.655       0.030       0.471       0.331       0.659       0.478       0.478         Back of Queue (Q), th/ln (95 th percentile)       4.5       7       29.8       186       3.7       182.1       67.1       148.8       68       66.9         Back of Queue (Q), th/ln (95 th percentile)       0.2       0.3       11.4       7.3       0.1       7.2       2.6       5.9       2.7       2.7         Queue Storage Ratio (RQ) (95 th percentile)       0.1       0.0	Adjusted Flow I	Rate ( v	), veh/h		3	3		514	146	;		9	931	367	344	626	625
Queue Service Time ( $g_{5}$ ), s       0.2       0.2       12.8       10.3       0.7       12.5       7.0       9.6       4.8       4.8         Cycle Queue Clearance Time ( $g_{c}$ ), s       0.2       0.2       12.8       10.3       0.7       12.5       7.0       9.6       4.8       4.8         Green Ratio ( $g/C$ )       0.01       0.00       0.15       0.14       0.56       0.56       0.70       0.68       0.70       0.70         Capacity (c), veh/h       69       8       622       224       306       1977       1110       522       13.09       1307         Volume-to-Capacity Ratio (X)       0.045       0.377       0.827       0.655       0.030       0.471       0.31       0.659       0.478       0.478         Back of Queue (Q), ft/ln (95 th percentile)       4.5       7       290.8       186       3.7       182.1       67.1       148.8       68       66.9         Back of Queue (Q), th/ln (95 th percentile)       0.2       0.3       11.4       7.3       0.1       7.2       2.6       5.9       2.7       2.7         Queue Storage Ratio (RQ) (95 th percentile)       0.18       0.00       0.68       0.00       0.04       0.00				n	1781	1670					4	144				<u> </u>	1867
Cycle Queue Clearance Time (g c), s       0.2       0.2       12.8       10.3       0.7       12.5       7.0       9.6       4.8       4.8         Green Ratio (g/C)       0.01       0.00       0.15       0.14       0.56       0.56       0.70       0.68       0.70       0.70         Capacity (c), veh/h       69       8       622       224       306       1977       1110       522       1309       1307         Volume-to-Capacity Ratio (X)       0.045       0.377       0.827       0.55       0.030       0.471       0.331       0.659       0.478       0.478         Back of Queue (Q), ft/ln (95 th percentile)       4.5       7       290.8       186       3.7       182.1       67.1       148.8       68       66.9         Back of Queue (Q), veh/ln (95 th percentile)       0.2       0.3       11.4       7.3       0.1       7.2       2.6       5.9       2.7       2.7         Queue Storage Ratio (RQ) (95 th percentile)       0.18       0.0       0.68       0.0       0.04       0.09       0.29       1.06       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.						0.2		12.8	10.3	3	0	0.7	12.5	7.0		4.8	4.8
Green Ratio (g/C)0.010.0000.150.1400.560.560.700.680.700.70Capacity (c), veh/h6986222243061977111052213091307Volume-to-Capacity Ratio (X)0.0450.37770.8270.65560.0300.4710.3110.6590.478Back of Queu (Q), th/ln (95 th percentile)4.576290.818660.017.22.65.92.72.7Queue Storage Ratio (RQ) (95 th percentile)0.180.011.47.360.040.000.201.060.00Uniform Delay (d 1), s/veh59.359.445.046.067.08.68.59.31.41.4Intitial Queue Delay (d 3), s/veh0.030.2.77.247.949.36.00.00.00.00.00.00.0Control Delay, s/veh / LOSEFMDDAAABAAApproach Delay, s/veh / LOS72.72.72.72.79.31.072.62.62.6Intersection Delay, s/veh / LOS72.7FM9.31.00.00.00.00.00.00.00.00.00.0Intersection Delay, s/veh / LOS72.78.4AAAAAAAAAAAAAAA									<u> </u>		C	0.7		7.0	9.6	4.8	4.8
Capacity (c), veh/h       69       8       622       224       306       1977       1110       522       1309       1307         Volume-to-Capacity Ratio (X)       0.045       0.377       0.827       0.655       0.030       0.471       0.331       0.659       0.478       0.478         Back of Queue (Q), ft/ln (95 th percentile)       4.5       7       290.8       186       3.7       182.1       67.1       148.8       68       66.9         Back of Queue (Q), veh/ln (95 th percentile)       0.2       0.3       11.4       7.3       0.1       7.2       2.6       5.9       2.7       2.7         Queue Storage Ratio (RQ) (95 th percentile)       0.18       0.0       0.68       0.0       0.04       0.00       0.29       1.06       0.0       0.00         Uniform Delay (d_1), s/veh       59.3       59.4       45.0       46.0       7.0       8.6       8.5       9.3       1.4       1.3       1.3         Intremental Delay (d_2), s/veh       0.3       26.3       2.9       3.2       0.2       0.8       0.8       1.4       1.3       1.3         Initial Queue Delay (d_3), s/veh       0.0       0.0       0.0       0.0       0.0       0.0 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td><u> </u></td> <td>_</td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									<u> </u>	_	_						
Back of Queue (Q), ft/ln (95 th percentile)4.57290.81863.7182.167.1148.86866.9Back of Queue (Q), veh/ln (95 th percentile)0.20.311.47.30.17.22.65.92.72.7Queue Storage Ratio (RQ) (95 th percentile)0.180.00.680.000.040.000.291.060.000.00Uniform Delay (d1), s/veh59.359.445.046.07.08.68.59.31.41.4Incremental Delay (d2), s/veh0.326.32.93.20.20.80.81.41.31.3Initial Queue Delay (d3), s/veh0.00.00.00.00.00.00.00.00.00.00.0Control Delay, s/veh / LOSEFDDAAABAAApproach Delay, s/veh / LOS72.7E48.2D9.3A4.4AIntersection Delay, s/veh / LOS72.7E48.2D9.3A4.4APedestrian LOS Score / LOS3.0C2.9C2.5B2.2B	Capacity ( c ), v	/eh/h			69	8								1110	522	1309	1307
Back of Queue (Q), veh/ln (95 th percentile)0.20.311.47.30.17.22.65.92.72.7Queue Storage Ratio (RQ) (95 th percentile)0.180.00.680.000.040.000.291.060.000.00Uniform Delay (d_1), s/veh59.359.445.046.07.08.68.59.31.41.4Incremental Delay (d_2), s/veh0.326.32.93.20.0	Volume-to-Cap	acity Ra	itio(X)		0.045	0.377		0.827	0.65	5	0.	.030	0.471	0.331	0.659	0.478	0.478
Back of Queue (Q), veh/ln (95 th percentile)0.20.311.47.30.17.22.65.92.72.7Queue Storage Ratio (RQ) (95 th percentile)0.180.00.680.000.040.000.291.060.000.00Uniform Delay (d_1), s/veh59.359.445.046.07.08.68.59.31.41.4Incremental Delay (d_2), s/veh0.326.32.93.20.0	Back of Queue	(Q), ft/	(In (95 th percentile)	)					<u> </u>							68	
Queue Storage Ratio ( RQ ) ( 95 th percentile)0.180.00.00.680.00.00.040.00.291.060.00.0Uniform Delay ( d 1 ), s/veh59.359.445.045.046.07.08.68.59.31.41.4Incremental Delay ( d 2 ), s/veh0.3 $2 \in 3$ 2.9 $3.2$ 0.2 $0.8$ 0.81.41.31.3Initial Queue Delay ( d 3 ), s/veh0.0 $0.0$									<u> </u>	_						<u> </u>	
Uniform Delay (d 1), s/veh59.359.445.046.07.08.68.59.31.41.4Incremental Delay (d 2), s/veh0.326.32.93.20.20.80.81.41.31.3Initial Queue Delay (d 3), s/veh0.0 <td></td> <td></td> <td>· · ·</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td><u> </u></td> <td></td>			· · ·						<u> </u>		_					<u> </u>	
Incremental Delay (d 2), s/veh0.3 $26.3$ $2.9$ $3.2$ $0.2$ $0.8$ $1.4$ $1.3$ $1.3$ Initial Queue Delay (d 3), s/veh $0.0$ <td></td> <td></td> <td></td> <td>,</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>_</td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td>				,						_		_					
Initial Queue Delay (d 3), s/veh0.0									<u> </u>							<u> </u>	
Control Delay (d), s/veh59.6 $59.6$ $85.7$ $47.9$ $49.3$ $7.2$ $9.4$ $9.3$ $10.7$ $2.6$ $2.6$ Level of Service (LOS)EFDDAAABAAApproach Delay, s/veh / LOS $72.7$ E $48.2$ D $9.3$ A $4.4$ AIntersection Delay, s/veh / LOS $72.7$ E $48.2$ D $9.3$ A $4.4$ AIntersection Delay, s/veh / LOS $72.7$ E $48.2$ D $9.3$ A $4.4$ AIntersection Delay, s/veh / LOS $72.7$ E $48.2$ D $9.3$ A $4.4$ AIntersection Delay, s/veh / LOS $72.7$ E $72.7$ E $8.7$ </td <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			-							_							
Level of Service (LOS)EFDDDAABAAApproach Delay, s/veh / LOS72.7E $48.2$ D $9.3$ A $4.4$ AIntersection Delay, s/veh / LOS $14.4$ $14.4$ $14.4$ AMultimodal ResultsEB $\mathbb{EB}$										_						<u> </u>	
Approach Delay, s/veh / LOS       72.7       E       48.2       D       9.3       A       4.4       A         Intersection Delay, s/veh / LOS       14.4       14.4       B       B       B       B       B         Multimodal Results       EB       WB       NB       SB       B         Pedestrian LOS Score / LOS       3.0       C       2.9       C       2.5       B       2.2       B																	
Intersection Delay, s/veh / LOS       14.4       B         Multimodal Results       EB       WB       NB       SB         Pedestrian LOS Score / LOS       3.0       C       2.9       C       2.5       B       2.2       B		· · · ·					E		1	D							
Multimodal Results         EB         WB         NB         SB           Pedestrian LOS Score / LOS         3.0         C         2.9         C         2.5         B         2.2         B																	
Pedestrian LOS Score / LOS         3.0         C         2.9         C         2.5         B         2.2         B	intersection beidy, siven / 200																
	Multimodal Re	Multimodal Results				EB			WE	3			NB			SB	
Bicycle LOS Score / LOS 0.5 A 1.6 B 1.6 B 1.8 B	Pedestrian LOS				3.0		С	2.9		С		2.5		В	2.2		В
	Bicycle LOS Sc	ore / LC	DS		0.5		А	1.6		В		1.6		В	1.8		В

General Inform	nation								Int	tersect	ion Inf	ormatic	on		4741	<u>ل</u> ا ا
Agency		FMA							Du	uration,	h	0.25		1	41	
Analyst		Addie Kirkham		Analys	is Date	e May 3	1, 2018		Ar	еа Тур	е	Other		4		4
Jurisdiction		Knox County		Time F	Period	Existin	g PM P	eak				0.89			₩ĚE	2 \$
Urban Street		Ebenezer Road		Analys			0			nalysis	Period	1> 7:0	00			*
Intersection		Ebenezer Road at \	Nestl	File Na			ig PM P	eak		-					5 + +	
Project Descrip	tion	223.013 The Cresc					5				(				। । । ব 1 ক প	Þ 7
.,																
Demand Inform	nation				EB			W	/B			NB			SB	
Approach Move	ement			L	Т	R	L	-	Т	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			429		182					141	699			1064	646
																^
Signal Informa	tion					11	2									_
Cycle, s	110.0	Reference Phase	2		50	51	ĸ						1	<b>N</b>	-	<b>-</b> ₹ .
Offset, s	0	Reference Point	End	Green	8.9	64.2	18.9	0.	0	0.0	0.0				3	<b>4</b>
Uncoordinated	No	Simult. Gap E/W	On	Yellow		4.0	4.0	0.		0.0	0.0				<u> </u>	
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.		0.0	0.0		5	6	7	8
Timer Results				EBL	-	EBT	WBL	-	N	VBT	NBI	_	NBT	SBI	-	SBT
Assigned Phase	e					4					5		2			6
Case Number						9.0					1.0		4.0			8.3
Phase Duration	nase Duration, s					24.9					14.9	)	85.1			70.2
Change Period	hange Period, (Y+R c), s					6.0					6.0		6.0			6.0
Max Allow Hea	dway(A	<i>MAH</i> ), s				4.2					4.1		0.0			0.0
Queue Clearan	ce Time	( g s ), s				16.5					7.3					
Green Extensio	n Time	(ge), s				2.4					0.4		0.0			0.0
Phase Call Pro	bability					1.00					0.99	)				
Max Out Proba	bility					0.11					0.00	)				
	_								_	_						
Movement Gro	-	sults		<u> </u>	EB			WI		-		NB			SB	
Approach Move				L	Т	R	L	Т	+	R	L	Т	R	L	Т	R
Assigned Move		· · · ·		7		14			+		5	2			6	16
Adjusted Flow I				482		204			4		158	785			964	957
-		w Rate (s), veh/h/l	n	1730		1585			4		1781	1781			1870	1646
Queue Service				14.5		11.9			4		5.3	1.4			64.4	63.3
Cycle Queue C		e Time ( <i>g c</i> ), s		14.5		11.9			$\rightarrow$		5.3	1.4			64.4	63.3
Green Ratio (g	,			0.17		0.25			_		0.68	0.72			0.58	0.58
Capacity (c), v				594		401					210	2562			1091	960
Volume-to-Cap				0.812		0.510					0.754	0.307			0.883	0.997
		In (95 th percentile)		256		198.2					196.5	19.8			426.2	649
		eh/In ( 95 th percenti	,	10.1		7.8					7.7	0.8			16.8	26.0
-	-	RQ) (95 th percent	tile)	0.93		0.00					2.07	0.00			0.00	0.00
Uniform Delay				40.7		32.7					31.9	0.7			9.5	12.1
Incremental De	lay ( <i>d</i> 2	), s/veh		3.6		1.0					5.4	0.3			10.4	28.3
Initial Queue De	elay ( <i>d</i>	3 ), s/veh		0.0		0.0					0.0	0.0			0.0	0.0
Control Delay (	d ), s/ve	eh		44.4		33.7					37.3	1.0			19.9	40.4
Level of Service				D		С					D	Α			В	D
Approach Delay	, s/veh	/ LOS		41.2		D	0.0				7.1		А	30.1		С
Intersection De	lay, s/ve	h / LOS				26	.2							С		
Multimodal Re		/			EB			WI				NB			SB	
Pedestrian LOS				2.9		С	2.7			С	0.7	_	A	2.4		В
BICYCIE LOS SC	ycle LOS Score / LOS					F					1.3		A	2.1		В

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# Attachment 6 Intersection Worksheets – Background AM/PM Peaks

