FEASIBILITY STUDY

State Road 421 (Dunlawton Avenue) at Clyde Morris Boulevard (County Road 483)
Section 79230 – M.P. 1.060
Volusia County

Prepared for:

RIVER TO SEA TRANSPORTATION PLANNING ORGANIZATION

Prepared by:
Traffic Engineering Data Solutions, Inc.
80 Spring Vista Drive
DeBary, Florida 32713

Traffic Engineering Data Solutions, Inc.

January 2017

Prepared by: Travis Hill
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1-12-17

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EXECUTIVE SUMMARY

Traffic Engineering Data Solutions, Inc. (TEDS) was retained on behalf of the River to Sea Transportation Planning Organization (R2CTPO) to conduct a Feasibility Study that was requested by the City of Port Orange at the intersection of State Road 421 at Clyde Morris Boulevard located in Port Orange (Volusia County), Florida. The intent of the study was to evaluate the need for an eastbound right-turn lane at the State Road 421/Clyde Morris Boulevard intersection and the feasibility of installing the turn lane.

Based on the data collected, field observations, the alternatives analyses and engineering judgement, an eastbound right-turn lane will provide for enhanced operations and safety at the intersection, with the benefits expected to be more significant as traffic volumes continue to grow in the area. Drainage inlets, curb ramps, pedestrian detectors, sidewalk, traffic signal equipment, and the Walgreens driveway approximately 310 feet west of the study intersection, will need to be reconstructed in conjunction with the turn lane installation. The engineering and construction costs associated with these improvements are estimated at approximately $454,300.

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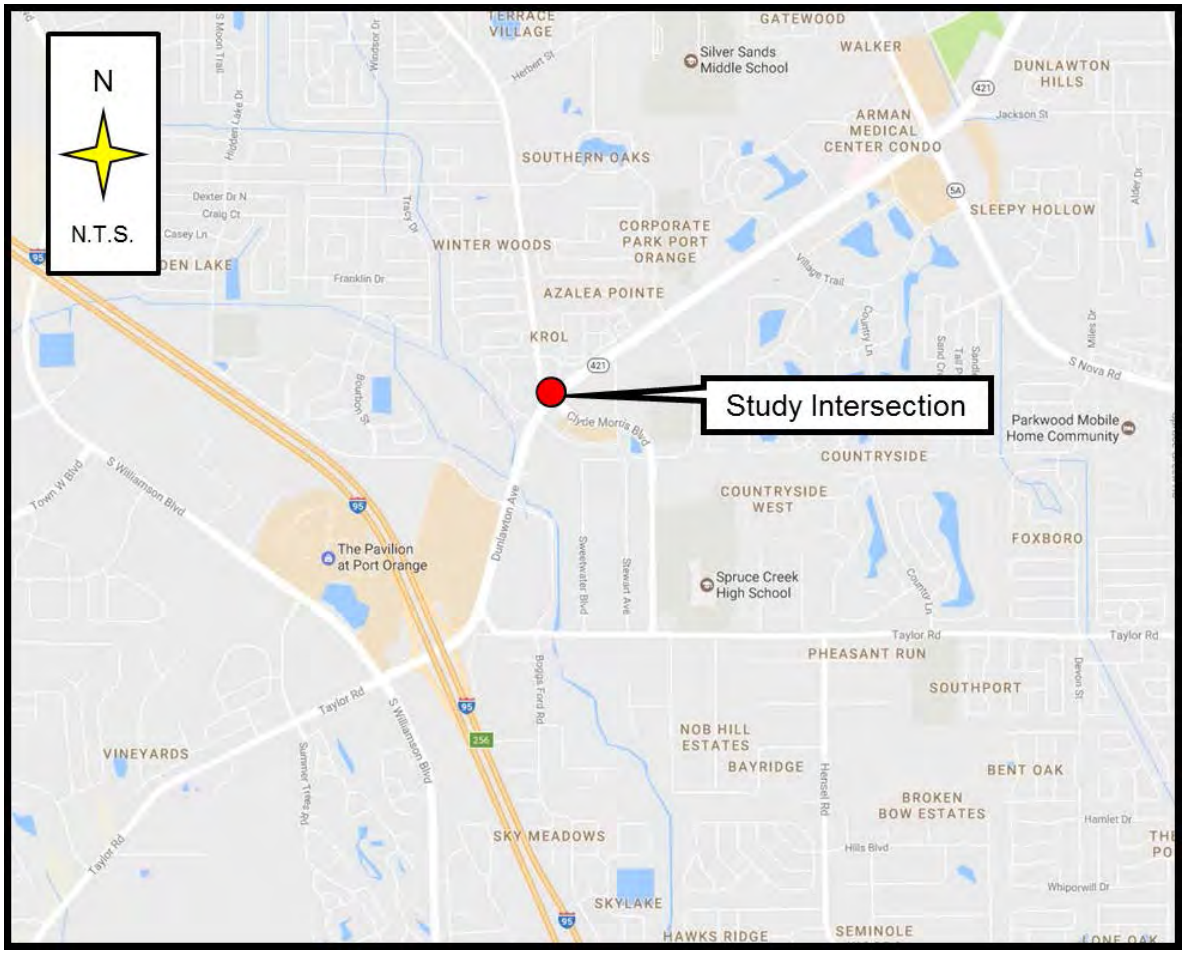
INTRODUCTION

Traffic Engineering Data Solutions, Inc. (TEDS) was retained on behalf of the River to Sea Transportation Planning Organization (R2CTPO) to conduct a Feasibility Study that was requested by the City of Port Orange for State Road 421 (Dunlawton Avenue) at Clyde Morris Boulevard (County Road 483) in Port Orange (Volusia County), Florida. The intent of the study was to evaluate the need for an eastbound right-turn lane at the State Road 421/Clyde Morris Boulevard intersection and the feasibility of installing the turn lane. A location map of the study intersection is shown below as ***Figure 1***.

The analysis methods used in completing this study are consistent with the Manual on Uniform Traffic Control Devices (MUTCD), Manual on Uniform Traffic Studies (MUTS), and engineering judgment. This report documents existing conditions, vehicle / pedestrian / bicycle counts, crash analysis, qualitative assessment, and recommendations.

Figure 1
General Location Map
State Road 421 at Clyde Morris Boulevard



Source: Bing Maps

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EXISTING CONDITIONS

State Road 421 (Dunlawton Avenue) is an east-west arterial that extends from Interstate 95 through Port Orange to State Road A1A. As shown in ***Figure 2***, at the study intersection State Road 421 is a six-lane divided arterial. Clyde Morris Boulevard is a north-south Volusia County roadway extending from Taylor Road in Port Orange to State Road 40 in Ormond Beach. South of the study intersection, Clyde Morris Boulevard is a four-lane undivided roadway for approximately 450 feet, at which point Clyde Morris Boulevard then becomes a two-lane undivided roadway. North of the study intersection, Clyde Morris Boulevard is a five-lane undivided roadway with a continuous two-way left-turn lane.

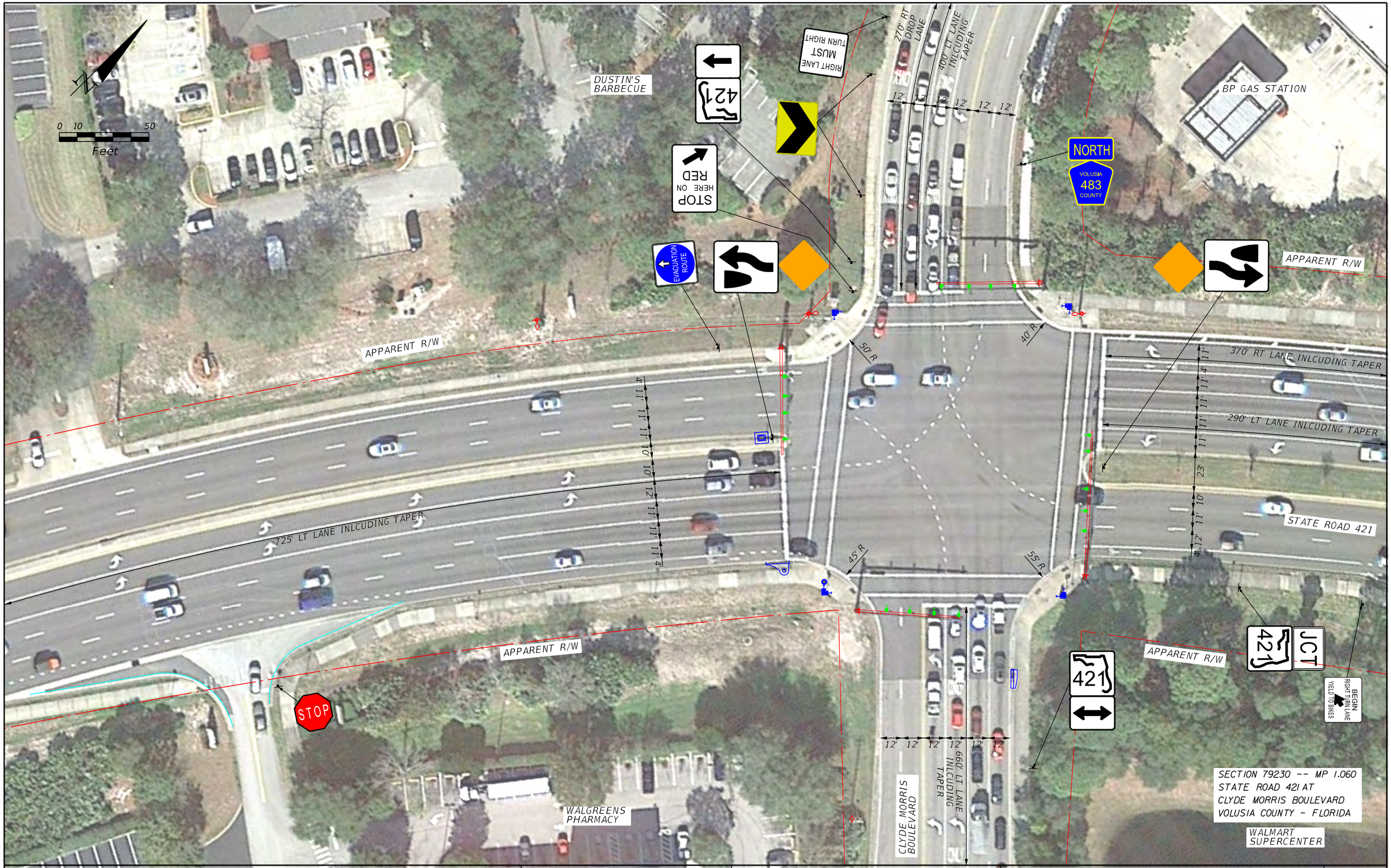
Figure 2
General Location Aerial
State Road 421 at Clyde Morris Boulevard

Source: Bing Maps

Table 1 on the following page summarizes the existing conditions for the study location. An existing condition diagram and photographs of the study location are included within this study.

