INTERSECTION EVALUATION STUDY

Culbreath Road (CR 581) at Ayers/Hayman Road (CR 576)
Hernando County

Prepared for:

HERNANDO COUNTY DEPARTMENT OF PUBLIC WORKS
1525 E. Jefferson St.
Brooksville, FL 34601

Contract for Traffic Operations
Burgess & Niple Contract No.: # 18-R00006/PH
Task Work Order: #16
Continuing Traffic Engineering Services

Prepared by:
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June 2023

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SIGNATURE PAGE

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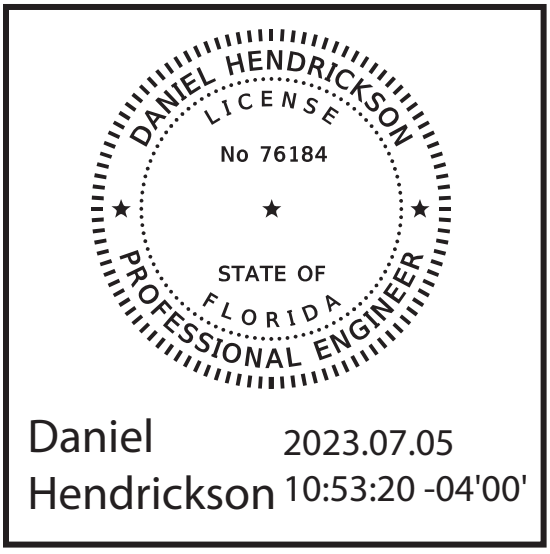

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1.0 INTRODUCTION

Hernando County Department of Public Works has retained Burgess & Niple (B&N) to conduct a Intersection Traffic Analysis at the intersection of Culbreath Road (CR 581) at Ayers/Hayman Road (CR 576) in Hernando County, Florida. As a follow up study of the Traffic Signal Warrant Analysis conducted by B&N in 2020 (included in **Appendix A**), this study compares and evaluates the alternatives of traffic signal and roundabout, respectively, for the study intersection. The study has been conducted in accordance with the guidelines and procedures outlined in the FDOT Manual on Uniform Traffic Studies (MUTS), FDOT Design Manual (FDM) and the Manual on Uniform Traffic Control Devices (MUTCD).

Figure 1-1: Project Location Map

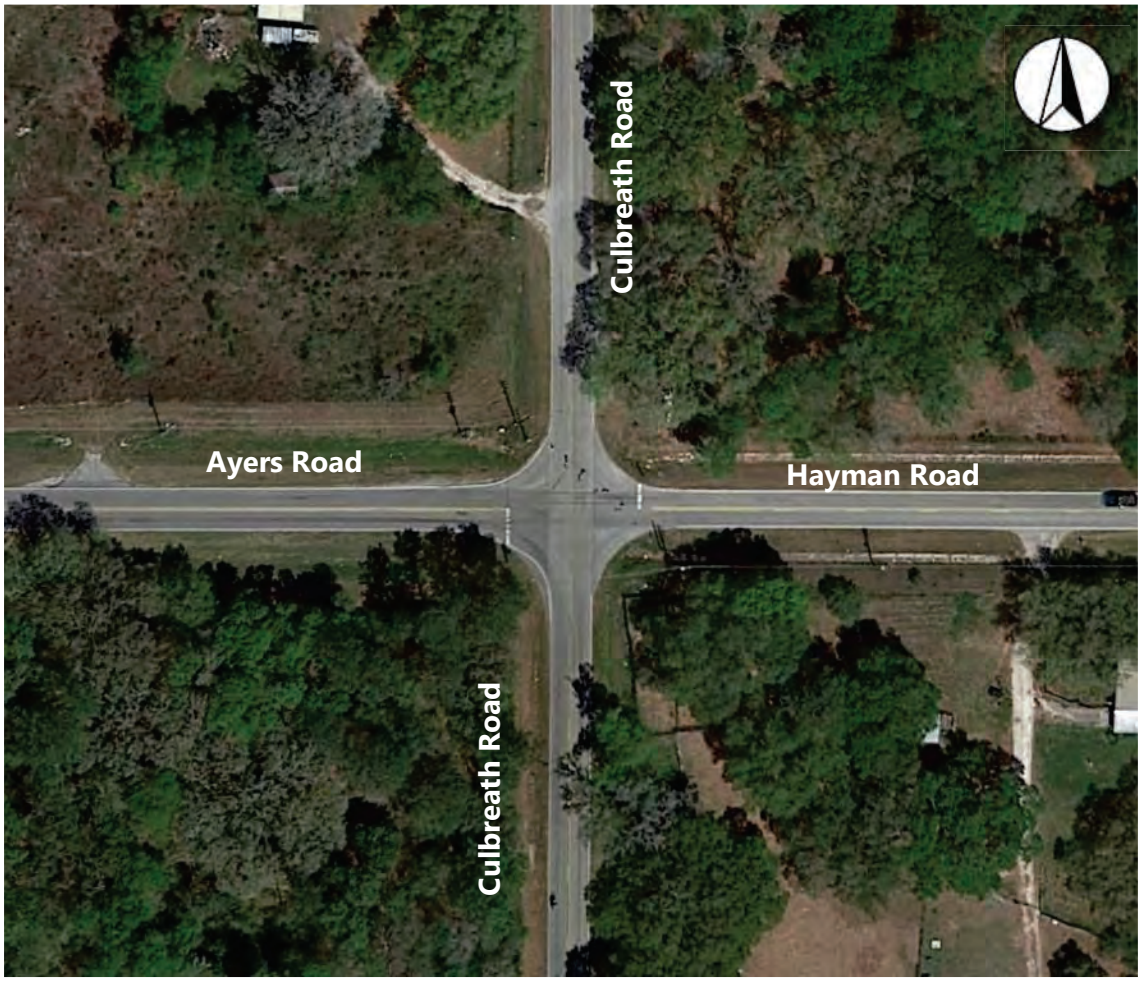
2.0 EXISTING CONDITION

The intersection of Culbreath Road (CR 581) at Ayers/Hayman Road (CR 576) is located in Hernando County, Florida. **Table 2-1** below summarizes the existing conditions at this intersection. Figures 2-1 shows the intersection aerial. Condition Diagram and approach photographs were included in **Appendix A.**

Table 2-1: Summary of Existing Conditions

Feature	Description	
Major Street	Culbreath Road (CR 581)	
Minor Street	Ayers/Hayman Road (CR 576)	
Posted Speed Limits	Culbreath Road – 45 MPH	Ayers/Hayman Road – 55 MPH
Traffic Control	Culbreath Road – Uncontrolled with yellow flashing warning beacon	Ayers/Hayman Road – STOP control supplemented with red flashing beacons

Figure 2-1: Intersection Aerial



3.0 TRAFFIC VOLUMES

Volume data and turning movement count (TMC) were collected in the previous study. The intersection TMC indicated a morning peak hour of 7:00 to 8:00 AM and afternoon peak hour of 5:00 to 6:00 PM. It also noted that the heaviest turning movements are the eastbound right turn in the AM peak and the northbound left turn in the PM peak. Detailed count information is included in **Appendix A**. Future volumes, including Opening Year (2025) and Design Year (2035), were calculated to evaluate the performance of traffic signal and roundabout, respectively. The growth rate of 3% for all approaches was estimated based on collected volume data and historical AADT from Florida Traffic Online. The projected morning and afternoon peak hour traffic volumes are graphically shown in **Figure 3-1** and Figure 3-2 for Opening Year and Design Year, respectively. The Historical AADT reports are included in **Appendix B**.

Figure 3-1 Opening Year (2025) Peak Hour TMC

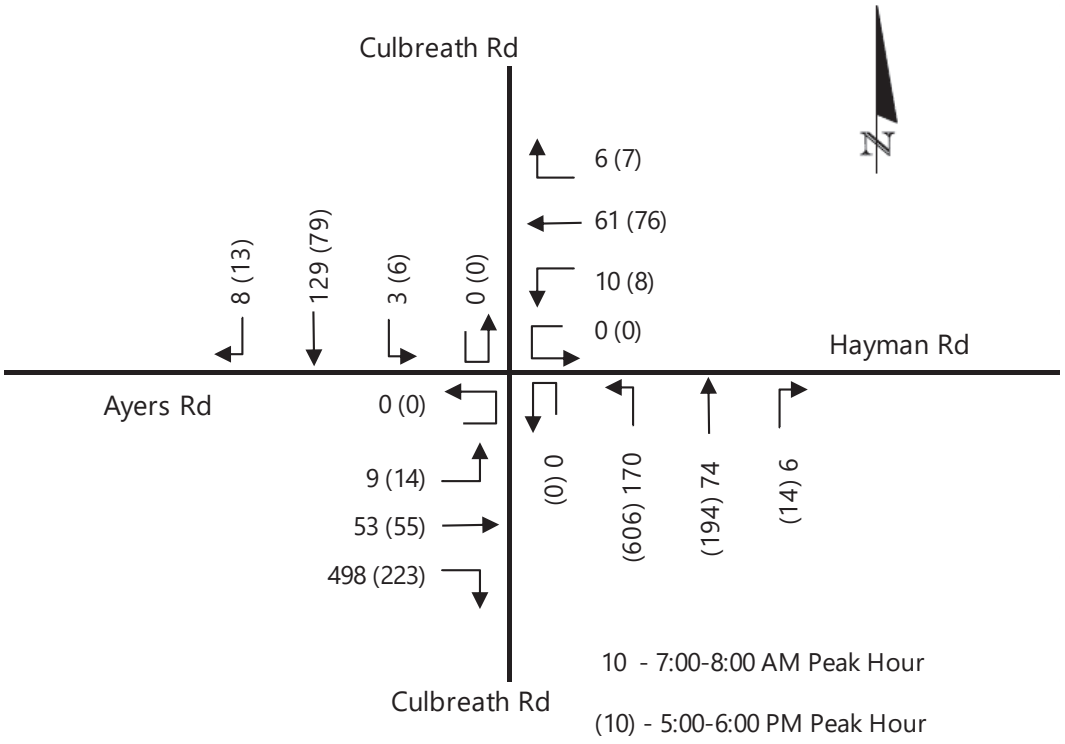
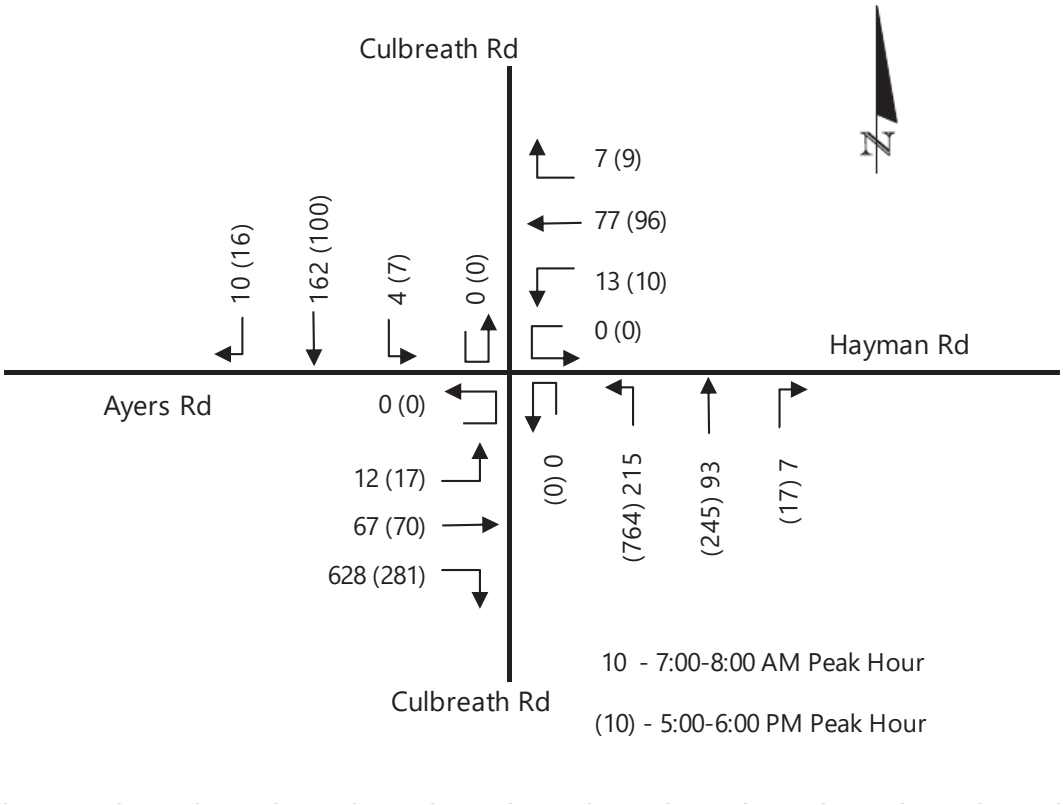


Figure 3-2 Design Year (2035) Peak Hour TMC



4.0 COLLISION DATA

Crash data for the 3-year period (January 1, 2016 to December 31, 2018) was obtained from the University of Florida's Signal 4 Analytics. A total of 22 crashes were reported within 3 years. Detailed crash analysis and the collision diagram can be found in the previous study in **Appendix A**.

5.0 ALTERNATIVE ANALYSIS

The following alternatives were evaluated as part of this analysis. Concepts can be found for each alternative in **Figure 5-1 & 5-2** on the following pages.

- No Build: Stop controlled intersection with stop signs on the eastbound/westbound approaches.
- Alternative 1: Install traffic signal and add one dedicated left turn lane for all approaches.
- Alternative 2: Construct a one-lane roundabout.

5.1 OPERATIONAL IMPACTS

The anticipated opening year for traffic signal and roundabout is 2025, and anticipated design year is 2035. Synchro 11 software and SIDRA 11 were used to analyze operational impacts of all alternatives. Traffic signal plan was optimized via Synchro and HCM 6th Edition model was used for delay and LOS calculation. The operational analysis results were summarized in **Table 5-1** for Opening Year (2025) and Future Design Year (2035) traffic volumes using the AM and PM peak hours of 7 – 8 AM and 5 – 6 PM, respectively.

Table 5-1: Summary of Operational Analysis

Scenarios	Approach	AM						PM					
		No Build		Alternative 1		Alternative 2		No Build		Alternative 1		Alternative 2	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Opening-2025	EB	28	D	5	A	9	A	NA*	F	19	B	5	A
	WB	28	D	10	A	4	A	NA*	F	28	C	9	A
	NB	5	A	13	B	5	A	7	A	12	B	14	B
	SB	0	A	11	B	5	A	1	A	32	C	8	A
	Overall	19	C	8	A	7	A	NA*	F	16	B	11	B
Design - 2035	EB	112	F	9	A	14	B	NA*	F	31	C	6	A
	WB	156	F	10	B	5	A	NA*	F	31	C	14	B
	NB	6	A	18	B	6	A	8	A	20	B	30	D
	SB	0	A	14	B	6	A	0	A	38	D	11	B
	Overall	74	F	12	B	10	B	NA*	F	24	C	22	C

Note: NA* stop control delay and LOS is not available due to the volumes exceed modeled capacity in Synchro.

The No Build Alternative eastbound and westbound traffic will experience extreme delay (beyond modeled capacity in Synchro) during PM peak hour for both Opening Year (2025) and Design Year (2035) due to the northbound high left turn volumes. The Opening Year (2025) overall delay is 19 second/vehicle (sec/veh) during the AM peak for No Build Alternative, which is expected to worsen to 74 sec/veh in 2035. Installing a traffic signal and providing dedicated left turn lane for all approaches (Alternative 2) reduces the overall delay and provides acceptable LOS for all scenarios. Compared to the No Build Alternative, the Alternative 2 of roundabout also reduces overall delay for all scenarios and provide the best LOS among the 3 analyzed alternatives. Additional operational information is included in reports in **Appendix C**. Based on **Table 5-1**, constructing a roundabout shows the greatest reduction in delay for this intersection.

5.2 QUEUE LENGTH ANALYSIS

A turn lane queue length analysis was performed for Alternative 1, utilizing the Design Year (2035) traffic volumes. The total required storage for turn lanes is calculated by summing the max queue and the deceleration length. Max queue lengths (Q) were provided by Synchro 11 and deceleration distances were used from FDOT FDM Section 212. For the approaches with low left turning volume and small calculated queue length, the minimum 100 ft queue length is applied as a conservative assumption to accommodate the high truck volume. The shared thru/right turn queue was also shown to determine whether the left turn lane will be impacted. The results of this analysis are shown below in **Table 5-2.** Additional design analysis will be performed following receipt of design survey to determine the feasibility and impacts of providing left turn lanes. Detailed queue length information is included in reports in **Appendix C**.

Table 5-2: Summary of Queue Length Analysis

Lane	NBL	NBT/R	SBL	SBT/R	EBL	EBT/R	WBL	WBT/R
Decel. Distance (L)[1]	185		185		350		350	
Max Queue Length (Q)[2]	575	100	100	125	100	250	100	100
Req'd Storage (Q+L[1])	760	100	285	125	450	250	450	100

Note: [1]FDOT FDM Exhibit 212-1, 45 MPH Design Speed; L=185', 55 MPH Design Speed; L=350'; [2]Synchro 11, 95th Percentile Calculated Queue Length, Max AM/PM

AYERS ROAD AND CULBREATH ROAD
INTERSECTION IMPROVEMENT

OPTION A
SIGNALIZED INTERSECTION

AYERS ROAD AND CULBREATH ROAD INTERSECTION IMPROVEMENT	OPTION B ROUNDABOUT

5.3 BENEFIT COST ANALYSIS

A Benefit Cost Analysis was performed for the 2 proposed alternatives. Based on the USDOT B/C Analysis Guidance for Discretionary Grant Programs (2023), benefits of proposed alternatives comparing to No Build are claimed via delay reduction and safety improvement. Detailed assumptions and data sources are included in **Appendix D**.

The benefit from reducing delays were calculated by comparing 2025 and 2035 calculated delay (as shown previously in **Table 5-1**) among alternatives. Daily delay benefits were only derived from AM and PM peak hours per day as a conservative benefit estimate. The Historical Crash Method was used to claim the safety benefits for each alternative. The following Crash Modification Factors (CMFs) were utilized and have been summarized in **Table 5-3**.

Table 5-3 Crash Modification Factor Summary

CMF ID	Description	Quality Rating	CMF	Crash Type	Crash Severity	Time of Day	Area Type
325	Conversion of Stop-Controlled Intersection to Signalized Control	5 stars	0.56	All	All	All	Rural
7867	Conversion of Stop-Controlled Intersection to Roundabout	3 stars	0.38	All	All	All	Not Specified

Construction costs for the 2 proposed alternatives were estimated and summarized in **Table 5-4**. Detailed engineer's Estimates for construction cost are included in **Appendix D**. Impacts of proposed alternatives on right-of-way (ROW) are illustrated in the Concept Plan (**Figure 5-1** and **5-2**), respectively. At this time, ROW acquisition costs are unknown, only construction costs are included in the analysis.

Table 5-4 Cost Estimates

Alternative	Construction Cost
Alternative 2: Traffic Signal	$2,114,467
Alternative 3: Roundabout	$2,057,769

The results of the Benefit Cost Analysis were summarized in **Table 5-5** and supporting calculations and assumptions are included in **Appendix D**. Based on this analysis, Alternative 3 of roundabout is preferred for this intersection.

Table 5-5 Benefit Cost Analysis Result Summary

Alternative	Benefits		Costs	Results	
	Delay Reduction	Safety		Net Present Value	Benefit/Cost Ratio
Alternative 2: Traffic Signal	$689,141	$4,466,244	$2,114,467	$3,169,778	2.6
Alternative 3: Roundabout	$798,736	$6,293,344	$2,057,769	$5,189,557	3.7

6.0 RECOMMENDATIONS

Based on the results of the alternative analysis, field observations, and engineering judgment, the following conclusions and recommendations were developed:

- With a Benefit/Cost ratio of 3.7 and net present value of $5,2 million dollars, Alternative 2 of roundabout is recommended. However, the final decision should consider the costs of ROW acquisition for the proposed alternatives.

APPENDIX A

Traffic Signal Warrant Analysis Report

TRAFFIC SIGNAL WARRANT ANALYSIS

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Hernando County

Prepared for:

HERNANDO COUNTY DEPARTMENT OF PUBLIC WORKS
1525 E. Jefferson St.
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Contract for Traffic Operations
Burgess & Niple Contract No.: # 18-R00006
Task Work Order: #1
Continuing Traffic Engineering Services

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June 2020

Professional Engineer: Daniel Hendrickson, PE
P.E. Number: 76184

1.0 INTRODUCTION

Hernando County Department of Public Works has retained Burgess & Niple to conduct a Traffic Signal Warrant Analaysis at the intersection of Culbreath Road (CR 581) at Ayers/Hayman Road (CR 576) in Hernando County, Florida. The intersection is in a rural area of Hernando County. This intersection is a connector eastbound to US 41 by way of Ayers/Hayman Road and to northbound to Brooksville by way of Culbreath Road. The study has been conducted in accordance with the guidelines and procedures outlined in the FDOT Manual on Uniform Traffic Studies (MUTS) and the Manual on Uniform Traffic Control Devices (MUTCD).