		псэ	7 Sig	nalize		tersec		kesu	its Su	mmar	у				
General Inform	ation								Intorco	ction Inf	ormatic	20		4741	be la
	lation	FMA							Duratior		0.25	511		411	
Agency		Addie Kirkham		Analus	ie Det	a 1.1.7	2040			•	O.25 Other				K.
Analyst Jurisdiction		Knox County		Analys Time F			ground A		Area Ty PHF	pe	0.93			w∔e	
						Peak									2 M
Urban Street		Ebenezer Road		Analys					Analysis		1> 7:0	00		htt	
Intersection		Westland (north)		File Na		Phas	e 3 AM F	Peak_S	Signalize	ed.xus				14141	1
Project Descrip	tion	223.013 The Cresco	ent at E	beneze	r										
Demand Inform	nation				EB			WE	3		NB			SB	
Approach Move				L	T	R	L	Т	R	L	Т	R	L	T	R
Demand (v), v				2	0	3	278		_	_	1703		138	659	0
Signal Informa	tion				215					5				_	<u> </u>
Cycle, s	110.0	Reference Phase	2			51		F.	6	è -			<b>Y</b> -	<b>_</b> ]	
Offset, s	0	Reference Point	End	Green	5.9	65.1	0.6	0.3	16.	1 0.0				5	~
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	3.0	4.5	3.5	0.0	3.5	0.0		4		$\sim$	
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	2.0	2.0	0.0	2.0	0.0		5	6	7	
Times Describe				EDI		EDT						NDT	0.01		ODT
Timer Results				EBI		EBT	WB		WBT	NB		NBT	SBI	-	SBT
Assigned Phase	e			3 1.2		8	7		4			2 5.3	1		6
Case Number				6.4		4.0	1.3		4.0 21.6		_		1.0		4.0
Phase Duration	Change Period, ( $Y+R_c$ ), s				+	6.1 5.5	21.9 6.0		6.0			71.6 6.5	10.4 4.5		82.0 6.5
-	Change Period,(Y+ <i>R</i> 。), s /ax Allow Headway( <i>MAH</i> ), s					4.4	4.3		4.3		_	0.0	4.5		0.0
Queue Clearan		,		3.9 2.1	-	2.2	6.0		17.6			0.0	5.4		0.0
Green Extensio				0.0		0.0	2.1		0.0			0.0	0.1		0.0
Phase Call Pro		(90),0		0.06		0.09	1.00		1.00			0.0	0.99		0.0
Max Out Proba	-		_	0.07		0.14	0.18		1.00	<u> </u>			0.20		
Manager					ED						ND			00	
Movement Gro	-	suits			EB T	R	L	WB T	R	L	NB T	R	L	SB T	R
Assigned Move				3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow I		) veh/h		2	3	10	299	369	14	3	1718	389	148	709	0
-	,	ow Rate (s), veh/h/l	n	1781	1585		1730	1586		740	1781	1585	1781	1870	0
Queue Service				0.1	0.2		4.0	15.6		0.1	43.3	8.6	3.4	2.4	0.0
Cycle Queue C		÷ :		0.1	0.2		4.0	15.6		0.1	43.3	8.6	3.4	2.4	0.0
Green Ratio ( g		<b>c</b> mic ( <b>g</b> c), c		0.00	0.01		0.15	0.14		0.59	0.59	0.74	0.66	0.69	0.0
Capacity (c), v	-			72	8		632	225		503	2107	1167	218	2568	<u> </u>
Volume-to-Cap	acity Ra	itio(X)		0.030	0.397	7	0.473	1.638	3	0.006		0.334	0.681	0.276	0.000
-	-	/In (95 th percentile)		2.8	7		155.7	1001 3		1.1	590.5	271.5	113.6	34.2	0
Back of Queue	(Q), ve	eh/In ( 95 th percenti	le)	0.1	0.3		6.1	39.4		0.0	23.2	10.7	4.5	1.3	0.0
		RQ) (95 th percent		0.11	0.00		0.37	0.00		0.01	0.00	1.18	0.81	0.00	0.00
Uniform Delay				54.5	54.5		38.7	44.6		6.8	19.9	23.9	22.6	1.6	
Incremental De	lay ( <i>d</i> 2	), s/veh		0.2	28.5		0.6	306.3	3	0.0	2.4	0.5	3.7	0.3	0.0
Initial Queue De	elay ( <i>d</i>	з), s/veh		0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	control Delay ( d ), s/veh			54.7	82.9		39.2	350.9	9	6.8	22.3	24.4	26.3	1.8	
	evel of Service (LOS)			D	F		D	F		Α	С	С	С	A	
Approach Delay	Approach Delay, s/veh / LOS			71.6	6	Е	211.	4	F	22.	7	С	6.1		А
Intersection Delay, s/veh / LOS						5	3.4						D		
Madel					==						ND			00	
Multimodal Re		/1.00			EB	0		WB		0.7	NB			SB	
Pedestrian LOS				3.0 0.5		C	2.9		C	2.5		B	2.2		B
BICYCIE LOS SC	ycle LOS Score / LOS					A	1.6		В	2.3		В	1.2		A

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	HCS	7 Sig	nalize	d Int	ersec	tion R	lesi	ults	Sun	nmar	У				
								1 -							
General Information								<u></u>			ormatic	on	- i	1474+1 1474+1	₩ <u></u>
Agency	FMA							<u> </u>	ation,		0.25				K
Analyst	Addie Kirkham				e Jul 7,				а Туре	e	Other				4
Jurisdiction	Knox County		Time P	eriod	Backg Peak	round A	M	PHF	-		0.89		4 1 L	₩ĴE	∲ + *
Urban Street	Ebenezer Road		Analys	is Yea	r 2021			Ana	lysis l	Period	1> 7:0	00		5 + +	
Intersection	Westland (south)		File Na	me	Phase	3 AM F	Peak	Signa	alized	l.xus				111 1114991	14
Project Description	223.013 The Cresc	ent at E	benezer												
Demand Information	1			EB			V	/B			NB			SB	
Approach Movement			L	Т	R	L	<u> </u>	Т	R	L	Т	R	L	Т	R
Demand (v), veh/h			632		29					139	1246	;		577	374
Signal Information				1			T								
Cycle, s 110.0	Reference Phase	2	-		1	1							ĸt		~
Offset, s 0	Reference Point	End		P 51	<u>1</u>							1	2	3	4
Uncoordinated No	Simult. Gap E/W	On	Green		58.0	25.1	0.		0.0	0.0	_				
			Yellow		4.0	4.0	0.		0.0	0.0	— <b>—</b>	)ੁ≮	<b>۔</b>		
Force Mode Fixed	d Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.	0	0.0	0.0	•	5	6	1	8
Timer Results			EBL		EBT	WB	L	WE	BT	NBI	-   -	NBT	SB	_	SBT
Assigned Phase					4					5		2			6
Case Number					9.0					1.0		4.0			8.3
Phase Duration, s					31.1					14.9	, .	78.9			64.0
Change Period, (Y+F	₹ c ), s				6.0					6.0		6.0			6.0
Max Allow Headway (	(MAH), s				4.1					4.1		0.0			0.0
Queue Clearance Tim	ne ( g s ), s				23.6					6.0					
Green Extension Time					1.4					0.3		0.0			0.0
Phase Call Probability	· • ·				1.00					0.99	,				
Max Out Probability					0.94					0.02	2				
Mayomont Crown D				50			10/1	P						CD	
Movement Group Re	esuits		<u> </u>	EB	D		WI T		P	1	NB	P		SB	
Approach Movement			L	Т	R	L	Т	+	R	L	Т	R	L	Т	R
Assigned Movement			7		14			_	_	5	2		<u> </u>	6	16
Adjusted Flow Rate (			710		33		<u> </u>	_	_	156	1400		<u> </u>	541	470
Adjusted Saturation F		IN	1730		1585		<u> </u>	_	_	1781	1781			1870	1623
Queue Service Time			21.6		1.4		<u> </u>	_	_	4.0	10.6		<u> </u>	23.9	17.2
Cycle Queue Clearan	ice lime ( $g_c$ ), s		21.6		1.4			_	_	4.0	10.6		<u> </u>	23.9	17.2
Green Ratio $(g/C)$			0.23		0.31			_	_	0.63	0.66		<u> </u>	0.53	0.53
Capacity ( c ), veh/h	Detie ( )()		789		490					383	2361		<u> </u>	986	856
Volume-to-Capacity R		\	0.900		0.067					0.408	0.593		<u> </u>	0.549	0.549
Back of Queue (Q),			373.8		24.9					66	108.1			320.9	233
Back of Queue (Q),	· ·		14.7		1.0			_		2.6	4.3		<u> </u>	12.6	9.3
Queue Storage Ratio		uie)	1.36		0.00					0.69	0.00			0.00	0.00
Uniform Delay ( $d_1$ ),			37.1		24.1					12.2	2.8			15.1	12.0
Incremental Delay ( a	•		11.4		0.1					0.7	1.1			2.1	2.4
Initial Queue Delay (	· ·		0.0		0.0			_		0.0	0.0			0.0	0.0
Control Delay (d), s/			48.5		24.2		_	_		12.9 P	3.9			17.2	14.4 B
Level of Service (LOS	•		D 47.5		C					B	A	Δ	45.4	B	
Approach Delay, s/ve			47.5		D 47	0.0				4.8		A	15.9	,	В
Intersection Delay, s/	/en / LOS				1/	7.8							B		
				EB			W	В			NB			SB	
Multimodal Results															
Multimodal Results Pedestrian LOS Scor	e / LOS		2.9		С	2.7		С		0.7		А	2.4		В

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	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Ebenezer at Crescent Lake
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	7/7/2019	East/West Street	Crescent Lake Way
Analysis Year	2021	North/South Street	Ebenezer Road
Time Analyzed	Background AM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	213.013 The Crescent at Ebenezer		



Major Street: North-South

Vehicle Volumes and Ad	justmo	ents														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	2	1	0	1	2	0
Configuration						L		R			Т	R		L	Т	
Volume, V (veh/h)						19		42			1858	20		7	932	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked						0.500		0.500						0.500		
Percent Grade (%)		0														
Right Turn Channelized		No No								Ν	lo			Ν	lo	
Median Type/Storage		Left Only											1			
Critical and Follow-up Headways																
Base Critical Headway (sec)						7.5		6.9						4.1		
Critical Headway (sec)						6.84		6.94						4.14		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, ar	d Leve	el of S	ervic	e												
Flow Rate, v (veh/h)						21		46						8		
Capacity, c (veh/h)						115		542						320		
v/c Ratio						0.18		0.08						0.03		
95% Queue Length, Q <sub>95</sub> (veh)						0.6		0.3						0.1		
Control Delay (s/veh)						43.4		12.3						16.6		
Level of Service, LOS						E		В						С		
Approach Delay (s/veh)						22	2.0	2			-			0	.1	
Approach LOS						(	C									

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HCS7 Two-Way Stop-Control Report												
General Information		Site Information										
Analyst	Addie Kirkham	Intersection	Ebenezer at Driveway									
Agency/Co.	FMA	Jurisdiction	Knox County									
Date Performed	7/7/2019	East/West Street	Weigel's Driveway									
Analysis Year	2021	North/South Street	Ebenezer Road									
Time Analyzed	Background AM Peak	Peak Hour Factor	0.92									
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25									
Project Description	213.013 The Crescent at Ebenezer											



Major Street: North-South

Vehicle Volumes and Ad	liustma	onts														
Approach			oound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12	-	7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	1	0	0	2	1	0	0	2	0
Configuration								R			т	R			т	
Volume, V (veh/h)								32			1819	49			939	
Percent Heavy Vehicles (%)								2								
Proportion Time Blocked								0.500								
Percent Grade (%)							0									
Right Turn Channelized		No No								١	10			١	١o	
Median Type/Storage		Left Only											1			
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)								6.9								
Critical Headway (sec)								6.94								
Base Follow-Up Headway (sec)								3.3								
Follow-Up Headway (sec)								3.32								
Delay, Queue Length, ar	nd Leve	el of S	Service	e												
Flow Rate, v (veh/h)								35								
Capacity, c (veh/h)								542								
v/c Ratio								0.06								
95% Queue Length, Q <sub>95</sub> (veh)								0.2								
Control Delay (s/veh)								12.1								
Level of Service, LOS								В								
Approach Delay (s/veh)						12	2.1	-		-	-			-	2	
Approach LOS						В										

Phase 3 AM Peak\_Ebenezer Driveway.xtw

	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Westland at Driveway
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	7/7/2019	East/West Street	Westland Drive
Analysis Year	2021	North/South Street	Driveway Connection
Time Analyzed	Background AM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	223.013 The Crescent at Ebenezer	·	



#### Major Street: East-West

Vehicle Volumes and Ad	ljustme	ents														
Approach		Eastb	ound			West	ound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume, V (veh/h)			491	20		12	612			37		12				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked						0.000				0.000		0.000				
Percent Grade (%)										(	C					
Right Turn Channelized		٩	10			N	0			Ν	lo			Ν	10	
Median Type/Storage		Undivided														
Critical and Follow-up H	leadwa	iys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.42		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, ar	nd Leve	el of S	Service	e												
Flow Rate, v (veh/h)						13				40		13				
Capacity, c (veh/h)						1014				192		538				
v/c Ratio						0.01				0.21		0.02				
95% Queue Length, Q <sub>95</sub> (veh)						0.0				0.8		0.1				
Control Delay (s/veh)						8.6				28.6		11.9				
Level of Service, LOS						A				D		В				
Approach Delay (s/veh)			-			0	.3			24	1.5					
Approach LOS										(	2					

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		HUS	7 SIG	nalize	a in	tersec		kesu	its a	Sun	nmar	у				
General Inform	ation								Inter		ion Inf	ormatio		l u	석 억 쇽 수	ba L
	lation	FMA										1	n	- 1	444	
Agency				Analus	ia Da		2010			ation,		0.25				K.
Analyst		Addie Kirkham		Analys					PHF	а Туре	9	Other			wle	نې چې سر
Jurisdiction		Knox County		Time F		Peak	ground F					0.97		14 W		
Urban Street		Ebenezer Road		Analys							Period	1> 7:0	00		httr	
Intersection		Westland (north)		File Na		Phase	e 3 PM I	Peak_	Signa	alized	d.xus				14141	Þ 7
Project Descrip	tion	223.013 The Cresc	ent at E	beneze	r											
Demand Inform	nation				EB			W	В			NB			SB	
Approach Move	ement			L	Т	R	L	Т	•	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			3	1	2	568	1	1	197	10	1005	388	371	1331	6
								n n								
Signal Informa			1		밊	_ <b>∠</b> Us	a	12		5 4	1	Į		-+-		-
Cycle, s	120.0	Reference Phase	2			51	₽Ŕ	Γ	2	le t	2		1	$\mathbf{Y}_{2}$ -	3	4
Offset, s	0	Reference Point	End	Green	15.2		0.6	0.5	r i	20.0	0.0					
Uncoordinated	No	Simult. Gap E/W	Off	Yellow		4.5	3.5	0.0		3.5	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	2.0	2.0	0.0		2.0	0.0	_	5	6	7	<b>Y</b> 8
Timer Results				EBL	_	EBT	WB	L	WB	BT	NBI	_	NBT	SBI	_	SBT
Assigned Phase	e			3		8	7		4				2	1		6
Case Number	-			1.2		4.0	1.3		4.0	)			5.3	1.0		4.0
Phase Duration	. S			6.6		6.1	26.0		25.				68.2	19.7		87.9
	e Period, ( <i>Y</i> + <i>R c</i> ), s			6.0		5.5	6.0		6.0				6.5	4.5		6.5
	x Allow Headway ( MAH ), s			3.9		4.3	4.2		4.2				0.0	4.1		0.0
Queue Clearan				2.2		2.2	17.0		14.9					13.8		
Green Extensio				0.0		0.0	3.0		3.1				0.0	1.4		0.0
Phase Call Pro				0.10	)	0.10	1.00	)	1.0	0				1.00	)	
Max Out Proba	bility			0.00	)	0.00	0.05	5	0.0	3				0.00	)	
	_	•												_		
Movement Gro	-	sults		<u> </u>	EB		<u> </u>	WB	1Î	_		NB		<u> </u>	SB	
Approach Move				L	Т	R		Т		R	L	Т	R		Т	R
Assigned Move		<u> </u>		3	8	18	7	4	_	14	5	2	12	1	6	16
Adjusted Flow I				3	3		586	185		_	9	906	350	382	690	689
-		w Rate (s), veh/h/l	n	1781	1670	)	1730	1586	_	_	393	1781	1585	1781	1870	1867
Queue Service				0.2	0.2		15.0	12.9		_	1.1	22.5	10.7	11.8	8.3	8.3
Cycle Queue C		e Time ( <i>g c</i> ), s		0.2	0.2		15.0	12.9		_	1.1	22.5	10.7	11.8	8.3	8.3
Green Ratio (g				0.01	0.00		0.17	0.16			0.51	0.51	0.68	0.66	0.68	0.68
Capacity ( c ), v Volume-to-Capa		tio (X)		69 0.045	8 0.37	7	697 0.840	258 0.71			262 0.034	1831 0.495	1080 0.324	486 0.787	1269 0.544	1267 0.544
		(In ( 95 th percentile)		4.5	0.37		322.2	222.	_		5.1	358	0.324 248.8	190.6	107.2	105.5
		eh/In ( 95 th percentile)		4.5 0.2	0.3		12.7	8.8			0.2	14.1	9.8	7.5	4.2	4.2
		RQ) (95 th percent	-	0.18	0.00		0.76	0.00			0.05	0.00	1.08	1.36	0.00	0.00
Uniform Delay				59.3	59.4		43.2	44.4			12.0	23.7	15.4	14.5	2.2	2.2
Incremental De				0.3	26.3		4.0	3.7			0.2	0.6	0.5	2.9	1.7	1.7
Initial Queue De		•		0.0	0.0		0.0	0.0	_		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (				59.6	85.7		47.2	48.1			12.1	24.4	15.9	17.3	3.9	3.9
Level of Service				E	F		D	D	+		B	C	B	В	A	A
Approach Delay				72.7		E	47.4	<u> </u>	D		22.0		C	6.8		A
Intersection De							0.2							C		
Multimodal Re	sults				EB			WB				NB			SB	
Pedestrian LOS				3.0		С	2.9		С		2.4		В	2.2		В
Bicycle LOS Sc	ore / LC	DS		0.5		А	1.8		В		1.7		В	1.9		В