Table 1
Existing Conditions
State Road 421 at Clyde Morris Boulevard

Feature	Description
Main Street	• State Road 421
Side Street	• Clyde Morris Boulevard
Area Location	• Port Orange (Volusia County), Florida
Adjacent Land Uses	• Southwest: Walgreens Pharmacy • Southeast: Walmart Supercenter • Northwest: Dustin's Barbecue • Northeast: BP Gas Station
Traffic Control	• Traffic Signal with protected-only left-turns for all directions
Adjacent Signalized Intersections	• South: Taylor Road – 0.87 miles • North: Willow Run Boulevard/City Center Parkway - 0.61 miles • West: Yorktown Boulevard – 0.33 miles • East: City Center Parkway – 0.39 miles
State Road 421	• Cross Section: 6-lane divided arterial with 4-foot shoulders (marked bicycle lanes) and curb and gutter • Access: Class 5 • Posted Speed Limit: 50 mph • AADT: 46,000 vehicles per day (year 2015) • Eastbound Approach Lanes: 2 left-turn lanes and 3 through lanes • Westbound Approach Lanes: 1 left-turn lane and 3 through lanes, 1 right-turn lane • Pedestrian Crossings: On both sides of the road • Sidewalks: Both sides of the road • Utilities: Overhead power lines running on the north side of the road • Street Lighting: On the north side of the road west of Clyde Morris Boulevard
Clyde Morris Boulevard	• Cross Section: South of the intersection – 4-lane undivided roadway with curb and gutter and no shoulders for 450' south, followed by 2-lane undivided roadway with no curb and gutter and no shoulders; north of the study intersection – 5-lane undivided roadway with a continuous two-way left-turn lane with curb and gutter and no shoulders • AADT: 9,200 vehicles per day (year 2015) • Northbound Approach Lanes: 2 left-turn lanes and 2 through lanes • Southbound Approach Lanes: 2 left-turn lanes, 1 through lane and 1 right-turn lane • Pedestrian Crossings: On both sides of the road • Sidewalks: On both sides of the road, with the exception of a gap from the study intersection to approximately 390' south on the west side of the road • Utilities: Overhead power lines on the west side of the road south of the study intersection • Street Lighting: None within 300' of study intersection



Utility Pole
Traffic Sign
Luminaire

Symbols:

Traffic Controller Cabinet
Ditch Bottom Inlet
Signal Pole
Pedestrian Signal Pole
Mitered End Section

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CERTIFICATION OF AUTHORIZATION # 27392

STATE OF FLORIDA

DEPARTMENT OF TRANSPORTATION

FIGURE 3
EXISTING CONDITIONS DIAGRAM

Eastbound Approach Photographs
State Road 421 at Clyde Morris Boulevard

Looking East Towards Intersection

Looking West Away From Intersection

Westbound Approach Photographs
State Road 421 at Clyde Morris Boulevard

Looking West Towards Intersection

Looking East Away From Intersection

Northbound Approach Photographs
State Road 421 at Clyde Morris Boulevard

Looking North Towards Intersection

Looking South Away From Intersection

Southbound Approach Photographs
State Road 421 at Clyde Morris Boulevard

Looking South Towards Intersection

Looking North Away From Intersection

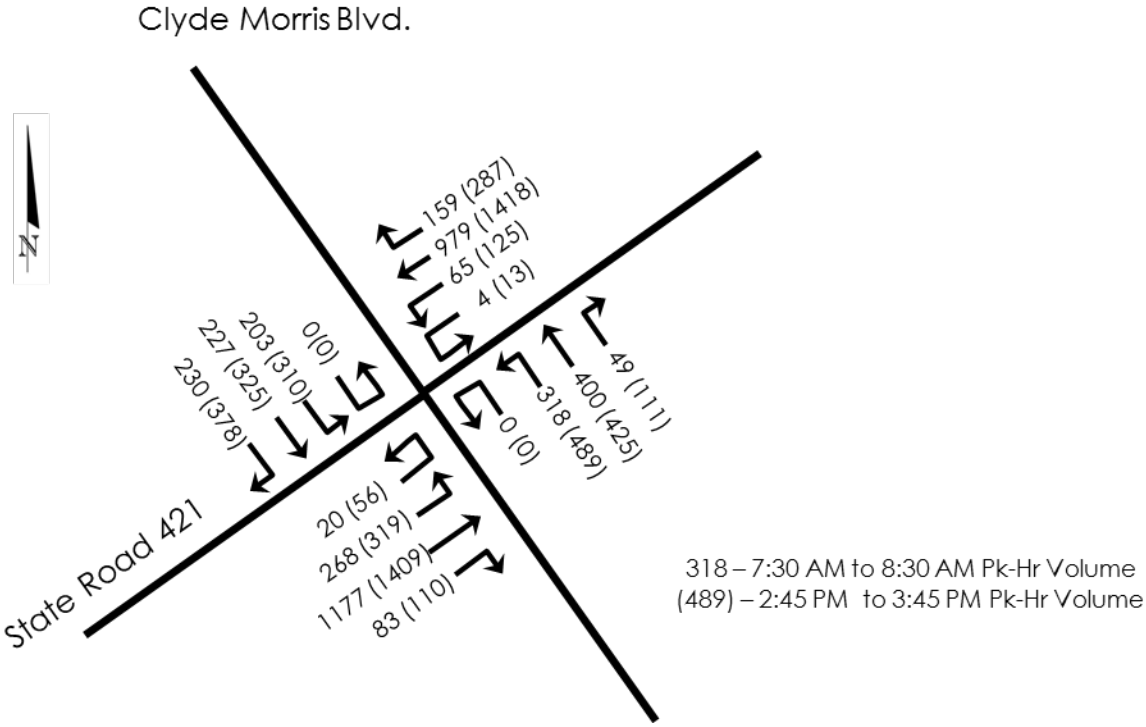
Traffic Volumes

Twenty-four hour weekday approach counts, included in the ***Appendix,*** were conducted at the study intersection on the northbound, southbound, eastbound and westbound approaches. According to these counts, the intersection had a daily traffic volume of 60,404 vehicles that entered the intersection consisting of 22,656 eastbound vehicles, 19,840 westbound vehicles; 6,623 northbound vehicles; and 11,285 southbound vehicles.

Based on a review of the twenty-four hour count data, eight (8) hours of manual turning movement counts were collected from 7:00 a.m. to 9:00 a.m. and from 12:00 p.m. to 6:00 p.m. on a weekday.

- The intersection morning peak hour occurred from 7:30 a.m. to 8:30 a.m. while the afternoon peak hour occurred from 2:45 p.m. to 3:45 p.m. As summarized below in ***Figure 4***, 4,182 and 5,775 vehicles were counted entering the intersection during the morning and afternoon peak hours, respectively, with the following characteristics:

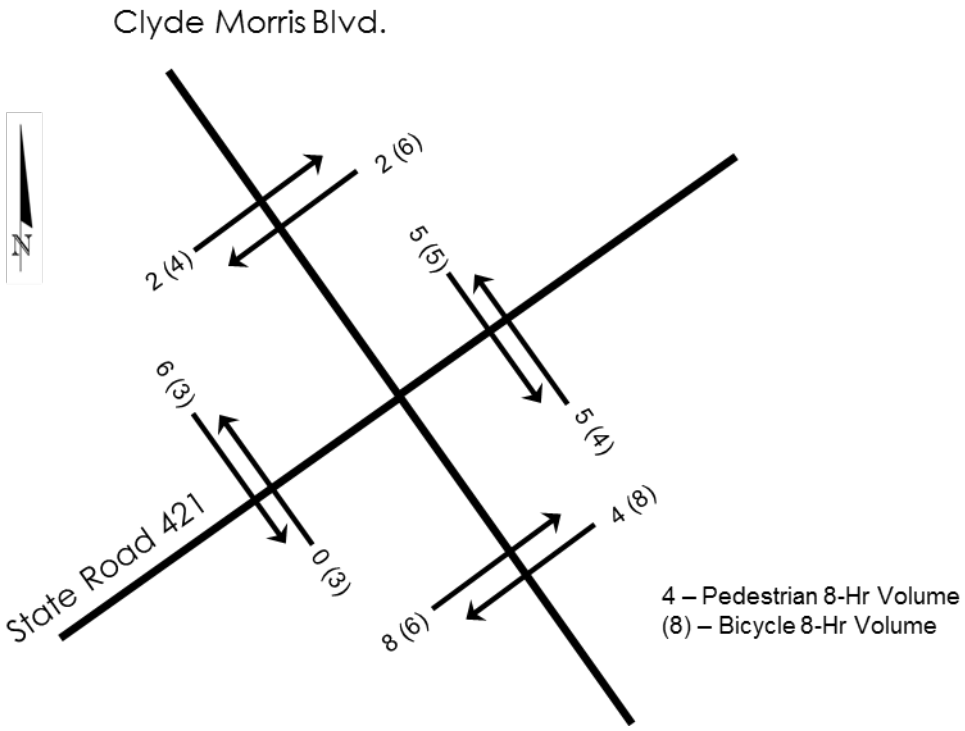
Figure 4
Summary of Peak-Hour Turning Movements
State Road 421 at Clyde Morris Boulevard



- During the eight (8) hours of manually collected turning movement counts, 964 eastbound right-turns occurred. The peak hour for eastbound right-turns occurred during 7:00 a.m. to 8:00 a.m. (221 vehicles).
- During the eight (8) hours of manually collected turning movement counts, heavy trucks, which include single unit trucks such as delivery trucks (Class 5 to 7) and tractor-trailer trucks (Class 8 to 15), accounted for approximately 1.2% (488 vehicles) of the traffic passing through the State Road 421/Clyde Morris Boulevard intersection.

- As summarized below in ***Figure 5,*** 32 pedestrians and 39 bicyclists were observed traversing the intersection during the eight (8) hours of manually collected turning movement counts. A Pedestrian Movement Summary and a Bicycle Movement Summary are provided in the ***Appendix***.

Figure 5
Summary of Pedestrian and Bicycle Movements (8-hours)
State Road 421 at Clyde Morris Boulevard



Collision Data

Crash data for the study intersection for a 60-month period (January 1, 2011 to December 31, 2015) was obtained from the University of Florida's *Signal Four Analytics* and the FDOT's CARS database. Ninety-one (91) crashes were reported and consisted of the following crash types:

- Fifty-seven (57) rear-end;
- Sixteen (16) side-swipe;
- Five (5) right-turn;
- Four (4) angle;
- Four (4) fixed-object;
- Two (2) left-turn;
- Two (2) overturn; and,
- One (1) bicycle.

- The crashes resulted in zero (0) fatalities, 41 injuries, and $380,521 in estimated property damage.
- Sixty-four (64) of the crashes occurred during the day and the remaining 27 occurred at night.
- Seventy-three (73) crashes occurred on dry pavement and the remaining 18 crashes occurred on wet pavement.
- Six (6) rear-ends occurred in the eastbound outside lane.
- Six (6) eastbound side-swipe crashes occurred:
  - Four (4) eastbound side-swipe crashes occurred in the eastbound dual left-turn lanes when one (1) eastbound left-turn vehicle sideswiped another eastbound left-turn vehicle while performing the turn.
  - One (1) eastbound sideswipe crash occurred when an eastbound U-turn vehicle attempted to U-turn from the outer eastbound left-turn lane, striking an eastbound left-turn vehicle in the inner eastbound left-turn lane.
  - Lastly, one (1) eastbound sideswipe crash occurred when an eastbound through vehicle side-swiped another eastbound through vehicle.
- Two (2) southbound left-turn crashes occurred when northbound vehicles ran the red light.
- One (1) bicyclist crash occurred when a bicyclist failed to yield to a northbound vehicle in the south leg crosswalk on Clyde Morris Boulevard.

A detailed collision summary featuring the crashes is provided in ***Table 2*** and graphically depicted in ***Figure 6***.