Figure 1-1: Project Location Map

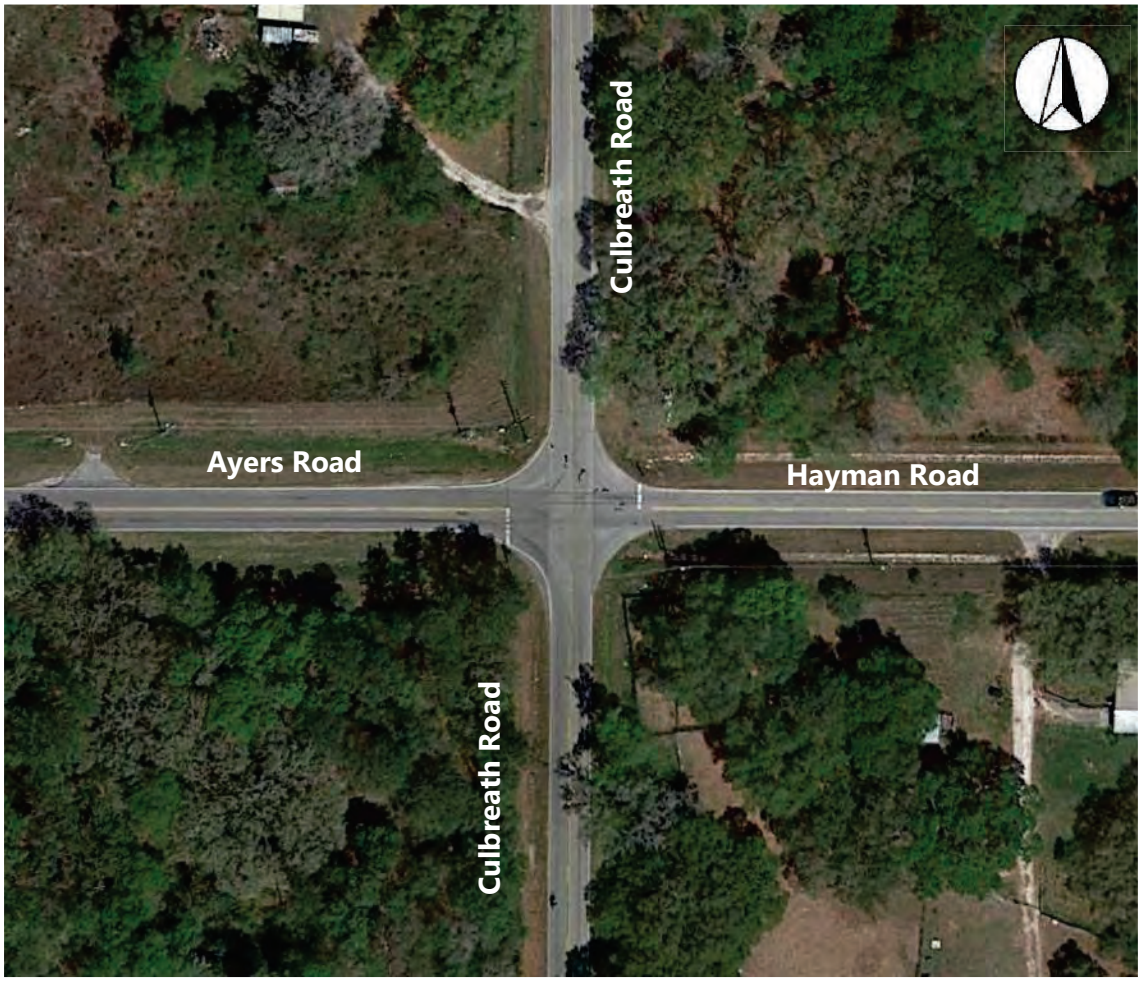
2.0 EXISTING CONDITIONS

The intersection of Culbreath Road (CR 581) at Ayers/Hayman Road (CR 576) is located in Hernando County, Florida. **Table 2-1** below summarizes the existing conditions at this intersection. Figures 2-1 and 2-2 show the intersection aerial and Condition Diagram, respectively. Approach photographs are included in **Appendix A.**

Table 2-1: Summary of Existing Conditions

Feature	Description	
Major Street	Culbreath Road (CR 581)	
Minor Street	Ayers/Hayman Road (CR 576)	
Posted Speed Limits	Culbreath Road – 45 MPH	Ayers/Hayman Road – 55 MPH
Traffic Control	Culbreath Road – Uncontrolled with yellow flashing warning beacon	Ayers/Hayman Road – STOP control supplemented with red flashing beacons

Figure 2-1: Intersection Aerial



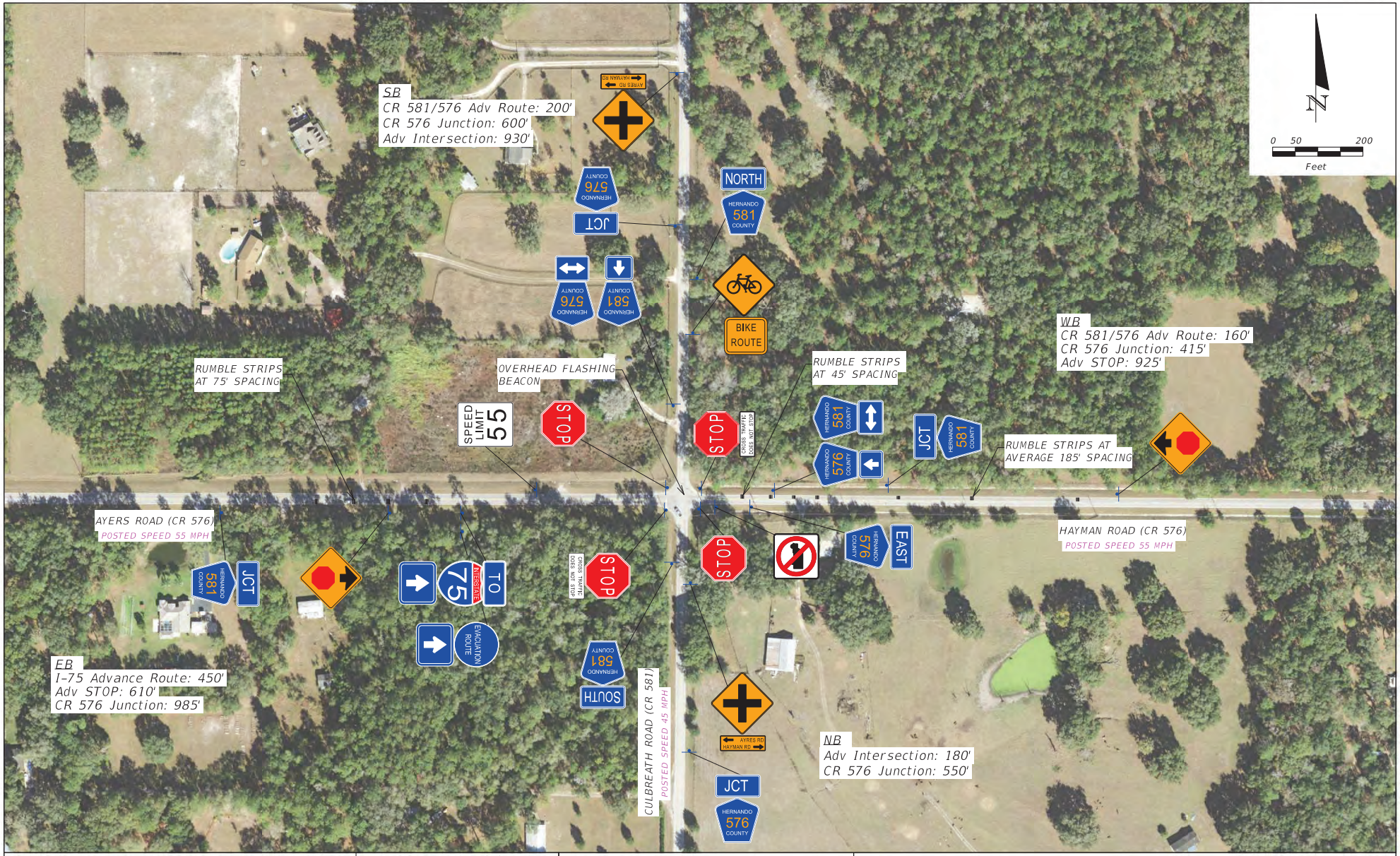


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FIGURE 2-2

CONDITION DIAGRAM

County Project No.	Drawing Name:	Drawn By:	Scale:	Sheet No.
18-r00006/PH		CH	1"=40'	

$USERS $DATES $TIMES $FILES

3.0 TRAFFIC VOLUMES

A 24-hour approach count was conducted at the intersection of CR 581 (Culbreath Road) and CR 576 (Ayers/Hayman Road) to determine the 8 peak hours for the turning movement count (TMC). The TMC was conducted on Thursday, February 27, 2020 for the hours of 6:00 to 9:00 AM and 2:00 to 7:00 PM. The 24-hour approach and TMC summaries are shown in **Table 3-1** and **Table 3-2**, respectively. There were no observed pedestrians or bicyclists during the study period. Detailed count information is included in **Appendix B**.

Table 3-1: Summary of 24-Hour Approach Counts

TIME	NB	SB	N/S TOTAL	EB	WB	E/W TOTAL	GRAND TOTAL
12:00 AM	27	1	28	6	2	8	36
1:00 AM	8	3	11	7	0	7	18
2:00 AM	13	1	14	5	3	8	22
3:00 AM	11	4	15	13	2	15	30
4:00 AM	20	24	44	41	2	43	87
5:00 AM	48	68	116	173	19	192	308
6:00 AM	133	123	256	385	47	432	688
7:00 AM	217	122	339	487	67	554	893
8:00 AM	203	104	307	308	60	368	675
9:00 AM	164	72	236	209	50	259	495
10:00 AM	180	80	260	165	33	198	458
11:00 AM	190	76	266	139	44	183	449
12:00 PM	191	74	265	122	48	170	435
1:00 PM	199	81	280	144	45	189	469
2:00 PM	277	98	375	157	41	198	573
3:00 PM	421	84	505	196	45	241	746
4:00 PM	605	95	700	236	88	324	1,024
5:00 PM	708	85	793	254	79	333	1,126
6:00 PM	442	76	518	166	44	210	728
7:00 PM	225	37	262	98	17	115	377
8:00 PM	129	29	158	64	18	82	240
9:00 PM	128	18	146	44	11	55	201
10:00 PM	85	16	101	30	7	37	138
11:00 PM	47	3	50	16	4	20	70
TOTAL	4,671	1,374	6,045	3,465	776	4,241	10,286

Table 3-2: Summary of 8-Hour Turning Movement Counts

TIME	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					TOTAL
BEGIN/END	U	L	T	R	TOT	U	L	T	R	TOT	U	L	T	R	TOT	U	L	T	R	TOT	INT
6 - 7	0	87	43	3	**133**	0	1	115	7	**123**	0	0	31	354	**385**	0	10	34	3	**47**	**688**
7 - 8	0	148	64	5	**217**	0	3	112	7	**122**	0	8	46	433	**487**	0	9	53	5	**67**	**893**
8 - 9	0	128	71	4	**203**	0	11	78	15	**104**	0	4	44	260	**308**	0	10	45	5	**60**	**675**
2 - 3	0	182	89	6	**277**	0	7	75	16	**98**	0	17	35	105	**157**	0	3	34	4	**41**	**573**
3 - 4	0	297	116	8	**421**	0	5	65	14	**84**	0	15	32	149	**196**	0	7	34	4	**45**	**746**
4 - 5	0	453	139	13	**605**	0	12	74	9	**95**	0	15	54	167	**236**	0	7	68	13	**88**	**1,024**
5 - 6	0	527	169	12	**708**	0	5	69	11	**85**	0	12	48	194	**254**	0	7	66	6	**79**	**1,126**
6 - 7	0	305	131	6	**442**	0	6	63	7	**76**	0	11	41	114	**166**	0	4	38	2	**44**	**728**
TOTAL	**0**	**2,127**	**822**	**57**	**3,006**	**0**	**50**	**651**	**86**	**787**	**0**	**82**	**331**	**1,776**	**2,189**	**0**	**57**	**372**	**42**	**471**	**6,453**
Percentage	0%	71%	27%	2%		0%	6%	83%	11%		0%	4%	15%	81%		0%	12%	79%	9%		
Maximum	0	527	169	13		0	12	115	16		0	17	54	433		0	10	68	13		
Minimum	0	87	43	3		0	1	63	7		0	0	31	105		0	3	34	2		
Truck Percentage	0.0%	2.8%	2.3%	5.3%	2.7%	0.0%	14.0%	1.8%	2.3%	2.7%	0.0%	2.4%	2.1%	2.7%	2.6%	0.0%	7.0%	3.0%	4.8%	3.6%	2.7%

4.0 COLLISION DATA

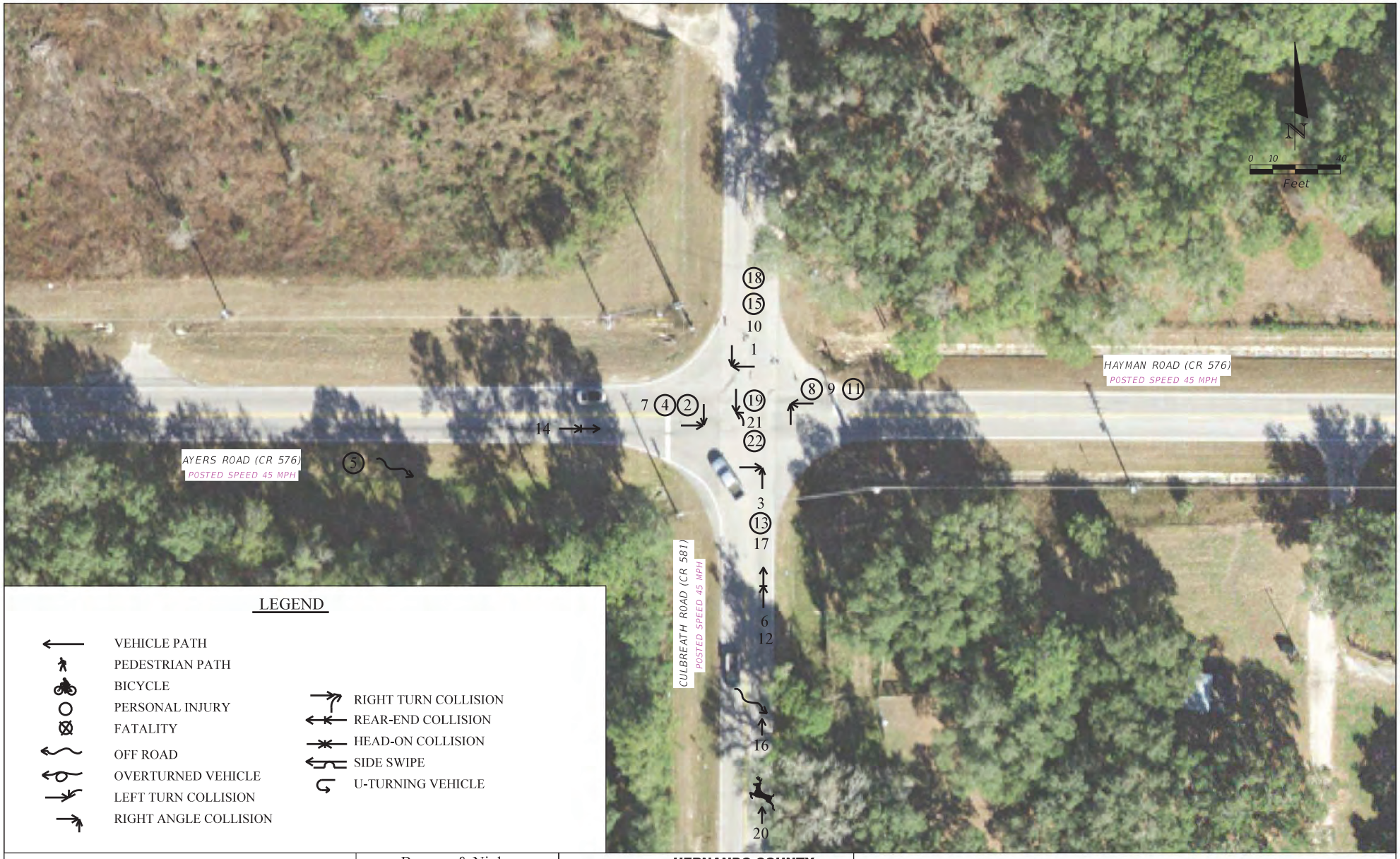
Crash data for the 3-year period (January 1, 2016 to December 31, 2018) was obtained from the University of Florida's Signal 4 Analytics for the intersection of Culbreath Road (CR 581) at Ayers/Hayman Road (CR 576). An overview of the crashes can be found on **Table 4-1** and additional details can be found in the Collision Diagram on **Figure 4-1**.

Table 4-1: Collision Statistics

Crash Type	2016	2017	2018	Total
Angle	2	7	4	13
Left Turn	0	0	3	3
Rear End	0	1	2	3
Off Road	0	1	1	2
Animal	0	0	1	1
TOTAL	**2**	**9**	**11**	**22**
Fatalities	0	0	0	0
Injuries*	1 (4)	4 (10)	5 (12)	10 (26)
Day	2	7	9	18
Night	0	2	2	4
Wet Conditions	0	1	2	3
Dry Conditions	2	8	9	19

**Number of injury crashes (Number of injured people)*

A total of 22 crashes were reported during the study period. There were no reported fatalities and 10 crashes resulted in 26 injuries. No crashes involving non-motorists were reported. The majority of crashes at this intersection were angle-type crashes, 7 of which occurred during a 12-month period.



LEGEND

- VEHICLE PATH
- PEDESTRIAN PATH
- BICYCLE
- PERSONAL INJURY
- FATALITY
- OFF ROAD
- OVERTURNED VEHICLE
- LEFT TURN COLLISION
- RIGHT ANGLE COLLISION
- RIGHT TURN COLLISION
- REAR-END COLLISION
- HEAD-ON COLLISION
- SIDE SWIPE
- U-TURNING VEHICLE

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$USERS $DATES $TIMES $FILES

FIGURE 3-1

COLLISION DIAGRAM

County Project No.	Drawing Name:	Drawn By:	Scale:	Sheet No.
18-r00006/PH		CH	1"=40'	7

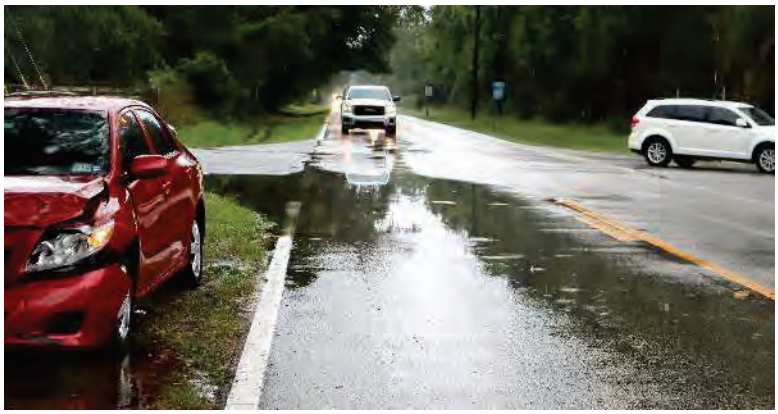
5.0 QUALITATIVE ASSESSMENT

Currently, there is are flashing beacons at this 4-way intersection with Ayers/Hayman Road being stop controlled. Sight Obstruction and speeding vehicles have been the most prevalent complaint regarding safety at this intersection.

Request: Numerous requests from citizens and the Hernando County Sheriff's Office (HCSO) have been received regarding the potential for crashes to occur at this intersection.