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		HCS	7 Sig	nalize	d Ir	ntersec	tion F	lesi	ults	Sun	nmar	у				
									1							
General Inform	nation	N										ormatic	on		47¢†	da la
Agency		FMA							Dur	ration,	h	0.25			**	N.
Analyst		Addie Kirkham		Analys	is Da	ate Jul 7,	2019		Are	еа Тур	e	Other		×		4 2
Jurisdiction		Knox County		Time F	Period	d Backo Peak	ground F	PM	PH	F		0.91		4 th the	₩ĴE	\$ ↓ ₹
Urban Street		Ebenezer Road		Analys	is Ye	ar 2021			Ana	alysis	Period	1> 7:0	00		5 + +	
Intersection		Westland (south)		File Na	ame	Phase	e 3 PM F	Peak	_Sigr	nalized	d.xus				   1 4 1 4 1 1	7 4
Project Descrip	tion	223.013 The Cresc	ent at E	benezer												
Demand Inform	nation				E	В		V	VB			NB			SB	
Approach Move	ement			L	Т	R	L	·	Т	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			480		193					150	784			1159	705
Signal Informa	tion				1	1		1								
Cycle, s	120.0	Reference Phase	2	1	20		E							<b>N</b>	_	$\prec$
Offset, s	0	Reference Point	End	Green		79.0	14.0	0.	0	0.0	0.0		1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow			4.0	0.		0.0	0.0				~	
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0		2.0	0.		0.0	0.0	7	5	6	7	8
		^ 			Ĩ			T						1		
Timer Results				EBL	-	EBT	WB	L	W	BT	NBI	-	NBT	SBI		SBT
Assigned Phase Case Number	e				_	4 9.0	<u> </u>	-		_	5 1.0	+	2 4.0			6 8.3
Phase Duration					+	20.0		-+		_	15.0		00.0			85.0
Change Period		a) 6			+	6.0	<u> </u>			_	6.0		6.0			6.0
Max Allow Head				-	-	4.2				_	4.1		0.0	-		0.0
Queue Clearan		· ·				16.0		$\rightarrow$		_	5.6		0.0			0.0
Green Extensio					-	0.0		-		_	0.1		0.0			0.0
Phase Call Pro		(90), 3			+	1.00		$\rightarrow$		_	1.00		0.0			0.0
Max Out Proba						1.00					1.00					
									_							
Movement Gro	-	sults			EE	1		W	1	<b>D</b>		NB	<b>D</b>		SB	
Approach Move				L	Т	R	L	Т	$\rightarrow$	R	L	Т	R	L	Т	R
Assigned Move		<u> </u>		7		14	<u> </u>				5	2		<u> </u>	6	16
Adjusted Flow I				527		212	<u> </u>		_		165	862			980	980
Adjusted Satura		ow Rate ( s ), veh/h/l	n	1730 14.0		1585 14.0			+	_	1781 3.6	1781 0.0			1870 52.3	1646 57.1
Cycle Queue C		÷ :		14.0		14.0			+	_	3.6	0.0			52.3	57.1
Green Ratio ( g		e fille ( <i>gc</i> ), s		0.12		0.19		<u> </u>	-	_	0.75	0.0		-	0.66	0.66
Capacity ( <i>c</i> ), v	,			404		303				_	234	2790			1232	1084
Volume-to-Capa		(X)		1.307		0.699				_	0.704	0.309			0.795	0.904
	-	/In ( 95 th percentile)		580.5		259.8			+		169.6	5.1			551.9	635.7
		eh/In (95 th percent		22.9		10.2				_	6.7	0.2			21.7	25.4
		RQ) (95 th percen		2.11		0.00					1.79	0.00			0.00	0.00
Uniform Delay			,	50.7		43.3					29.4	0.0			12.5	13.6
Incremental De				155.1		6.9					9.1	0.3			4.0	9.4
Initial Queue De		· · · · · · · · · · · · · · · · · · ·		0.0		0.0					0.0	0.0			0.0	0.0
Control Delay (				205.7		50.3					38.5	0.3			16.5	23.0
Level of Service				F		D					D	А			В	С
Approach Delay				161.1	1	F	0.0				6.4		A	19.7	7	В
Intersection De	lay, s/ve	eh / LOS				44	4.1							D		
Multimodal Re	culto				EB	2		W	D			NB			SB	
Pedestrian LOS		/1.05		2.9		S C	2.8			C	0.6	ii.	A	2.4	1	В
				2.9			2.8		C			_			_	
Bicycle LOS Sc	core / LC	5				F					1.3		A	2.2		В

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	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Ebenezer at Crescent Lake
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	7/7/2019	East/West Street	Crescent Lake Way
Analysis Year	2021	North/South Street	Ebenezer Road
Time Analyzed	Background PM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	213.013 The Crescent at Ebenezer		



Major Street: North-South

Vehicle Volumes and Ad	justme	ents														
Approach		Eastb	ound			West	ound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	2	1	0	1	2	0
Configuration						L		R			Т	R		L	т	
Volume, V (veh/h)						11		40			1228	36		49	1853	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked						0.200		0.200						0.200		
Percent Grade (%)						(	)									
Right Turn Channelized		No				N	0			Ν	lo			Ν	lo	
Median Type/Storage		Left Only									1					
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)						7.5		6.9						4.1		
Critical Headway (sec)						6.84		6.94						4.14		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, ar	d Leve	el of S	ervice	e										<u> </u>		
Flow Rate, v (veh/h)						12		43						53		
Capacity, c (veh/h)						131		766						566		
v/c Ratio						0.09		0.06						0.09		
95% Queue Length, Q <sub>95</sub> (veh)						0.3		0.2						0.3		
Control Delay (s/veh)						35.2		10.0						12.0		
Level of Service, LOS						E		A						В		
Approach Delay (s/veh)		-	-	-		15	5.5	-			-			0	.3	
Approach LOS						(	2									

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	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Ebenezer at Driveway
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	7/7/2019	East/West Street	Weigel's Driveway
Analysis Year	2021	North/South Street	Ebenezer Road
Time Analyzed	Background PM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	213.013 The Crescent at Ebenezer		



Major Street: North-South

Vehicle Volumes and Ad	justme	ents														
Approach	-		ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	1	0	0	2	1	0	0	2	0
Configuration								R			Т	R			Т	
Volume, V (veh/h)								26			1195	47			1902	
Percent Heavy Vehicles (%)								2								
Proportion Time Blocked								0.200								
Percent Grade (%)						. (	0									
Right Turn Channelized		Ν	lo			Ν	lo			Ν	lo			١	١o	
Median Type/Storage		Left Only										:	1			
Critical and Follow-up H	eadwa															
Base Critical Headway (sec)	Τ							6.9								
Critical Headway (sec)								6.94								
Base Follow-Up Headway (sec)								3.3								
Follow-Up Headway (sec)								3.32								
Delay, Queue Length, ar	d Leve	el of S	ervice	e												
Flow Rate, v (veh/h)	Τ							28								
Capacity, c (veh/h)								792								
v/c Ratio								0.04								
95% Queue Length, Q <sub>95</sub> (veh)								0.1								
Control Delay (s/veh)								9.7								
Level of Service, LOS					A											
Approach Delay (s/veh)		-		-		9	.7	-			-			-	2	
Approach LOS						/	4									

	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Westland at Driveway
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	7/7/2019	East/West Street	Westland Drive
Analysis Year	2021	North/South Street	Driveway Connection
Time Analyzed	Background PM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	223.013 The Crescent at Ebenezer		



#### Major Street: East-West

Vehicle Volumes and Ad	ljustme	ents														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume, V (veh/h)			694	37		14	703			54		18				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked						0.000				0.000		0.000				
Percent Grade (%)	0										C					
Right Turn Channelized		Ν	10			N	lo			N	lo			٩	١o	
Median Type/Storage		Undivided														
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.42		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, ar	nd Leve	el of S	Service	e		<u> </u>										
Flow Rate, v (veh/h)						15				59		20				
Capacity, c (veh/h)						827				120		398				
v/c Ratio						0.02				0.49		0.05				
95% Queue Length, Q <sub>95</sub> (veh)						0.1				2.2		0.2				
Control Delay (s/veh)						9.4				61.1		14.5				
Level of Service, LOS						A				F		В				
Approach Delay (s/veh)		-	-	-		0	.5			49	9.3	-		-		-
Approach LOS										I	E					

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# Attachment 7 Intersection Worksheets – Commercial Site AM/PM Peaks

										mmar	,				
General Inform	nation								Interse	ction Inf	ormatio	on		4741	ta L
Agency		FMA							Duratio	n. h	0.25			411	
Analyst		Addie Kirkham		Analys	is Date	e Mar 2	2. 2021		Area Ty		Other		4		4
Jurisdiction		Knox County		Time F		Comr	nercial A		PHF		0.93		→ → →	w ∯ E	11 11 14
Urban Street		Ebenezer Road		Analys	is Yea	Peak r 2021			Analysis	s Period	1> 7:0	0	1		¥ •
Intersection		Westland (north)		File Na			e 4 AM F		-		12 7.0			<u>1111</u>	
Project Descrip	tion	223.013 The Cresc	ent at E			1 1100	5 17 1011	oun_	orginaliza	00.700			1 "		r
Demand Inform	nation				EB			W	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			2	0	3	278	2	380	) 3	1717	386	142	675	0
				1	1 111	1.116					_				-
Signal Informa	1	Reference Dhase	2		215	alt's	La		A	Ħ	ļ		stz.	7	$\rightarrow$
Cycle, s Offset, s	110.0 0	Reference Phase Reference Point	2 End	-		- 1 <b>5</b> 1	rR .		2	2		1	2	3	4
Uncoordinated	No	Simult. Gap E/W	Off	Green		65.1	0.6	0.3							_
Force Mode		· · · · · · · · · · · · · · · · · · ·	<u> </u>	Yellow Red	3.0	4.5	3.5 2.0	0.0				5			- <b>€</b> .
	Fixed				1.0	2.0	2.0	0.0	2.0	10.0		5	0		8
Timer Results				EBL	_	EBT	WB	L	WBT	NB	L	NBT	SBI	_ [	SBT
Assigned Phas	e			3		8	7		4			2	1		6
Case Number	-			1.2	-	4.0	1.3		4.0			5.3	1.0		4.0
Phase Duration	), S			6.4		6.1	21.9		21.6			71.6	10.4		82.0
	inge Period, (Y+ $R_c$ ), s			6.0		5.5	6.0		6.0			6.5	4.5		6.5
-	lax Allow Headway ( <i>MAH</i> ), s			3.9		4.4	4.3		4.3			0.0	4.1		0.0
Queue Clearan	ce Time	e ( g s ), s		2.1		2.2	6.0		17.6				5.5		
Green Extensio	on Time	( <i>g</i> e ), s		0.0		0.0	2.2		0.0			0.0	0.2		0.0
Phase Call Pro	bability			0.06	;	0.09	1.00	)	1.00				0.99	)	
Max Out Proba	bility			0.07		0.14	0.19	9	1.00				0.22	2	
Movement Gro	oup Res	ults			EB			WB			NB			SB	
Approach Move	-			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow	Rate ( <i>v</i>	), veh/h		2	3		299	372		3	1765	397	153	726	0
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1781	1585		1730	1586	5	728	1781	1585	1781	1870	0
Queue Service		- ·		0.1	0.2		4.0	15.6		0.1	45.5	8.8	3.5	2.4	0.0
Cycle Queue C		e Time ( <i>g c</i> ), s		0.1	0.2		4.0	15.6		0.1	45.5	8.8	3.5	2.4	0.0
Green Ratio ( g	-			0.00	0.01	<u> </u>	0.15	0.14		0.59	0.59	0.74	0.66	0.69	
Capacity (c), v				72	8		632	225	_	496	2106	1167	210	2568	
Volume-to-Cap				0.030	0.397		0.473	1.652		0.006			0.727	0.283	
Back of Queue	(Q), tt/	In (95 th percentile)	)	2.8	7		155.7	1017 2	•	1.1	615.8	278.4	119.8	35	0
		eh/In ( 95 th percenti		0.1	0.3		6.1	40.0		0.0	24.2	11.0	4.7	1.4	0.0
		RQ) (95 th percent	tile)	0.11	0.00		0.37	0.00		0.01	0.00	1.21	0.86	0.00	0.00
-	Jniform Delay ( d 1), s/veh			54.5	54.5		38.7	44.6	_	6.9	20.4	24.2	23.6	1.6	
	ncremental Delay ( d ₂ ), s/veh			0.2	28.5		0.6	312.0	3	0.0	2.7	0.5	5.1	0.3	0.0
	nitial Queue Delay ( d 3 ), s/veh			0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
	Control Delay ( d), s/veh			54.7	82.9		39.2	357.2	<u> </u>	6.9	23.1	24.7	28.7	1.8	
Level of Service Approach Dela	. ,			D 71.6	F		D 215	F		A	C	C	C	A	Δ
Approach Dela Intersection De	-			71.6		E	215. 4.1	5	F	23.4	+	С	6.5 D		A
	iay, 5/VE	an / LOS				0·	<b>T.</b> I								
Multime del Desulte					EB			WB			NB			SB	
Multimodal Re	Pedestrian LOS Score / LOS														
Multimodal Re		/ LOS		3.0		С	2.9		С	2.5	;	В	2.2		В