Table 2
Collision Summary
State Road 421 at Clyde Morris Boulevard

COLLISION SUMMARY											
Section:	**79230**				**State Road:**	**SR 421**			**County:**	**Volusia**	
Intersecting route:	**Clyde Morris Boulevard**				**Milepost:**	**1.060**			**Data by:**	**VP**	
Study period:	**1/1/2011**	**to**	**12/31/2015**						**Date:**	**1/6/2017**	
NO.	DATE	DAY	TIME	FATAL	INJURY	PROPERTY DAMAGE	HARMFUL EVENT	DUI	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE
1	01/09/11	Sunday	20:23	0	0	$4,000	Angle	N	Night	Dry	Improper Turn
2	03/26/11	Saturday	5:52	0	1	$400	Overturn	N	Night	Dry	Lost Control
3	06/03/11	Friday	8:56	0	0	$1,000	Side-Swipe	N	Day	Dry	Improper Turn
4	07/05/11	Tuesday	15:31	0	1	$0	Rear-end	N	Day	Dry	Careless Driving
5	07/05/11	Tuesday	15:47	0	0	$250	Rear-end	N	Day	Dry	Careless Driving
6	09/02/11	Friday	20:59	0	2	$3,000	Left-Turn	N	Night	Dry	Ran Red Light
7	10/02/11	Sunday	15:25	0	0	$12,000	Rear-end	N	Day	Dry	Careless Driving
8	10/19/11	Wednesday	7:46	0	1	$3,500	Rear-end	N	Day	Wet	Careless Driving
9	11/21/11	Monday	21:34	0	1	$2,000	Rear-end	Y	Night	Dry	Careless Driving
10	04/20/12	Friday	15:22	0	1	$100	Rear-end	N	Day	Wet	Careless Driving
11	04/30/12	Monday	9:52	0	0	$5,000	Side-Swipe	N	Day	Dry	Improper Turn
12	05/06/12	Sunday	19:09	0	0	$20,000	Angle	N	Day	Dry	Ran Red Light
13	05/21/12	Monday	11:19	0	0	$750	Rear-end	N	Day	Dry	Careless Driving
14	06/06/12	Wednesday	9:57	0	1	$1,000	Side-Swipe	N	Day	Dry	Improper Lane Change
15	06/08/12	Friday	22:17	0	0	$10,000	Rear-end	Y	Night	Wet	Careless Driving
16	07/12/12	Thursday	22:24	0	1	$1,250	Rear-end	N	Night	Dry	Careless Driving
17	07/13/12	Friday	2:57	0	0	$1,250	Fixed-Object	Y	Night	Dry	Lost Control
18	08/12/12	Sunday	19:29	0	0	$100	Rear-end	Y	Day	Wet	Careless Driving
19	08/14/12	Tuesday	15:28	0	0	$700	Rear-end	N	Day	Wet	Careless Driving
20	08/16/12	Thursday	17:04	0	2	$21,050	Side-Swipe	Y	Night	Dry	DUI
21	08/22/12	Wednesday	6:23	0	0	$100	Rear-end	N	Night	Dry	Careless Driving
22	10/24/12	Wednesday	16:08	0	0	$4,000	Rear-end	N	Day	Dry	Careless Driving
23	10/26/12	Friday	7:13	0	0	$5,000	Rear-end	N	Day	Dry	Careless Driving
24	10/26/12	Friday	13:29	0	0	$4,500	Side-Swipe	N	Day	Dry	Improper Turn
25	12/05/12	Wednesday	18:18	0	1	$1,000	Side-Swipe	N	Day	Dry	Improper Lane Change
26	12/06/12	Thursday	17:25	0	0	$1,000	Rear-end	N	Day	Dry	Careless Driving
27	01/14/13	Monday	2:42	0	1	$22,000	Fixed-Object	Y	Night	Dry	DUI
28	01/19/13	Saturday	19:19	0	0	$1,500	Side-Swipe	N	Night	Dry	Careless Driving
29	01/25/13	Friday	14:14	0	0	$3,000	Rear-end	N	Day	Dry	Careless Driving
30	02/14/13	Thursday	15:27	0	0	$1,000	Rear-end	N	Day	Dry	Careless Driving
31	02/17/13	Sunday	10:59	0	1	$1,250	Rear-end	N	Day	Dry	Careless Driving
32	03/12/13	Tuesday	14:10	0	0	$1,000	Rear-end	N	Day	Wet	Careless Driving
33	03/16/13	Saturday	20:17	0	0	$1,500	Rear-end	Y	Night	Dry	Careless Driving
34	04/19/13	Friday	22:03	0	2	$0	Rear-end	N	Night	Wet	Careless Driving
35	06/06/13	Thursday	9:27	0	1	$15,000	Angle	N	Day	Wet	Ran Red Light
36	06/06/13	Thursday	16:12	0	0	$10,000	Side-Swipe	N	Day	Wet	Improper Lane Change
37	07/01/13	Monday	16:35	0	0	$501	Rear-end	N	Day	Wet	Careless Driving
38	07/05/13	Friday	13:43	0	0	$250	Rear-end	N	Day	Dry	Careless Driving
39	07/12/13	Friday	18:40	0	0	$7,000	Rear-end	N	Day	Dry	Careless Driving
40	07/29/13	Monday	22:09	0	0	$6,000	Angle	Y	Night	Dry	Ran Red Light

Source: University of Florida's Signal Four Analytics

COLLISION SUMMARY

Section: 79230 **State Road:** SR 421 **County:** Volusia

Intersecting route: Clyde Morris Boulevard **Milepost:** 1.060 **Data by:** VP

Study period: 1/1/2011 to 12/31/2015 **Date:** 1/6/2017

NO.	DATE	DAY	TIME	FATAL	INJURY	PROPERTY DAMAGE	HARMFUL EVENT	DUI	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE
41	09/17/13	Tuesday	15:16	0	3	$8,500	Rear-end	N	Day	Dry	Careless Driving
42	09/20/13	Friday	15:47	0	0	$1,500	Rear-end	N	Day	Dry	Careless Driving
43	10/10/13	Thursday	19:52	0	0	$600	Side-Swipe	N	Night	Dry	Improper Lane Change
44	10/16/13	Wednesday	12:54	0	0	$2,000	Side-Swipe	N	Day	Dry	Improper Turn
45	11/07/13	Thursday	7:00	0	0	$1,000	Rear-end	N	Day	Dry	Careless Driving
46	11/10/13	Sunday	0:18	0	0	$2,100	Rear-end	N	Night	Dry	Careless Driving
47	11/23/13	Saturday	1:57	0	0	$2,000	Fixed-Object	Y	Night	Dry	Careless Driving
48	11/25/13	Monday	15:06	0	0	$1,100	Rear-end	N	Day	Dry	Careless Driving
49	11/25/13	Monday	17:57	0	1	$4,000	Rear-end	N	Night	Wet	Careless Driving
50	12/12/13	Thursday	13:23	0	0	$4,000	Right-turn	N	Day	Dry	FTYRW
51	01/09/14	Thursday	10:55	0	0	$3,250	Rear-end	N	Day	Wet	Careless Driving
52	02/12/14	Wednesday	18:43	0	0	$1,000	Right-turn	N	Night	Wet	FTYRW
53	02/14/14	Friday	8:09	0	0	$2,000	Rear-end	N	Day	Dry	Careless Driving
54	03/02/14	Sunday	5:32	0	0	$35,000	Fixed-Object	Y	Night	Dry	Lost Control
55	05/17/14	Saturday	16:01	0	0	$1,500	Rear-end	N	Day	Dry	Careless Driving
56	07/16/14	Wednesday	19:08	0	0	$200	Rear-end	Y	Day	Dry	Careless Driving
57	08/05/14	Tuesday	18:20	0	0	$3,000	Rear-end	N	Day	Dry	Careless Driving
58	08/08/14	Friday	19:05	0	0	$700	Side-Swipe	N	Day	Dry	Improper Lane Change
59	08/16/14	Saturday	11:55	0	0	$1,050	Rear-end	N	Day	Dry	Careless Driving
60	08/28/14	Thursday	14:08	0	0	$200	Rear-end	N	Day	Dry	Careless Driving
61	09/04/14	Thursday	16:32	0	2	$17,000	Rear-end	N	Day	Dry	Careless Driving
62	09/06/14	Saturday	20:45	0	0	$6,000	Right-turn	N	Night	Wet	FTYRW
63	09/28/14	Sunday	7:23	0	0	$0	Rear-end	N	Day	Dry	Careless Driving
64	11/01/14	Saturday	7:04	0	4	$33,000	Rear-end	N	Day	Dry	Careless Driving
65	12/10/14	Wednesday	15:07	0	1	$300	bicycle	N	Day	Dry	FTYRW
66	12/18/14	Thursday	19:32	0	0	$1,100	Rear-end	N	Night	Dry	Careless Driving
67	03/02/15	Monday	14:40	0	0	$120	Rear-end	N	Day	Dry	Careless Driving
68	03/08/15	Sunday	11:03	0	0	$1,000	Rear-end	N	Day	Dry	Careless Driving
69	03/13/15	Friday	9:50	0	1	$4,500	Rear-end	N	Day	Dry	Careless Driving
70	03/26/15	Thursday	9:32	0	0	$2,500	Rear-end	N	Day	Dry	Careless Driving
71	04/21/15	Tuesday	16:18	0	0	$500	Right-turn	N	Day	Dry	FTYRW
72	04/23/15	Thursday	13:43	0	0	$6,000	Rear-end	N	Day	Dry	Careless Driving
73	04/29/15	Wednesday	7:58	0	1	$3,500	Rear-end	N	Day	Wet	Careless Driving
74	05/01/15	Friday	18:09	0	0	$1,000	Rear-end	N	Day	Dry	Careless Driving
75	05/19/15	Tuesday	8:59	0	0	$600	Rear-end	N	Day	Dry	Careless Driving
76	05/28/15	Thursday	8:46	0	3	$10,000	Left-Turn	N	Day	Dry	FTYRW
77	06/12/15	Friday	20:21	0	0	$600	Rear-end	N	Day	Dry	Careless Driving
78	07/18/15	Saturday	18:15	0	1	$500	Overturn	N	Day	Wet	Lost Control
79	08/26/15	Wednesday	21:38	0	0	$2,000	Side-Swipe	N	Night	Dry	Improper Lane Change
80	09/17/15	Thursday	17:29	0	0	$4,000	Rear-end	N	Day	Dry	Careless Driving
81	09/28/15	Monday	18:19	0	0	$7,500	Side-Swipe	N	Day	Wet	Improper Lane Change
82	09/28/15	Monday	12:27	0	0	$2,350	Rear-end	N	Day	Wet	Careless Driving