Operations: *General Observations:* The following is a brief summary of the observed intersection operations:

- In addition to having stop signs on the right and left sides of the eastbound (EB) and westbound (WB) approaches, there is also an overhead flashing beacon with amber for the northbound (NB) and southbound (SB) approaches and red for EB and WB.
- There are ground-in rumble strips for the east and WB approaches beginning approximately 800-ft upstream of each stop bar. However, the rumble stips only extend for about 300-ft in the EB direction leaving a 500-ft gap immediately upstream of the stop bar with no rumble strips. The WB approach includes rumble strips for the full 800-ft in advance of the stop bar.
- NB and SB vehicles were observed to arrive at fairly random intervals with minor platooning when large trucks traveled slower than passenger vehicles behind them.
- Very high volume of EB right turns in the morning and NB left turns in the afternoon. The afternoon SB volume is light enough that the NB left turn volume was rarely delayed.
- The site was observed after a rain event and showed signs of ponding at the northeast corner. A crash was actually witnessed during the field review where a vehicle hydroplaned within the intersection and was struck by a second hydroplaning vehicle.
    - Although this crash event was witnessed during the field review, wet conditions only accounted for 3 of the 22 crashes.



Disabled vehicle and ponding at northeast corner of intersection

Overall Physical Conditions: In addition to observing operational and safety conditions, correctible physical conditions were also identified. The following observations were made during the field review:

- Physical conditions show no obstructions from any approach. This intesction is in a rural area and visibility is not impeded by alignment, vegetation, or buildings.
- There are no crosswalks at this intersection and no pedestrian traffic was observed.
- Each intersection approach has slightly different signage as can be seen in the Condition Diagram.

6.0 SIGNAL WARRANT ANALYSIS

The signal warrant analysis was done in accordance with the procedures and guidelines outlined in the Manual on Uniform Traffic Control Devices (MUTCD 2009) and Manual on Uniform Traffic Studies (MUTS).

For the Signal Warrant Analysis, Culbreath Road is considered the major street and Ayers/Hayman Road. is considered the minor street approach for all the peak hours. Based on the posted speed limit of 45 mph on US 17/92, the 70 percent volume criteria was applied to the analysis. The detailed signal warrant sheets from the MUTCD can be found in **Appendix C** and **Table 6-1** summarizes the results of the warrant analysis. The following additional considerations were included in the analysis:

Table 6-1: Summary of Signal Warrant Analysis

Warrant		Applicable	Satisfied
1A	Minimum Vehicular Volume	Yes	No
1B	Interruption of Continuous Traffic	No	No
2	Four Hour Vehicular Volume	Yes	No
3	Peak Hour	No	No
4	Pedestrian Volume	Yes	No
5	School Crossing	No	No
6	Coordinated Signal System	No	No
7	Crash Experience	Yes	No
8	Roadway Network	No	No
9	Grade Crossing	No	No

7.0 RECOMMENDATIONS

Based on the data collection, field observations, collision analysis, signal warrant analysis, and engineering judgment, the following conclusions and recommendations were developed:

- This intersection does not meet any of the warrants outlined in the MUTCD, therefore, installation of a traffic signal is not recommended.
- Although a wet weather crash was observed during the site visit, based on the 3-year crash history review, only 3 of 22 crashes occurred on wet pavement, therefore, major drainage improvements are not recommended at this time.

Short Term Improvements

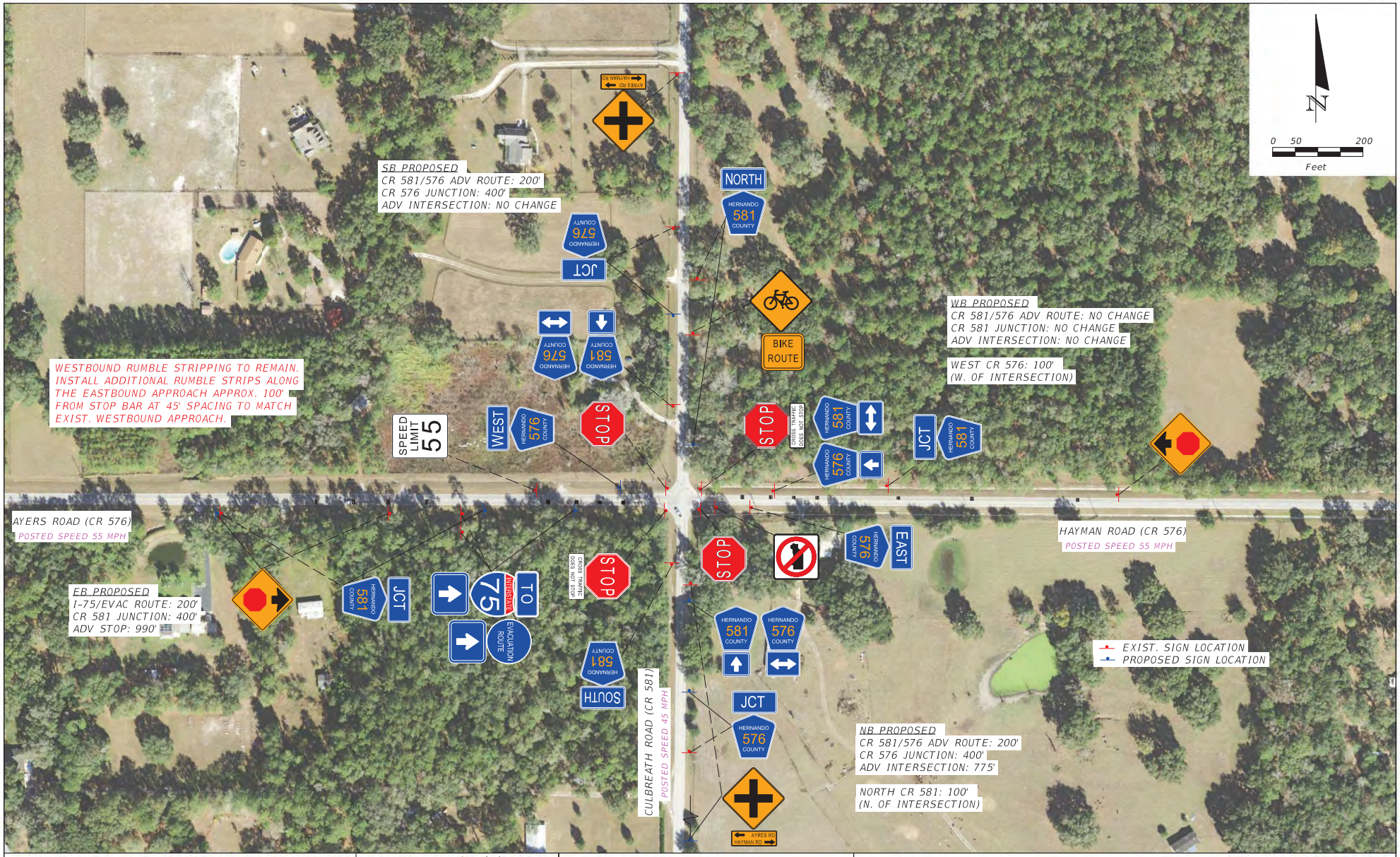
- Consider installing additional rumble stripping along the eastbound approach approximately 100' from the stop bar at 45' spacing to match the westbound approach.
- Consider adjusting the advance warning and route signs per MUTCD standards, as shown on the **Improvement Diagram.**

Mid Term Improvements

- Consider installing an Intersection Conflict Warning System at the intersection. The system includes warning beacons with *TRAFFIC APPROACHING WHEN FLASHING* signs along the uncontrolled approaches (CR 581) which are actuated by loops along the stop controlled approaches (CR 576)

Long Term Improvements

- Recommend evaluating the intersection for a roundabout.



Burgess & Niple
10006 NORTH DALE MABRY HWY.
SUITE 201
TAMPA, FL 33618
TELEPHONE (813) 962-8689

CERTIFICATE OF AUTHORIZATION NO 8230
DANIEL HENDRICKSON, P.E. NO. 76184

HERNANDO COUNTY DEPARTMENT OF PUBLIC WORKS
1525 E. JEFFERSON ST.
BROOKSVILLE, FLORIDA 34601
Ph. (352) 754-4060 Fax. (352) 754-4423

$USERS $DATES $TIMES $FILES

FIGURE 7-1

IMPROVEMENT DIAGRAM

County Project No.	Drawing Name:	Drawn By:	Scale:	Sheet No.
18-r00006/PH		CH	1"=40'	12

APPENDIX A

Approach Photographs

Northbound Approach Photograph

Looking north into the intersection along Culbreath Road

Southbound Approach Photograph

Looking south into the intersection along Culbreath Road

Eastbound Approach Photograph

Looking east into the intersection along Ayers Road

Westbound Approach Photograph

Looking west into the intersection along Hayman Road

APPENDIX B

Traffic Count Data

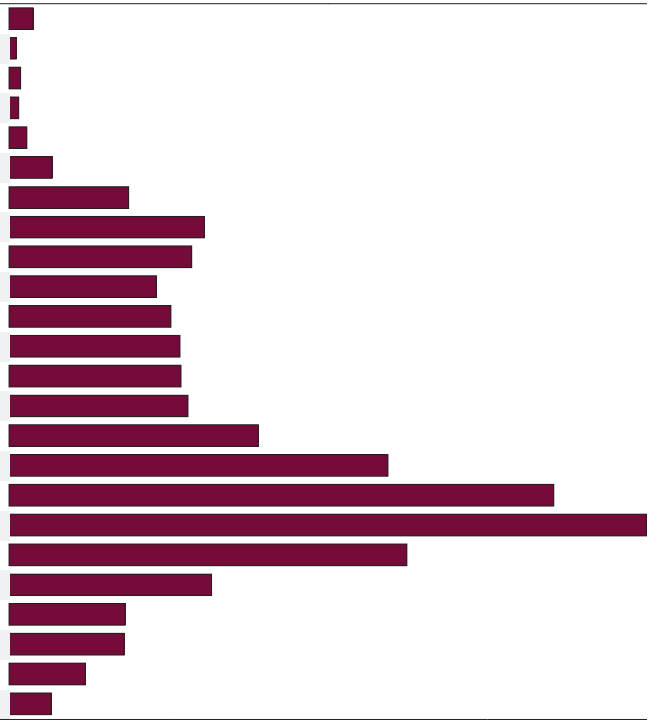
ICON Consultant Group, Inc.

10006 N. Dale Mabry Hwy, Suite 201
Tampa, Fl. 33618
(813) 962-8689

Culbreath Rd at Ayers Rd / Hayman Rd
County: Hernando
Weather: Clear

Date Start: 2/27/2020
Date End: 2/28/2020
Date Printed: 3/4/2020
Culbreath Rd (Northbound)

Start Time	Thu 2/27/2020	<----------Quarter 1st	2nd	Hour----------> 3rd	4th	Hour Total
12:00 AM		4	9	9	5	27
01:00		3	1	1	3	8
02:00		2	1	4	6	13
03:00		6	2	2	1	11
04:00		4	3	8	5	20
05:00		11	14	13	10	48
06:00		22	30	37	44	133
07:00		55	59	55	48	217
08:00		47	52	57	47	203
09:00		38	36	44	46	164
10:00		40	35	44	61	180
11:00		55	50	47	38	190
12:00 PM		47	49	46	49	191
01:00		41	55	36	67	199
02:00		68	66	66	77	277
03:00		81	106	95	139	421
04:00		132	144	171	158	605
05:00		167	224	185	132	708
06:00		133	140	96	73	442
07:00		73	48	49	55	225
08:00		39	22	35	33	129
09:00		27	37	39	25	128
10:00		25	33	14	13	85
11:00		14	10	10	13	47
Day Total						4671
Grand Total						4671



ICON Consultant Group, Inc.

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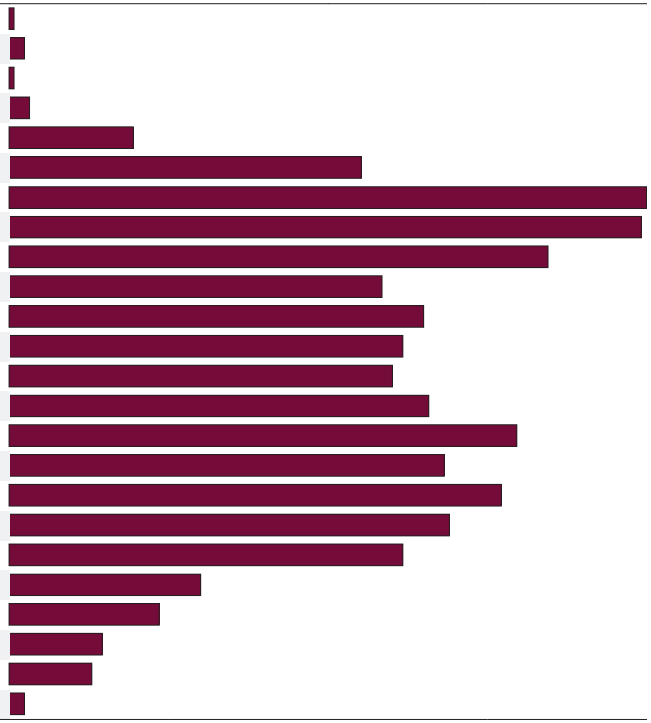
Tampa, Fl. 33618
(813) 962-8689

Culbreath Rd at Ayers Rd / Hayman Rd
County: Hernando
Weather: Clear

Date Start: 2/27/2020
Date End: 2/28/2020
Date Printed: 3/4/2020
Culbreath Rd (Southbound)

Start Time	Thu 2/27/2020	<----------Quarter 1st	2nd	Hour----------> 3rd	4th	Hour Total
12:00 AM		0	0	1	0	1
01:00		1	0	1	1	3
02:00		1	0	0	0	1
03:00		0	1	1	2	4
04:00		1	5	10	8	24
05:00		9	18	16	25	68
06:00		26	33	29	35	123
07:00		26	40	33	23	122
08:00		26	23	32	23	104
09:00		29	15	13	15	72
10:00		23	27	19	11	80
11:00		17	17	21	21	76
12:00 PM		16	16	21	21	74
01:00		17	21	28	15	81
02:00		27	17	25	29	98
03:00		19	19	22	24	84
04:00		34	19	18	24	95
05:00		19	25	19	22	85
06:00		27	13	18	18	76
07:00		9	9	10	9	37
08:00		10	6	7	6	29
09:00		5	5	3	5	18
10:00		5	6	3	2	16
11:00		2	0	0	1	3
Day Total						1374
Grand Total						1374



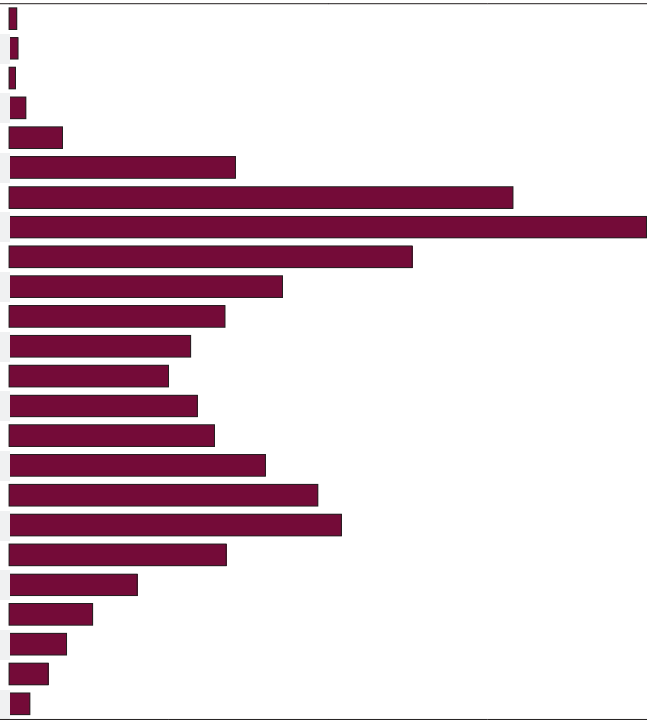
ICON Consultant Group, Inc.

10006 N. Dale Mabry Hwy, Suite 201
Tampa, Fl. 33618
(813) 962-8689

Culbreath Rd at Ayers Rd / Hayman Rd
County: Hernando
Weather: Clear

Date Start: 2/27/2020
Date End: 2/28/2020
Date Printed: 3/4/2020
Ayers Rd (Eastbound)

Start Time	Thu 2/27/2020	<----------Quarter 1st	2nd	Hour----------> 3rd	4th	Hour Total
12:00 AM		0	1	2	3	6
01:00		3	1	1	2	7
02:00		1	1	1	2	5
03:00		2	2	6	3	13
04:00		2	7	11	21	41
05:00		27	33	40	73	173
06:00		71	103	112	99	385
07:00		138	117	126	106	487
08:00		94	78	62	74	308
09:00		54	53	52	50	209
10:00		45	49	33	38	165
11:00		29	28	39	43	139
12:00 PM		21	26	41	34	122
01:00		33	34	40	37	144
02:00		36	36	45	40	157
03:00		48	50	52	46	196
04:00		49	52	60	75	236
05:00		72	52	71	59	254
06:00		67	47	30	22	166
07:00		31	26	15	26	98
08:00		21	12	17	14	64
09:00		7	12	21	4	44
10:00		6	12	7	5	30
11:00		6	6	4	0	16
Day Total						3465
Grand Total						3465



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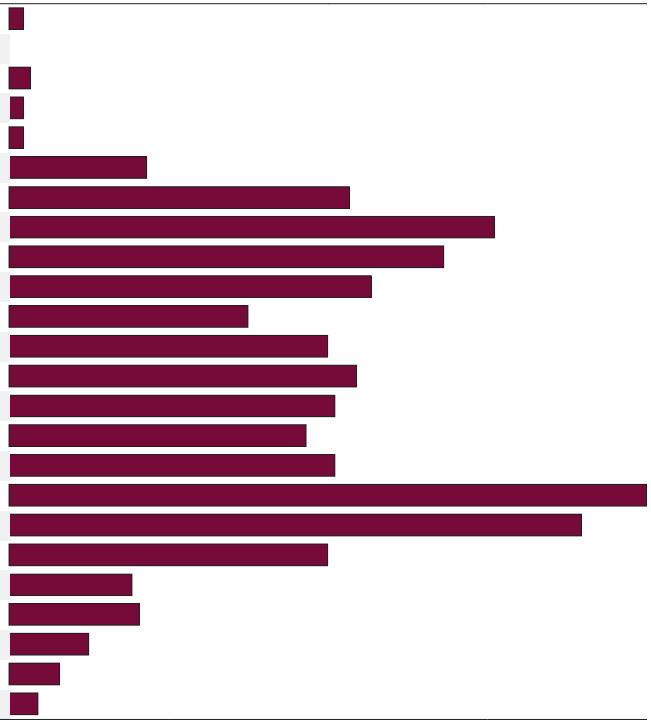
Culbreath Rd at Ayers Rd / Hayman Rd
County: Hernando
Weather: Clear

Date Start: 2/27/2020
Date End: 2/28/2020
Date Printed: 3/4/2020
Hayman Rd (Westbound)

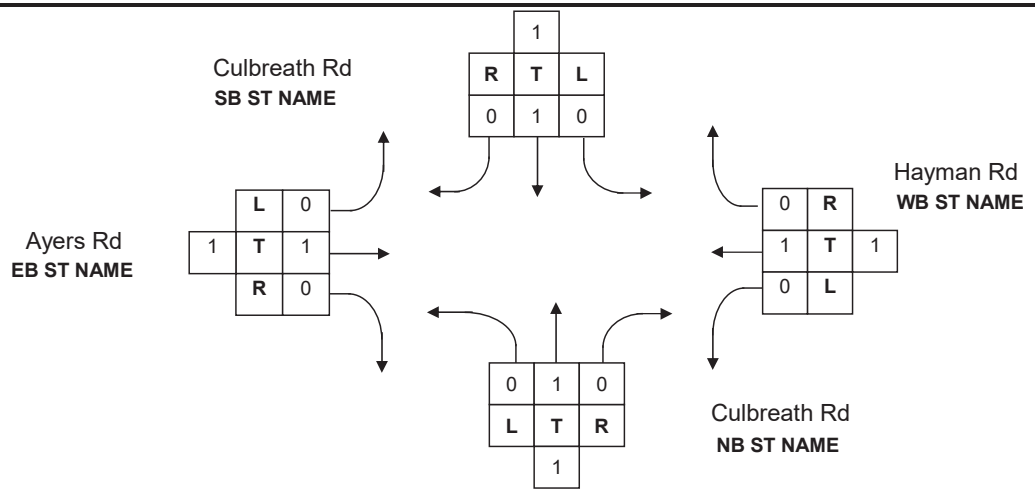
Start Time	Thu 2/27/2020	<----------Quarter 1st	2nd	Hour----------> 3rd	4th	Hour Total
12:00 AM		1	0	1	0	2
01:00		0	0	0	0	0
02:00		1	0	1	1	3
03:00		0	0	2	0	2
04:00		1	0	0	1	2
05:00		1	4	5	9	19
06:00		7	16	12	12	47
07:00		22	17	14	14	67
08:00		13	21	10	16	60
09:00		5	14	13	18	50
10:00		6	10	10	7	33
11:00		11	9	11	13	44
12:00 PM		14	10	19	5	48
01:00		14	8	7	16	45
02:00		12	11	12	6	41
03:00		14	10	13	8	45
04:00		16	24	19	29	88
05:00		26	23	18	12	79
06:00		11	13	9	11	44
07:00		7	5	4	1	17
08:00		2	10	3	3	18
09:00		0	6	2	3	11
10:00		4	0	1	2	7
11:00		1	1	2	0	4
Day Total						776
Grand Total						776