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	HCS	7 Sig	nalize	d Int	ersect	tion R	esi	ults S	umr	mary	/				
														14741	U.T.
General Information	Y.							l			ormatio	n	- 1		494   1 <u>44  </u>
Agency	FMA							Durati			0.25				R.
Analyst	Addie Kirkham		Analys					Area T	уре		Other				2
Jurisdiction	Knox County		Time P	eriod	Comr Peak	nercial A	M	PHF			0.89		4 M *	W = E	\$ + *
Urban Street	Ebenezer Road		Analys	is Yea	r 2021			Analys	sis Pe	eriod	1> 7:0	0		5 + +	
Intersection	Westland (south)		File Na	ime	Phase	e 4 AM F	eak_	Signali	zed.x	kus				111 141447	1
Project Description	223.013 The Cresc	ent at E	benezer												
Demand Information	1			EB			W	/B			NB			SB	
Approach Movement			L	Т	R	L	-	T F	२	L	Т	R	L	Т	R
Demand (v), veh/h			648		29					139	1279			601	391
Signal Information					1										-
Cycle, s 110.0	Reference Phase	2	1	. 54		-7							<b>N</b>		~
Offset, s 0	Reference Point	End		<u> </u>							_	1	2	3	4
Uncoordinated No	Simult. Gap E/W	On	Green Yellow		57.5 4.0	25.5	0.			0.0					
Force Mode Fixed	-	On	Red	2.0	2.0	4.0	0.			0.0	-7	5	6	7	8
		on	1100		12.0	12.0				10.0					
Timer Results			EBL		EBT	WBI	-	WBT		NBL	-	NBT	SB	L	SBT
Assigned Phase					4					5		2			6
Case Number					9.0					1.0		4.0			8.3
Phase Duration, s					31.5					14.9		78.5			63.5
Change Period, (Y+F	₹ c ), s				6.0					6.0		6.0			6.0
Max Allow Headway (	( <i>MAH</i> ), s				4.1					4.1		0.0			0.0
Queue Clearance Tim	ne ( <i>g</i> s ), s				24.2					6.0					
Green Extension Time	e ( <i>g</i> <sub>e</sub> ), s				1.3					0.3		0.0			0.0
Phase Call Probability	ý				1.00					0.99					
Max Out Probability					1.00					0.03					
Movement Group Re	esults			EB			W	3			NB			SB	
Approach Movement			L	т	R	L	Т	R		L	т	R	L	Т	R
Assigned Movement			7		14					5	2			6	16
Adjusted Flow Rate (	v), veh/h		728		33					156	1437			550	478
Adjusted Saturation F		In	1730		1585					1781	1781			1870	1623
Queue Service Time			22.2		1.4					4.0	11.7			25.4	17.7
Cycle Queue Clearan			22.2		1.4					4.0	11.7			25.4	17.7
Green Ratio ( $g/C$ )	(9-),-		0.23		0.31					0.62	0.66			0.52	0.52
Capacity (c), veh/h			803		497				_	370	2346			978	849
Volume-to-Capacity R	Ratio (X)		0.906		0.066					0.422	0.613			0.563	0.563
Back of Queue (Q),	. ,	)	383.8		24.7					67.1	118.2			326.3	236.6
Back of Queue (Q),			15.1		1.0					2.6	4.7			12.8	9.5
Queue Storage Ratio	· ·		1.40		0.00					0.71	0.00			0.00	0.00
Uniform Delay ( $d_1$ ),		,	36.8		23.8					12.9	3.0			15.2	12.2
Incremental Delay ( d			12.3		0.1					0.8	1.2			2.2	2.6
Initial Queue Delay (	•		0.0		0.0					0.0	0.0			0.0	0.0
Control Delay (d), s/			49.1		23.8					13.7	4.2			17.5	14.7
Level of Service (LOS			D		C					В	А			В	В
Approach Delay, s/ve	•		48.0		D	0.0		<u>II</u>		5.1		A	16.2	2	В
Intersection Delay, s/v					18								В		
		Multimodal Results													
Multimodal Results				EB			W	3			NB			SB	
Multimodal Results Pedestrian LOS Score	e / LOS		2.9	EB	С	2.7	W	З С		0.7	NB	A	2.4		В

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	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Ebenezer at Crescent Lake
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	3/22/2021	East/West Street	Crescent Lake Way
Analysis Year	2021	North/South Street	Ebenezer Road
Time Analyzed	Commercial AM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	213.013 The Crescent at Ebenezer		



Major Street: North-South

Vehicle Volumes and Ad	justmo	ents															
Approach		Eastb	ound			West	oound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	0	0		1	0	1	0	0	2	1	0	1	2	0	
Configuration						L		R			Т	R		L	Т		
Volume, V (veh/h)						69		67			1829	98		33	922		
Percent Heavy Vehicles (%)						2		2						2			
Proportion Time Blocked						0.500		0.500						0.500			
Percent Grade (%)		0															
Right Turn Channelized		Ν	lo			N	lo			Ν	lo		No				
Median Type/Storage		Left Only											1				
Critical and Follow-up H	eadwa	iys															
Base Critical Headway (sec)						7.5		6.9						4.1			
Critical Headway (sec)						6.84		6.94						4.14			
Base Follow-Up Headway (sec)						3.5		3.3						2.2			
Follow-Up Headway (sec)					3.52 3.32								2.22				
Delay, Queue Length, ar	d Leve	el of S	ervic	e													
Flow Rate, v (veh/h)						75		73						36			
Capacity, c (veh/h)						116		542						291			
v/c Ratio						0.64		0.13						0.12			
95% Queue Length, Q <sub>95</sub> (veh)						3.3		0.5						0.4			
Control Delay (s/veh)						79.8		12.7						19.1			
Level of Service, LOS						F		В						С			
Approach Delay (s/veh)						46.7								0.7			
Approach LOS					E												

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	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Ebenezer at Driveway
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	3/22/2021	East/West Street	Weigel's Driveway
Analysis Year	2021	North/South Street	Ebenezer Road
Time Analyzed	Commercial AM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	213.013 The Crescent at Ebenezer		



Major Street: North-South

Vehicle Volumes and Ad	liustm	ents															
Approach	<b>,</b>		ound			West	bound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	0	0		0	0	1	0	0	2	1	0	0	2	0	
Configuration								R			Т	R			т		
Volume, V (veh/h)								43			1833	49			955		
Percent Heavy Vehicles (%)								2									
Proportion Time Blocked								0.500									
Percent Grade (%)		0															
Right Turn Channelized		Ν	10			Ν	10			٩	10		No				
Median Type/Storage		Left Only											1				
Critical and Follow-up H	eadwa	iys															
Base Critical Headway (sec)								6.9									
Critical Headway (sec)								6.94									
Base Follow-Up Headway (sec)								3.3									
Follow-Up Headway (sec)								3.32									
Delay, Queue Length, ar	nd Leve	el of S	ervic	e		<u>.</u>	<u>.</u>				<u>.</u>						
Flow Rate, v (veh/h)								47									
Capacity, c (veh/h)								542									
v/c Ratio								0.09									
95% Queue Length, Q <sub>95</sub> (veh)								0.3									
Control Delay (s/veh)								12.3									
Level of Service, LOS					В												
Approach Delay (s/veh)						12	2.3	-									
Approach LOS					В							1					

	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Westland at Driveway
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	3/22/2021	East/West Street	Westland Drive
Analysis Year	2021	North/South Street	Driveway Connection
Time Analyzed	Commercial AM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	223.013 The Crescent at Ebenezer	·	-



Major Street: East-West

Vehicle Volumes and Ad	justme	ents														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume, V (veh/h)			488	27		31	605			46		28				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked						0.000				0.000		0.000				
Percent Grade (%)											)					
Right Turn Channelized		No No								N	lo			Ν	lo	
Median Type/Storage		Undivided														
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.42		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, ar	nd Leve	el of S	ervice	e												
Flow Rate, v (veh/h)						34				50		30				
Capacity, c (veh/h)						1011				179		539				
v/c Ratio						0.03				0.28		0.06				
95% Queue Length, Q <sub>95</sub> (veh)						0.1				1.1		0.2				
Control Delay (s/veh)						8.7				32.7		12.1				
Level of Service, LOS						A				D		В				
Approach Delay (s/veh)					0.9			24.9								
Approach LOS							С									

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		HCS	S7 Sig	nalize	ed In	tersec	tion	Resi	ilts	Sun	nmar	У				
General Inform	ation								Inte	orcoct	tion Inf	ormatic	20		4 남 4 1	be la
	lation	FMA								ration,		0.25	511		444	
Agency		Addie Kirkham		Analyc		to Mor 2	2 202	1				O.25 Other		1		K.
Analyst		Knox County		1		te Mar 2	nercial		PH	еа Тур Г	e	0.97		×	wle	<u>م</u> ا_ر
Jurisdiction				Time F		Peak		PINI						<u>, 4</u> 47		
Urban Street		Ebenezer Road		Analys					11	-	Period	1> 7:0	00		1111	
Intersection		Westland (north)		File Na		Phas	e 4 PM	Peak_	_Sigi	nalized	d.xus			1	4144	7
Project Descrip	tion	223.013 The Cresc	ent at E	beneze	r											
Demand Inform	nation				EE	}		W	/B			NB			SB	
Approach Move				L	Т	R	L		г	R	L	Т	R	L	T	R
Demand $(v)$ , v				3	1	2	56		1	200	10	1015	_	373	1340	6
								-								
Signal Informa	tion					, <mark>⊿</mark> U,	2	2			2				-	<b>A</b>
Cycle, s	120.0	Reference Phase	2			_ <u>_</u>	₽Ŕ.	- F	2	1 9	2			$\Psi$ -	<b>-</b>	×.
Offset, s	0	Reference Point	End	Green	15.3		0.6	0.	5	20.0	0.0	_				
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	3.0	4.5	3.5	0.0		3.5	0.0				$\checkmark$	
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	2.0	2.0	0.0	0	2.0	0.0		5	6	7	Y 8
Timer Results				EBI	-	EBT	W	3L	W	/BT	NBI	_	NBT	SBL	-	SBT
Assigned Phas	e			3		8	7	·	4	4		2		1		6
Case Number				1.2		4.0	1.	3	4	.0			5.3	1.0		4.0
Phase Duration	Phase Duration, s					6.1	26	.0	25	5.5			68.1	19.8	3	87.9
Change Period	Change Period, (Y+R c), s					5.5	6.	0	6	.0			6.5	4.5	1.5 6.	
Max Allow Head	dway( <i>I</i>	MAH ), s		3.9		4.3	4.	2	4	.2			0.0	4.1		0.0
Queue Clearan	ce Time	e ( g s ), s		2.2		2.2	17	.0	15.2					13.9	)	
Green Extensio		( <i>g</i> e ), s		0.0		0.0	3.0			.1			0.0	1.4		0.0
Phase Call Pro				0.10		0.10	1.0			00				1.00		
Max Out Proba	bility			0.00		0.00	0.0	)5	0.	04				0.00	)	
Movement Gro	un Res	sults			EB			WE	3			NB			SB	
Approach Move	-			1	Т	R	L	T		R	L	Т	R	L	T	R
Assigned Move				3	8	18	7	4	+	14	5	2	12	1	6	16
Adjusted Flow I		), veh/h		3	3		586	188	3	_	9	922	353	385	694	693
-		w Rate (s), veh/h/l	In	1781	1670	)	1730				390	1781	1585	1781	1870	1867
Queue Service	Time ( g	g s ), s		0.2	0.2		15.0	13.	2		1.2	23.0	10.7	11.9	8.4	8.5
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		0.2	0.2		15.0	13.	2		1.2	23.0	10.7	11.9	8.4	8.5
Green Ratio (g	/C)			0.01	0.00	)	0.17	0.1	6		0.51	0.51	0.68	0.66	0.68	0.68
Capacity ( c ), v				69	8		698	258			260	1828	1078	482	1268	1266
Volume-to-Cap		· · ·		0.045	0.37	7	0.839	_			0.035	0.504		0.798	0.547	0.548
		In (95 th percentile)	,	4.5	7		322.1				5.1	361.6	246.9	192.9	108.5	106.7
		eh/In (95 th percent	-	0.2	0.3	_	12.7				0.2	14.2	9.7	7.6	4.3	4.3
		RQ) (95 th percent	tile)	0.18	0.00		0.76				0.05	0.00	1.07	1.38	0.00	0.00
Uniform Delay				59.3	59.4		43.2				11.9	23.7	15.3	14.9	2.3	2.3
Incremental De		•		0.3	26.3	_	4.0	3.9	_		0.2	0.7	0.5	3.1	1.7	1.7
	Initial Queue Delay (d 3), s/veh				0.0 85.7	_	0.0 47.2	0.0 48.4			0.0 12.1	0.0 24.4	0.0 15.8	0.0 18.0	0.0 4.0	0.0
Control Delay ( <i>d</i> ), s/veh Level of Service (LOS)				59.6 E	65.7 F		47.2 D	40.4 D	-		B	24.4 C	B	B	4.0 A	4.0 A
Approach Delay, s/veh / LOS			72.7		E	47			D	22.0		C	7.0		A	
	Approach Delay, s/ven / LOS Intersection Delay, s/veh / LOS						0.3			-				C 7.0		
	,, <i>2</i> ,															
Multimodal Re	sults				EB			WE	3			NB			SB	
Pedestrian LOS	Score	/ LOS		3.0		С	2.	9	(	С	2.4		В	2.2		В
Bicycle LOS So	ore / LC	DS		0.5		А	1.	8	E	В	1.7		В	1.9		В

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		HCS	7 Sig	nalize	d Int	ersec	tion R	lesi	ults	Sun	nmar	y				
									1 -							
General Inform	nation	1										ormatio	on		I A LA A ↓	
Agency		FMA							<u> </u>	ation,		0.25				
Analyst		Addie Kirkham				e Mar 2	2, 2021			а Тур	e	Other				▲ 2
Jurisdiction		Knox County		Time F	Period	Comn Peak	nercial F	PM	PHF	=		0.91		4 m 4	₩‡E	∲ ↓ ¥
Urban Street		Ebenezer Road		Analys	is Yea	r 2021			Ana	lysis	Period	1> 7:0	00		5 + +	
Intersection		Westland (south)		File Na	ame	Phase	4 PM F	Peak	_Sign	alized	d.xus				1     1 1 4 M	1
Project Descrip	tion	223.013 The Cresc	ent at E	benezer												
Demand Inform	nation				EB			٧	VB			NB			SB	
Approach Move	ement			L	Т	R	L		Т	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			488		193					150	801			1176	717
Signal Informa	tion				1	11										_
Cycle, s	120.0	Reference Phase	2	1	5.54		-2							<b>村</b>	_	~
Offset, s	0	Reference Point	End		-					0.0			1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow		79.0 4.0	14.0 4.0	0. 0.		0.0	0.0	_				
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.		0.0	0.0	-7	5	6	7	8
	- mou		•	<u></u>	1	1-1-			-							
Timer Results				EBL	-	EBT	WB	L	WE	ЗT	NBI	-	NBT	SB	-	SBT
Assigned Phase	e					4					5		2			6
Case Number						9.0					1.0		4.0			8.3
Phase Duration	Phase Duration, s					20.0					15.0	) 1	00.0			85.0
Change Period	Change Period, ( $Y+R_c$ ), s					6.0					6.0		6.0			6.0
Max Allow Head	dway(/	MAH ), s				4.2					4.1		0.0			0.0
Queue Clearan	ce Time	e ( g s ), s				16.0					5.8					
Green Extensio	n Time	(ge), s				0.0					0.1		0.0			0.0
Phase Call Pro	bability					1.00					1.00	)				
Max Out Proba	bility					1.00					1.00	)				
Movement Gro	oup Res	sults			EB			W	B			NB			SB	
Approach Move	-			L	Т	R	L	Т		R	L	Т	R	L	T	R
Assigned Move				7		14					5	2			6	16
Adjusted Flow I		/), veh/h		536		212				_	165	880		-	985	985
		ow Rate (s), veh/h/l	n	1730		1585					1781	1781			1870	1646
Queue Service				14.0		14.0					3.8	0.0			54.2	57.9
Cycle Queue C		•		14.0		14.0					3.8	0.0			54.2	57.9
Green Ratio ( g		<u> </u>		0.12		0.19					0.75	0.78			0.66	0.66
Capacity ( c ), v	,			404		303					232	2790			1232	1084
Volume-to-Capa		atio (X)		1.329		0.699					0.710	0.316			0.799	0.908
		/In ( 95 th percentile)	)	601.1		259.8					170.7	5.3			558	645.8
		eh/In ( 95 th percenti		23.7		10.2					6.7	0.2			22.0	25.8
		RQ) (95 th percent		2.19		0.00					1.80	0.00			0.00	0.00
Uniform Delay				50.7		43.3					30.0	0.0			12.5	13.7
Incremental De				164.2		6.9					9.6	0.3			4.1	9.7
Initial Queue De		·		0.0		0.0					0.0	0.0			0.0	0.0
	Control Delay ( d ), s/veh			214.9		50.3					39.6	0.3			16.6	23.4
Level of Service				F		D					D	А			В	С
Approach Delay, s/veh / LOS		168.2	2	F	0.0		л		6.5		A	20.0	)	С		
Intersection De						45	5.7							D		
Multimodal Re	sulte				EB			W	B			NB			SB	
Pedestrian LOS		/105		2.9		С	2.8		ь С		0.6		A	2.4	1	В
Bicycle LOS Sc				2.9		F	2.0	$\rightarrow$	U	,	1.3		A	2.4		B
											1.5		Π	2.2		U