Source: University of Florida's Signal Four Analytics

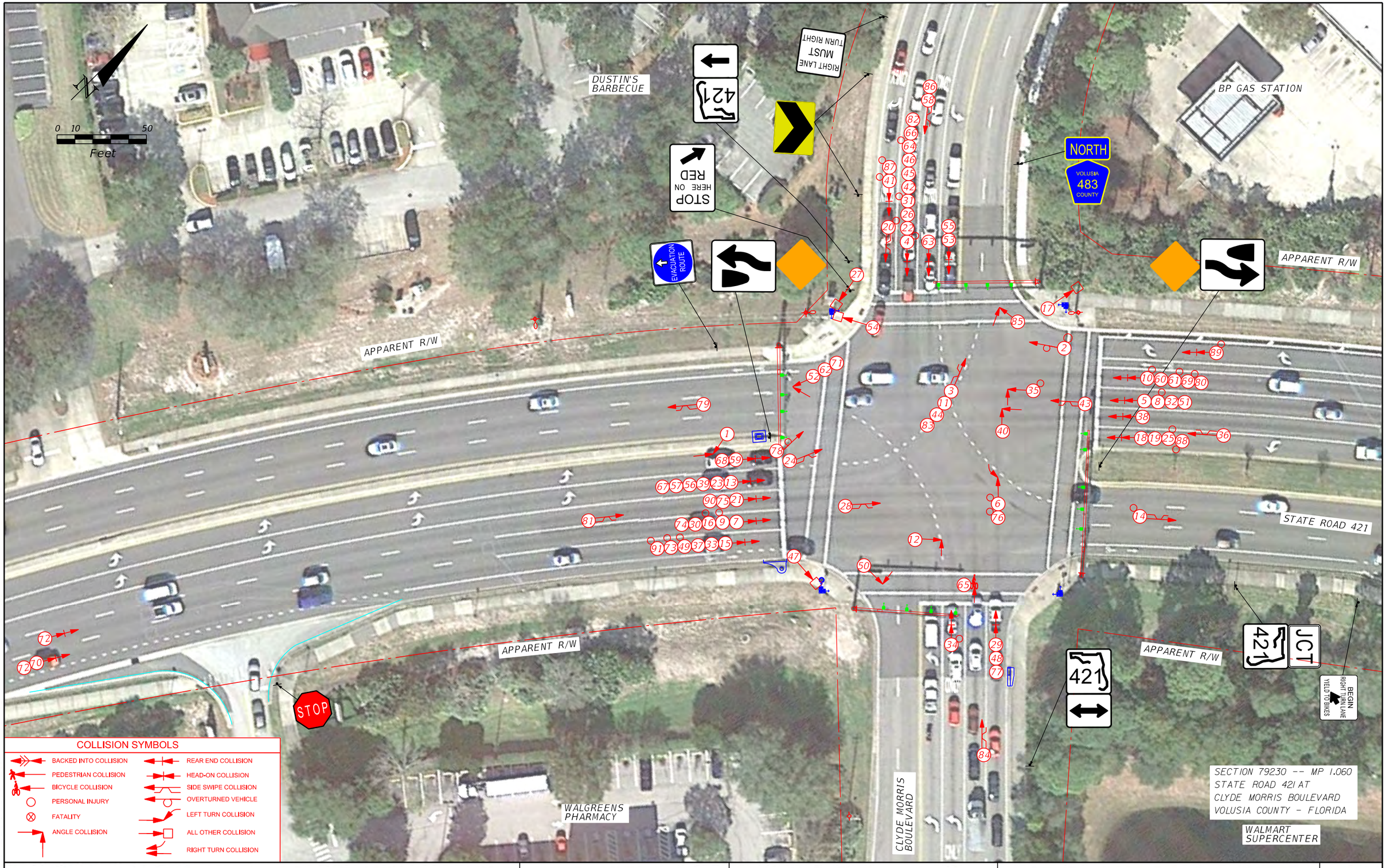
COLLISION SUMMARY												
Section:	**79230**				**State Road:**	**SR 421**			**County:**	**Volusia**		
Intersecting route:	**Clyde Morris Boulevard**				**Milepost:**	**1.060**			**Data by:**	**VP**		
Study period:	**1/1/2011**	**to**	**12/31/2015**						**Date:**	**1/6/2017**		

NO.	DATE	DAY	TIME	FATAL	INJURY	PROPERTY DAMAGE	HARMFUL EVENT	DUI	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE
83	09/30/15	Wednesday	11:43	0	0	$2,000	Side-Swipe	N	Day	Dry	Improper Turn
84	10/08/15	Thursday	19:40	0	0	$5,500	Side-Swipe	N	Night	Dry	Improper Lane Change
85	10/08/15	Thursday	13:55	0	0	$4,000	Right-turn	N	Day	Dry	FTYRW
86	10/15/15	Thursday	16:45	0	0	$1,700	Side-Swipe	N	Day	Dry	Improper Lane Change
87	11/06/15	Friday	18:35	0	1	$600	Rear-end	N	Night	Dry	Careless Driving
88	11/06/15	Friday	18:12	0	2	$5,500	Rear-end	N	Night	Dry	Careless Driving
89	11/17/15	Tuesday	20:28	0	2	$2,000	Rear-end	N	Night	Dry	Careless Driving
90	12/12/15	Saturday	9:07	0	0	$2,000	Rear-end	Y	Day	Dry	Careless Driving
91	12/30/15	Wednesday	13:25	0	2	$5,500	Rear-end	N	Day	Dry	Careless Driving
TOTAL				**0**	**41**	**$380,521**					

TOTAL NO.	Fatal	Injury	Property Damage Only	Left-Turn	Rear-End	Bicycle	Fixed-Object	Angle	Side-Swipe	Overturn	Right-turn
91	0	27	64	2	57	1	4	4	16	2	5
Percent	0%	30%	70%	2%	63%	1%	4%	4%	18%	2%	5%

CONTRIB-CAUSE	Day	Night	Pavement Condition			Improper Lane Change	Careless Driving	Lost Control	FTYRW	DUI	Improper Turn	Ran Red Light
			Wet	Dry	?							
Total	64	27	18	73	0	9	59	4	7	2	6	4
Percent	70%	30%	20%	80%	0%	10%	65%	4%	8%	2%	7%	4%

Source: University of Florida's Signal Four Analytics



COLLISION SYMBOLS

- BACKED INTO COLLISION
- PEDESTRIAN COLLISION
- BICYCLE COLLISION
- PERSONAL INJURY
- FATALITY
- ANGLE COLLISION
- REAR END COLLISION
- HEAD-ON COLLISION
- SIDE SWIPE COLLISION
- OVERTURNED VEHICLE
- LEFT TURN COLLISION
- ALL OTHER COLLISION
- RIGHT TURN COLLISION

Symbols:

- Utility Pole
- Traffic Sign
- Luminaire
- Traffic Controller Cabinet
- Ditch Bottom Inlet
- Signal Pole
- Pedestrian Signal Pole
- Mitered End Section

Traffic Engineering Data Solutions, Inc.
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Phone: 386.753.0558 Fax: 386.753.0778
CERTIFICATION OF AUTHORIZATION # 27392

STATE OF FLORIDA

DEPARTMENT OF TRANSPORTATION

FIGURE 6
COLLISION DIAGRAM
(1/01/2011 TO 12/31/2015)

3

QUALITATIVE ASSESSMENT

The intersection of State Road 421 at Clyde Morris Boulevard was observed during the peak hours by a registered professional engineer to assess existing operating conditions and to determine if installing an eastbound right-turn lane would be potentially beneficial.

Operations:

General observations:

- Sight distance is adequate for all motorists traveling in all directions.

Morning Observation:

- Eastbound and westbound traffic was observed arriving at the intersection in well-defined platoons.
- Signal coordination was apparent along the State Road 421 corridor.
- On one (1) occasion, westbound left-turn queues were observed to spill back into to the westbound through lanes. Westbound through vehicular traffic is relatively low (979 vehicles from 7:30 a.m. to 8:30 a.m.) and is spread out over three (3) through lanes, so no safety issues or concern were observed regarding the westbound left-turn spill back.
- The queues of eastbound vehicles extended beyond the Walgreens driveway (which is located approximately 310 feet west of Clyde Morris Boulevard). Several instances were noted where the queue in the outside eastbound through lane appeared to be disproportionately long as compared to the queue in the other two through lanes.
- The outside eastbound lane traffic comprised of mostly right-turn vehicles. The eastbound right-turn traffic volumes were noticeably heavier in the morning observation (221 vehicles from 7:00 a.m. to 8:00 a.m.) than the afternoon observation (110 vehicles from 2:45 p.m. to 3:45 p.m.). Eastbound right-turn volumes were particularly heavy between 7:00 a.m. to 7:15 a.m. (90 vehicles).
- No obvious concerns or issues were noted with regard to eastbound right-turn vehicles delaying or impeding traffic flow in the outside eastbound through lane.
- Three (3) eastbound right-turns were observed to roll through the red light while the northbound left-turn phase was activated. No concerns or issues were observed with regard to eastbound right-turn on red maneuvers.
- Spruce Creek High School is located on Clyde Morris Boulevard approximately 0.75 miles south of the study intersection. School hours are from 7:20 a.m. to 2:45 p.m.
- Pedestrian and bicycle activity was minimal with one (1) pedestrian and three (3) bicyclists observed to traverse the study intersection.

Afternoon Observation:

- Eastbound and westbound traffic was observed arriving at the intersection in well-defined platoons.
- Signal coordination was apparent along the State Road 421 corridor.

- No phase failures or queue spillbacks were observed with regard to the eastbound left-turn and through movements.
- The queues of eastbound vehicles extended beyond the Walgreens driveway (which is located approximately 310 feet west of Clyde Morris Boulevard). Several instances were noted where the queue in the outside eastbound through lane appeared to be disproportionately long as compared to the queue in the other two through lanes.
- No obvious concerns or issues were noted with regard to eastbound right-turn vehicles delaying or impeding traffic flow in the outside eastbound through lane.
- No concerns or issues were observed with regard to eastbound right-turn on red maneuvers.
- Pedestrian and bicycle activity appeared to be generally consistent with the traffic volume counts, with seven (7) bicycles, one (1) pedestrian, and one (1) motorized scooter observed. With the exception of one (1) bicyclist that passed through the intersection utilizing the bike lane, all others utilized the sidewalks, crosswalks, and the signalized pedestrian features to cross the intersection. No issues or concerns were observed with crossings, however, a lady on a motorized scooter, when crossing the eastern crosswalk from south to north, did honk her horn as she crossed the westbound departing lanes, appearing to give notice to any potential northbound right-turn motorists.
- Motorists exiting the Walgreens driveway onto State Road 421 (approximately 310 feet west of Clyde Morris Boulevard), entered traffic without issue. A few motorists weaved across all eastbound through lanes to enter the eastbound left-turn lanes, but no issues or concerns were observed. One right-turning motorist did not stop at the STOP sign and entered State Road 421 quickly (no issues or concerns were observed as there was no conflicting eastbound traffic).
- One eastbound through motorist did enter the intersection after receipt of a red signal indication, but no conflicts were observed.

Safety:

In addition to the collision analysis, the following observations were made with respect to the safety of the study intersection:

- No signs of skid marks, plastic, or other indication of a crash were observed at the intersection, however broken glass was observed to be in the southbound right-turn lane.

Maintenance:

During the field reviews the condition of the study intersection's asphalt, striping, signing and lighting were observed. The following are observations related to the maintenance of the intersection based on the various field reviews of the intersection:

- The signs, pavement markings, and pavement conditions at the intersection of State Road 421 and Clyde Morris Boulevard are in good condition.