FLORIDA DEPARTMENT OF TRANSPORTATION

SUMMARY OF VEHICLE MOVEMENTS

SECTION		**MAIN ROUTE**	Culbreath Road	**COUNTY**	Hernando
MILEPOST		**INTERSECTING ROUTE**	Ayers Road / Hayman Road	**CITY**	Unicorporated
OBSERVER	ICON Consultant Group, Inc.	**DATE**	02/27/2020		
WEATHER	Clear	**ROAD CONDITION**	Dry		
REMARKS					
		FORM COMPLETED BY	DM		



TIME	NORTHBOUND					SOUTHBOUND					TOTAL	EASTBOUND					WESTBOUND					TOTAL	TOTAL
BEGIN/END	**U**	**L**	**T**	**R**	**TOT**	**U**	**L**	**T**	**R**	**TOT**	**N/S**	**U**	**L**	**T**	**R**	**TOT**	**U**	**L**	**T**	**R**	**TOT**	**E/W**	**INT**
6 - 7	0	87	43	3	**133**	0	1	115	7	**123**	**256**	0	0	31	354	**385**	0	10	34	3	**47**	**432**	**688**
7 - 8	0	148	64	5	**217**	0	3	112	7	**122**	**339**	0	8	46	433	**487**	0	9	53	5	**67**	**554**	**893**
8 - 9	0	128	71	4	**203**	0	11	78	15	**104**	**307**	0	4	44	260	**308**	0	10	45	5	**60**	**368**	**675**
2 - 3	0	182	89	6	**277**	0	7	75	16	**98**	**375**	0	17	35	105	**157**	0	3	34	4	**41**	**198**	**573**
3 - 4	0	297	116	8	**421**	0	5	65	14	**84**	**505**	0	15	32	149	**196**	0	7	34	4	**45**	**241**	**746**
4 - 5	0	453	139	13	**605**	0	12	74	9	**95**	**700**	0	15	54	167	**236**	0	7	68	13	**88**	**324**	**1,024**
5 - 6	0	527	169	12	**708**	0	5	69	11	**85**	**793**	0	12	48	194	**254**	0	7	66	6	**79**	**333**	**1,126**
6 - 7	0	305	131	6	**442**	0	6	63	7	**76**	**518**	0	11	41	114	**166**	0	4	38	2	**44**	**210**	**728**
TOTAL	**0**	**2,127**	**822**	**57**	**3,006**	**0**	**50**	**651**	**86**	**787**	**3,793**	**0**	**82**	**331**	**1,776**	**2,189**	**0**	**57**	**372**	**42**	**471**	**2,660**	**6,453**
Percentage	0%	71%	27%	2%		0%	6%	83%	11%			0%	4%	15%	81%		0%	12%	79%	9%			
Maximum	0	527	169	13		0	12	115	16			0	17	54	433		0	10	68	13			
Minimum	0	87	43	3		0	1	63	7			0	0	31	105		0	3	34	2			
Truck Percentage	0.0%	2.8%	2.3%	5.3%	2.7%	0.0%	14.0%	1.8%	2.3%	2.7%	-	0.0%	2.4%	2.1%	2.7%	2.6%	0.0%	7.0%	3.0%	4.8%	3.6%	-	2.7%

ICON Consultant Group Inc.

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Culbreath Rd at Ayers Rd / Hayman Rd
County: Hernando
Weather: Clear

Count Name: 01_ Culbreath Rd at Ayers/ Hayman Rd SWA
Start Date: 02/27/2020

Vehicles & Heavy Vehicles

Start Time	Culbreath Rd Northbound						Culbreath Rd Southbound						Ayers Rd Eastbound						Hayman Rd Westbound						Int. Total
	U-Turn	LT	TH	RT		App. Total	U-Turn	LT	TH	RT		App. Total	U-Turn	LT	TH	RT		App. Total	U-Turn	LT	TH	RT		App. Total	
6:00 AM	0	12	10	0	0	22	0	0	23	3	0	26	0	0	3	68	0	71	0	0	6	1	0	7	126
6:15 AM	0	19	10	1	0	30	0	0	33	0	0	33	0	0	7	96	0	103	0	4	12	0	0	16	182
6:30 AM	0	24	13	0	0	37	0	1	25	3	0	29	0	0	11	101	0	112	0	3	7	2	0	12	190
6:45 AM	0	32	10	2	0	44	0	0	34	1	0	35	0	0	10	89	0	99	0	3	9	0	0	12	190
Hourly Total	0	87	43	3	0	133	0	1	115	7	0	123	0	0	31	354	0	385	0	10	34	3	0	47	688
7:00 AM	0	41	13	1	0	55	0	0	25	1	0	26	0	0	6	132	0	138	0	3	17	2	0	22	241
7:15 AM	0	42	15	2	0	59	0	1	38	1	0	40	0	2	13	102	0	117	0	1	13	3	0	17	233
7:30 AM	0	38	16	1	0	55	0	1	29	3	0	33	0	2	16	108	0	126	0	2	12	0	0	14	228
7:45 AM	0	27	20	1	0	48	0	1	20	2	0	23	0	4	11	91	0	106	0	3	11	0	0	14	191
Hourly Total	0	148	64	5	0	217	0	3	112	7	0	122	0	8	46	433	0	487	0	9	53	5	0	67	893
8:00 AM	0	28	17	2	0	47	0	2	21	3	0	26	0	0	11	83	0	94	0	1	12	0	0	13	180
8:15 AM	0	31	20	1	0	52	0	3	16	4	0	23	0	0	11	67	0	78	0	4	16	1	0	21	174
8:30 AM	0	38	19	0	0	57	0	2	24	6	0	32	0	2	10	50	0	62	0	2	6	2	0	10	161
8:45 AM	0	31	15	1	0	47	0	4	17	2	0	23	0	2	12	60	0	74	0	3	11	2	0	16	160
Hourly Total	0	128	71	4	0	203	0	11	78	15	0	104	0	4	44	260	0	308	0	10	45	5	0	60	675
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:00 PM	0	46	20	2	0	68	0	3	18	6	0	27	0	2	12	22	0	36	0	2	10	0	0	12	143
2:15 PM	0	42	23	1	0	66	0	0	16	1	0	17	0	9	6	21	0	36	0	0	11	0	0	11	130
2:30 PM	0	42	22	2	0	66	0	3	17	5	0	25	0	5	13	27	0	45	0	0	10	2	0	12	148
2:45 PM	0	52	24	1	0	77	0	1	24	4	0	29	0	1	4	35	0	40	0	1	3	2	0	6	152
Hourly Total	0	182	89	6	0	277	0	7	75	16	0	98	0	17	35	105	0	157	0	3	34	4	0	41	573
3:00 PM	0	65	15	1	0	81	0	0	18	1	0	19	0	4	9	35	0	48	0	1	12	1	0	14	162
3:15 PM	0	72	33	1	0	106	0	3	14	2	0	19	0	3	8	39	0	50	0	2	8	0	0	10	185
3:30 PM	0	71	22	2	0	95	0	1	14	7	0	22	0	4	9	39	0	52	0	0	11	2	0	13	182
3:45 PM	0	89	46	4	0	139	0	1	19	4	0	24	0	4	6	36	0	46	0	4	3	1	0	8	217
Hourly Total	0	297	116	8	0	421	0	5	65	14	0	84	0	15	32	149	0	196	0	7	34	4	0	45	746
4:00 PM	0	98	29	5	0	132	0	4	25	5	0	34	0	3	10	36	0	49	0	3	10	3	0	16	231
4:15 PM	0	107	35	2	0	144	0	3	15	1	0	19	0	4	5	43	0	52	0	1	20	3	0	24	239
4:30 PM	0	132	36	3	0	171	0	3	14	1	0	18	0	3	13	44	0	60	0	1	15	3	0	19	268
4:45 PM	0	116	39	3	0	158	0	2	20	2	0	24	0	5	26	44	0	75	0	2	23	4	0	29	286
Hourly Total	0	453	139	13	0	605	0	12	74	9	0	95	0	15	54	167	0	236	0	7	68	13	0	88	1024
5:00 PM	0	123	41	3	0	167	0	0	19	0	0	19	0	3	16	53	0	72	0	2	23	1	0	26	284
5:15 PM	0	174	48	2	0	224	0	3	20	2	0	25	0	2	7	43	0	52	0	3	18	2	0	23	324
5:30 PM	0	139	44	2	0	185	0	1	12	6	0	19	0	3	18	50	0	71	0	2	14	2	0	18	293
5:45 PM	0	91	36	5	0	132	0	1	18	3	0	22	0	4	7	48	0	59	0	0	11	1	0	12	225
Hourly Total	0	527	169	12	0	708	0	5	69	11	0	85	0	12	48	194	0	254	0	7	66	6	0	79	1126
6:00 PM	0	100	32	1	0	133	0	3	22	2	0	27	0	0	17	50	0	67	0	2	9	0	0	11	238
6:15 PM	0	94	45	1	0	140	0	1	11	1	0	13	0	6	13	28	0	47	0	2	10	1	0	13	213
6:30 PM	0	62	30	4	0	96	0	1	15	2	0	18	0	1	9	20	0	30	0	0	8	1	0	9	153
6:45 PM	0	49	24	0	0	73	0	1	15	2	0	18	0	4	2	16	0	22	0	0	11	0	0	11	124
Hourly Total	0	305	131	6	0	442	0	6	63	7	0	76	0	11	41	114	0	166	0	4	38	2	0	44	728
Grand Total	0	2127	822	57	0	3006	0	50	651	86	0	787	0	82	331	1776	0	2189	0	57	372	42	0	471	6453
Approach %	0.0	70.8	27.3	1.9	-	-	0.0	6.4	82.7	10.9	-	-	0.0	3.7	15.1	81.1	-	-	0.0	12.1	79.0	8.9	-	-	-
Total %	0.0	33.0	12.7	0.9	-	46.6	0.0	0.8	10.1	1.3	-	12.2	0.0	1.3	5.1	27.5	-	33.9	0.0	0.9	5.8	0.7	-	7.3	-
Vehicles	0	2068	803	54	-	2925	0	43	639	84	-	766	0	80	324	1728	-	2132	0	53	361	40	-	454	6277
% Vehicles	-	97.2	97.7	94.7	-	97.3	-	86.0	98.2	97.7	-	97.3	-	97.6	97.9	97.3	-	97.4	-	93.0	97.0	95.2	-	96.4	97.3
Heavy Vehicles	0	59	19	3	-	81	0	7	12	2	-	21	0	2	7	48	-	57	0	4	11	2	-	17	176
% Heavy Vehicles	-	2.8	2.3	5.3	-	2.7	-	14.0	1.8	2.3	-	2.7	-	2.4	2.1	2.7	-	2.6	-	7.0	3.0	4.8	-	3.6	2.7
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0

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Culbreath Rd at Ayers Rd / Hayman Rd
County: Hernando
Weather: Clear

Count Name: 01_ Culbreath Rd at Ayers/ Hayman Rd SWA
Start Date: 02/27/2020
Page No: 1

Heavy Vehicles

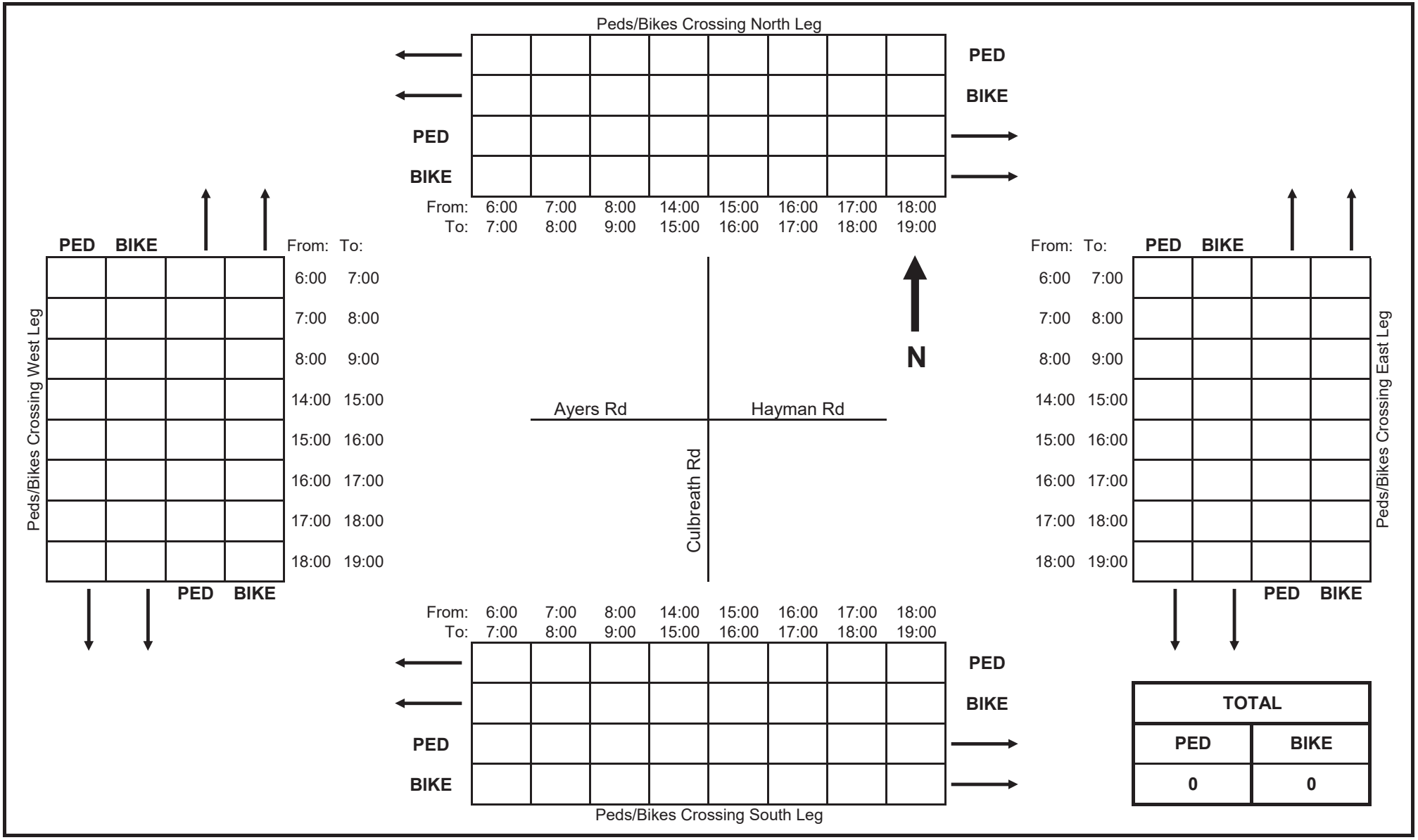
Start Time	Culbreath Rd Northbound						Culbreath Rd Southbound						Ayers Rd Eastbound						Hayman Rd Westbound						Int. Total
	U-Turn	LT	TH	RT		App. Total	U-Turn	LT	TH	RT		App. Total	U-Turn	LT	TH	RT		App. Total	U-Turn	LT	TH	RT		App. Total	
6:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	3	0	3	0	0	1	0	0	1	5
6:15 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
6:30 AM	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	3
6:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	2
Hourly Total	0	1	3	0	0	4	0	0	1	0	0	1	0	0	0	5	0	5	0	0	2	0	0	2	12
7:00 AM	0	1	0	1	0	2	0	0	1	0	0	1	0	0	0	2	0	2	0	0	0	0	0	0	5
7:15 AM	0	2	1	0	0	3	0	1	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	1	6
7:30 AM	0	2	2	1	0	5	0	0	1	0	0	1	0	0	0	4	0	4	0	0	0	0	0	0	10
7:45 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	3
Hourly Total	0	6	3	2	0	11	0	1	2	0	0	3	0	0	0	9	0	9	0	0	1	0	0	1	24
8:00 AM	0	3	1	0	0	4	0	1	1	0	0	2	0	0	0	2	0	2	0	0	0	0	0	0	8
8:15 AM	0	1	0	0	0	1	0	1	1	0	0	2	0	0	0	1	0	1	0	0	1	0	0	1	5
8:30 AM	0	3	2	0	0	5	0	1	0	0	0	1	0	0	1	3	0	4	0	0	0	0	0	0	10
8:45 AM	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	6
Hourly Total	0	10	3	0	0	13	0	3	2	0	0	5	0	0	1	9	0	10	0	0	1	0	0	1	29
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:00 PM	0	3	0	0	0	3	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	2
2:30 PM	0	2	1	0	0	3	0	1	0	1	0	2	0	1	1	4	0	6	0	0	0	0	0	0	11
2:45 PM	0	4	1	0	0	5	0	0	2	0	0	2	0	0	0	2	0	2	0	0	0	0	0	0	9
Hourly Total	0	9	2	0	0	11	0	1	3	1	0	5	0	1	1	8	0	10	0	0	0	0	0	0	26
3:00 PM	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	2	0	2	0	0	1	0	0	1	6
3:15 PM	0	1	2	0	0	3	0	0	0	0	0	0	0	0	0	3	0	3	0	0	1	0	0	1	7
3:30 PM	0	1	0	0	0	1	0	0	1	1	0	2	0	1	0	2	0	3	0	0	1	0	0	1	7
3:45 PM	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	3
Hourly Total	0	6	3	0	0	9	0	0	1	1	0	2	0	1	0	8	0	9	0	0	3	0	0	3	23
4:00 PM	0	3	0	0	0	3	0	0	1	0	0	1	0	0	1	2	0	3	0	1	0	1	0	2	9
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	2
4:30 PM	0	1	1	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	4
4:45 PM	0	4	0	0	0	4	0	1	0	0	0	1	0	0	3	3	0	6	0	0	0	1	0	1	12
Hourly Total	0	8	1	0	0	9	0	2	1	0	0	3	0	0	4	7	0	11	0	1	1	2	0	4	27
5:00 PM	0	3	0	1	0	4	0	0	1	0	0	1	0	0	0	0	0	0	0	1	2	0	0	3	8
5:15 PM	0	5	2	0	0	7	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	8
5:30 PM	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	6
5:45 PM	0	1	1	0	0	2	0	0	1	0	0	1	0	0	0	1	0	1	0	0	1	0	0	1	5
Hourly Total	0	14	3	1	0	18	0	0	2	0	0	2	0	0	0	2	0	2	0	2	3	0	0	5	27
6:00 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:15 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	3
6:30 PM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
6:45 PM	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Hourly Total	0	5	1	0	0	6	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	8
Grand Total	0	59	19	3	0	81	0	7	12	2	0	21	0	2	7	48	0	57	0	4	11	2	0	17	176
Approach %	0.0	72.8	23.5	3.7	-	-	0.0	33.3	57.1	9.5	-	-	0.0	3.5	12.3	84.2	-	-	0.0	23.5	64.7	11.8	-	-	-
Total %	0.0	33.5	10.8	1.7	-	46.0	0.0	4.0	6.8	1.1	-	11.9	0.0	1.1	4.0	27.3	-	32.4	0.0	2.3	6.3	1.1	-	9.7	-
Heavy Vehicles	0	59	19	3	-	81	0	7	12	2	-	21	0	2	7	48	-	57	0	4	11	2	-	17	176
% Heavy Vehicles	-	100.0	100.0	100.0	-	100.0	-	100.0	100.0	100.0	-	100.0	-	100.0	100.0	100.0	-	100.0	-	100.0	100.0	100.0	-	100.0	100.0

Culbreath Rd at Ayers Rd / Hayman Rd

Weather: Clear
County: Hernando

Pedestrian / Bicycle Count
Field Data Sheet

File Name: 001_Ped-Bike
Start Date: 2/27/2020
Start Time: 6:00 AM
End Time: 7:00 PM



TOTAL	
PED	BIKE
0	0

APPENDIX C

Signal Warrant Worksheets

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	NA	Engineer:	DH
County:	08 – Hernando	Date:	April 9, 2020
District:	Seven		

Major Street:	CR 581	Lanes:	1	Major Approach Speed:	45
Minor Street:	CR 420	Lanes:	1	Minor Approach Speed:	55

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

Volume Level Criteria

1. Is the posted speed or 85th-percentile of major street > 40 mph (70 km/h)? ☑ Yes ☐ No
2. Is the intersection in a built-up area of an isolated community with a population < 10,000? ☐ Yes ☑ No

"70%" volume level **may** be used if Question 1 **or** 2 above is answered "Yes" ☑ 70% ☐ 100%

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME

Warrant 1 is satisfied if Condition A or Condition B is "100%" satisfied for eight hours. ☐ Yes ☑ No

Warrant 1 is also satisfied if both Condition A and Condition B are "80%" satisfied (should only be applied after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems). ☐ Yes ☑ No

Condition A - Minimum Vehicular Volume

Condition A is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

100% Satisfied: ☐ Yes ☑ No
80% Satisfied: ☐ Yes ☑ No
70% Satisfied: ☐ Yes ☑ No

Number of Lanes for moving traffic on each approach		Vehicles per hour on major-street (total of both approaches)			Vehicles per hour on minor-street (one direction only)		
Major	Minor	100%[a]	80%[b]	70%[c]	100%[a]	80%[b]	70%[c]
1	1	500	400	350	150	120	105
2 or more	1	600	480	420	150	120	105
2 or more	2 or more	600	480	420	200	160	140
1	2 or more	500	400	350	200	160	140

[a] Basic Minimum hourly volume
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures
[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Record 8 highest hours and the corresponding major-street and minor-street volumes in the Instructions Sheet.