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	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Ebenezer at Crescent Lake
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	3/22/2021	East/West Street	Crescent Lake Way
Analysis Year	2021	North/South Street	Ebenezer Road
Time Analyzed	Commercial PM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	213.013 The Crescent at Ebenezer		



Major Street: North-South

Vehicle Volumes and Ad	justmo	ents														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	2	1	0	1	2	0
Configuration						L		R			Т	R		L	Т	
Volume, V (veh/h)						49		54			1218	71		67	1844	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked						0.200		0.200						0.200		
Percent Grade (%)		0 No No														
Right Turn Channelized		N	lo			N	lo			Ν	lo			Ν	lo	
Median Type/Storage		Left Only											1			
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)						7.5		6.9						4.1		
Critical Headway (sec)						6.84		6.94						4.14		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32					2.22			
Delay, Queue Length, an	d Leve	el of S	ervic	e												
Flow Rate, v (veh/h)						53		59						73		
Capacity, c (veh/h)						125		774						550		
v/c Ratio						0.42		0.08						0.13		
95% Queue Length, Q <sub>95</sub> (veh)						1.8		0.2						0.5		
Control Delay (s/veh)						53.3		10.0						12.5		
Level of Service, LOS						F		В						В		
Approach Delay (s/veh)						30	).5	-					0.4			
Approach LOS					[	)										

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	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Ebenezer at Driveway
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	3/22/2021	East/West Street	Weigel's Driveway
Analysis Year	2021	North/South Street	Ebenezer Road
Time Analyzed	Commercial PM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	213.013 The Crescent at Ebenezer	<u>.</u>	-



## Major Street: North-South

Vehicle Volumes and Ad	justmo	ents															
Approach		Eastb	ound			West	bound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6	
Number of Lanes		0	0	0		0	0	1	0	0	2	1	0	0	2	0	
Configuration								R			Т	R			Т		
Volume, V (veh/h)								30			1205	47			1911		
Percent Heavy Vehicles (%)								2									
Proportion Time Blocked								0.200									
Percent Grade (%)							0										
Right Turn Channelized		Ν	10			Ν	10			Ν	lo		No				
Median Type/Storage		Left Only											1				
Critical and Follow-up H	eadwa	iys															
Base Critical Headway (sec)								6.9									
Critical Headway (sec)								6.94									
Base Follow-Up Headway (sec)								3.3									
Follow-Up Headway (sec)					3.32												
Delay, Queue Length, ar	d Leve	el of S	ervice	e													
Flow Rate, v (veh/h)								33									
Capacity, c (veh/h)								784									
v/c Ratio								0.04									
95% Queue Length, Q <sub>95</sub> (veh)								0.1									
Control Delay (s/veh)								9.8									
Level of Service, LOS					A												
Approach Delay (s/veh)						9.8											
Approach LOS							A										

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HCS7 Two-Way Stop-Control Report									
General Information		Site Information							
Analyst	Addie Kirkham	Intersection	Westland at Driveway						
Agency/Co.	FMA	Jurisdiction	Knox County						
Date Performed	3/22/2021	East/West Street	Westland Drive						
Analysis Year	2021	North/South Street	Driveway Connection						
Time Analyzed	Commercial PM Peak	Peak Hour Factor	0.92						
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25						
Project Description	223.013 The Crescent at Ebenezer		<u>.</u>						



#### Major Street: East-West

Vehicle Volumes and Ad	ljustme	ents														
Approach	Eastbound			Westbound			Northbound			Southbound						
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume, V (veh/h)			692	41		24	699			60		30				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked						0.000				0.000		0.000				
Percent Grade (%)								0								
Right Turn Channelized		No			No			No			No					
Median Type/Storage		Undivided														
Critical and Follow-up H	leadwa	ys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.42		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, ar	nd Leve	el of S	Service	e		<u> </u>										
Flow Rate, v (veh/h)						26				65		33				
Capacity, c (veh/h)						825				115		398				
v/c Ratio						0.03				0.56		0.08				
95% Queue Length, Q <sub>95</sub> (veh)						0.1				2.7		0.3				
Control Delay (s/veh)						9.5				70.6		14.9				
Level of Service, LOS						A				F		В				
Approach Delay (s/veh)					0.8			51.8					-			
Approach LOS								F								

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# Attachment 8 Turn Lane Warrant Analysis

## Project: The Crescent at Ebenezer Commercial Site

Background (Weigel's)					
Westland Drive	VOLUMES				
at Proposed Driveway					
RIGHT TURN		Thru	RT	RT MAX	Warrant Met
AM		491	20	99	NO
PM		694	37	25	YES
Ebenezer Road	VOLUMES				
at Proposed Driveway					
RIGHT TURN		Thru	RT	RT MAX	Warrant Met
AM		955*	49	25	YES
PM		627*	47	25	YES
Commercial Site					
Westland Drive	VOLUMES				
at Proposed Driveway					
RIGHT TURN		Thru	RT	RT MAX	Warrant Met
AM		487	27	99	NO
PM		693	41	25	YES

\* The volume per lane was multiplied by 1.05 in accordance with the Knox County Department of Engineering and Public Works "Access Control and Driveway Design Policy"



Future Turn Lane Scale: 1"=40'

## TABLE 5B

# RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

RIGHT-TURN	THRC	UGH VOLUM	E PLUS LEI	T-TURN	VOLUME	*
VOLUME	< 100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99						
100 - 149 150 - 199						
200 - 249 250 - 299					Yes	Yes Yes
300 - 349 350 - 399			Yes	Ves Yes	Yes Yes	Yes Yes
400 - 449 450 - 499		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN	THR	OUGH VOLU	ME PLUS LEF	T-TURN	VOLUM	£ *
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99			AM Peak 20 R	   Yes	Yes Yes	Yes Yes M Peak 37 R
100 - 149 150 - 199		Yes	Yes Yes	Yes Yes	Yes Yes	Yes
200 - 249 250 - 299	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

\* Or through volume only if a left-turn lane exists.

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## TABLE 6B

# RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 46 TO 55 MPH

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RIGHT-TURN	THRO	UGH VOLUM	E PLUS LEI	T-TURN	VOLUME	, * 1
VOLUME	< 100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99						
100 - 149 150 - 199						Yes
200 - 249 250 - 299				Yes	Yes Yes	Yes Yes
300 - 349 350 - 399			Yes Yes	Yes Yes	Yes Yes	Yes Yes
400) - 449 450 - 499	<u></u>	Yes Yes	Y'es Y'es	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN	THRO	UGH VOLUM	E PLUS LEI	T-TURN	VOLUMI	<u>}</u> *
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99			Yes		 1 Peak 47   1 Peak 49	
100 - 149	Yes	Yes	Yes	Yes	Yes	Yes
150 - 199		Yes	Yes	Yes	Yes	Yes
200 - 249	Yes	Yes	Yes	Yes	Yes	Yes
250 - 299	Yes	Yes	Yes	Yes	Yes	Yes
300 - 349	Yes	Yes	Yes	Yes	Yes	Yes
350 - 399	Yes	Yes	Yes	Yes	Yes	Yes
400 - 449	Yes	Yes	Yes	Yes	Yes •	Yes
450 - 499	Yes	Yes	Yes	Yes	Yes	Yes
500 - 549	Yes	Yes	Yes	Yes	Yes	Yes
550 - 599	Yes	Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

\* Or through volume only if a left-turn lane exists.

## TABLE 5B

# RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

RIGHT-TURN	THRC	UGH VOLUM	E PLUS LEI	T-TURN	VOLUME	, * 
VOLUME	IMPE < 100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99						
100 - 149 150 - 199						
200 - 249 250 - 299					Yes	Yes Yes
300 - 349 350 - 399			Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes		Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN	THR	OUGH VOLU	ME PLUS LEF	T-TURN	VOLUM	
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99			AM Peak 27 R1	Yes	Yes Yes PN	۲ <u>ن</u> ۱ Peak 41 F
100 - 149 150 - 199		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Y'es Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

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\* Or through volume only if a left-turn lane exists.

Attachment 9	
<b>Aerial Photos</b>	





		HCS	7 Sig	nalize	ed Int	ersec	tion F	Resu	Its Sı	ımmar	у				
									• .						L T
General Inform	nation	)/								ction Inf	1	on		↓ 44 ↓ ↓ ↓ ↓ ↓	4× 1.
Agency		FMA		1		1			Duratio		0.25				
Analyst		Addie Kirkham				e Mar 2			Area T	/pe	Other				*
Jurisdiction		Knox County		Time Period Phase 2 PHF Apartments AM Peak					0.93						
Urban Street		Ebenezer Road		Analys			Analys	s Period	1> 7:0	00		httr			
Intersection		Westland (north)		File Na			2 Apar			eak_Sign			-	╡↑┿⋎	<sup>†</sup> ₹
Project Descrip	tion	223.013 The Cresc	ent at E	1		1	/ <u>_</u> / (p or			<u>e</u> .g.:			-		
		,													
Demand Inform	mation				EB			W	В		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			2	0	3	279	2	38	1 3	1721	386	141	675	0
										¥	-				
Signal Informa	1	1			216	144	2	1 2		$\geq$	l		-+-		<b>→</b>
Cycle, s	110.0	Reference Phase	2			51	۳Ř	Γ	2	2		1	$\mathbf{Y}_{2}$ -	3	× ,
Offset, s	0	Reference Point	End	Green	5.9	65.1	0.6	0.3	16	.1 0.0					
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	3.0	4.5	3.5	0.0	) 3.5	5 0.0					A
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	2.0	2.0	0.0	2.0	0.0		5	6	7	¥ د
Timer Deculto				EDI		FDT						NDT	CDI		ODT
	Timer Results		EBI 3		EBT	WB		WBT 4	NB		NBT	SBI 1	-	SBT	
Assigned Phas	e			-		8	· · ·	-		-		2 5.3	· ·		6
Case Number Phase Duratior				1.2	_	4.0 6.1	1.3 21.9	_	4.0 21.6	-	_	5.3 71.6	1.0 10.4		4.0 82.0
Change Period	,			6.4 6.0		5.5	6.0	_	6.0	-		6.5	4.5		6.5
Max Allow Hea				3.9		4.4	4.3		4.3	-		0.0		_	0.0
Queue Clearan	• •			2.1		2.2	6.0	_	17.6	-		0.0	4.1 5.5		0.0
Green Extensio				0.0		0.0	2.2	_	0.0	-	0.0		0.2		0.0
Phase Call Pro		( 9 e ), s		0.0		0.09		_	1.00	-		0.0	0.2		0.0
Max Out Proba				0.00	_	0.09	1.00 0.19		1.00	-			0.38		
Max Out Proba	Dinty			0.07		0.14	0.13		1.00				0.22	-	
Movement Gro	oup Res	sults			EB			WB	;	_	NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ement			3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow		), veh/h		2	3		300	373		3	1765	396	152	726	0
Adjusted Satur	ation Flo	ow Rate (s), veh/h/l	n	1781	1585		1730	1586	3	728	1781	1585	1781	1870	0
Queue Service	Time ( g	g s ), s		0.1	0.2		4.0	15.6	;	0.1	45.5	8.8	3.5	2.4	0.0
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		0.1	0.2		4.0	15.6	;	0.1	45.5	8.8	3.5	2.4	0.0
Green Ratio ( g				0.00	0.01		0.15	0.14	1	0.59	0.59	0.74	0.66	0.69	
Capacity (c),	/eh/h			72	8		632	225		496	2106	1167	210	2568	
Volume-to-Cap	acity Ra	atio(X)		0.030	0.397		0.475	1.65	7	0.006	0.838	0.339	0.722	0.283	0.000
Back of Queue	( Q ), ft/	/In ( 95 th percentile)		2.8	7		156.3	1022 5	2.	1.1	615.8	277.8	118.4	35	0
Back of Queue	of Queue (Q), veh/In (95 th percentile)		le)	0.1	0.3		6.2	40.3	3	0.0	24.2	10.9	4.7	1.4	0.0
	eue Storage Ratio ( RQ ) ( 95 th percentile)			0.11	0.00		0.37	0.00	)	0.01	0.00	1.21	0.85	0.00	0.00
Uniform Delay				54.5	54.5		38.7	44.6		6.9	20.4	24.2	23.6	1.6	
Incremental De				0.2	28.5		0.6	314.		0.0	2.7	0.5	4.8	0.3	0.0
Initial Queue D				0.0	0.0		0.0	0.0	_	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (				54.7	82.9		39.2	359.2	_	6.9	23.1	24.7	28.4	1.8	
								-			-			1	-

Approach Delay, s/veh / LOS 71.6 Е 216.6 F С 6.4 23.4 А Intersection Delay, s/veh / LOS 54.4 D **Multimodal Results** EΒ WB NB SB Pedestrian LOS Score / LOS 3.0 С 2.9 С 2.5 В 2.2 В Bicycle LOS Score / LOS 0.5 2.4 В 1.2 А А 1.6 В

D

F

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Level of Service (LOS)