4

IMPROVEMENT ALTERNATIVES

As previously conveyed, the purpose of this study was to evaluate the need and feasibility of installing an eastbound right-turn lane at the study intersection. For purposes of understanding the operational benefits of adding an eastbound right-turn lane, capacity analyses were conducted for the morning and afternoon peak hours utilizing the Highway Capacity Software (HCS), existing turning movement counts, existing signal timings (see ***Appendix***), and the existing and proposed intersection geometry. Based on the analyses with the existing intersection geometry (without an exclusive eastbound right-turn lane), the intersection is projected to operate at LOS D (average delay of 45.6 seconds per vehicle) and LOS F (average delay of 80.3 seconds per vehicle) during the morning and afternoon peak hours, respectively. With the proposed eastbound right-turn lane, the intersection is projected to operate at LOS D (average delay of 45.3 seconds per vehicle) and LOS E (average delay of 78.6 seconds per vehicle) during the morning and afternoon peak hours, respectively. Therefore, the average delay per vehicle will be reduced with the addition of the eastbound right-turn lane. It is also important to note that the AASHTO's Highway Safety Manual (HSM) provides a crash modification factor of 0.96 for the installation of a right-turn lane on a major roadway at a signalized intersection thus indicating that such improvement has been shown to reduce all crashes at an intersection by four percent (4%). Therefore, the installation of a eastbound right-turn lane will provide both safety and operational benefits for the intersection and the benefits are expected to increase as traffic volumes increase.

An improvement concept was developed for the installation of an eastbound right-turn lane at the State Road 421 at Clyde Morris Boulevard intersection. Per FDOT's 2016 Design Standards, Index 301, an eastbound right-turn lane length of 390 feet (inclusive of a 50-foot taper) is recommended, based on a 150-foot queue length and 240 feet of deceleration for a design speed of 50 mph using rural conditions. However the eastbound right-turn lane is recommended to be 500-feet long in order to adequately accommodate the projected queues in addition to vehicles turning into the Walgreen driveway located approximately 310 feet west of the study intersection. Details of the proposed improvement are provided below (see ***Figure 7***) and a typical section is included as the first item in the ***Appendix***:

- Construct 12-foot wide, 500-foot long eastbound right-turn lane with Type-f curb and gutter.
- Adjust an existing manhole on the south side of State Road 421, approximately 150 feet west of Clyde Morris Boulevard, to finished grade.
- Adjust an existing manhole on the south side of State Road 421, approximately 20 feet west of Clyde Morris Boulevard, to finished grade.
- Restripe pavement markings as needed, including directional arrows.
- Construct a curb ramp with detectable warning surfaces on the southwest corner of the study intersection.
- Construct two (2) new curb ramps with detectable warnings at the reconstructed driveway serving the adjacent Walgreens.
- Extend the stop line and crosswalk on the eastbound approach.

- Remove the existing concrete valley gutter on eastbound State Road 421 within the driveway serving the adjacent Walgreens.
- Construct a new Type 7 manhole over top of the existing V-inlet located within the concrete valley gutter, approximately 390 feet west of Clyde Morris Boulevard, and connect a new manhole.
- Relocate existing street sign approximately 70 feet west of Clyde Morris Boulevard.
- Replace the existing mast arm in the southwest corner of the intersection.
- Approximately 10 feet west of the study intersection, construct a new Type 7 manhole over top of the existing curb inlet and connect to existing storm pipe.
- Construct new curb inlets with J-bottoms and connect to existing storm pipe approximately 270 feet and 440 feet west of Clyde Morris Boulevard.
- Reconstruct driveway, approximately 310 feet west of the study intersection, with 30-foot radii.
- Remove and install pedestrian signal head, detector and pedestal in the southwest corner of the study intersection.
- Remove 450 feet of existing eight -foot sidewalk on the south side of State Road 421 (west of Clyde Morris Boulevard) and construct new eight-foot sidewalk at back of curb.
- Replace impacted loops and pull boxes and modify the traffic controller box as necessary.
- Remove existing concrete end wall, and construct a new manhole, storm pipe, and mitered end section.
- Relocate the existing bus stop on the south side of State Road 421, approximately 510 feet west of Clyde Morris Boulevard, and reinstall concrete pad.

Construction of a right turn lane would typically qualify for exemption from Environmental Resource Permit (ERP) under FAC 62-330.051. However, under Application No. 23032-1, the St. Johns River Water Management District (SJRWMD) previously issued an ERP for the 6-laning of SR 421 in 1992, to which there have been several subsequent modifications. As such, a permit modification is expected to be required from SJRWMD. In addition, a Right of Way Use Permit will be required from Volusia County for the connection onto CR 483 (Clyde Morris Blvd). It is recommended that FDOT administer project design and construction due to the majority of improvement recommendations occurs with FDOT right-of-way.

The overall improvement costs were estimated based on FDOT historical unit prices. The total cost of the improvements, including engineering and CEI, is estimated at approximately $454,300 and is provided in ***Table 4***.

IMPROVEMENTS:

1. CONSTRUCT 12-FOOT WIDE, 500-FOOT LONG EASTBOUND RIGHT-TURN LANE WITH TYPE-F CURB AND GUTTER
2. ADJUST EXISTING DRAINAGE MANHOLE TO FINISHED GRADE
3. INSTALL DIRECTIONAL ARROW
4. INSTALL PAVEMENT MARKINGS
5. CONSTRUCT CURB RAMP WITH DETECTABLE WARNING SURFACE
6. EXTEND STOP BAR AND CROSSWALK
7. CONSTRUCT TYPE 7 MANHOLE OVER TOP OF V-INLET
8. RELOCATE EXISTING STREET SIGN
9. REPLACE EXISTING MAST ARM
10. REMOVE CURB INLET AND CONNECT NEW MANHOLE TO EXISTING STORM PIPE, CONNECT NEW CURB INLET TO NEW MANHOLE
11. CONNECT NEW J-BOTTOM CURB INLET TO EXISTING STORM PIPE
12. RECONSTRUCT DRIVEWAY WITH 30-FOOT RADII, ADJUST FOR CHANGES IN GRADE
13. REMOVE PEDESTRIAN SIGNAL HEAD, DETECTOR, AND PEDESTAL AND INSTALL NEW PEDESTRIAN SIGNAL HEAD, DETECTOR AND PEDESTAL
14. REMOVE 450 LF OF EXISTING SIDEWALK AND CONSTRUCT NEW 8' SIDEWALK AT BACK OF CURB
15. RELOCATE EXISTING LIGHT POLES BEHIND NEWLY CONSTRUCTED SIDEWALK
16. REPLACE IMPACTED LOOPS AND PULL BOXES
17. REMOVE EXISTING END WALL, CONNECT MANHOLE TO EXISTING PIPE AND CONSTRUCT NEW STORM PIPE AND MES
18. INSTALL STOP SIGN, STOP BAR, AND CROSSWALK
19. ADJUST VALVE BOX TO FINSIHED GRADE
20. ADJUST SEWER MANHOLE TO FINISHED GRADE

0 10 50
Feet

DUSTIN'S BARBECUE
BP GAS STATION
WALGREENS PHARMACY
EXIST. DRAINAGE EASEMENT (PLAT BOOK 42, PG 16)
EXIST. R/W
COUNTY ROAD 483 (CLYDE MORRIS BOULEVARD)
STATE ROAD 421 (DUNLAWTON AVE)
RIGHT LANE MUST TURN RIGHT
STOP HERE ON RED
EVACUATION ROUTE
WEST 421
NORTH 421
NORTH VOLUSIA 483 COUNTY
421
JCT 421
45' R
STOP
51 52 53 54 55 56 57

SECTION 79230 -- MP 1.060
STATE ROAD 421 AT
CLYDE MORRIS BOULEVARD
VOLUSIA COUNTY - FLORIDA

Utility Pole
Traffic Sign
Luminaire
Signal Head

Symbols:
Traffic Controller Cabinet
Ditch Bottom Inlet
Yard Drain
Signal Pole
Pedestrian Signal Pole
Mitered End Section
Curb Inlet

Traffic Engineering Data Solutions, Inc.
80 Spring Vista Drive Phone: 386.753.0558
DeBary, FL 32713 Fax: 386.753.0778
CERTIFICATION OF AUTHORIZATION # 27392

RIVER TO SEA TRANSPORTATION PLANNING ORGANIZATION

FIGURE 7
IMPROVEMENT DIAGRAM

TABLE 3
ENGINEER'S OPINION OF PROBABLE COSTS
VOLUSIA COUNTY
STATE ROAD 421 AT CLYDE MORRIS

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
I. ROADWAY					
102-1	MOBILIZATION (25%)	1	LS	$49,925.18	$49,925.18
104-10-3	SEDIMENT BARRIER	600	LF	$1.13	$954.38
110-1-1	CLEARING AND GRUBBING	0.526	AC	$12,730.10	$6,696.03
110-4	REMOVAL OF EXISTING CONCRETE PAVEMENT	647	SY	$21.02	$13,591.87
120-1	REGULAR EXCAVATION	338	CY	$4.49	$1,517.62
120-6	EMBANKMENT	150	CY	$9.39	$1,408.50
160-4	TYPE B STABILIZATION	750	SY	$3.01	$2,257.50
285-701	OPTIONAL BASE,BASE GROUP 01	768	SY	$9.55	$7,334.40
334-1-13	SUPERPAVE ASPH CONC, TRAFFIC C (1")	45	TN	$96.50	$4,342.50
337-7-55	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 82-22 (1.5")	67	TN	$88.99	$5,962.33
425-1311	INLETS, CURB TYPE P-1, <10'	1	EA	$4,765.63	$4,765.63
425-1411	INLETS, CURB TYPE J-1, <10'	2	EA	$7,282.12	$14,564.24
425-5	MANHOLE, ADJUST	1	EA	$562.85	$562.85
425-2-41	MANHOLES, P-7, <10'	3	EA	$4,343.58	$13,030.74
425-6	ADJUST VALVE BOX	6	EA	$372.38	$2,234.28
430-174-124	PIPE CULVERT, OPTIONAL MATERIAL, ROUND 24" SD	60	LF	$86.95	$5,217.00
520-1-10	CONCRETE CURB & GUTTER, TYPE F	590	LF	$17.31	$10,212.90
522-2	SIDEWALK/DRIVEWAY CONCRETE, 6" THICK	461	SY	$44.20	$20,390.93
527-2	DETECTABLE WARNINGS	90	SF	$31.15	$2,809.42
570-1-2	PERFORMANCE TURF, SOD	1181	SY	$2.30	$2,716.30
				SUBTOTAL	**$170,494.60**
III. SIGNAL					
630-2-11	CONDUIT, FURNISH AND INSTALL, OPEN TRENCH	400	LF	$7.89	$3,156.00
630-2-12	CONDUIT, FURNISH AND INSTALL, DIRECTIONAL BORE	200	LF	$15.09	$3,018.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1	PI	$4,925.72	$4,925.72
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	5	EA	$566.09	$2,830.45
646-1-12	ALUMINUM SIGNALS POLE, PED DETECT POST	2	EA	$738.70	$1,477.40
649-31-205	M/ARM,F&I, WS-130,SINGLE ARM,W/ LU 78	1	EA	$33,269.94	$33,269.94
649-365-00	MAST ARM, REMOVE DEEP/COMPLETE FOUNDATION, BOLT ON ATTACHMENT	1	EA	$4,348.50	$4,348.50
650-1-60	TRAFFIC SIGNAL, REMOVE- POLES TO REMAIN	4	AS	$80.03	$320.12
650-1311	TRAFFIC SIGNAL,F&I,3 SECT,1 WAY,ALUMINUM	4	AS	$1,037.25	$4,149.00
653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	2	AS	$672.04	$1,344.08
653-1-60	PEDESTRIAN SIGNAL, REMOVE	2	AS	$74.14	$148.28
660-2-102	LOOP ASSEMBLY, F&I, TYPE B	6	AS	$724.27	$4,345.62
660-2-106	LOOP ASSEMBLY, F&I, TYPE F	2	AS	$925.06	$1,850.12
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	2	EA	$260.86	$521.72
665-1-60	PEDESTRIAN DETECTOR, REMOVE	2	EA	$60.71	$121.42
671-2-40	TRAFFIC CONTROLLER, MODIFY	1	EA	$3,307.77	$3,307.77
700-5-22	INTERNAL ILLUM SIGN, F&I OM, 12-18 SF	1	EA	$3,236.20	$3,236.20
700-5-60	INTERNAL ILLUM SIGN, REMOVE	1	EA	$185.82	$185.82
				SUBTOTAL	**$66,382.16**
II. SIGNING, PAVEMENT MARKINGS, AND LIGHTING					
711-16-101	THERMOPLASTIC, STD-OTH, WHITE, SOLID, 6"	0.068	NM	$3,899.85	$265.19
711-11-123	THERMOPLASTIC, STD, WHITE, SOLID, 12"	140	LF	$2.24	$313.60
711-11-125	THERMOPLASTIC, STANDARD, WHITE, SOLID, 24"	25	LF	$4.19	$104.75
711-11-170	THERMOPLASTIC, STANDARD, WHITE, ARROW	5	EA	$59.57	$297.85
711-14-141	THERMOPLASTIC, PREF, WHITE, 2-4 DOT, CON	0.028	GM	$7,410.00	$207.48
711-16-201	THERMOPLASTIC, STANDARD-OTHER SURFACE, YELLOW, SOLID, 6"	0.005	NM	$3,754.65	$18.77
715-4-400	LIGHT POLE COMPLETE, RELOCATE	4.000	EA	$2,885.37	$11,541.48
				SUBTOTAL	**$12,749.12**
IV. RIGHT OF WAY					
				RIGHT OF WAY	$0.00
				SUBTOTAL	**$0.00**
				SUBTOTAL	$249,625.88
				MAINTENANCE OF TRAFFIC (20%)	$49,925.18
				CONTINGENCY (20%)	$49,925.18
				CONSTRUCTION TOTAL	$349,476.24
				ENGINEERING (20%)	$69,895.25
				CEI (10%)	$34,947.62
				PROJECT TOTAL (2017)	**$454,319.11**
				PROJECT TOTAL (2018)	**$466,585.72**
				PROJECT TOTAL (2019)	**$479,760.98**