Street	Eight Highest Hours							
	6AM-7AM	7AM-8AM	8AM-9AM	2PM-3PM	3PM-4PM	4PM-5PM	5PM-6PM	6PM-7PM
Major	256	339	307	375	505	700	793	518
Minor	44	62	55	52	47	75	73	52

Existing Volumes

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

Condition B - Interruption of Continuous Traffic

Condition B is intended for application where Condition A is not satisfied and the traffic volume on a major street is so heavy that traffic on the minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

Applicable:	☐ Yes	☑ No
100% Satisfied:	☐ Yes	☐ No
80% Satisfied:	☐ Yes	☐ No
70% Satisfied:	☐ Yes	☐ No

Number of Lanes for moving traffic on each approach		Vehicles per hour on major-street (total of both approaches)			Vehicles per hour on minor-street (one direction only)		
Major	**Minor**	**100%[a]**	**80%[b]**	**70%[c]**	**100%[a]**	**80%[b]**	**70%[c]**
1	1	750	600	525	75	60	53
2 or more	1	900	720	630	75	60	53
2 or more	2 or more	900	720	630	100	80	70
1	2 or more	750	600	525	100	80	70

[a] Basic Minimum hourly volume

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures

[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Record 8 highest hours and the corresponding major-street and minor-street volumes in the Instructions Sheet.

Eight Highest Hours								
Street	**6AM-7AM**	**7AM-8AM**	**8AM-9AM**	**2PM-3PM**	**3PM-4PM**	**4PM-5PM**	**5PM-6PM**	**6PM-7PM**
Major	256	339	307	375	505	700	793	518
Minor	44	62	55	52	47	75	73	52

Existing Volumes

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	NA	Engineer:	DH
County:	08 – Hernando	Date:	April 9, 2020
District:	Seven		

Major Street:	CR 581	Lanes:	1	Major Approach Speed:	45
Minor Street:	CR 420	Lanes:	1	Minor Approach Speed:	55

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

Volume Level Criteria

1. Is the posted speed or 85th-percentile of major street > 40 mph (70 km/h)? ☑ Yes ☐ No
2. Is the intersection in a built-up area of an isolated community with a population < 10,000? ☐ Yes ☑ No

"70%" volume level **may** be used if Question 1 **or** 2 above is answered "Yes" ☑ Yes ☐ No

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME

If all four points lie above the appropriate line, then the warrant is satisfied.

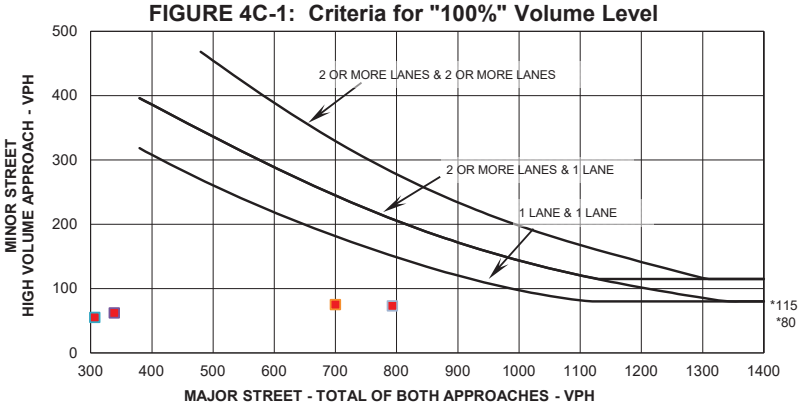
Applicable: ☑ Yes ☐ No
Satisfied: ☐ Yes ☑ No

Plot four volume combinations on the applicable figure below.

100% Volume Level

Four Highest Hours	Volumes	
	Major Street	Minor Street
7AM-8AM	339	62
8AM-9AM	307	55
4PM-5PM	700	75
5PM-6PM	793	73

FIGURE 4C-1: Criteria for "100%" Volume Level



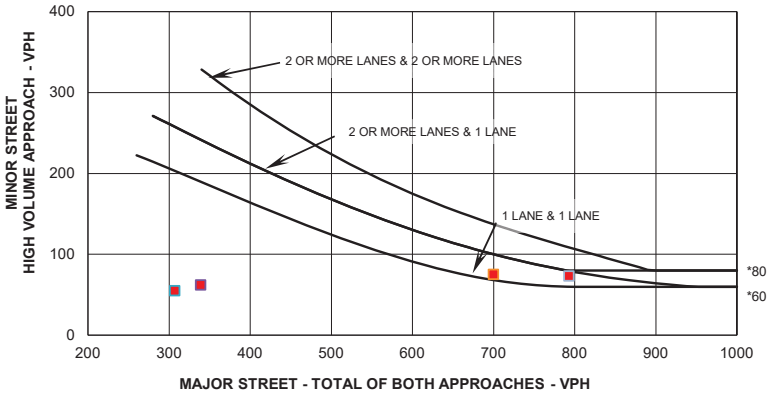
** Note: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume threshold for a minor street approach with one lane.*

70% Volume Level

Four Highest Hours	Volumes	
	Major Street	Minor Street
7AM-8AM	339	62
8AM-9AM	307	55
4PM-5PM	700	75
5PM-6PM	793	73

FIGURE 4C-2: Criteria for "70%" Volume Level

(Community Less than 10,000 population or above 70 km/hr (40 mph) on Major Street)



** Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume threshold for a minor street approach with one lane.*

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	NA	Engineer:	DH
County:	08 – Hernando	Date:	April 9, 2020
District:	Seven		

Major Street:	CR 581	Lanes:	1	Major Approach Speed:	45
Minor Street:	CR 420	Lanes:	1	Minor Approach Speed:	55

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

Volume Level Criteria

1. Is the posted speed or 85th-percentile of major street > 40 mph (70 km/h)? ☑ Yes ☐ No
2. Is the intersection in a built-up area of an isolated community with a population < 10,000? ☐ Yes ☑ No

"70%" volume level **may** be used if Question 1 **or** 2 above is answered "Yes" ☑ 70% ☐ 100%

WARRANT 3 - PEAK HOUR

*If all three criteria are fulfilled **or** the plotted point lies above the appropriate line, then the warrant is satisfied.*

Applicable: ☐ Yes ☑ No
Satisfied: ☐ Yes ☐ No

Unusual condition justifying use of warrant:

Record hour when criteria are fulfilled and the corresponding delay or volume in boxes provided.

Peak Hour 100% Volume		
Time	Major Vol.	Minor Vol.

Peak Hour 70% Volume		
Time	Major Vol.	Minor Vol.

Criteria

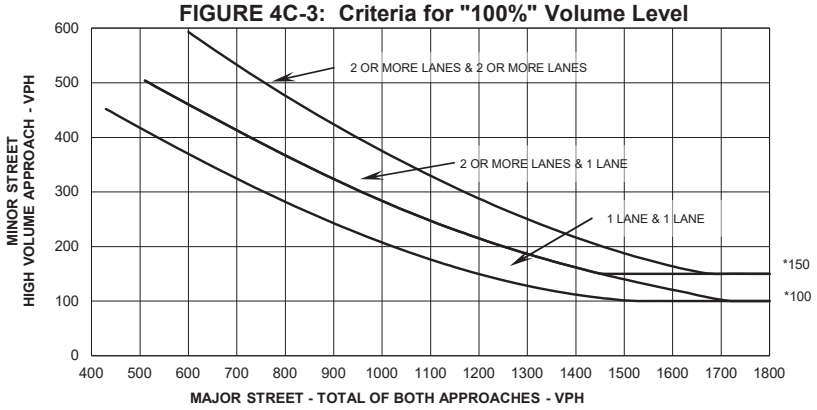
1. Delay on Minor Approach *(vehicle-hours)		
Approach Lanes	1	2
Delay Criteria*	4.0	5.0
Delay*		
Fulfilled?:	☐ Yes ☑ No	

2. Volume on Minor Approach One-Direction *(vehicles per hour)		
Approach Lanes	1	2
Volume Criteria*	100	150
Volume*		
Fulfilled?:	☐ Yes ☑ No	

3. Total Intersection Entering Volume *(vehicles per hour)		
No. of Approaches	3	4
Volume Criteria*	650	800
Volume*		
Fulfilled?:	☑ Yes ☐ No	

Plot volume combination on the applicable figure below.

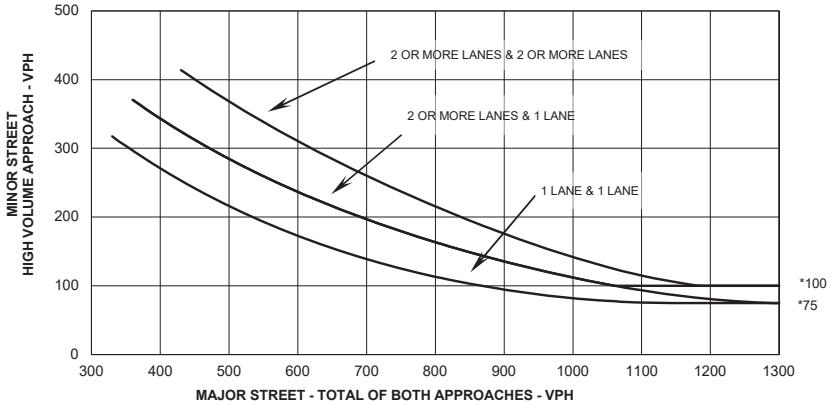
FIGURE 4C-3: Criteria for "100%" Volume Level



** Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume threshold for a minor street approach with one lane.*

FIGURE 4C-4: Criteria for "70%" Volume Level

(Community Less than 10,000 population or above 70 km/hr (40 mph) on Major Street)



** Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume threshold for a minor street approach with one lane.*

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	NA	Engineer:	DH
County:	08 – Hernando	Date:	April 9, 2020
District:	Seven		

Major Street:	CR 581	Lanes:	1	Major Approach Speed:	45
Minor Street:	CR 420	Lanes:	1	Minor Approach Speed:	55

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

Volume Level Criteria

1. Is the posted speed or 85th-percentile of major street > 40 mph (70 km/h)? ☑ Yes ☐ No
2. Is the intersection in a built-up area of an isolated community with a population < 10,000? ☐ Yes ☑ No

"70%" volume level **may** be used if Question 1 **or** 2 above is answered "Yes" ☑ 70% ☐ 100%

WARRANT 4 - PEDESTRIAN VOLUME

For each of any 4 hours of an average day, the plotted points lie above the appropriate line, then the warrant is satisfied.

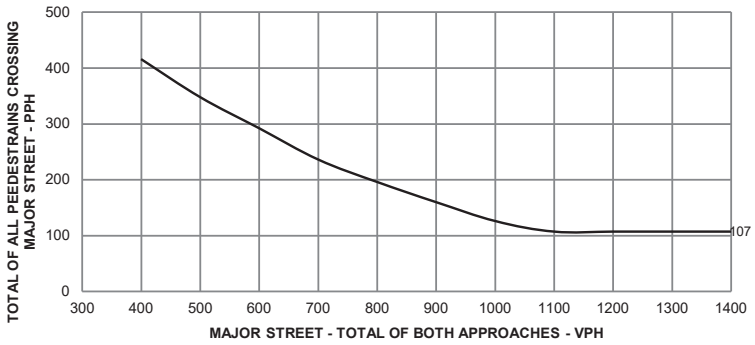
Applicable: ☑ Yes ☐ No
Satisfied: ☐ Yes ☑ No

100% Volume Level

Four Highest Hours	Volumes	
	Major Street	Pedestrian Total

Plot four volume combinations on the applicable figure below.

Figure 4C-5. Criteria for "100%" Volume Level

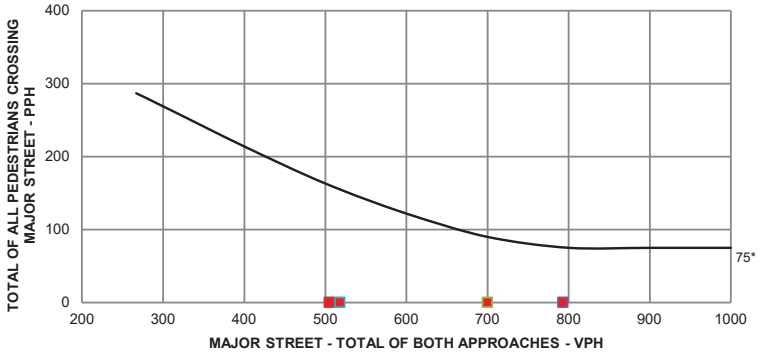


** Note: 107 pph applies as the lower threshold volume*

70% Volume Level

Four Highest Hours	Volumes	
	Major Street	Pedestrian Total
3PM-4PM	505	
4PM-5PM	700	
5PM-6PM	793	
6PM-7PM	518	

Figure 4C-6 Criteria for "70%" Volume Level



** Note: 75 pph applies as the lower threshold volume*

WARRANT 4 - PEDESTRIAN VOLUME

For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point falls above the appropriate line, then the warrant is satisfied.

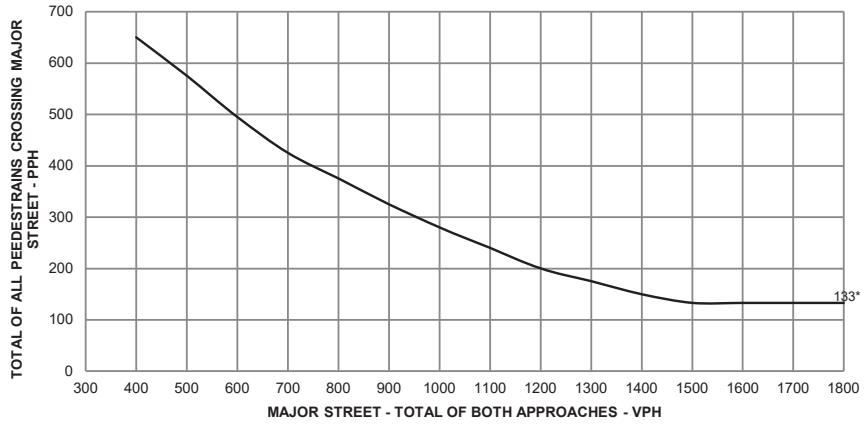
Applicable: ☑ Yes ☐ No
Satisfied: ☐ Yes ☑ No

Plot one volume combination on the applicable figure below.

100% Volume Level

Peak Hour	Volumes	
	Major Street	Pedestrian Total

Figure 4C-7. Criteria for "100%" Volume Level - Peak Hour

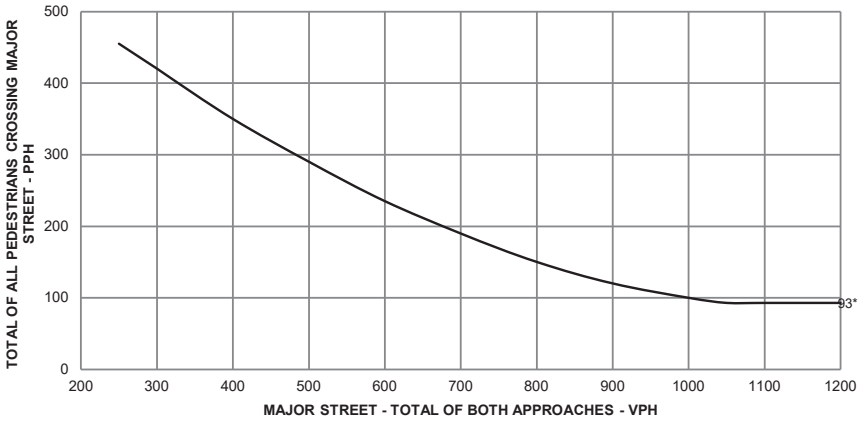


** Note: 133 pph applies as the lower threshold volume*

70% Volume Level

Peak Hour	Volumes	
	Major Street	Pedestrian Total

Figure 4C-8 Criteria for "70%" Volume Level - Peak Hour



** Note: 93 pph applies as the lower threshold volume*

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	NA	Engineer:	DH
County:	08 – Hernando	Date:	April 9, 2020
District:	Seven		

Major Street:	CR 581	Lanes:	1	Major Approach Speed:	45
Minor Street:	CR 420	Lanes:	1	Minor Approach Speed:	55

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

WARRANT 5 - SCHOOL CROSSING

Record hours where criteria are fulfilled and the corresponding volume or gap frequency in the boxes provided. The warrant is satisfied if all three of the criteria are fulfilled.

Applicable: ☐ Yes ☑ No

Satisfied: ☐ Yes ☐ No

Criteria				Fulfilled? Yes	Fulfilled? No
1. There are a minimum of 20 students crossing the major street during the highest crossing hour.	Students:	Hour:			
2. There are fewer adequate gaps in the major street traffic stream during the period when the children are using the established school crossing than the number of minutes in the same period.		Minutes:	Gaps:		
3. The nearest traffic signal along the major street is located more than 300 ft. (90 m) away, or the nearest signal is within 300 ft. (90 m) but the proposed traffic signal will not restrict the progressive movement of traffic.					

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	NA	Engineer:	DH
County:	08 – Hernando	Date:	April 9, 2020
District:	Seven		

Major Street:	CR 581	Lanes:	1	Major Approach Speed:	45
Minor Street:	CR 420	Lanes:	1	Minor Approach Speed:	55

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

WARRANT 6 - COORDINATED SIGNAL SYSTEM

Indicate if the criteria are fulfilled in the boxes provided. The warrant is satisfied if either criterion is fulfilled. This warrant should not be applied when the resulting signal spacing would be less than 300 m (1,000 ft.).

Applicable: ☐ Yes ☑ No

Satisfied: ☐ Yes ☑ No

Criteria	Fulfilled? Yes	Fulfilled? No
1. On a one-way street or a street that has traffic predominately in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.		
2. On a two-way street, adjacent signals do not provide the necessary degree of platooning, and the proposed and adjacent signals will collectively provide a progressive operation.		

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	NA	Engineer:	DH
County:	08 – Hernando	Date:	April 9, 2020
District:	Seven		

Major Street:	CR 581	Lanes:	1	Major Approach Speed:	45
Minor Street:	CR 420	Lanes:	1	Minor Approach Speed:	55

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

WARRANT 7 - CRASH EXPERIENCE

Record hours where criteria are fulfilled, the corresponding volume, and other information in the boxes provided. The warrant is satisfied if all three of the criteria are fulfilled.

Applicable: ☑ Yes ☐ No

Satisfied: ☐ Yes ☑ No

Criteria		Hour								Volume		Met?		Fulfilled?	
										Major	Minor	Yes	No	Yes	No
1. One of the warrants to the right is met.	Warrant 1, Condition A (80% satisfied)												x		x
	Warrant 1, Condition B (80% satisfied)												x		
	Warrant 4, Pedestrian Volume at 80% of volume requirements: # ped/hr for four (4) hours or # ped/hr for one (1) hour.												x		
2. Adequate trial of other remedial measure has failed to reduce crash frequency.		Measure tried:	None												x
3. Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12-month period.		Observed Crash Types:	Angle							Number of crashes per 12 months:		7		x	

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	NA	Engineer:	DH
County:	08 – Hernando	Date:	April 9, 2020
District:	Seven		

Major Street:	CR 581	Lanes:	1	Major Approach Speed:	45
Minor Street:	CR 420	Lanes:	1	Minor Approach Speed:	55

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

WARRANT 8 - ROADWAY NETWORK

Record hours where criteria are fulfilled, and the corresponding volume or other information in the boxes provided. The warrant is satisfied if at least one of the criteria is fulfilled and if all intersecting routes have one or more of the Major Route characteristics listed.