HCS7<sup>™</sup> Streets Version 7.2.1

D

F

А

С

С

Generated: 3/26/2021 1:27:22 PM

С

А

#### lized lote .140 0 41р.

		HCS	7 Sig	nalize	d In	tersec	tion R	lesi	ults	s Sur	nmar	у				
									1					_		
General Inform	nation	1									-	ormatic	on	_	\   4 7 40 †	
Agency		FMA		1		1				ration,		0.25				the second se
Analyst		Addie Kirkham				e Mar 2				еа Тур	e	Other				▲ 2-
Jurisdiction		Knox County		Time F	Period	Phase Apartr Peak	e 2 ments A	М	PH	IF		0.89		<u>, 4</u> .4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.	W = E	∲ + √
Urban Street		Ebenezer Road		Analys	sis Yea	ar 2021			An	alysis	Period	1> 7:0	00		<u> </u>   	
Intersection		Westland (south)		File Na	ame	Phase	e 2 Apar	tmen	nts Al	M Pea	k_Signa	alized.x	us			r
Project Descrip	tion	223.013 The Cresc	ent at E	benezei	r											
Demand Inform	mation				EB			V	VB		1	NB			SB	
Approach Move				L	Т	R	1	1	T	R		Т	R	L	Т	R
Demand (v), v				648	· ·	29	-				139	1278		+-	603	391
								1	1	_			_			
Signal Informa	1					1								<b>K</b>		7
Cycle, s	110.0	Reference Phase	2		<u>h 51</u>	5 St	F.						1	2	3	┥ ┥
Offset, s	0	Reference Point	End	Green		57.5	25.5	0.		0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	-	4.0	4.0	0.		0.0	0.0	— <b>—</b>	∖ Ľ	1 _		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.	0	0.0	0.0	+	5	6	7	8
Timer Results				EBL	_	EBT	WB	L	W	/BT	NB		NBT	SB	L	SBT
Assigned Phas						4					5		2			6
Case Number						9.0					1.0		4.0			8.3
Phase Duration	n. s					31.5				_	14.9		78.5			63.5
Change Period		c ), S				6.0					6.0		6.0			6.0
Max Allow Hea						4.1				_	4.1		0.0			0.0
Queue Clearan						24.2					6.0					
Green Extensio	on Time	(ge),s				1.3					0.3		0.0			0.0
Phase Call Pro	bability					1.00					0.99	)		1		
Max Out Proba	bility					1.00					0.03	3				
Movement Gro	oup Res	sults			EB			W	В			NB			SB	
Approach Move	-			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move				7		14					5	2			6	16
Adjusted Flow		), veh/h		728		33					156	1436			551	478
-	-	w Rate (s), veh/h/l	n	1730		1585					1781	1781			1870	1623
Queue Service	Time ( g	g s ), s		22.2		1.4					4.0	11.7			25.5	17.8
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		22.2		1.4					4.0	11.7			25.5	17.8
Green Ratio ( g	g/C)			0.23		0.31					0.62	0.66			0.52	0.52
Capacity (c), v	/eh/h			803		497					370	2346			978	849
Volume-to-Cap	acity Ra	itio(X)		0.906		0.066					0.422	0.612			0.563	0.563
Back of Queue	( Q ), ft/	In (95 th percentile)		383.8		24.7					67.1	118.1			326.6	236.9
		eh/In ( 95 th percenti		15.1		1.0					2.6	4.6			12.9	9.5
		RQ) (95 th percent	tile)	1.40		0.00					0.71	0.00			0.00	0.00
Uniform Delay				36.8		23.8					13.0	3.0			15.2	12.2
Incremental De		-		12.3		0.1					0.8	1.2			2.2	2.6
Initial Queue D		•		0.0		0.0					0.0	0.0			0.0	0.0
Control Delay (		eh		49.1		23.8					13.7	4.2			17.5	14.7
Level of Service	· /	(1.00		D		C					B	A			В	B
Approach Dela	-			48.0		D	0.0				5.1		A	16.2	2	В
Intersection De	iay, s/ve	en / LUS				18	5.1							В		
Multimodal Re	sults				EB			W	В			NB		SB		
Pedestrian LOS	S Score	/ LOS		2.9		С	2.7		(	С	0.7		А	2.4		В
Bicycle LOS So	core / LC	DS				F					1.8		В	1.4		А

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	HCS7 Two-Way	Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Ebenezer at Driveway
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	3/22/2021	East/West Street	Weigel's Driveway
Analysis Year	2021	North/South Street	Ebenezer Road
Time Analyzed	Phase 2 Apartment AM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	213.013 The Crescent at Ebenezer		



Major Street: North-South

Vehicle Volumes and Ad	justmo	ents														
Approach	Τ	Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	1	0	0	2	1	0	0	2	0
Configuration								R			Т	R			Т	
Volume, V (veh/h)								43			1837	49			955	
Percent Heavy Vehicles (%)								2								
Proportion Time Blocked								0.500								
Percent Grade (%)							0	°							°	
Right Turn Channelized		Ν	10			Ν	10			Ν	lo			Ν	10	
Median Type/Storage				Left	Only								1			
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)								6.9								
Critical Headway (sec)								6.94								
Base Follow-Up Headway (sec)								3.3								
Follow-Up Headway (sec)								3.32								
Delay, Queue Length, ar	d Leve	el of S	ervice	e		<u>.</u>	<u>.</u>		<u>.</u>							
Flow Rate, v (veh/h)	Τ							47								
Capacity, c (veh/h)								542								
v/c Ratio								0.09								
95% Queue Length, Q <sub>95</sub> (veh)								0.3								
Control Delay (s/veh)								12.3								
Level of Service, LOS								В								
Approach Delay (s/veh)	12.3			2.3												
Approach LOS	В															

	HCS7 Two-Way	Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Ebenezer at Crescent Lake
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	3/22/2021	East/West Street	Crescent Lake Way
Analysis Year	2021	North/South Street	Ebenezer Road
Time Analyzed	Phase 2 Apartment AM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	213.013 The Crescent at Ebenezer		



Major Street: North-South

Vehicle Volumes and Ad	justmo	ents														
Approach		Eastb	ound			West	ound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	2	1	0	1	2	0
Configuration						L		R			Т	R		L	Т	
Volume, V (veh/h)						70		71			1829	97		33	924	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked						0.500		0.500						0.500		
Percent Grade (%)					(											
Right Turn Channelized		No No								Ν	lo			N	lo	
Median Type/Storage		Left Only										:	1			
Critical and Follow-up H	eadwa	·														
Base Critical Headway (sec)						7.5		6.9						4.1		
Critical Headway (sec)						6.84		6.94						4.14		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, an	d Leve	el of S	ervice	e												
Flow Rate, v (veh/h)						76		77						36		
Capacity, c (veh/h)						116		542						292		
v/c Ratio						0.65		0.14						0.12		
95% Queue Length, Q <sub>95</sub> (veh)						3.4		0.5						0.4		
Control Delay (s/veh)						81.0		12.7						19.0		
Level of Service, LOS	F B										С					
Approach Delay (s/veh)	46.6						0.7									
Approach LOS	E															

	HCS7 Two-Way	Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Westland at Driveway
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	3/22/2021	East/West Street	Westland Drive
Analysis Year	2021	North/South Street	Driveway Connection
Time Analyzed	Phase 2 Apartment AM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	223.013 The Crescent at Ebenezer		



Major Street: East-West

Vehicle Volumes and Ad	justmo	ents														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume, V (veh/h)			487	27		31	607			46		28				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked						0.000				0.000		0.000				
Percent Grade (%)										(	)					
Right Turn Channelized		No No								N	lo			Ν	lo	
Median Type/Storage		Undivided														
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.42		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, ar	nd Leve	el of S	ervice	e												
Flow Rate, v (veh/h)						34				50		30				
Capacity, c (veh/h)						1012				179		539				
v/c Ratio									0.28		0.06					
95% Queue Length, Q <sub>95</sub> (veh)						0.1				1.1		0.2				
Control Delay (s/veh)						8.7				32.8		12.1				
Level of Service, LOS						А				D		В				
Approach Delay (s/veh)		0.9						25.0								
Approach LOS							[	)								

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HCS7<sup>™</sup> TWSC Version 7.2.1

	HCS7 Two-Way	Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Westland at Driveway
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	3/24/2021	East/West Street	Westland Drive
Analysis Year	2021	North/South Street	Serene Breeze Way
Time Analyzed	Phase 2 Apartment AM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	223.013 The Crescent at Ebenezer		



Major Street: East-West

Vehicle Volumes and Ad	ljustme	ents														
Approach		East	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	Т				LR					
Volume, V (veh/h)			510	5		5	606			32		32				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked						0.000				0.000		0.000				
Percent Grade (%)										. (	)					
Right Turn Channelized		No No								Ν	lo			Ν	lo	
Median Type/Storage		Undivided														
Critical and Follow-up H	eadwa	adways														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.42		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, ar	nd Leve	el of S	Service	e												
Flow Rate, v (veh/h)						5					70					
Capacity, c (veh/h)						1011					287					
v/c Ratio						0.00					0.24					
95% Queue Length, Q <sub>95</sub> (veh)						0.0					0.9					
Control Delay (s/veh)						8.6					21.6					
Level of Service, LOS						A					С					
Approach Delay (s/veh)	0.1						21.6									
Approach LOS								(	C							

# **HCS7 Signalized Intersection Results Summary**

		HCS	7 Sig	nalize	ed Int	ersec	tion F	Resi	ults	Sur	nmar	у				
0															4741	u T
General Inform	nation	[							<u> </u>			ormatic	on	- 1	୶∔৻	1. J.
Agency		FMA								ration,		0.25				R.
Analyst		Addie Kirkham				Mar 2				еа Тур	e	Other		- ÷		****
Jurisdiction		Knox County		Time F	Period	Phase Apart Peak	e 2 ments P	M	PH	F		0.97			W # E	 
Urban Street		Ebenezer Road		Analys	sis Yea	· 2021			Ana	alysis	Period	1> 7:0	00		ी T T ( इ.स.कृष्ट्	Þ 7
Intersection		Westland (north)		File Na	ame	Phase	e 2 Apar	tmen	ts Pl	M Pea	k_Signa	alized.x	us			
Project Descrip	otion	223.013 The Cresc	ent at E	beneze	r											
Demand Inform	mation				EB			١٨	/B			NB			SB	
Approach Move				L	Т	R	L		г	R	L	T	R	L	T	R
Demand (v), v				3	1	2	569		1	201	10	1018		373	1344	6
								1								1
Signal Informa	17		1		216		2	2			2	l		-+-		₩.
Cycle, s	120.0	Reference Phase	2	_		51	rR -	F	2	] '	2			$\mathbf{Y}_{2}$ -		4
Offset, s	0	Reference Point	End	Green	15.3	61.6	0.6	0.	5	20.1	0.0					
Uncoordinated	No	Simult. Gap E/W	Off	Yellow		4.5	3.5	0.		3.5	0.0		4			
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	2.0	2.0	0.	0	2.0	0.0		5	6	7	<b>Y</b> 8
Timer Results				EBI		EBT	WB	1	W	/BT	NBI		NBT	SBL		SBT
Assigned Phas				3	-	8	7	-	WBT 4			_	2	1		6
Case Number	<u> </u>			1.2		4.0	1.3			.0			5.3	1.0		4.0
Phase Duration				6.6		6.1	26.			5.6			68.1 19.			87.8
	hange Period, ( $Y+Rc$ ), s					5.5	6.0			.0			6.5	4.5	_	6.5
Max Allow Hea				6.0 3.9		4.3			4.2				0.0	4.1		0.0
Queue Clearan		· ·		2.2		2.2	17.0		15.3					13.9	)	
Green Extensio	on Time	( <i>g</i> e), s		0.0		0.0	3.0		3.	.1		0.0		1.4		0.0
Phase Call Pro	bability			0.10	)	0.10	1.00	)	1.	00				1.00	)	
Max Out Proba	bility			0.00	)	0.00	0.05	5	0.	04				0.00	)	
Movement Gro	oup Res	sults			EB		V		WB			NB			SB	
Approach Move	-			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ement			3	8	18	7	4		14	5	2	12	1	6	16
Adjusted Flow	Rate ( v	), veh/h		3	3		587	189	Э		9	925	353	385	696	695
Adjusted Satura	ation Flo	ow Rate ( s ), veh/h/l	n	1781	1670		1730	158	6		388	1781	1585	1781	1870	1867
Queue Service		- ·		0.2	0.2		15.0	13.			1.2	23.0	10.8	11.9	8.5	8.5
-		e Time ( <i>g c</i> ), s		0.2	0.2		15.0	13.			1.2	23.0	10.8	11.9	8.5	8.5
Green Ratio ( g				0.01	0.00		0.17	0.1			0.51	0.51	0.68	0.66	0.68	0.68
Capacity (c), v				69	8		699	259	_		259	1827	1078	481	1268	1266
Volume-to-Cap		. ,		0.045	0.377	<u> </u>	0.840	0.72			0.035	0.506	0.328	0.799	0.549	0.549
		/In ( 95 th percentile) eh/In ( 95 th percenti		4.5 0.2	7 0.3		322.6 12.7	227 8.9			5.1 0.2	362.6 14.3	246.6 9.7	193.4 7.6	109.2 4.3	107.4 4.3
		RQ) ( 95 th percent		0.2	0.0		0.76	0.0			0.2	0.00	9.7	1.38	4.3	4.3
Uniform Delay				59.3	59.4		43.1	44.			11.9	23.8	15.3	14.9	2.3	2.3
-	incremental Delay ( $d_2$ ), s/veh				26.3		4.0	3.9			0.2	0.7	0.5	3.1	1.7	1.7
nitial Queue Delay ( d 2 ), s/veh				0.3	0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( d ), s/veh				59.6	85.7		47.2	48.	4		12.1	24.4	15.8	18.1	4.0	4.0
Level of Service (LOS)				E	F		D	D			В	С	В	В	Α	A
Approach Dela				72.7	7	E	47.5	5	C	D	22.0	)	С	7.0		А
Intersection De	lay, s/ve	eh / LOS				2	0.3							С		
Multimodal Re	sulte				EB			W	2			NB			SB	
Pedestrian LOS		/105		3.0		С	2.9			с	2.4	1	В	2.2	1	В
Bicycle LOS So				0.5		A	1.8			B	1.7	_	B	2.0	_	B
				0.0			1.0						-			_