Notes:

* Unit Prices from FDOT's 12-Month Moving Statewide Average.

[1] An annual inflation factor of 2.7% and 2.8%, as obtained from FDOT's Transportation Costs Reports, was applied to factor the costs to year 2018 and 2019, respectively.

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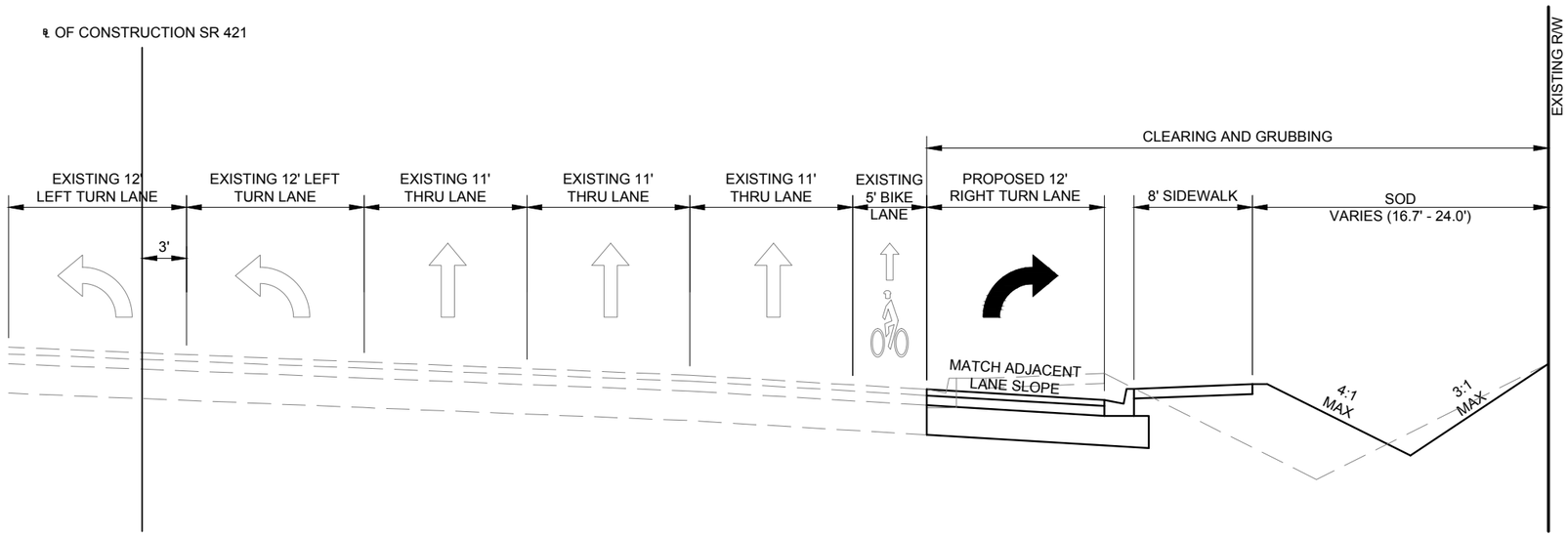
CONCLUSION

Traffic Engineering Data Solutions, Inc. (TEDS) was retained on behalf of the River to Sea Transportation Planning Organization (R2CTPO) to conduct an Feasibility Study for State Road 421 (Dunlawton Avenue) at Clyde Morris Boulevard (County Road 483) in Port Orange (Volusia County), Florida. Based on the data collected, field observations, the alternatives analyses and engineering judgement, an eastbound right-turn lane will provide for enhanced operations and safety at the intersection, with the benefits expected to be more significant as traffic volumes continue to grow in the area. Drainage inlets, curb ramps, pedestrian detectors, sidewalk, traffic signal equipment, and the Walgreens driveway approximately 310 feet west of the study intersection will need to be reconstructed in conjunction with the turn lane installation. The engineering and construction costs associated with these improvements are estimated at approximately $454,300.

APPENDIX

NEW CONSTRUCTION

OPTIONAL BASE GROUP 01 (TYPE B-12.5 ONLY) WITH TYPE SP STRUCTURAL COURSE (TRAFFIC C) (1") AND FRICTION COURSE FC-12.5 (1.5") (TRAFFIC C, PG 76-22, ARB)



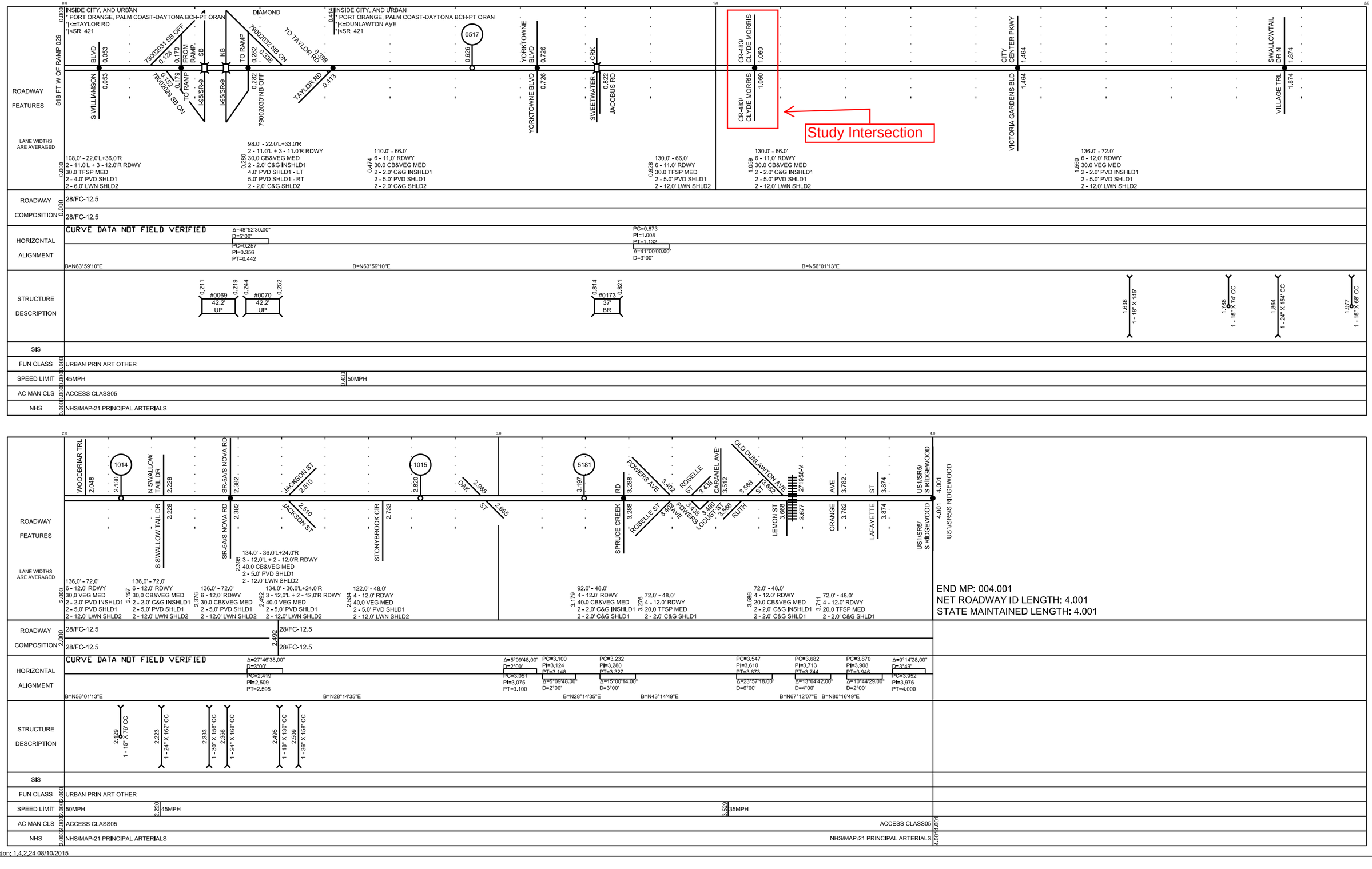
	Traffic Engineering Data Solutions, Inc. *80 Spring Vista Drive* *Phone: 386.753.0558* *DeBary, FL 32713* *Fax: 386.753.0778* *CERTIFICATION OF AUTHORIZATION # 27392*	RIVER TO SEA TRANSPORTATION PLANNING ORGANIZATION	FIGURE 8 TYPICAL SECTION SR 421 AT CLYDE MORRIS BOULEVARD	PAGE NO.