Applicable: ☑ Yes ☐ No

Satisfied: ☐ Yes ☑ No

Criteria								Met? Yes	Met? No	Fulfilled? Yes	Fulfilled? No
1. Both of the criteria to the right are met.	a. Total entering volume of at least 1,000 veh/hr during a typical weekday peak hour.			Entering Volume:							
	b. Five-year projected volumes that satisfy one or more of Warrants 1, 2, or 3.			Warrant:	1	2	3				
				Satisfied?:							
2. Total entering volume at least 1,000 veh/hr for each of any 5 hrs of a non-normal business day (Sat. or Sun.)								← Hour			
								←Volume			

Characteristics of Major Routes		Met? Yes	Met? No	Fulfilled? Yes	Fulfilled? No
1. Part of the street or highway system that serves as the principal roadway network for through traffic flow.	Major Street:				
	Minor Street:				
2. Rural or suburban highway outside of, entering, or traversing a city.	Major Street:				
	Minor Street:				
3. Appears as a major route on an official plan.	Major Street:				
	Minor Street:				

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	NA	Engineer:	DH
County:	08 – Hernando	Date:	April 9, 2020
District:	Seven		

Major Street:	CR 581	Lanes:	1	Major Approach Speed:	45
Minor Street:	CR 420	Lanes:	1	Minor Approach Speed:	55

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

Approach Lane Criteria

1. How many approach lanes are there at the track crossing? ☐ 1 ☐ 2 or

If there is 1 lane, use Figure 4C-9 and if there are 2 or more, use Figure 4C-10. ☐ Fig 4C-9 ☐ Fig 4C-10

WARRANT 9 - INTERSECTION NEAR A GRADE CROSSING

This signal warrant should be applied only after adequate consideration has been given to other alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade crossing.

Indicate if both criteria are fulfilled in the boxes provided. The warrant is satisfied if both criteria are met.

Applicable: ☐ Yes ☐ No

Satisfied: ☐ Yes ☑ No

Criteria	Fulfilled? Yes	Fulfilled? No
1. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach; and	☐	☐
2. During the highest traffic volume hour during which the rail uses the crossing, the plotted point falls above the applicable curve for the existing combination of approach lanes over the track and the distance D (clear storage distance).	☐	☐

Use the following tables (4C-2, 4C-3, and 4C-4 to appropriately adjust the minor-street approach volume).

Inputs		Adjustment Factors from Tables
Occurrences of Rail traffic per day		
% of High Occupancy Buses on Minor-Street Approach		1.00
Enter D (feet)		
% of Tractor-Trailer Trucks on Minor-Street Approach		0.50

Table 4C-2. Adjustment Factor for Daily Frequency of Rail Traffic

Rail Traffic per Day	Adjustment Factor
1	0.67
2	0.91
3 to 5	1.00
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

Table 4C-3. Adjustment Factor for Percentage of High-Occupancy Buses

% of High-Occupancy Buses* on Minor Street Approach	Adjustment Factor
0%	1.00
2%	1.09
4%	1.19
6% or more	1.32

* A high-occupancy bus is defined as a bus occupied by at least 20 people

Table 4C-4. Adjustment Factor for Percentage of Tractor-Trailer Trucks

% of Tractor-Trailer Trucks on Minor-Street Approach	Adjustment Factor	
	D less than 70 feet	D of 70 feet or more
0% to 2.5%	0.50	0.50
2.6% to 7.5%	0.75	0.75
7.6% to 12.5%	1.00	1.00
12.6% to 17.5%	2.30	1.15
17.6% to 22.5%	2.70	1.35
22.6% to 27.5%	3.28	1.64
More than 27.5%	4.18	2.09

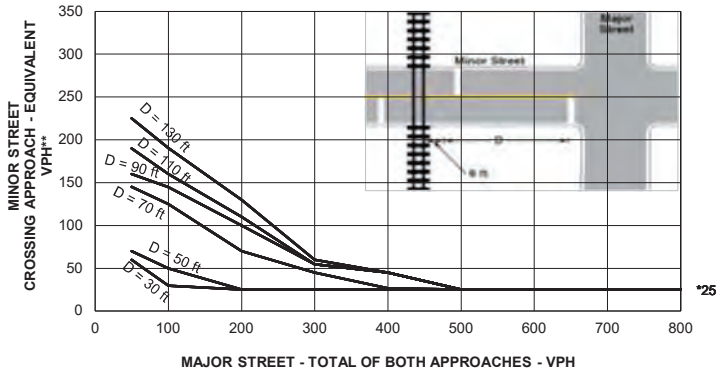
Input the major and minor street volumes before adjustment factors are applied

1 Approach Lane		
D (ft)	Major Vol.	Minor Vol.

After adjustment factors are applied

1 Approach Lane w/Factors		
D (ft)	Major Vol.	Minor Vol.

FIGURE 4C-9: Criteria for 1 Approach Lane at the Track Crossing



** Note: 25 vph applies as the lower threshold volume*

** *Note: VPH after applying the adjustment factors in Tables 4C-2, 4C, and or 4C-4, if appropriate*

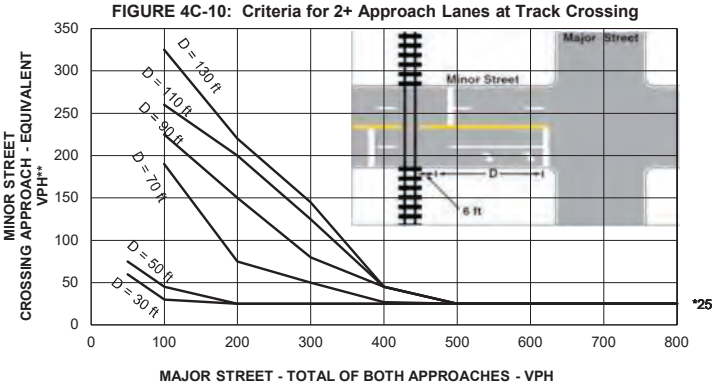
Input D and the major and minor street volumes before adjustment factors are applied

2 or more Approach Lanes		
D (ft)	Major Vol.	Minor Vol.

After adjustment factors are applied

2+ Approach Lane w/Factors		
D (ft)	Major Vol.	Minor Vol.

FIGURE 4C-10: Criteria for 2+ Approach Lanes at Track Crossing



** Note: 25 vph applies as the lower threshold volume*

** *Note: VPH after applying the adjustment factors in Tables 4C-2, 4C, and or 4C-4, if appropriate*

Form 750-020-01
TRAFFIC ENGINEERING
10/15

State of Florida Department of Transportation

TRAFFIC SIGNAL WARRANT SUMMARY

City:	NA	Engineer:	DH
County:	08 – Hernando	Date:	April 9, 2020
District:	Seven		

Major Street:	CR 581	Lanes:	1	Major Approach Speed:	45
Minor Street:	CR 420	Lanes:	1	Minor Approach Speed:	55

MUTCD Electronic Reference to Chapter 4: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/part4.pdf

CONCLUSIONS

Remarks:

WARRANTS SATISFIED:

☐	Warrant 1	☐	Not Applicable
☐	Warrant 2	☐	Not Applicable
☐	Warrant 3	☑	Not Applicable
☐	Warrant 4	☐	Not Applicable
☐	Warrant 5	☑	Not Applicable
☐	Warrant 6	☑	Not Applicable
☐	Warrant 7	☐	Not Applicable
☐	Warrant 8	☑	Not Applicable
☐	Warrant 9	☑	Not Applicable

APPENDIX B

Historical AADT Reports

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2022 HISTORICAL AADT REPORT

COUNTY: 08 - HERNANDO

SITE: 9018 - AYERS RD, E OF US41/BROAD ST

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
2022	7700 C	E 3700	W 4000	9.50	54.50	6.50
2021	7500 C	E 3500	W 4000	9.50	54.20	4.70
2020	4000 X	0	0	9.50	54.30	4.50
2019	4100 X	0	0	9.50	54.30	4.50
2018	4000 X	0	0	9.50	54.40	13.80
2017	3900 6	0	0	9.50	55.60	6.70
2016	3700 V	0	0	9.50	54.80	11.80
2015	3500 R	0	0	9.50	55.00	13.20
2014	3300 T			9.50	56.00	10.70
2013	3300 S	0	0	9.50	57.60	13.30
2012	3300 F	0	0	9.50	55.00	12.10
2011	3300 C	E 0	W 0	9.50	55.00	12.40

AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE
V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2022 HISTORICAL AADT REPORT

COUNTY: 08 - HERNANDO

SITE: 9607 - CR 581, BETWEEN 'CR 576' AND 'ENDSLEY RD'

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
2022	3400 F	N 1800	S 1600	9.50	54.50	6.50
2021	3200 C	N 1700	S 1500	9.50	54.20	4.70

AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE
V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2022 HISTORICAL AADT REPORT

COUNTY: 08 - HERNANDO

SITE: 9624 - CR 572 B/W EMERSON RD AND CULBREATH RD

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
2022	4300 F	E 2200	W 2100	9.50	54.50	11.20
2021	4100 C	E 2100	W 2000	9.50	54.20	6.10

AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE
V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

APPENDIX C

Operational Analysis Reports

(Synchro and Sidra)

Intersection	
Int Delay, s/veh	18.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	53	498	10	61	6	170	74	6	3	129	8
Future Vol, veh/h	9	53	498	10	61	6	170	74	6	3	129	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	10	59	552	11	68	7	188	82	7	3	143	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	653	619	148	921	620	86	152	0	0	89	0	0
Stage 1	154	154	-	462	462	-	-	-	-	-	-	-
Stage 2	499	465	-	459	158	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	379	403	896	250	403	970	1423	-	-	1500	-	-
Stage 1	846	768	-	578	563	-	-	-	-	-	-	-
Stage 2	552	561	-	580	765	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	287	346	896	75	346	970	1423	-	-	1500	-	-
Mov Cap-2 Maneuver	287	346	-	75	346	-	-	-	-	-	-	-
Stage 1	728	766	-	498	485	-	-	-	-	-	-	-
Stage 2	406	483	-	205	763	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	27.7	27.5	5.4	0.2
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1423	-	-	756	244	1500	-	-
HCM Lane V/C Ratio	0.132	-	-	0.821	0.35	0.002	-	-
HCM Control Delay (s)	7.9	0	-	27.7	27.5	7.4	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0.5	-	-	9	1.5	0	-	-

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	14	55	223	8	76	7	606	194	14	6	79	13
Future Vol, veh/h	14	55	223	8	76	7	606	194	14	6	79	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	61	247	9	84	8	672	215	16	7	88	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1722	1684	95	1830	1683	223	102	0	0	231	0	0
Stage 1	109	109	-	1567	1567	-	-	-	-	-	-	-
Stage 2	1613	1575	-	263	116	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	70	94	962	59	94	817	1490	-	-	1337	-	-
Stage 1	896	805	-	139	172	-	-	-	-	-	-	-
Stage 2	131	170	-	742	800	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 45	962	-	~ 45	817	1490	-	-	1337	-	-
Mov Cap-2 Maneuver	-	~ 45	-	-	~ 45	-	-	-	-	-	-	-
Stage 1	432	800	-	67	~ 83	-	-	-	-	-	-	-
Stage 2	-	82	-	506	795	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			7	0.5
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1490	-	-	-	-	1337	-	-
HCM Lane V/C Ratio	0.451	-	-	-	-	0.005	-	-
HCM Control Delay (s)	9.4	0	-	-	-	7.7	0	-
HCM Lane LOS	A	A	-	-	-	A	A	-
HCM 95th %tile Q(veh)	2.4	-	-	-	-	0	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	74.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	12	67	628	13	77	7	215	93	7	4	162	10
Future Vol, veh/h	12	67	628	13	77	7	215	93	7	4	162	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	74	696	14	85	8	238	103	8	4	180	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	824	781	186	1162	782	107	191	0	0	111	0	0
Stage 1	194	194	-	583	583	-	-	-	-	-	-	-
Stage 2	630	587	-	579	199	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	292	326	856	172	326	947	1383	-	-	1479	-	-
Stage 1	808	740	-	498	499	-	-	-	-	-	-	-
Stage 2	470	497	-	501	736	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	188	265	856	22	265	947	1383	-	-	1479	-	-
Mov Cap-2 Maneuver	188	265	-	22	265	-	-	-	-	-	-	-
Stage 1	659	738	-	406	407	-	-	-	-	-	-	-
Stage 2	301	406	-	84	734	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	112	156.2	5.6	0.2
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1383	-	-	673	109	1479	-	-
HCM Lane V/C Ratio	0.172	-	-	1.165	0.987	0.003	-	-
HCM Control Delay (s)	8.1	0	-	112	156.2	7.4	0	-
HCM Lane LOS	A	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.6	-	-	25.4	6.3	0	-	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	70	281	10	96	9	764	245	17	7	100	16
Future Vol, veh/h	17	70	281	10	96	9	764	245	17	7	100	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	78	312	11	106	10	847	272	19	8	111	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2170	2121	120	2307	2121	282	129	0	0	291	0	0
Stage 1	136	136	-	1976	1976	-	-	-	-	-	-	-
Stage 2	2034	1985	-	331	145	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	34	~ 50	931	27	~ 50	757	1457	-	-	1271	-	-
Stage 1	867	784	-	80	107	-	-	-	-	-	-	-
Stage 2	74	106	-	682	777	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 15	931	-	~ 15	757	1457	-	-	1271	-	-
Mov Cap-2 Maneuver	-	~ 15	-	-	~ 15	-	-	-	-	-	-	-
Stage 1	264	779	-	24	~ 33	-	-	-	-	-	-	-
Stage 2	-	~ 32	-	406	772	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			8.1	0.4
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1457	-	-	-	-	1271	-	-
HCM Lane V/C Ratio	0.581	-	-	-	-	0.006	-	-
HCM Control Delay (s)	10.8	0	-	-	-	7.8	0	-
HCM Lane LOS	B	A	-	-	-	A	A	-
HCM 95th %tile Q(veh)	4	-	-	-	-	0	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

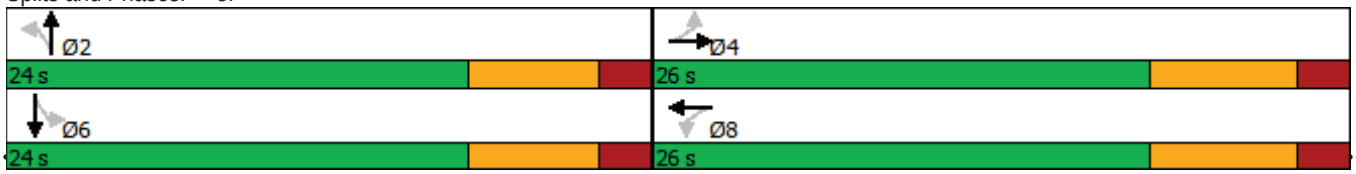
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	53	498	10	61	6	170	74	6	3	129	8
Future Volume (vph)	9	53	498	10	61	6	170	74	6	3	129	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.864			0.986			0.988			0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1594	0	1752	1819	0	1752	1823	0	1752	1828	0
Flt Permitted	0.708			0.388			0.660			0.699		
Satd. Flow (perm)	1306	1594	0	716	1819	0	1217	1823	0	1289	1828	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		552			7			7			7	
Link Speed (mph)		55			55			45			45	
Link Distance (ft)		977			1082			1598			1480	
Travel Time (s)		12.1			13.4			24.2			22.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	10	59	552	11	68	7	188	82	7	3	143	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	611	0	11	75	0	188	89	0	3	152	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	23.5	23.5		23.5	23.5		22.8	22.8		22.8	22.8	
Total Split (s)	26.0	26.0		26.0	26.0		24.0	24.0		24.0	24.0	
Total Split (%)	52.0%	52.0%		52.0%	52.0%		48.0%	48.0%		48.0%	48.0%	
Maximum Green (s)	18.5	18.5		18.5	18.5		17.2	17.2		17.2	17.2	
Yellow Time (s)	5.5	5.5		5.5	5.5		4.8	4.8		4.8	4.8	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		6.8	6.8		6.8	6.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Act Effct Green (s)	14.1	14.1		14.1	14.1		11.2	11.2		11.1	11.1	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.34	0.34		0.34	0.34	
v/c Ratio	0.02	0.61		0.04	0.10		0.45	0.14		0.01	0.24	
Control Delay	10.0	5.2		10.4	9.7		15.0	10.0		10.0	11.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.0	5.2		10.4	9.7		15.0	10.0		10.0	11.0	
LOS	A	A		B	A		B	B		A	B	
Approach Delay		5.3			9.8			13.4			11.0	
Approach LOS		A			A			B			B	
Queue Length 50th (ft)	1	8		1	9		26	10		0	18	
Queue Length 95th (ft)	9	69		10	33		88	40		5	63	
Internal Link Dist (ft)		897			1002			1518			1400	
Turn Bay Length (ft)												
Base Capacity (vph)	798	1188		437	1114		708	1064		750	1066	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.51		0.03	0.07		0.27	0.08		0.00	0.14	

Intersection Summary

Area Type: Other
Cycle Length: 50
Actuated Cycle Length: 32.8
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 8.4 Intersection LOS: A
Intersection Capacity Utilization 68.8% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3:

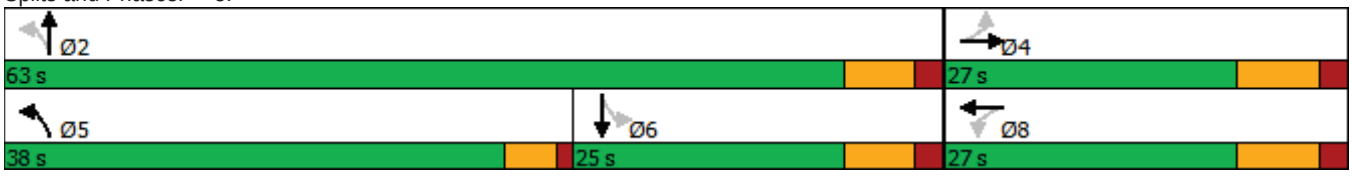


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	55	223	8	76	7	606	194	14	6	79	13
Future Volume (vph)	14	55	223	8	76	7	606	194	14	6	79	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.880			0.987			0.990			0.979	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1639	0	1770	1839	0	1770	1844	0	1770	1824	0
Flt Permitted	0.697			0.395			0.418			0.615		
Satd. Flow (perm)	1298	1639	0	736	1839	0	779	1844	0	1146	1824	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		207			5			8			8	
Link Speed (mph)		55			55			45			45	
Link Distance (ft)		977			1082			1598			1480	
Travel Time (s)		12.1			13.4			24.2			22.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	16	61	247	9	84	8	672	215	16	7	88	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	308	0	9	92	0	672	231	0	7	102	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	4.0	4.0		4.0	4.0		5.0	4.0		4.0	4.0	
Minimum Split (s)	23.5	23.5		23.5	23.5		9.5	22.8		22.8	22.8	
Total Split (s)	27.0	27.0		27.0	27.0		38.0	63.0		25.0	25.0	
Total Split (%)	30.0%	30.0%		30.0%	30.0%		42.2%	70.0%		27.8%	27.8%	
Maximum Green (s)	19.5	19.5		19.5	19.5		33.5	56.2		18.2	18.2	
Yellow Time (s)	5.5	5.5		5.5	5.5		3.5	4.8		4.8	4.8	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		4.5	6.8		6.8	6.8	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Act Effct Green (s)	10.8	10.8		10.8	10.8		38.7	36.1		9.3	9.3	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.61	0.57		0.15	0.15	
v/c Ratio	0.07	0.68		0.07	0.29		0.75	0.22		0.04	0.37	
Control Delay	26.9	18.9		27.5	28.0		13.9	6.5		30.0	31.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.9	18.9		27.5	28.0		13.9	6.5		30.0	31.9	
LOS	C	B		C	C		B	A		C	C	
Approach Delay		19.3			27.9			12.0			31.8	
Approach LOS		B			C			B			C	
Queue Length 50th (ft)	6	39		3	33		118	32		3	37	
Queue Length 95th (ft)	23	124		16	78		312	82		15	92	
Internal Link Dist (ft)		897			1002			1518			1400	
Turn Bay Length (ft)												
Base Capacity (vph)	457	711		259	651		1146	1556		376	605	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.04	0.43		0.03	0.14		0.59	0.15		0.02	0.17	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 63.2			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 16.3		Intersection LOS: B	
Intersection Capacity Utilization 69.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3:

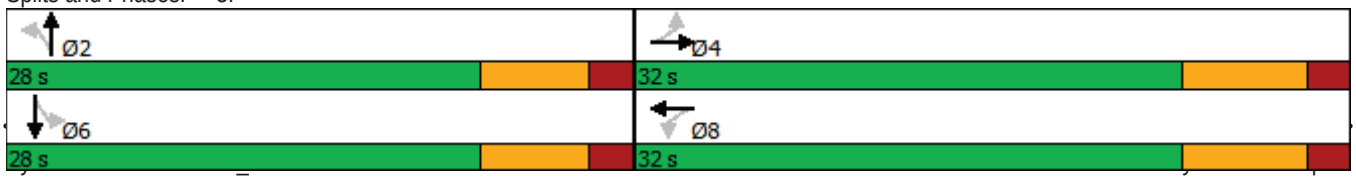


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	67	628	13	77	7	215	93	7	4	162	10
Future Volume (vph)	12	67	628	13	77	7	215	93	7	4	162	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.864			0.987			0.989			0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1609	0	1770	1839	0	1770	1842	0	1770	1846	0
Flt Permitted	0.697			0.247			0.637			0.685		
Satd. Flow (perm)	1298	1609	0	460	1839	0	1187	1842	0	1276	1846	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		567			8			7			6	
Link Speed (mph)		55			55			45			45	
Link Distance (ft)		977			1082			1598			1480	
Travel Time (s)		12.1			13.4			24.2			22.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	13	74	696	14	85	8	238	103	8	4	180	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	770	0	14	93	0	238	111	0	4	191	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	23.5	23.5		23.5	23.5		22.8	22.8		22.8	22.8	
Total Split (s)	32.0	32.0		32.0	32.0		28.0	28.0		28.0	28.0	
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%	
Maximum Green (s)	24.5	24.5		24.5	24.5		21.2	21.2		21.2	21.2	
Yellow Time (s)	5.5	5.5		5.5	5.5		4.8	4.8		4.8	4.8	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		6.8	6.8		6.8	6.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Act Effct Green (s)	20.8	20.8		20.8	20.8		15.3	15.3		14.7	14.7	
Actuated g/C Ratio	0.50	0.50		0.50	0.50		0.36	0.36		0.35	0.35	
v/c Ratio	0.02	0.71		0.06	0.10		0.55	0.16		0.01	0.29	
Control Delay	10.4	8.8		11.5	10.1		20.0	12.7		12.5	13.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.4	8.8		11.5	10.1		20.0	12.7		12.5	13.9	
LOS	B	A		B	B		C	B		B	B	
Approach Delay		8.8			10.3			17.7			13.9	
Approach LOS		A			B			B			B	
Queue Length 50th (ft)	2	36		2	14		49	18		1	34	
Queue Length 95th (ft)	11	#205		13	42		134	55		6	89	
Internal Link Dist (ft)		897			1002			1518			1400	
Turn Bay Length (ft)												
Base Capacity (vph)	805	1213		285	1143		669	1041		719	1043	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.02	0.63		0.05	0.08		0.36	0.11		0.01	0.18	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 42			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 11.8		Intersection LOS: B	
Intersection Capacity Utilization 82.2%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3:

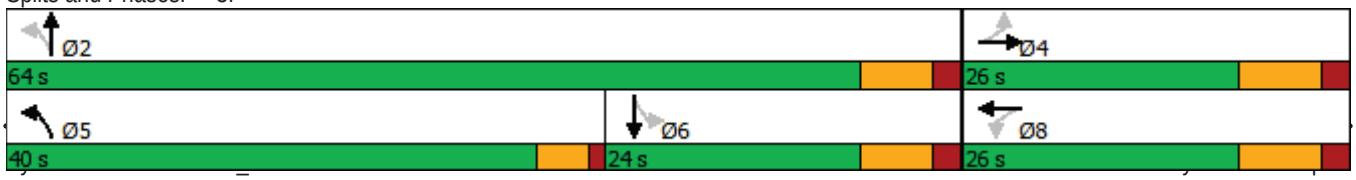


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	70	281	10	96	9	764	245	17	7	100	16
Future Volume (vph)	17	70	281	10	96	9	764	245	17	7	100	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.880			0.987			0.990			0.979	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1639	0	1770	1839	0	1770	1844	0	1770	1824	0
Flt Permitted	0.682			0.280			0.443			0.582		
Satd. Flow (perm)	1270	1639	0	522	1839	0	825	1844	0	1084	1824	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		201			5			8			8	
Link Speed (mph)		55			55			45			45	
Link Distance (ft)		977			1082			1598			1480	
Travel Time (s)		12.1			13.4			24.2			22.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	19	78	312	11	106	10	847	272	19	8	111	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	19	390	0	11	116	0	847	291	0	8	129	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	4.0	4.0		4.0	4.0		5.0	4.0		4.0	4.0	
Minimum Split (s)	23.5	23.5		23.5	23.5		9.5	22.8		22.8	22.8	
Total Split (s)	26.0	26.0		26.0	26.0		40.0	64.0		24.0	24.0	
Total Split (%)	28.9%	28.9%		28.9%	28.9%		44.4%	71.1%		26.7%	26.7%	
Maximum Green (s)	18.5	18.5		18.5	18.5		35.5	57.2		17.2	17.2	
Yellow Time (s)	5.5	5.5		5.5	5.5		3.5	4.8		4.8	4.8	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		4.5	6.8		6.8	6.8	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Act Effct Green (s)	14.3	14.3		14.3	14.3		48.4	45.9		10.7	10.7	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.64	0.61		0.14	0.14	
v/c Ratio	0.08	0.82		0.11	0.33		0.88	0.26		0.05	0.49	
Control Delay	28.4	31.1		30.8	30.5		23.7	7.4		31.7	37.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.4	31.1		30.8	30.5		23.7	7.4		31.7	37.8	
LOS	C	C		C	C		C	A		C	D	
Approach Delay		31.0			30.5			19.5			37.5	
Approach LOS		C			C			B			D	
Queue Length 50th (ft)	8	91		5	48		262	58		4	59	
Queue Length 95th (ft)	27	#238		20	100		#553	100		16	113	
Internal Link Dist (ft)		897			1002			1518			1400	
Turn Bay Length (ft)												
Base Capacity (vph)	329	574		135	481		1030	1395		261	446	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.68		0.08	0.24		0.82	0.21		0.03	0.29	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 75.4			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 24.2		Intersection LOS: C	
Intersection Capacity Utilization 83.2%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3:



MOVEMENT SUMMARY

Site: [AM - Opening (Site Folder: Opening)]

Culbreath Rd at Ayers Rd/Hayman Rd
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Culbreath Rd														
3	L2	170	3.0	185	3.0	0.218	4.8	LOS A	1.1	28.1	0.23	0.10	0.23	34.6
8	T1	74	3.0	80	3.0	0.218	4.8	LOS A	1.1	28.1	0.23	0.10	0.23	34.6
18	R2	6	3.0	7	3.0	0.218	4.8	LOS A	1.1	28.1	0.23	0.10	0.23	33.6
Approach		250	3.0	272	3.0	0.218	4.8	LOS A	1.1	28.1	0.23	0.10	0.23	34.6
East: Hayman Rd														
1	L2	10	3.0	11	3.0	0.083	4.3	LOS A	0.3	8.9	0.41	0.28	0.41	38.6
6	T1	61	3.0	66	3.0	0.083	4.3	LOS A	0.3	8.9	0.41	0.28	0.41	38.5
16	R2	6	3.0	7	3.0	0.083	4.3	LOS A	0.3	8.9	0.41	0.28	0.41	37.3
Approach		77	3.0	84	3.0	0.083	4.3	LOS A	0.3	8.9	0.41	0.28	0.41	38.4
North: Culbreath Rd														
7	L2	3	3.0	3	3.0	0.150	4.9	LOS A	0.7	16.8	0.42	0.30	0.42	36.6
4	T1	129	3.0	140	3.0	0.150	4.9	LOS A	0.7	16.8	0.42	0.30	0.42	36.6
14	R2	8	3.0	9	3.0	0.150	4.9	LOS A	0.7	16.8	0.42	0.30	0.42	35.4
Approach		140	3.0	152	3.0	0.150	4.9	LOS A	0.7	16.8	0.42	0.30	0.42	36.5
West: Ayers Rd														
5	L2	9	3.0	10	3.0	0.534	9.4	LOS A	3.8	97.4	0.51	0.34	0.51	35.8
2	T1	53	3.0	58	3.0	0.534	9.4	LOS A	3.8	97.4	0.51	0.34	0.51	35.8
12	R2	498	3.0	541	3.0	0.534	9.4	LOS A	3.8	97.4	0.51	0.34	0.51	34.7
Approach		560	3.0	609	3.0	0.534	9.4	LOS A	3.8	97.4	0.51	0.34	0.51	34.8
All Vehicles		1027	3.0	1116	3.0	0.534	7.3	LOS A	3.8	97.4	0.42	0.27	0.42	35.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [PM - Opening (Site Folder: Opening)]

Culbreath Rd at Ayers Rd/Hayman Rd
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Culbreath Rd														
3	L2	606	3.0	659	3.0	0.719	13.6	LOS B	8.1	206.6	0.55	0.30	0.55	30.5
8	T1	194	3.0	211	3.0	0.719	13.6	LOS B	8.1	206.6	0.55	0.30	0.55	30.4
18	R2	14	3.0	15	3.0	0.719	13.6	LOS B	8.1	206.6	0.55	0.30	0.55	29.6
Approach		814	3.0	885	3.0	0.719	13.6	LOS B	8.1	206.6	0.55	0.30	0.55	30.4
East: Hayman Rd														
1	L2	8	3.0	9	3.0	0.187	9.3	LOS A	0.7	18.2	0.67	0.67	0.67	35.7
6	T1	76	3.0	83	3.0	0.187	9.3	LOS A	0.7	18.2	0.67	0.67	0.67	35.6
16	R2	7	3.0	8	3.0	0.187	9.3	LOS A	0.7	18.2	0.67	0.67	0.67	34.6
Approach		91	3.0	99	3.0	0.187	9.3	LOS A	0.7	18.2	0.67	0.67	0.67	35.6
North: Culbreath Rd														
7	L2	6	3.0	7	3.0	0.175	8.0	LOS A	0.7	17.5	0.64	0.64	0.64	34.7
4	T1	79	3.0	86	3.0	0.175	8.0	LOS A	0.7	17.5	0.64	0.64	0.64	34.7
14	R2	13	3.0	14	3.0	0.175	8.0	LOS A	0.7	17.5	0.64	0.64	0.64	33.7
Approach		98	3.0	107	3.0	0.175	8.0	LOS A	0.7	17.5	0.64	0.64	0.64	34.5
West: Ayers Rd														
5	L2	14	3.0	15	3.0	0.263	5.4	LOS A	1.4	35.1	0.29	0.15	0.29	38.2
2	T1	55	3.0	60	3.0	0.263	5.4	LOS A	1.4	35.1	0.29	0.15	0.29	38.1
12	R2	223	3.0	242	3.0	0.263	5.4	LOS A	1.4	35.1	0.29	0.15	0.29	36.9
Approach		292	3.0	317	3.0	0.263	5.4	LOS A	1.4	35.1	0.29	0.15	0.29	37.2
All Vehicles		1295	3.0	1408	3.0	0.719	11.0	LOS B	8.1	206.6	0.51	0.32	0.51	32.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [AM - Future (Site Folder: Future)]

Culbreath Rd at Ayers Rd/Hayman Rd
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Culbreath Rd														
3	L2	215	3.0	234	3.0	0.281	5.5	LOS A	1.5	38.5	0.28	0.14	0.28	34.3
8	T1	93	3.0	101	3.0	0.281	5.5	LOS A	1.5	38.5	0.28	0.14	0.28	34.2
18	R2	7	3.0	8	3.0	0.281	5.5	LOS A	1.5	38.5	0.28	0.14	0.28	33.2
Approach		315	3.0	342	3.0	0.281	5.5	LOS A	1.5	38.5	0.28	0.14	0.28	34.2
East: Hayman Rd														
1	L2	13	3.0	14	3.0	0.113	4.9	LOS A	0.5	12.1	0.47	0.36	0.47	38.2
6	T1	77	3.0	84	3.0	0.113	4.9	LOS A	0.5	12.1	0.47	0.36	0.47	38.1
16	R2	7	3.0	8	3.0	0.113	4.9	LOS A	0.5	12.1	0.47	0.36	0.47	36.9
Approach		97	3.0	105	3.0	0.113	4.9	LOS A	0.5	12.1	0.47	0.36	0.47	38.0
North: Culbreath Rd														
7	L2	4	3.0	4	3.0	0.202	5.8	LOS A	0.9	23.3	0.49	0.39	0.49	36.1
4	T1	162	3.0	176	3.0	0.202	5.8	LOS A	0.9	23.3	0.49	0.39	0.49	36.0
14	R2	10	3.0	11	3.0	0.202	5.8	LOS A	0.9	23.3	0.49	0.39	0.49	35.0
Approach		176	3.0	191	3.0	0.202	5.8	LOS A	0.9	23.3	0.49	0.39	0.49	36.0
West: Ayers Rd														
5	L2	12	3.0	13	3.0	0.704	14.2	LOS B	10.7	274.3	0.72	0.65	1.00	33.2
2	T1	67	3.0	73	3.0	0.704	14.2	LOS B	10.7	274.3	0.72	0.65	1.00	33.2
12	R2	628	3.0	683	3.0	0.704	14.2	LOS B	10.7	274.3	0.72	0.65	1.00	32.2
Approach		707	3.0	768	3.0	0.704	14.2	LOS B	10.7	274.3	0.72	0.65	1.00	32.3
All Vehicles		1295	3.0	1408	3.0	0.704	10.3	LOS B	10.7	274.3	0.56	0.47	0.71	33.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [PM - Future (Site Folder: Future)]

Culbreath Rd at Ayers Rd/Hayman Rd
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Culbreath Rd														
3	L2	764	3.0	830	3.0	0.927	30.1	LOS D	37.9	970.2	1.00	0.79	1.40	25.0
8	T1	245	3.0	266	3.0	0.927	30.1	LOS D	37.9	970.2	1.00	0.79	1.40	25.0
18	R2	17	3.0	18	3.0	0.927	30.1	LOS D	37.9	970.2	1.00	0.79	1.40	24.5
Approach		1026	3.0	1115	3.0	0.927	30.1	LOS D	37.9	970.2	1.00	0.79	1.40	25.0
East: Hayman Rd														
1	L2	10	3.0	11	3.0	0.301	13.9	LOS B	1.2	30.4	0.76	0.78	0.87	33.3
6	T1	96	3.0	104	3.0	0.301	13.9	LOS B	1.2	30.4	0.76	0.78	0.87	33.3
16	R2	9	3.0	10	3.0	0.301	13.9	LOS B	1.2	30.4	0.76	0.78	0.87	32.3
Approach		115	3.0	125	3.0	0.301	13.9	LOS B	1.2	30.4	0.76	0.78	0.87	33.2
North: Culbreath Rd														
7	L2	7	3.0	8	3.0	0.269	11.3	LOS B	1.0	26.8	0.71	0.71	0.71	33.1
4	T1	100	3.0	109	3.0	0.269	11.3	LOS B	1.0	26.8	0.71	0.71	0.71	33.1
14	R2	16	3.0	17	3.0	0.269	11.3	LOS B	1.0	26.8	0.71	0.71	0.71	32.1
Approach		123	3.0	134	3.0	0.269	11.3	LOS B	1.0	26.8	0.71	0.71	0.71	32.9
West: Ayers Rd														
5	L2	17	3.0	18	3.0	0.341	6.4	LOS A	1.9	49.2	0.36	0.21	0.36	37.6
2	T1	70	3.0	76	3.0	0.341	6.4	LOS A	1.9	49.2	0.36	0.21	0.36	37.5
12	R2	281	3.0	305	3.0	0.341	6.4	LOS A	1.9	49.2	0.36	0.21	0.36	36.3
Approach		368	3.0	400	3.0	0.341	6.4	LOS A	1.9	49.2	0.36	0.21	0.36	36.6
All Vehicles		1632	3.0	1774	3.0	0.927	22.2	LOS C	37.9	970.2	0.82	0.65	1.08	27.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX D

Benefit Cost Analysis

BCA Result Summary

Factors	Alternative 1: Traffic Signal		Alternative 2: Roundabout	
	Undiscounted	Discounted to 2022$	Undiscounted	Discounted to 2022$
Benefits				
Delay Benefits	$ 949,161	$ 658,477	$ 1,134,344	$ 798,736
Safety Benefits	$ 7,500,984	$ 4,466,244	$ 10,569,568	$ 6,293,344
Total Benefits	$ 8,450,144	**$ 5,124,721**	$ 11,703,912	**$ 7,092,081**
Costs				
Construction	$ 2,114,467	$ 1,954,943	$ 2,057,769	$ 1,902,523
Total Cost	$ 2,114,467	**$ 1,954,943**	$ 2,057,769	**$ 1,902,523**
Comparing Benefits to Costs				
Net Present Value	$ 6,335,678	**$ 3,169,778**	$ 9,646,143	**$ 5,189,557**
Benefit-Cost Ratio	4.00	**2.62**	5.69	**3.73**

Assumptions

Items	Value	Unit	Source
Travel Time Savings			
Total Number of Workdays per year	260	day	5 days per week
Average Vehicle Occupancy			
Passenger Car	1.48	per vehicle	USDOT Grant BCA Guidance
Truck	1	per vehicle	
Hourly Values of Travel Time Savings			
All Purposes	18.8	$ per person-hour	USDOT Grant BCA Guidance
Truck Drivers	32.4	$ per person-hour	
Safety Benefits			
No Injury	$ 7,700	$ per crash	FDM Table 122.6.2 (obtained by 6/12/23)
Possible Injury	$ 103,950	$ per crash	
Non-incapacitating Injury	$ 180,180	$ per crash	
Incapacitating Injury	$ 888,030	$ per crash	
Killed	$ 10,890,000	$ per crash	
Inflation Rate			
Discount Rate	4%	per year	FDM Section 122.6 (obtained by 6/12/23)

Delay Reduction Benefits

Year	Approach	Delay						HV%	Count Data							
		AM			PM				Total		AM			PM		
		NB	TS	RA	NB	TS	RA		AM	PM	L	T	R	L	T	R
2025	EB	27.7	8.8	9.4	51	19.3	5.4	2.60%	560	292	9	53	498	14	55	223
	WB	27.5	10.3	4.3	51	27.9	9.3	3.60%	77	91	10	61	6	8	76	7
	NB	5.4	17.7	4.8	7	12	13.6	2.70%	250	814	170	74	6	606	194	14
	SB	0.2	13.9	4.9	0.5	31.8	8	2.70%	140	98	3	129	8	6	79	13
2035	EB	112	8.8	14.2	51	31	6.4	2.60%	707	368	12	67	628	17	70	281
	WB	156.2	10.3	4.9	51	30.5	13.9	3.60%	97	115	13	77	7	10	96	9
	NB	5.6	17.7	5.5	8.1	19.5	30.1	2.70%	315	1026	215	93	7	764	245	17
	SB	0.2	13.9	5.8	0.4	37.5	11.3	2.70%	176	123	4	162	10	7	100	16

Note: No Build EB/WB delay of 51s was applied based on LOS F for stop control criteria as a conservative estmation of benefits

Alternative 1: Traffic Signal

Year	Approach	Benfit Per Hour				Travel Time Saving				Daily Saving	Annual Saving
		AM		PM		AM		PM			
		PV	HV	PV	HV	PV	HV	PV	HV		
2025	EB	$ 15,176	$ 472	$ 7,913	$ 246	$ 79.7	$ 2.5	$ 69.7	$ 2.2	$ 154.0	$ 22,482
	WB	$ 2,065	$ 90	$ 2,441	$ 106	$ 9.9	$ 0.4	$ 15.7	$ 0.7	$ 26.6	
	NB	$ 6,768	$ 219	$ 22,037	$ 712	$ (23.1)	$ (0.7)	$ (30.6)	$ (1.0)	$ (55.5)	
	SB	$ 3,790	$ 122	$ 2,653	$ 86	$ (14.4)	$ (0.5)	$ (23.1)	$ (0.7)	$ (38.7)	
2035	EB	$ 19,160	$ 596	$ 9,973	$ 310	$ 549.3	$ 17.1	$ 55.4	$ 1.7	$ 623.5	$ 150,093
	WB	$ 2,602	$ 113	$ 3,085	$ 134	$ 105.4	$ 4.6	$ 17.6	$ 0.8	$ 128.4	
	NB	$ 8,528	$ 276	$ 27,777	$ 898	$ (28.7)	$ (0.9)	$ (88.0)	$ (2.8)	$ (120.4)	
	SB	$ 4,765	$ 154	$ 3,330	$ 108	$ (18.1)	$ (0.6)	$ (34.3)	$ (1.1)	$ (54.1)	