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Analysis     Analysis     Analysis     Analysis     Para     Pice     Other       Jurisdiction     Knox County     Time Period     Phase 2 Poartments PM     PHF     0.91     Image: Construction     Image: Construction <t< th=""><th></th><th></th><th>HCS</th><th>7 Sig</th><th>nalize</th><th>d Int</th><th>ersec</th><th>tion R</th><th>Resi</th><th>ults</th><th>Sun</th><th>nmar</th><th>у</th><th></th><th></th><th></th><th></th></t<>			HCS	7 Sig	nalize	d Int	ersec	tion R	Resi	ults	Sun	nmar	у				
Partner     <										1 -					_		
Analyst     Duration // L23     Duration // L23     Duration // L23       Addle Kithnam     Analysis Date     Mar 22, 2021     Anae Type     0.91       Jurisdiction     Knox County     Time Period     Phase 2     PHF     0.91       Urban     Street     Ebenezer Road     Analysis Year (2021)     Analysis Period     1> 7.00       Intersection     Westand (south)     File Name     Phase 2 Apartments PM Peak_Signalized.xus     Phase 1     17.7     R       Domand Information     La     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     L     T     R     <	General Inform	nation	Y.										N.	on			
Juriadiction     Knox County     Time Period Pask     Phase 2 Pask     Phase 2 Phase 2 Pask     Phase 2 Phase	Agency												_				the second se
Apartments PM peakVestand (south)File Name Project DescriptionVestand (south)File Name Phase 2 Apartments PM Peak. Signalized Austributed Summary Project DescriptionNBSBProject DescriptionVMENBCColspan="4">VMENBSBApproach MovementLTR </td <td>Analyst</td> <td></td> <td>Addie Kirkham</td> <td></td> <td>Analys</td> <td>is Date</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>e</td> <td>Other</td> <td></td> <td>×</td> <td></td> <td>4 2-</td>	Analyst		Addie Kirkham		Analys	is Date						e	Other		×		4 2-
Intersection     Westland (south)     File Name     Phase 2 Apartments PM Peak_Signalized.xus       Project Description     223.013 The Creacent at Ebenezer       Demand Information     EB     WB     NB     L     T     R     S     S     L     C     C     C     C     C     C     C     C     T <td< td=""><td>Jurisdiction</td><td></td><td>Knox County</td><td></td><td>Time F</td><td>Period</td><td>Apartr</td><td></td><td>M</td><td>PH</td><td>F</td><td></td><td>0.91</td><td></td><td>⊿ 4 Å ∲</td><td>w ∄ E</td><td>4 4 4</td></td<>	Jurisdiction		Knox County		Time F	Period	Apartr		M	PH	F		0.91		⊿ 4 Å ∲	w ∄ E	4 4 4
Intersection     Westland (south)     File Name     Phase 2 Apartments PM Peak_Signalized xus       Project Description     223.013 The Crescent at Ebenezer       Demand Information     EB     WB     I     T     R     L <th< td=""><td>Urban Street</td><td></td><td>Ebenezer Road</td><td></td><td>Analys</td><td>is Yea</td><td colspan="2"></td><td></td><td>Ana</td><td>alysis</td><td>Period</td><td>1&gt; 7:0</td><td>00</td><td></td><td><u>111</u></td><td>1. 1</td></th<>	Urban Street		Ebenezer Road		Analys	is Yea				Ana	alysis	Period	1> 7:0	00		<u>111</u>	1. 1
Demand Information     EB     WB     NB     SB       Approach Movement     L     T     R     L     T	Intersection		Westland (south)		File Na	ame	Phase	e 2 Apar	tmen	nts Pl	M Pea	k_Signa	alized.x	us	1 '		r
Approach Movement   L   T   R	Project Descrip	otion	223.013 The Cresc	ent at E	benezer												
Approach Movement   L   T   R	Demand Infor	mation				FB			V	VB			NB			SB	
Demand (v), veh/h     489     193     150     804     1177     717       Signal Information Cycle, s     120.0     Reference Phase     2       Signal Information Cycle, s     120.0     Reference Point     End 0     79.0     14.0     0.0     0.0     0.0       Offsat, S     0     Reference Point     End 0     79.0     14.0     0.0<					1	ir	R		1	1	R		i.	R	1	-	R
Signal Information Cycle, s     120.0     Reference Phase     2       Offset, s     0     Reference Phase     2       Offset, s     0     Reference Phase     2       Time Results     0     Simult. Gap EW     0       Freed Mode     Fixed     Simult. Gap LW     0       Timer Results     EBL     EBL     EBL     WBT     NBT     SBL     SBT       Assigned Phase     9.0     10.0     4.0     0.0     0.0     0.0     86.0       Case Number     9.0     10.0     4.0     83.3     83.3       Phase Duration, s     0.0     16.0     6.0     6.0     8.0       Ara Allow Headway (MAH), S     0.0     0.0     0.0     0.0     0.0       Queue Clearance Time (g +), s     16.0     5.9     -     -     -       Green Extension Time (g +), s     10.00     1.00     1.00     -     -       Assigned Movement Aroup Results     EB     WB     NB     SB     R     R     -     - <td>•••</td> <td></td> <td></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td><u> </u></td> <td>+</td> <td></td> <td></td> <td>150</td> <td></td> <td></td> <td>+-</td> <td></td> <td>717</td>	•••					<u> </u>		<u> </u>	+			150			+-		717
Cycle.s     120.0     Reference Phase     2       Offsat, s     0     Reference Point     End.       Green     9.0     78.0     14.0     0.0     0.0     0.0       Force Mode     Fixed     Simult. Gap N/S     On     Red     2.0     2.0     0.0     <					lír	1		- II									
Cybe, so     Table of Reference Point End     Gree of 00     Point S     Come of Point S </td <td></td> <td>1/</td> <td></td> <td></td> <td></td> <td></td> <td>24 I</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td>		1/					24 I	1							-		
Uncoordinated     No     Simult. Gap E/W     On     Velow 40     4.0     0.	-				-	h sr	51	F.						1		3	$\prec$
Force Mode     Fixed     Simult. Gap N/S     On     Real     2.0     2.0     0.0 <td></td> <td>-</td> <td></td> <td>-</td> <td>Green</td> <td>9.0</td> <td>79.0</td> <td>14.0</td> <td>0.</td> <td>.0</td> <td>0.0</td> <td>0.0</td> <td></td> <td></td> <td></td> <td></td> <td>_</td>		-		-	Green	9.0	79.0	14.0	0.	.0	0.0	0.0					_
Timer Results   EBL   EBL   WBL   WBT   NBL   NBT   SBL   SBL   SBT     Assigned Phase   4   5   2   6     Case Number   9.0   1.0   4.0   8.3     Phase Duration, s   20.0   15.0   100.0   85.0     Change Period, (Y+Re.), s   6.0   6.0   6.0   6.0   6.0     Max Allow Headway (MAH), s   4.2   4.1   0.0   0.0   0.0     Queue Clearance Time (g e), s   0.0   0.0   0.0   0.0   0.0   0.0     Max Out Probability   1.00   1.00   1.00   1.00   1.00   1.00   0.0     Movement Group Results   EB   WB   NB   SB   SB     Aguised Flow Rate (v), veh/h   537   212   165   884   987   987     Adjusted Flow Rate (v), veh/h   537   212   158   1781   1781   1870   164     Queue Service Time (g e), s   14.0   13.9   0.0   54.3   58.3   Green Ratio (g'C)   0.12   165   884		No	·								_		`	ς  Ζ	1 _		
Assigned Phase   4   5   2   6     Case Number   9.0   1.0   4.0   8.3     Phase Duration, s   20.0   15.0   100.0   85.0     Change Period, $(Y+R_c)$ , s   6.0   6.0   6.0   6.0     Max Allow Headway (MAH), s   4.2   4.1   0.0   0.0     Queue Clearance Time (g_s), s   16.0   5.9   0.0   0.1   0.0   0.0     Green Extension Time (g_s), s   0.0   0.0   0.1   0.0   0.0   0.0     Max Out Probability   1.00   1.00   1.00   5.43   5.3     Approach Movement   7   7   1.4   5.2   6   6     Adjusted Flow Rate (v), veh/h   537   212   165	Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.	.0	0.0	0.0	1	5	6	7	8
Assigned Phase   4   5   2   6     Case Number   9.0   1.0   4.0   8.3     Phase Duration, s   20.0   15.0   100.0   85.0     Change Period, $(Y+R_c)$ , s   6.0   6.0   6.0   6.0     Max Allow Headway (MAH), s   4.2   4.1   0.0   0.0     Queue Clearance Time (g_s), s   16.0   5.9   0.0   0.1   0.0   0.0     Green Extension Time (g_s), s   0.0   0.0   0.1   0.0   0.0   0.0     Max Out Probability   1.00   1.00   1.00   5.43   5.3     Approach Movement   7   7   1.4   5.2   6   6     Adjusted Flow Rate (v), veh/h   537   212   165	Timer Results				EBI		FBT	WB	L	W	/BT	NBI		NBT	SB		SBT
Case Number   9.0   1.0   4.0   8.3     Phase Duration, s   20.0   15.0   100.0   85.0     Change Period, (Y+Rc), s   6.0   6.0   6.0   6.0   6.0     Max Allow Headway (MAH), s   4.2   4.1   0.0   0.0     Queue Clearance Time (g *), s   16.0   5.9									_								
Phase Duration, s   20.0   Image of the second of the se		-									_	-					-
Change Period, $(Y+R_c)$ , s   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   6.0   0.0     Queue Clearance Time $(g_s)$ , s   16.0   5.9   0.0   0.1   0.0   0.0   0.0     Phase Call Probability   1.00   1.00   1.00   1.00   0.0   0.0     Max Aut Probability   1.00   1.00   1.00   1.00   1.00   0.0   0.0     Movement Group Results   EB   WB   NB   SB   B   B   B   B     Adjusted Flow Rate ( $v$ ), veh/h   537   212   165   884   987   987   987     Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln   1730   1585   1781   1781   1781   1870   1646     Queue Service Time ( $g_c$ ), s   14.0   14.0   3.9   0.0   54.3   58.3     Cycle Queue Clearance Time ( $g_c$ ), s   13.31   0.699   0.713   0.317   0.801   66.0   66.0		). S		_	-								) 1				
Max Allow Headway (MAH), s   4.2   4.1   0.0   0.0     Queue Clearance Time ( $g \circ$ ), s   0.0   5.9   -   0.1   0.0   0.0     Green Extension Time ( $g \circ$ ), s   0.0   0.0   0.1   0.0   0.0   0.0     Max Out Probability   1.00   1.00   1.00   1.00   0.0   0.0     Movement Group Results   EB   VB   I   R   L   T   R   R <t< td=""><td></td><td></td><td>c). S</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>			c). S														
Queue Clearance Time ( $g \circ$ ), s16.05.90.00.00.00.00.0Phase Call Probability1.001.001.001.000.00.00.0Max Out Probability1.001.001.001.001.001.001.001.00Movement Group ResultsLTRLTRLTRLTR1.001.00Assigned MovementLTRLTRLTR1.00 <t< td=""><td>-</td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	-		-														
Green Extension Time ( $g_e$ ), s   0.0   0.0   0.1   0.0   0.0     Phase Call Probability   1.00   1.00   1.00   0.0   0.0     Max Out Probability   1.00   1.00   1.00   0.0   0.0     Movement Group Results   EB   VB   NB   R   L   T   R   L																	
Phase Call Probability   1.00   I.00   I.00   I.00   IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII							0.0					0.1					0.0
Movement Group Results     EB     WB     NB     SB       Approach Movement     L     T     R     L     T <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1.00</td> <td></td> <td></td> <td></td> <td></td> <td>1.00</td> <td colspan="2">)</td> <td>1</td> <td></td> <td></td>							1.00					1.00	)		1		
Approach Movement   L   T   R   R    Adjusted	Max Out Proba	bility					1.00					1.00	)				
Approach Movement   L   T   R   R    Adjusted	Movement Gro	oup Res	sults	_		FB			W	B			NB			SB	
Assigned Movement   7   14   5   2   6   16     Adjusted Flow Rate (v), veh/h   537   212   165   884   987   987     Adjusted Saturation Flow Rate (s), veh/h/ln   1730   1585   1781   1781   1870   1646     Queue Service Time (g s), s   14.0   14.0   3.9   0.0   54.3   58.3     Cycle Queue Clearance Time (g c), s   14.0   14.0   3.9   0.0   54.3   58.3     Green Ratio (g/C)   0.12   0.19   0.75   0.78   0.66   0.66     Capacity (c), veh/h   404   303   231   2790   1232   1084     Volume-to-Capacity Ratio (X)   1.331   0.699   0.713   0.317   0.801   0.910     Back of Queue (Q), trl/n (95 th percentile)   60.37   259.8   1771.3   5.3   560.3   650.7     Back of Queue (Q), trl/n (95 th percentile)   23.8   10.2   6.7   0.2   22.1   26.0     Queue Storage Ratio (RQ) (95 th percentile)   2.38   10.2   6.7   0.2   22.1   26.6 <t< td=""><td></td><td>-</td><td></td><td>_</td><td>L</td><td></td><td>R</td><td>L</td><td>1</td><td>11</td><td>R</td><td>L</td><td></td><td>R</td><td>L</td><td>-</td><td>R</td></t<>		-		_	L		R	L	1	11	R	L		R	L	-	R
Adjusted Flow Rate ( v), veh/h   537   212   165   884   987   987     Adjusted Saturation Flow Rate ( s), veh/h/ln   1730   1585   1781   1781   1781   1870   1640     Queue Service Time ( g s ), s   14.0   14.0   14.0   3.9   0.0   54.3   58.3     Cycle Queue Clearance Time ( g c ), s   14.0   14.0   3.9   0.0   54.3   58.3     Green Ratio ( g/C)   0.12   0.19   0.75   0.78   0.66   0.66     Capacity ( c ), veh/h   404   303   231   2790   1232   1084     Volume-to-Capacity Ratio ( X)   1.331   0.699   0.713   0.317   0.801   0.910     Back of Queue ( Q ), veh/n ( 95 th percentile)   23.8   10.2   6.7   0.2   22.1   260.3   650.3     Back of Queue ( Q ), veh/n ( 95 th percentile)   23.8   10.2   6.7   0.2   22.1   260.3   650.3     Queue Storage Ratio ( RQ ) ( 95 th percentile)   2.20   0.00   1.80   0.0   0.00   0.00   0.00   0.00   0.00   0.00 </td <td></td> <td><u> </u></td> <td></td> <td></td>															<u> </u>		
Adjusted Saturation Flow Rate (s), veh/h/ln   1730   1585   1781   1781   1781   1870   1646     Queue Service Time (g s), s   14.0   14.0   14.0   3.9   0.0   54.3   58.3     Cycle Queue Clearance Time (g c), s   14.0   14.0   3.9   0.0   54.3   58.3     Green Ratio (g/C)   0.12   0.19   0.75   0.78   0.66   0.66     Capacity (c), veh/h   404   303   231   2790   1232   1080     Volume-to-Capacity Ratio (X)   1.331   0.699   0.713   0.317   0.801   0.910     Back of Queue (Q), th/ln (95 th percentile)   603.7   259.8   171.3   5.3   560.3   650.3     Back of Queue (Q), veh/ln (95 th percentile)   23.8   10.2   6.7   0.2   22.1   26.00     Queue Storage Ratio (RQ) (95 th percentile)   23.8   10.2   6.7   0.2   22.1   26.0     Intramental Delay (d 1), s/veh   50.7   43.3   0.0   0.0   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00			), veh/h	_	<u> </u>							-					
Queue Service Time $(g_{s})$ , s   14.0   14.0   14.0   3.9   0.0   54.3   58.3     Cycle Queue Clearance Time $(g_{c})$ , s   14.0   14.0   3.9   0.0   54.3   58.3     Green Ratio $(g/C)$ 0.12   0.19   0.19   0.75   0.78   0.66   0.66     Capacity $(c)$ , veh/h   404   303   231   2790   1232   1084     Volume-to-Capacity Ratio $(X)$ 1.331   0.699   0.713   0.317   0.801   0.910     Back of Queue $(Q)$ , th/ln (95 th percentile)   603.7   259.8   171.3   5.3   560.3   650.3     Back of Queue $(Q)$ , veh/ln (95 th percentile)   2.20   0.00   6.7   0.2   22.1   26.0     Queue Storage Ratio $(RQ)$ (95 th percentile)   2.20   0.00   1.80   0.0   0.00   0.00   0.00   0.00   0.00   12.6   13.7     Incremental Delay $(d_{2})$ , s/veh   165.3   6.9   9.8   0.3   4.1   9.9     Initial Queue Delay $(d_{3})$ , s/veh   0.0   0.0   0.0   0.0   0.0   0.0   0.0 <td></td> <td>`</td> <td><i>/</i>·</td> <td>n</td> <td></td> <td>1646</td>		`	<i>/</i> ·	n													1646
Cycle Queue Clearance Time (g c), s14.014.014.03.90.054.358.3Green Ratio (g/C)0.120.190.190.750.780.780.660.66Capacity (c), veh/h4043030.92312790012321084Volume-to-Capacity Ratio (X)1.3310.6990.7130.3170.8010.910Back of Queue (Q), th/ln (95 th percentile)603.7259.8171.35.30560.3650.3Back of Queue (Q), veh/ln (95 th percentile)23.810.20.006.70.222.126.00Queue Storage Ratio (RQ) (95 th percentile)2.200.001.800.000.00.000.00Uniform Delay (d 1), s/veh50.743.36.930.30.012.613.7Incremental Delay (d 2), s/veh165.36.92.20.000.00.012.613.7Incremental Delay (d 3), s/veh216.050.36.944.20.30.00.00.00.0Control Delay, s/veh / LOS169.1FD40.20.316.723.60.0 <t< td=""><td>-</td><td></td><td>. ,</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td><td>58.3</td></t<>	-		. ,								_						58.3
Green Ratio (g/C)0.120.190.1900.750.7800.660.66Capacity (c), veh/h4043030231279012321084Volume-to-Capacity Ratio (X)1.3310.699000.7130.31700.8010.910Back of Queu (Q), th/ln (95 th percentile)603.7259.80171.35.30560.3650.3Back of Queu (Q), veh/ln (95 th percentile)23.810.20.006.70.2022.126.03Queue Storage Ratio (RQ) (95 th percentile)2.200.0001.8000.000.000.00Uniform Delay (d_1), s/veh50.743.301.8000.012.613.7Incremental Delay (d_2), s/veh165.36.90.00.00.00.012.613.7Incremental Delay (d_3), s/veh0.00.00.00.00.00.00.00.0Control Delay, s/veh / LOSFDA40.20.3A0.00.00.0Intersection Delay, s/veh / LOS169.1F0.0I6.6A20.2CMultimodal ResultsEBEBEBEBEBC0.6A2.4BPedestrian LOS Score / LOS2.9C2.8C0.6A2.4B			- ·														58.3
Capacity (c), veh/h   404   303   231   279   1232   1084     Volume-to-Capacity Ratio (X)   1.331   0.699   0.713   0.317   0.801   0.910     Back of Queue (Q), ft/ln (95 th percentile)   603.7   259.8   171.3   5.3   0   560.3   650.7     Back of Queue (Q), veh/ln (95 th percentile)   23.8   10.2   6.7   0.2   0   22.1   26.00     Queue Storage Ratio (RQ) (95 th percentile)   2.20   0.00   1.80   0.0							0.19					0.75	0.78			0.66	0.66
Back of Queue (Q), ft/ln (95 th percentile)   603.7   259.8   IT1.3   5.3   560.3   650.3     Back of Queue (Q), veh/ln (95 th percentile)   23.8   10.2   67.7   0.2   22.1   26.0     Queue Storage Ratio (RQ) (95 th percentile)   2.20   0.00   Incemental Delay (d1), s/veh   50.7   43.3   30.3   0.0   Incemental Delay (d2), s/veh   12.6   13.7     Incremental Delay (d2), s/veh   165.3   6.9   Incemental Delay (d2), s/veh   0.00   Incemental Delay (d2), s/veh   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   12.6   13.7     Incremental Delay (d2), s/veh   165.3   6.9   Incemental Delay (d3), s/veh   0.0   <	Capacity (c),	veh/h														1232	1084
Back of Queue (Q), veh/ln (95 th percentile)23.810.26.70.22.226.0Queue Storage Ratio (RQ) (95 th percentile)2.200.001.800.000.000.000.00Uniform Delay (d_1), s/veh50.743.3330.30.012.613.7Incremental Delay (d_2), s/veh165.36.99.80.34.19.9Initial Queue Delay (d_3), s/veh0.00.00.00.00.00.00.0Control Delay (d), s/veh216.050.3-40.20.3-16.723.6Level of Service (LOS)FD-DABCApproach Delay, s/veh / LOS169.1F0.0-6.6A20.2CMultimodal ResultsPedestrian LOS Score / LOS2.9C2.8C0.6A2.4B	Volume-to-Cap	acity Ra	itio ( X )		1.331		0.699					0.713	0.317			0.801	0.910
Queue Storage Ratio ( RQ ) ( 95 th percentile)   2.20   0.00   Image: Constraint of the percentile)   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   12.6   13.7     Incremental Delay ( d 2 ), s/veh   165.3   6.9   0.0   9.8   0.3   0.0   12.6   13.7     Initial Queue Delay ( d 3 ), s/veh   0.0			· · ·													<u> </u>	
Uniform Delay (d 1), s/veh   50.7   43.3   30.3   0.0   12.6   13.7     Incremental Delay (d 2), s/veh   165.3   6.9   9.8   0.3   4.1   9.9     Initial Queue Delay (d 3), s/veh   0.0	Back of Queue	(Q), ve	eh/In ( 95 th percenti	le)	23.8		10.2					6.7	0.2			22.1	26.0
Incremental Delay ( $d_2$ ), s/veh165.36.99.89.80.34.19.9Initial Queue Delay ( $d_3$ ), s/veh0.00.			· · ·		2.20		0.00					1.80	0.00			0.00	0.00
Initial Queue Delay (d 3), s/veh0.00.00.00.00.00.00.00.0Control Delay (d), s/veh216.050.340.20.340.20.316.723.6Level of Service (LOS)FDD $I$ DA0BCApproach Delay, s/veh / LOS169.1F0.0 $I$ <t< td=""><td>Uniform Delay</td><td>(d1), s</td><td>/veh</td><td></td><td>50.7</td><td></td><td>43.3</td><td></td><td></td><td></td><td></td><td>30.3</td><td>0.0</td><td></td><td></td><td>12.6</td><td>13.7</td></t<>	Uniform Delay	(d1), s	/veh		50.7		43.3					30.3	0.0			12.6	13.7
Control Delay ( d ), s/veh   216.0   50.3   Image: solar diamond line diamond	Incremental De						6.9					9.8	0.3			4.1	9.9
Level of Service (LOS)   F   D   D   D   A   B   C     Approach Delay, s/veh / LOS   169.1   F   0.0   6.6   A   20.2   C     Intersection Delay, s/veh / LOS   46.0   46.0   0.0   6.6   A   20.2   C     Multimodal Results   EB   WB   VB   NB   SB   C     Pedestrian LOS Score / LOS   2.9   C   2.8   C   0.6   A   2.4   B	Initial Queue D						0.0					0.0	0.0			0.0	0.0
Approach Delay, s/veh / LOS   169.1   F   0.0   6.6   A   20.2   C     Intersection Delay, s/veh / LOS   46.0   D   D   D     Multimodal Results   EB   WB   NB   SB     Pedestrian LOS Score / LOS   2.9   C   2.8   C   0.6   A   2.4   B	Control Delay ( d ), s/veh				216.0		50.3					40.2	0.3			16.7	23.6
Intersection Delay, s/veh / LOS     46.0     D       Multimodal Results     EB     WB     NB     SB       Pedestrian LOS Score / LOS     2.9     C     2.8     C     0.6     A     2.4     B	_evel of Service (LOS)				F		D					D	А			В	С
Multimodal Results     EB     WB     NB     SB       Pedestrian LOS Score / LOS     2.9     C     2.8     C     0.6     A     2.4     B	Approach Dela	y, s/veh	/ LOS		169.1	1	F	0.0				6.6		Α	20.2	2	С
Pedestrian LOS Score / LOS     2.9     C     2.8     C     0.6     A     2.4     B	Intersection De	lay, s/ve	eh / LOS				46	6.0							D		
Pedestrian LOS Score / LOS     2.9     C     2.8     C     0.6     A     2.4     B	Multimodal Re	sults				FR			\٨/	B			NR			SB	
			/LOS		2.9		С	28	1		0	0.6		A	24		В
							F	2.0			-			A	-		B