	5 YR INV	SLD REV	BMP	EMP	INV	SLD REV
DATE	01/16/2014	03/19/2014	000.000	004.001	07/07/2015 DP	08/11/2015 MR
BY	Debbie Prince	Michael Register	000.000	004.001		12/22/2014 MR

FLORIDA DEPARTMENT OF TRANSPORTATION

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY

SECTION STATUS	INT. or US ROUTE NO.	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO:
02		SR 421	VOLUSIA	05	79230000	1 OF 1



Version: 1,4,2,24 08/10/2015

State Road 421 at Clyde Morris Blvd

24 Hour Approach Counts (Hourly)

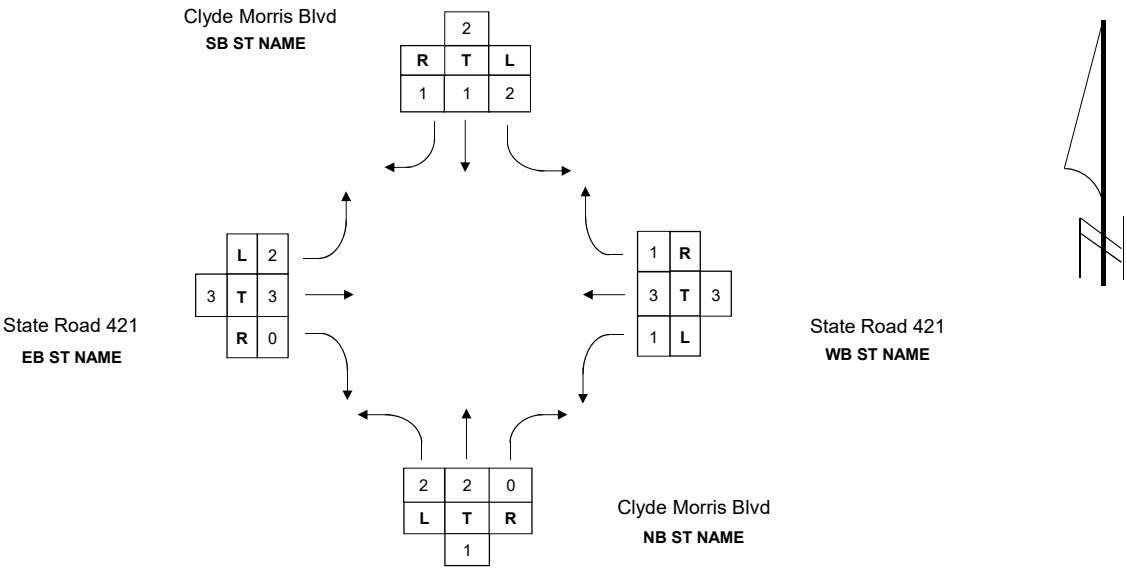
TIME	North	South	N/S TOTAL	East	West	E/W TOTAL	GRAND TOTAL
1:00	20	56	**76**	140	88	**228**	**304**
2:00	11	50	**61**	76	61	**137**	**198**
3:00	6	22	**28**	53	63	**116**	**144**
4:00	15	33	**48**	44	56	**100**	**148**
5:00	20	56	**76**	67	76	**143**	**219**
6:00	47	112	**159**	169	211	**380**	**539**
7:00	229	282	**511**	720	505	**1225**	**1736**
8:00	588	574	**1162**	1456	1101	**2557**	**3719**
9:00	426	574	**1000**	1403	1048	**2451**	**3451**
10:00	334	642	**976**	1363	1126	**2489**	**3465**
11:00	339	708	**1047**	1409	1275	**2684**	**3731**
12:00	449	778	**1227**	1506	1410	**2916**	**4143**
13:00	441	755	**1196**	1720	1557	**3277**	**4473**
14:00	503	837	**1340**	1764	1527	**3291**	**4631**
15:00	612	844	**1456**	1687	1495	**3182**	**4638**
16:00	576	917	**1493**	1645	1629	**3274**	**4767**
17:00	495	954	**1449**	1554	1458	**3012**	**4461**
18:00	415	949	**1364**	1692	1512	**3204**	**4568**
19:00	321	696	**1017**	1375	1235	**2610**	**3627**
20:00	332	482	**814**	939	853	**1792**	**2606**
21:00	236	402	**638**	773	717	**1490**	**2128**
22:00	110	293	**403**	593	426	**1019**	**1422**
23:00	54	162	**216**	312	243	**555**	**771**
24:00	44	107	**151**	196	168	**364**	**515**
	6623	**11285**	**17908**	**22656**	**19840**	**42496**	**60404**

FLORIDA DEPARTMENT OF TRANSPORTATION

SUMMARY OF VEHICLE MOVEMENTS

SECTION	79230	**CITY**	Port Orange	**COUNTY**	Volusia
STATE ROUTE	State Road 421	**INTERSECTING ROUTE**	Clyde Morris Blvd		
OBSERVER	TEDS	**DATE**	12/15/2016	**MILEPOST**	
WEATHER	Sunny	**ROAD CONDITION**	Good		
REMARKS					

FORM COMPLETED BY PHF **DATE** 01/05/17



TIME	NORTHBOUND					SOUTHBOUND					TOTAL	EASTBOUND					WESTBOUND					TOTAL
BEGIN/END	L	T	R	U	TOT	L	T	R	U	TOT	N/S	L	T	R	U	TOT	L	T	R	U	TOT	E/W
7:00 - 8:00	274	358	64	0	**696**	168	282	186	0	**636**	**1332**	240	1055	221	16	**1532**	117	944	152	5	**1218**	**2750**
8:00 - 9:00	223	319	31	0	**573**	199	196	239	0	**634**	**1207**	261	1165	75	28	**1529**	78	964	144	5	**1191**	**2720**
12:00 - 1:00	310	314	121	0	**745**	259	313	352	0	**924**	**1669**	351	1374	103	61	**1889**	150	1391	240	17	**1798**	**3687**
1:00 - 2:00	378	309	140	0	**827**	295	347	354	0	**996**	**1823**	350	1400	124	47	**1921**	105	1411	233	20	**1769**	**3690**
2:00 - 3:00	384	331	108	0	**823**	291	314	314	0	**919**	**1742**	351	1331	112	41	**1835**	100	1338	284	13	**1735**	**3570**
3:00 - 4:00	402	376	100	0	**878**	307	338	367	0	**1012**	**1890**	315	1389	119	51	**1874**	136	1432	278	13	**1859**	**3733**
4:00 - 5:00	400	339	72	0	**811**	301	398	359	0	**1058**	**1869**	299	1362	99	47	**1807**	93	1283	223	16	**1615**	**3422**
5:00 - 6:00	314	315	71	1	**701**	252	386	389	0	**1027**	**1728**	324	1548	111	67	**2050**	81	1462	197	11	**1751**	**3801**
TOTAL	**2685**	**2661**	**707**	**1**	**6054**	**2072**	**2574**	**2560**	**0**	**7206**	**13260**	**2491**	**10624**	**964**	**358**	**14437**	**860**	**10225**	**1751**	**100**	**12936**	**27373**

FLORIDA DEPARTMENT OF TRANSPORTATION

PEDESTRIAN MOVEMENT SUMMARY

SECTION 79230 **CITY** Port Orange **COUNTY** Volusia
STATE ROUTE State Road 421 **INTERSECTING ROUTE** Clyde Morris Blvd
OBSERVER TEDS **DATE** 12/15/2016

REMARKS _____

FORM COMPLETED BY PHF **DATE** 01/05/17

HOURS	West side of Clyde Morris Blvd			East side of Clyde Morris Blvd			North side of State Road 421			South side of State Road 421			GRAND TOTAL
	NB	SB	TOTAL	NB	SB	TOTAL	EB	WB	TOTAL	EB	WB	TOTAL	
7:00 - 8:00	0	0	**0**	1	1	**2**	0	0	**0**	1	1	**2**	**4**
8:00 - 9:00	0	0	**0**	0	1	**1**	0	0	**0**	0	0	**0**	**1**
12:00 - 1:00	0	2	**2**	1	0	**1**	0	0	**0**	2	1	**3**	**6**
1:00 - 2:00	0	0	**0**	0	3	**3**	1	0	**1**	2	0	**2**	**6**
2:00 - 3:00	0	0	**0**	3	0	**3**	0	2	**2**	2	1	**3**	**8**
3:00 - 4:00	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	**0**
4:00 - 5:00	0	4	**4**	0	0	**0**	1	0	**1**	1	0	**1**	**6**
5:00 - 6:00	0	0	**0**	0	0	**0**	0	0	**0**	0	1	**1**	**1**
TOTAL	**0**	**6**	**6**	**5**	**5**	**10**	**2**	**2**	**4**	**8**	**4**	**12**	**32**

FLORIDA DEPARTMENT OF TRANSPORTATION

BICYCLE MOVEMENT SUMMARY

SECTION 79230 **CITY** Port Orange **COUNTY** Volusia
STATE ROUTE State Road 421 **INTERSECTING ROUTE** Clyde Morris Blvd
OBSERVER TEDS **DATE** 12/15/2016

REMARKS _____

FORM COMPLETED BY PHF **DATE** 01/05/17

HOURS	West side of Clyde Morris Blvd			East side of Clyde Morris Blvd			North side of State Road 421			South side of State Road 421			GRAND TOTAL
	NB	SB	TOTAL	NB	SB	TOTAL	EB	WB	TOTAL	EB	WB	TOTAL	
7:00 - 8:00	0	1	**1**	0	1	**1**	0	1	**1**	0	0	**0**	**3**
8:00 - 9:00	0	0	**0**	0	1	**1**	2	0	**2**	0	0	**0**	**3**
12:00 - 1:00	0	1	**1**	2	1	**3**	0	1	**1**	1	0	**1**	**6**
1:00 - 2:00	2	0	**2**	1	2	**3**	1	1	**2**	0	1	**1**	**8**
2:00 - 3:00	0	0	**0**	1	0	**1**	0	2	**2**	1	2	**3**	**6**
3:00 - 4:00	1	0	**1**	0	0	**0**	0	1	**1**	2	3	**5**	**7**
4:00 - 5:00	0	0	**0**	0	0	**0**	0	0	**0**	0	2	**2**	**2**
5:00 - 6:00	0	1	**1**	0	0	**0**	1	0	**1**	2	0	**2**	**4**
TOTAL	**3**	**3**	**6**	**4**	**5**	**9**	**4**	**6**	**10**	**6**	**8**	**14**	**39**