Alternative 2: Roundabout

Year	Approach	Benfit Per Hour				Travel Time Saving				Daily Saving	Annual Saving
		AM		PM		AM		PM			
		PV	HV	PV	HV	PV	HV	PV	HV		
2025	EB	$ 15,176	$ 472	$ 7,913	$ 246	$ 77.1	$ 2.4	$ 100.2	$ 3.1	$ 182.9	$ 45,482
	WB	$ 2,065	$ 90	$ 2,441	$ 106	$ 13.3	$ 0.6	$ 28.3	$ 1.2	$ 43.4	
	NB	$ 6,768	$ 219	$ 22,037	$ 712	$ 1.1	$ 0.0	$ (40.4)	$ (1.3)	$ (40.5)	
	SB	$ 3,790	$ 122	$ 2,653	$ 86	$ (4.9)	$ (0.2)	$ (5.5)	$ (0.2)	$ (10.8)	
2035	EB	$ 19,160	$ 596	$ 9,973	$ 310	$ 520.5	$ 16.2	$ 123.6	$ 3.8	$ 664.1	$ 160,762
	WB	$ 2,602	$ 113	$ 3,085	$ 134	$ 109.3	$ 4.8	$ 31.8	$ 1.4	$ 147.3	
	NB	$ 8,528	$ 276	$ 27,777	$ 898	$ 0.2	$ 0.0	$ (169.7)	$ (5.5)	$ (175.0)	
	SB	$ 4,765	$ 154	$ 3,330	$ 108	$ (7.4)	$ (0.2)	$ (10.1)	$ (0.3)	$ (18.1)	

Year	Alternative 1		Alternative 2	
	Delay Reduction Benefits	Discounted to 2022$	Delay Reduction Benefits	Discounted to 2022$
2025	$ 22,482	$ 19,986	$ 45,482	$ 40,433
2026	$ 35,243	$ 30,126	$ 57,010	$ 48,732
2027	$ 48,004	$ 39,456	$ 68,538	$ 56,333
2028	$ 60,765	$ 48,024	$ 80,066	$ 63,277
2029	$ 73,526	$ 55,874	$ 91,594	$ 69,604
2030	$ 86,287	$ 63,049	$ 103,122	$ 75,350
2031	$ 99,048	$ 69,590	$ 114,650	$ 80,552
2032	$ 111,810	$ 75,534	$ 126,178	$ 85,242
2033	$ 124,571	$ 80,919	$ 137,706	$ 89,451
2034	$ 137,332	$ 85,777	$ 149,234	$ 93,211
2035	$ 150,093	$ 90,142	$ 160,762	$ 96,550
Total	**$ 949,161**	**$ 658,477**	**$ 1,134,344**	**$ 798,736**

Data Input
Description
Intermediate Calculation Results
Subtotal Calculation Results

Safety Benefits

3-Year Crash Data

Year	Fatal	Incapacitating Injury	Non-incapacitating Injury	Possible Injury	PDO	Total
2016	0	1	0	0	1	2
2017	0	1	2	1	5	9
2018	0	2	3	0	6	11
Grand Total	0	4	5	1	12	22

CMF of Alternative 1:	0.56	Source: CMF ID: 325				
	Fatal	**Incapacitating Injury**	**Non-incapacitating Injury**	**Possible Injury**	**PDO**	**Total**
Annual Average Crash #	0.00	1.33	1.67	0.33	4.00	7.33
Annual Number of Crash Reduction	0.00	0.59	0.73	0.15	1.76	3.23
Annual Safety Benefits	$ -	$ 520,978	$ 132,132	$ 15,246	$ 13,552	$ 681,908

CMF of Alternative 2:	0.38	Source: CMF ID:7867				
	Fatal	**Incapacitating Injury**	**Non-incapacitating Injury**	**Possible Injury**	**PDO**	**Total**
Annual Average Crash #	0.00	1.33	1.67	0.33	4.00	7.33
Annual Number of Crash Reduction	0.00	0.83	1.03	0.21	2.48	4.55
Annual Safety Benefits	$ -	$ 734,105	$ 186,186	$ 21,483	$ 19,096	$ 960,870

Year	Alternative 1		Alternative 2	
	Safety Benefits	Discounted to 2022$	Safety Benefits	Discounted to 2022$
2025	$ 681,908	$ 556,640	$ 960,870	$ 784,356
2026	$ 681,908	$ 520,224	$ 960,870	$ 733,043
2027	$ 681,908	$ 486,191	$ 960,870	$ 685,087
2028	$ 681,908	$ 454,384	$ 960,870	$ 640,268
2029	$ 681,908	$ 424,658	$ 960,870	$ 598,381
2030	$ 681,908	$ 396,876	$ 960,870	$ 559,235
2031	$ 681,908	$ 370,913	$ 960,870	$ 522,650
2032	$ 681,908	$ 346,647	$ 960,870	$ 488,457
2033	$ 681,908	$ 323,969	$ 960,870	$ 456,502
2034	$ 681,908	$ 302,775	$ 960,870	$ 426,638
2035	$ 681,908	$ 282,967	$ 960,870	$ 398,727
Total	**$ 7,500,984**	**$ 4,466,244**	**$ 10,569,568**	**$ 6,293,344**

Data Input
Description
Intermediate Calculation Results
Subtotal Calculation Results

ENGINEER'S ESTIMATE

HERNANDO COUNTY

FINANCIAL PROJECT ID # :

PROJECT DESCRIPTION:	Ayers Road and Culbreath Road Intersection Improvement Signal Concept
SUBMITTAL TYPE:	Concept
COUNTY:	Hernando
DATE:	April 25, 2023
ENGINEERING CONSULTANT FIRM:	Burgess & Niple
CONTACT NAME:	Danny Hendrickson
PHONE NUMBER:	(813) 555-1212
FILE VERSION:	
PAGE NUMBER:	1 of 3

COMPONENT GROUPS

100 - STRUCTURES	*NOT USED*		
200 - ROADWAY			$1,132,450.17
300 - SIGNING & PAVEMENT MARKINGS			$25,950.80
400 - LIGHTING	*NOT USED*		
500 - SIGNALIZATION			$333,490.25
550 - ITS	*NOT USED*		
600 - LANDSCAPE / PERIPHERALS	*NOT USED*		
700 - UTILITIES	*NOT USED*		
800 - ARCHITECTURAL	*NOT USED*		
900 - MASS TRANSIT	*NOT USED*		
1000 - INVALID & OTHER ITEMS	*NOT USED*		
	COMPONENT SUB-TOTAL		$1,491,891.22
(102-1) MOT (Maintenance of Traffic)		10%	$149,189.12
	SUB-TOTAL		$1,641,080.34
(101-1) MOB (Mobilization)		10%	$164,108.03
	SUB-TOTAL		$1,805,188.37
PU (Project Unknowns)		15%	$270,778.26
	SUB-TOTAL		$2,075,966.63
(999-25) Initial Contingency (Do Not Bid)			$38,500.00
	PROJECT GRAND TOTAL		**$2,114,466.63**

NOTES:

ENGINEER'S ESTIMATE
HILLSBOROUGH COUNTY

FINANCIAL PROJECT ID:	
FILE VERSION:	
PAGE NUMBER:	2 of 3

200-Roadway

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0101 1	MOBILIZATION		10%	See Summary Sheet	
0102 1	MAINTENANCE OF TRAFFIC		10%	See Summary Sheet	
0110 1 1	CLEARING & GRUBBING	AC	5.0	$54,807.65	$274,038.25
0110 4 10	REMOVAL OF EXISTING CONCRETE	SY	1400	$35.11	$49,154.00
0160 4	TYPE B STABILIZATION	SY	10262	$8.43	$86,508.66
0285709	OPTIONAL BASE, BASE GROUP 09	SY	3840	$22.78	$87,475.20
0327 70 6	MILLING EXIST ASPH PAVT, 1 1/2" AVG DEPTH	SY	9111	$3.68	$33,528.48
0334 1 53	SUPERPAVE ASPHALTIC CONCRETE, TRAFFIC C, PG76-22	TN	634	$155.36	$98,498.24
0337 7 83	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-12.5, PG 76-22	TN	1069	$152.04	$162,530.76
0430175136	PIPE CULVERT, OPT MATERIAL, ROUND, 36"S/CD	LF	300	$252.82	$75,846.00
0430982138	MITERED END SECTION, OPTIONAL ROUND, 36" CD	EA	6	$8,015.00	$48,090.00
0524 1 1	CONCRETE DITCH PAVT, NON REINFORCED, 3"	SY	1400	$74.27	$103,978.00
0570 1 2	PERFORMANCE TURF, SOD	SY	22293	$5.06	$112,802.58
200-Roadway			**COMPONENT TOTAL**		**$1,132,450.17**

ENGINEER'S ESTIMATE
HILLSBOROGH COUNTY

FINANCIAL PROJECT ID:	
FILE VERSION:	EE_01-27_Rev30
PAGE NUMBER:	3 of 3

300-Signing & Pavement Markings

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0700 1 11	SINGLE POST SIGN, F&I GROUND MOUNT, UP TO 12 SF	AS		$457.35	$457.35
0700 1 60	SINGLE POST SIGN, REMOVE	AS	14	$45.37	$635.18
0711 11125	THERMOPLASTIC, STANDARD, WHITE, SOLID, 24" FOR STOP LINE AND CROSSWALK	LF	96	$4.07	$390.72
0711 15101	THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES WHITE, SOLID, 6"	GM	1.66	$6,113.26	$10,148.01
0711 11170	THERMOPLASTIC, STANDARD, WHITE, ARROW	EA	19	$69.13	$1,313.47
0711 15201	THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES, YELLOW, SOLID, 6"	GM	1.86	$6,113.26	$11,370.66
0711 11224	THERMOPLASTIC, STANDARD, YELLOW, SOLID, 18" FOR DIAGONAL OR CHEVRON	LF	340	$4.81	$1,635.40
300-Signing & Pavement Markings		**COMPONENT TOTAL**			**$25,950.80**

ENGINEER'S ESTIMATE

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 7

FINANCIAL PROJECT ID:	
FILE VERSION:	EE_01-27_Rev30
PAGE NUMBER:	

500-Signalization

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0630 2 11	CONDUIT, FURNISH & INSTALL, OPEN TRENCH	LF	85	$17.05	$1,449.25
0630 2 12	CONDUIT, FURNISH & INSTALL, DIRECTIONAL BORE	LF	511	$35.35	$18,063.85
0632 7 1	SIGNAL CABLE- NEW OR RECONSTRUCTED INTERSECTION, FURNISH & INSTALL	PI	1	$9,675.05	$9,675.05
0633 1121	FIBER OPTIC CABLE, F&I, UNDERGROUND,2-12 FIBERS	LF	220	$3.93	$864.60
0633 2 31	FIBER OPTIC CONNECTION, INSTALL, SPLICE	EA	12	$54.05	$648.60
0633 2 32	FIBER OPTIC CONNECTION, INSTALL, TERMINATION	EA	12	$103.45	$1,241.40
0633 3 11	FIBER OPTIC CONNECTION HARDWARE, F&I, SPLICE ENCLOSURE	EA	1	$1,251.40	$1,251.40
0633 3 12	FIBER OPTIC CONNECTION HARDWARE, F&I, SPLICE TRAY	EA	1	$153.97	$153.97
0633 3 14	FIBER OPTIC CONNECTION HARDWARE, F&I, BUFFER TUBE FAN OUT KIT	EA	1	$93.78	$93.78
0633 3 15	FIBER OPTIC CONNECTION HARDWARE, F&I, PRETERMINATED PATCH PANEL	EA	1	$1,580.44	$1,580.44
0635 2 11	PULL & SPLICE BOX, F&I, 13" x 24" COVER SIZE	EA	16	$1,397.09	$22,353.44
0635 2 13	PULL & SPLICE BOX, F&I, 30" X 60" RECTANGULAR OR 36" ROUND COVER SIZE	EA	1	$5,831.30	$5,831.30
0639 1122	ELECTRICAL POWER SERVICE, F&I, UNDERGROUND, METER PURCHASED BY CON	AS	1	$4,585.66	$4,585.66
0639 2 1	ELECTRICAL SERVICE WIRE, FURNISH & INSTALL	LF	20	$18.79	$375.80
0641 2 12	PRESTRESSED CONCRETE POLE, F&I, TYPE P-II SERVICE POLE	EA	1	$1,849.04	$1,849.04
0641 2 18	PRESTRESSED CONCRETE POLE, F&I, TYPE P-VIII	EA	4	$19,733.64	$78,934.56
0646 1 11	ALUMINUM SIGNALS POLE, PEDESTAL	EA	8	$2,410.94	$19,287.52
0650 1 14	VEHICULAR TRAFFIC SIGNAL, FURNISH & INSTALL ALUMINUM, 3 SECTION, 1 WAY	AS	4	$1,755.30	$7,021.20
0650 1 16	VEHICULAR TRAFFIC SIGNAL, FURNISH & INSTALL ALUMINUM, 4 SECTION, 1 WAY	AS	4	$1,698.21	$6,792.84
0653111	SIGNAL PEDESTRIAN, 12 INCH, INCANDESCENT, 1 WAY	AS	8	$810.03	$6,480.24
0660 4 11	VEHICLE DETECTION SYSTEM- VIDEO, FURNISH & INSTALL CABINET EQUIPMENT	EA	1	$20,547.77	$20,547.77
0660 4 12	VEHICLE DETECTION SYSTEM- VIDEO, FURNISH & INSTALL ABOVE GROUND EQUIP	EA	4	$6,892.29	$27,569.16
0663 1111	SIGNAL PRIORITY AND PREEMPTION SYSTEM, F&I, OPTICAL, CABINET ELECTRON	EA	1	$7,166.97	$7,166.97
0663 1112	SIGNAL PRIORITY AND PREEMPTION SYSTEM, F&I, OPTICAL, DETECTOR	EA	2	$3,550.78	$7,101.56
0665 1 11	PEDESTRIAN DETECTOR, FURNISH & INSTALL, STANDARD	EA	8	$309.36	$2,474.88
0670 5111	TRAFFIC CONTROLLER ASSEMBLY, F&I, NEMA, 1 PREEMPTION	AS	1	$42,473.60	$42,473.60
0684 1 1	MANAGED FIELD ETHERNET SWITCH, FURNISH & INSTALL	EA	1	$5,041.64	$5,041.64
0685 1 14	UNINTERRUPTIBLE POWER SUPPLY, FURNISH AND INSTALL, ONLINE/DOUBLE CON	EA	1	$13,331.93	$13,331.93
0700 5 22	INTERNALLY ILLUMINATED SIGN, FURNISH & INSTALL, OVERHEAD MOUNT, 12-18 S	EA	4	$4,812.20	$19,248.80
500-Signalization		**COMPONENT TOTAL**			**$333,490.25**

ENGINEER'S ESTIMATE

HERNANDO COUNTY

FINANCIAL PROJECT ID # :

PROJECT DESCRIPTION:	Ayers Road and Culbreath Road Intersection Improvement Roundabout Concept
SUBMITTAL TYPE:	Concept
COUNTY:	Hernando
DATE:	April 25, 2023
ENGINEERING CONSULTANT FIRM:	Burgess & Niple
CONTACT NAME:	Danny Hendrickson
PHONE NUMBER:	(813) 555-1212
FILE VERSION:	EE_01-27_Rev30
PAGE NUMBER:	1 of 3

COMPONENT GROUPS

100 - STRUCTURES	*NOT USED*		
200 - ROADWAY			$1,262,766.01
300 - SIGNING & PAVEMENT MARKINGS			$12,025.19
400 - LIGHTING	*NOT USED*		
500 - SIGNALIZATION	*NOT USED*		
550 - ITS	*NOT USED*		
600 - LANDSCAPE / PERIPHERALS	*NOT USED*		
700 - UTILITIES	*NOT USED*		
800 - ARCHITECTURAL	*NOT USED*		
900 - MASS TRANSIT	*NOT USED*		
1000 - INVALID & OTHER ITEMS	*NOT USED*		
	COMPONENT SUB-TOTAL		$1,274,791.20
(102-1) MOT (Maintenance of Traffic)		20%	$254,958.24
	SUB-TOTAL		$1,529,749.43
(101-1) MOB (Mobilization)		10%	$152,974.94
	SUB-TOTAL		$1,682,724.38
PU (Project Unknowns)		20%	$336,544.88
	SUB-TOTAL		$2,019,269.25
(999-25) Initial Contingency (Do Not Bid)			$38,500.00
	PROJECT GRAND TOTAL		**$2,057,769.25**

NOTES:

ENGINEER'S ESTIMATE
HILLSBOROUGH COUNTY

FINANCIAL PROJECT ID:	
FILE VERSION:	EE_01-27_Rev30
PAGE NUMBER:	2 of 3

200-Roadway

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0101 1	MOBILIZATION		10%	See Summary Sheet	
0102 1	MAINTENANCE OF TRAFFIC		20%	See Summary Sheet	
0110 1 1	CLEARING & GRUBBING	AC	3.7	$54,807.65	$202,788.31
0110 4 10	REMOVAL OF EXISTING CONCRETE	SY	1245	$35.11	$43,711.95
0160 4	TYPE B STABILIZATION	SY	8744	$8.43	$73,711.92
0285709	OPTIONAL BASE, BASE GROUP 09	SY	5762	$22.78	$131,258.36
0334 1 53	SUPERPAVE ASPHALTIC CONCRETE, TRAFFIC C, PG76-22	TN	951	$155.36	$147,747.36
0337 7 83	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-12.5, PG 76-22	TN	476	$152.04	$72,371.04
0350 30 13	CONCRETE PAVEMENT FOR ROUNDABOUT APRON, 12" DEPTH	SY	313	$136.35	$42,677.55
0425 1461	INLETS, CURB, TYPE J-6, <10'	EA	4	$10,699.32	$42,797.28
0425 1541	INLETS, DT BOT, TYPE D, <10'	EA	4	$7,429.41	$29,717.64
0430175118	PIPE CULVERT,OPTIONAL MATERIAL,ROUND, 18"S/CD	LF	350	$134.39	$47,036.50
0430175136	PIPE CULVERT, OPT MATERIAL, ROUND, 36"S/CD	LF	570	$252.82	$144,107.40
0430982138	MITERED END SECTION, OPTIONAL ROUND, 36" CD	EA	6	$8,015.00	$48,090.00
0520 1 7	CONCRETE CURB & GUTTER, TYPE E	LF	1716	$34.59	$59,356.44
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	772	$60.65	$46,821.80
0520 2 4	CONCRETE CURB, TYPE D	LF	250	$50.66	$12,665.00
0520 2 8	CONCRETE CURB, TYPE RA	LF	327	$56.46	$18,462.42
0524 1 1	CONCRETE DITCH PAVT, NON REINFORCED, 3"	SY	670	$74.27	$49,760.90
0570 1 2	PERFORMANCE TURF, SOD	SY	9819	$5.06	$49,684.14
200-Roadway			**COMPONENT TOTAL**		**$1,262,766.01**

ENGINEER'S ESTIMATE
HILLSBOROGH COUNTY

FINANCIAL PROJECT ID:	
FILE VERSION:	EE_01-27_Rev30
PAGE NUMBER:	3 of 3

300-Signing & Pavement Markings

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0700 1 11	SINGLE POST SIGN, F&I GROUND MOUNT, UP TO 12 SF	AS		$457.35	$457.35
0700 1 60	SINGLE POST SIGN, REMOVE	AS	14	$45.37	$635.18
0711 11123	THERMOPLASTIC, STANDARD, WHITE, SOLID, 12" FOR CROSSWALK AND ROUNDABOUT	LF	65	$4.07	$264.55
0711 15101	THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES WHITE, SOLID, 6"	GM	0.63	$6,113.26	$3,851.35
0711 11160	THERMOPLASTIC, STANDARD, WHITE, MESSAGE OR SYMBOL	EA	4	$247.09	$988.36
0711 15201	THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES, YELLOW, SOLID, 6"	GM	0.87	$6,113.26	$5,318.54
0711 11224	THERMOPLASTIC, STANDARD, YELLOW, SOLID, 18" FOR DIAGONAL OR CHEVRON	LF	106	$4.81	$509.86

300-Signing & Pavement Markings	**COMPONENT TOTAL**	**$12,025.19**