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	HCS7 Two-Way	Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Ebenezer at Driveway
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	3/22/2021	East/West Street	Weigel's Driveway
Analysis Year	2021	North/South Street	Ebenezer Road
Time Analyzed	Phase 2 Apartment PM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	213.013 The Crescent at Ebenezer		



Major Street: North-South

Vehicle Volumes and Ad	justmo	ents															
Approach		Eastb	ound			West	bound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6	
Number of Lanes		0	0	0		0	0	1	0	0	2	1	0	0	2	0	
Configuration								R			Т	R			Т		
Volume, V (veh/h)								30			1208	47			1915		
Percent Heavy Vehicles (%)								2									
Proportion Time Blocked								0.200									
Percent Grade (%)							0										
Right Turn Channelized		No No								No No							
Median Type/Storage		Left Only											1				
Critical and Follow-up H	eadwa	iys															
Base Critical Headway (sec)								6.9									
Critical Headway (sec)								6.94									
Base Follow-Up Headway (sec)								3.3									
Follow-Up Headway (sec)								3.32									
Delay, Queue Length, ar	d Leve	el of S	ervice	9		<u>.</u>	<u>.</u>										
Flow Rate, v (veh/h)	Τ							33									
Capacity, c (veh/h)								783									
v/c Ratio								0.04									
95% Queue Length, Q <sub>95</sub> (veh)								0.1									
Control Delay (s/veh)								9.8									
Level of Service, LOS								A									
Approach Delay (s/veh)		-			9.8					-							
Approach LOS					A												

	HCS7 Two-Way	Stop-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Ebenezer at Crescent Lake
Agency/Co.	FMA	Jurisdiction	Knox County
Date Performed	3/22/2021	East/West Street	Crescent Lake Way
Analysis Year	2021	North/South Street	Ebenezer Road
Time Analyzed	Phase 2 Apartment PM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	213.013 The Crescent at Ebenezer		



Major Street: North-South

Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	2	1	0	1	2	0
Configuration						L		R			Т	R		L	Т	
Volume, V (veh/h)						49		57			1219	74		71	1845	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked						0.200		0.200						0.200		
Percent Grade (%)						. (	)									
Right Turn Channelized		No No								Ν	lo			N	0	
Median Type/Storage		Left Only										:	1			
Critical and Follow-up H	eadwa															
Base Critical Headway (sec)	eadways 7.5 6.9											4.1				
Critical Headway (sec)						6.84		6.94						4.14		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, ar	d Leve	el of S	ervice	e												
Flow Rate, v (veh/h)						53		62						77		
Capacity, c (veh/h)						124		774						548		
v/c Ratio						0.43		0.08						0.14		
95% Queue Length, Q <sub>95</sub> (veh)						1.9		0.3						0.5		
Control Delay (s/veh)						54.2		10.1						12.6		
Level of Service, LOS						F		В						В		
Approach Delay (s/veh)	30.4						0.5									
Approach LOS	D															

Phase 2 Apartments PM Peak\_Crescent Lake.xtw

HCS7 Two-Way Stop-Control Report										
General Information		Site Information	Site Information							
Analyst	Addie Kirkham	Intersection	Westland at Driveway							
Agency/Co.	FMA	Jurisdiction	Knox County							
Date Performed	3/22/2021	East/West Street	Westland Drive							
Analysis Year	2021	North/South Street	Driveway Connection							
Time Analyzed	Phase 2 Apartment PM Peak	Peak Hour Factor	0.92							
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	223.013 The Crescent at Ebenezer									



Major Street: East-West

Vehicle Volumes and Ad	justme	ents																
Approach	Eastbound Westbound							North	bound		Southbound							
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0		
Configuration				TR		LT				L		R						
Volume, V (veh/h)			693	41		24	701			60		30						
Percent Heavy Vehicles (%)						2				2		2						
Proportion Time Blocked						0.000				0.000		0.000						
Percent Grade (%)										(	)							
Right Turn Channelized		No				Ν	lo		No				No					
Median Type/Storage		Undivided																
Critical and Follow-up H	eadwa	iys																
Base Critical Headway (sec)						4.1				7.1		6.2						
Critical Headway (sec)						4.12				6.42		6.22						
Base Follow-Up Headway (sec)						2.2				3.5		3.3						
Follow-Up Headway (sec)						2.22				3.52		3.32						
Delay, Queue Length, ar	d Leve	el of S	ervice	e														
Flow Rate, v (veh/h)						26				65		33						
Capacity, c (veh/h)						824				115		397						
v/c Ratio						0.03				0.57		0.08						
95% Queue Length, Q <sub>95</sub> (veh)						0.1				2.7		0.3						
Control Delay (s/veh)						9.5				71.3		14.9						
Level of Service, LOS						А				F		В						
Approach Delay (s/veh)					0.8				52	2.3								
Approach LOS										I	=							

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HCS7 Two-Way Stop-Control Report										
General Information		Site Information	Site Information							
Analyst	Addie Kirkham	Intersection	Westland at Driveway							
Agency/Co.	FMA	Jurisdiction	Knox County							
Date Performed	3/24/2021	East/West Street	Westland Drive							
Analysis Year	2021	North/South Street	Serene Breeze Way							
Time Analyzed	Phase 2 Apartment PM Peak	Peak Hour Factor	0.92							
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	223.013 The Crescent at Ebenezer									



Major Street: East-West

					,													
Vehicle Volumes and Ad	ljustme	ents																
Approach	Eastbound			Westbound				North	bound		Southbound							
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0		
Configuration				TR		L	Т				LR							
Volume, V (veh/h)			703	20		19	698			27		27						
Percent Heavy Vehicles (%)						2				2		2						
Proportion Time Blocked						0.000				0.000		0.000						
Percent Grade (%)										. (	)							
Right Turn Channelized		١	lo			N	lo			Ν	lo		No					
Median Type/Storage		Undivided																
Critical and Follow-up H	eadwa	ys																
Base Critical Headway (sec)						4.1				7.1		6.2						
Critical Headway (sec)						4.12				6.42		6.22						
Base Follow-Up Headway (sec)						2.2				3.5		3.3						
Follow-Up Headway (sec)						2.22				3.52		3.32						
Delay, Queue Length, ar	nd Leve	el of S	Service	e														
Flow Rate, v (veh/h)						21					58							
Capacity, c (veh/h)						832					182							
v/c Ratio						0.03					0.32							
95% Queue Length, Q <sub>95</sub> (veh)						0.1					1.3							
Control Delay (s/veh)						9.4					33.9							
Level of Service, LOS	Í					A					D							
Approach Delay (s/veh)					0.3					33	3.9							
Approach LOS										[	)							

HCS7™ TWSC Version 7.2.1



Date: May 19, 2021

## Project Name: Crescent Commercial & Phase 2 Apartments

### To: Knoxville-Knox County Planning

### Subject: TIS Review for Crescent Commercial & Phase 2 Apartments (6-D-21-UR)

Dear Knoxville-Knox County Planning staff,

The following comment response document is submitted to address comments dated May 17, 2021:

- 1. **Reviewer Comment:** On page 5, the engineer discusses improvements at the Westland Drive driveway. This appears to be the access that will serve the commercial site and not the apartments directly.
  - a. Please add "commercial" to the description of this access point here and throughout the TIA.
  - b. Add a summary of the discussion for Westland Drive at Serene Breeze Way.

<u>Response:</u> Revised the description of the intersection to Westland Drive at Commercial Driveway Connection throughout the report and included a summary of the discussion for Westland Drive at Serene Breeze Way.

2. Reviewer Comment: Page 42 – see first bullet for page 5 above.

<u>Response:</u> Revised the name of the intersection to Westland Drive at Commercial Driveway Connection.

3. **Reviewer Comment:** Page 43 – The original apartments TIA noted that a westbound left-turn lane is warranted at the apartment driveway (now Serene Breeze Way). That needs to be included here.

<u>Response:</u> "As a part of the construction of The Crescent at Ebenezer Apartments – Phase 1 a westbound left turn lane with a 75 foot storage length was installed at the intersection of Westland Drive at Serene Breeze Way."

Sincerely, Addie Kirkham, P.E.