File Name : Not Named 1
Site Code : 00000000
Start Date : 12/15/2016
Page No : 1

Groups Printed- All Vehicles

	CLYDE MORRIS BLVD Northbound					CLYDE MORRIS BLVD Southbound					STATE ROAD 421 Eastbound					STATE ROAD 421 Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	55	59	15	0	129	21	84	26	0	131	51	211	90	1	353	56	198	34	0	288	901
07:15 AM	51	59	18	2	130	39	64	39	0	142	62	228	76	1	367	43	249	35	0	327	966
07:30 AM	85	124	16	0	225	45	60	59	0	164	67	273	30	0	370	14	240	38	0	292	1051
07:45 AM	83	116	15	0	214	63	74	62	0	199	76	343	25	0	444	9	257	45	0	311	1168
Total	274	358	64	2	698	168	282	186	0	636	256	1055	221	2	1534	122	944	152	0	1218	4086
08:00 AM	78	72	10	0	160	38	43	55	0	136	75	285	9	0	369	15	254	35	0	304	969
08:15 AM	72	88	8	0	168	57	50	54	0	161	70	276	19	0	365	31	228	41	0	300	994
08:30 AM	49	95	8	1	153	47	43	49	0	139	68	248	19	0	335	17	230	36	0	283	910
08:45 AM	24	64	5	0	93	57	60	81	0	198	76	356	28	0	460	20	252	32	0	304	1055
Total	223	319	31	1	574	199	196	239	0	634	289	1165	75	0	1529	83	964	144	0	1191	3928
*** BREAK ***																					
12:00 PM	74	63	10	0	147	70	110	108	2	290	93	286	22	0	401	39	331	60	0	430	1268
12:15 PM	68	93	29	0	190	70	65	86	0	221	115	350	23	1	489	45	419	62	0	526	1426
12:30 PM	75	80	31	1	187	71	90	105	0	266	103	349	33	1	486	43	335	62	0	440	1379
12:45 PM	93	78	51	0	222	48	48	53	0	149	101	389	25	1	516	40	306	56	0	402	1289
Total	310	314	121	1	746	259	313	352	2	926	412	1374	103	3	1892	167	1391	240	0	1798	5362
01:00 PM	120	95	40	0	255	70	84	97	0	251	95	389	22	0	506	26	346	56	1	429	1441
01:15 PM	115	77	32	2	226	85	67	77	0	229	98	317	37	2	454	33	375	59	0	467	1376
01:30 PM	65	70	31	0	166	71	114	87	0	272	93	353	40	0	486	32	368	57	0	457	1381
01:45 PM	78	67	37	1	183	69	82	93	0	244	111	341	25	0	477	34	322	61	0	417	1321
Total	378	309	140	3	830	295	347	354	0	996	397	1400	124	2	1923	125	1411	233	1	1770	5519
02:00 PM	83	71	31	2	187	67	85	79	0	231	93	345	32	1	471	22	342	61	2	427	1316
02:15 PM	91	77	23	0	191	78	80	74	0	232	96	313	36	1	446	26	333	88	0	447	1316
02:30 PM	68	59	21	0	148	71	67	72	0	210	104	327	23	0	454	32	298	60	0	390	1202
02:45 PM	142	124	33	1	300	75	82	89	0	246	99	346	21	1	467	33	365	75	0	473	1486
Total	384	331	108	3	826	291	314	314	0	919	392	1331	112	3	1838	113	1338	284	2	1737	5320
03:00 PM	129	111	27	0	267	63	74	97	0	234	100	402	29	0	531	37	378	66	0	481	1513
03:15 PM	124	106	32	0	262	82	92	105	0	279	103	288	29	0	420	40	302	79	0	421	1382
03:30 PM	94	84	19	0	197	90	77	87	0	254	73	373	31	0	477	28	373	67	0	468	1396
03:45 PM	55	75	22	0	152	72	95	78	0	245	90	326	30	0	446	44	379	66	0	489	1332
Total	402	376	100	0	878	307	338	367	0	1012	366	1389	119	0	1874	149	1432	278	0	1859	5623
04:00 PM	90	78	20	0	188	75	107	110	0	292	72	331	33	1	437	34	321	49	0	404	1321
04:15 PM	123	81	9	0	213	72	73	63	0	208	93	361	24	0	478	35	365	52	0	452	1351
04:30 PM	103	91	25	0	219	65	92	97	4	258	89	328	22	0	439	17	284	54	0	355	1271
04:45 PM	84	89	18	0	191	89	126	89	0	304	92	342	20	0	454	23	313	68	1	405	1354
Total	400	339	72	0	811	301	398	359	4	1062	346	1362	99	1	1808	109	1283	223	1	1616	5297
05:00 PM	81	73	11	0	165	77	96	99	0	272	115	387	29	0	531	26	389	33	0	448	1416
05:15 PM	86	85	23	0	194	72	121	111	0	304	108	337	33	0	478	22	327	62	0	411	1387
05:30 PM	86	74	14	0	174	57	92	98	0	247	81	432	24	0	537	13	398	57	0	468	1426
05:45 PM	62	83	23	0	168	46	77	81	0	204	87	392	25	1	505	31	348	45	0	424	1301
Total	315	315	71	0	701	252	386	389	0	1027	391	1548	111	1	2051	92	1462	197	0	1751	5530
Grand Total	2686	2661	707	10	6064	2072	2574	2560	6	7212	2849	10624	964	12	14449	960	10225	1751	4	12940	40665
Apprch %	44.3	43.9	11.7	0.2		28.7	35.7	35.5	0.1		19.7	73.5	6.7	0.1		7.4	79	13.5	0		
Total %	6.6	6.5	1.7	0	14.9	5.1	6.3	6.3	0	17.7	7	26.1	2.4	0	35.5	2.4	25.1	4.3	0	31.8	

File Name : Not Named 1
Site Code : 00000000
Start Date : 12/15/2016
Page No : 2

	CLYDE MORRIS BLVD Northbound					CLYDE MORRIS BLVD Southbound					STATE ROAD 421 Eastbound					STATE ROAD 421 Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	**85**	**124**	**16**	0	**225**	45	60	59	0	164	67	273	**30**	0	370	14	240	38	0	292	1051
07:45 AM	83	116	15	0	214	**63**	**74**	**62**	0	**199**	**76**	**343**	25	0	**444**	9	**257**	**45**	0	**311**	**1168**
08:00 AM	78	72	10	0	160	38	43	55	0	136	75	285	9	0	369	15	254	35	0	304	969
08:15 AM	72	88	8	0	168	57	50	54	0	161	70	276	19	0	365	**31**	228	41	0	300	994
Total Volume	318	400	49	0	767	203	227	230	0	660	288	1177	83	0	1548	69	979	159	0	1207	4182
% App. Total	41.5	52.2	6.4	0		30.8	34.4	34.8	0		18.6	76	5.4	0		5.7	81.1	13.2	0		
PHF	.935	.806	.766	.000	.852	.806	.767	.927	.000	.829	.947	.858	.692	.000	.872	.556	.952	.883	.000	.970	.895
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	07:30 AM					07:30 AM					07:15 AM					07:15 AM					
+0 mins.	**85**	**124**	**16**	0	**225**	45	60	59	0	164	62	228	**76**	**1**	367	**43**	249	35	0	**327**	
+15 mins.	83	116	15	0	214	**63**	**74**	**62**	0	**199**	67	273	30	0	370	14	240	38	0	292	
+30 mins.	78	72	10	0	160	38	43	55	0	136	**76**	**343**	25	0	**444**	9	**257**	**45**	0	311	
+45 mins.	72	88	8	0	168	57	50	54	0	161	75	285	9	0	369	15	254	35	0	304	
Total Volume	318	400	49	0	767	203	227	230	0	660	280	1129	140	1	1550	81	1000	153	0	1234	
% App. Total	41.5	52.2	6.4	0		30.8	34.4	34.8	0		18.1	72.8	9	0.1		6.6	81	12.4	0		
PHF	.935	.806	.766	.000	.852	.806	.767	.927	.000	.829	.921	.823	.461	.250	.873	.471	.973	.850	.000	.943	
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:15 PM																					
12:15 PM	68	93	29	0	190	70	65	86	0	221	**115**	350	23	**1**	489	**45**	**419**	**62**	0	**526**	1426
12:30 PM	75	80	31	**1**	187	**71**	**90**	**105**	0	**266**	103	349	**33**	1	486	43	335	62	0	440	1379
12:45 PM	93	78	**51**	0	222	48	48	53	0	149	101	**389**	25	1	**516**	40	306	56	0	402	1289
01:00 PM	**120**	**95**	40	0	**255**	70	84	97	0	251	95	389	22	0	506	26	346	56	**1**	429	**1441**
Total Volume	356	346	151	1	854	259	287	341	0	887	414	1477	103	3	1997	154	1406	236	1	1797	5535
% App. Total	41.7	40.5	17.7	0.1		29.2	32.4	38.4	0		20.7	74	5.2	0.2		8.6	78.2	13.1	0.1		
PHF	.742	.911	.740	.250	.837	.912	.797	.812	.000	.834	.900	.949	.780	.750	.968	.856	.839	.952	.250	.854	.960
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	12:30 PM					01:00 PM					12:15 PM					12:00 PM					
+0 mins.	75	80	31	1	187	70	84	**97**	0	251	**115**	350	23	**1**	489	39	331	60	0	430	
+15 mins.	93	78	**51**	0	222	**85**	67	77	0	229	103	349	**33**	1	486	**45**	**419**	**62**	0	**526**	
+30 mins.	**120**	**95**	40	0	**255**	71	**114**	87	0	**272**	101	**389**	25	1	**516**	43	335	62	0	440	
+45 mins.	115	77	32	**2**	226	69	82	93	0	244	95	389	22	0	506	40	306	56	0	402	
Total Volume	403	330	154	3	890	295	347	354	0	996	414	1477	103	3	1997	167	1391	240	0	1798	
% App. Total	45.3	37.1	17.3	0.3		29.6	34.8	35.5	0		20.7	74	5.2	0.2		9.3	77.4	13.3	0		
PHF	.840	.868	.755	.375	.873	.868	.761	.912	.000	.915	.900	.949	.780	.750	.968	.928	.830	.968	.000	.855	
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:45 PM																					
02:45 PM	**142**	**124**	**33**	**1**	**300**	75	82	89	0	246	99	346	21	**1**	467	33	365	75	0	473	1486
03:00 PM	129	111	27	0	267	63	74	97	0	234	100	**402**	29	0	**531**	37	**378**	66	0	**481**	**1513**
03:15 PM	124	106	32	0	262	82	**92**	**105**	0	**279**	**103**	288	29	0	420	**40**	302	**79**	0	421	1382
03:30 PM	94	84	19	0	197	**90**	77	87	0	254	73	373	**31**	0	477	28	373	67	0	468	1396
Total Volume	489	425	111	1	1026	310	325	378	0	1013	375	1409	110	1	1895	138	1418	287	0	1843	5777
% App. Total	47.7	41.4	10.8	0.1		30.6	32.1	37.3	0		19.8	74.4	5.8	0.1		7.5	76.9	15.6	0		
PHF	.861	.857	.841	.250	.855	.861	.883	.900	.000	.908	.910	.876	.887	.250	.892	.863	.938	.908	.000	.958	.955
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	02:45 PM					04:30 PM					05:00 PM					03:00 PM					
+0 mins.	**142**	**124**	**33**	**1**	**300**	65	92	97	**4**	258	**115**	387	29	0	531	37	378	66	0	481	
+15 mins.	129	111	27	0	267	**89**	**126**	89	0	**304**	108	337	**33**	0	478	40	302	**79**	0	421	
+30 mins.	124	106	32	0	262	77	96	99	0	272	81	**432**	24	0	**537**	28	373	67	0	468	
+45 mins.	94	84	19	0	197	72	121	**111**	0	304	87	392	25	**1**	505	**44**	**379**	66	0	**489**	
Total Volume	489	425	111	1	1026	303	435	396	4	1138	391	1548	111	1	2051	149	1432	278	0	1859	
% App. Total	47.7	41.4	10.8	0.1		26.6	38.2	34.8	0.4		19.1	75.5	5.4	0		8	77	15	0		
PHF	.861	.857	.841	.250	.855	.851	.863	.892	.250	.936	.850	.896	.841	.250	.955	.847	.945	.880	.000	.950	

File Name : TMC (8-hr)
Site Code : 00000000
Start Date : 12/15/2016
Page No : 1

Groups Printed- Heavy Trucks

	CLYDE MORRIS BLVD Northbound					CLYDE MORRIS BLVD Southbound					STATE ROAD 421 Eastbound					STATE ROAD 421 Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	1	0	2	0	3	1	0	1	0	2	0	5	0	0	5	0	3	0	0	3	13
07:15 AM	0	1	0	1	2	2	0	2	0	4	3	4	0	1	8	0	9	0	0	9	23
07:30 AM	0	0	0	0	0	0	0	1	0	1	0	3	2	0	5	0	12	0	0	12	18
07:45 AM	1	0	0	0	1	1	0	1	0	2	1	4	0	0	5	0	10	1	0	11	19
Total	2	1	2	1	6	4	0	5	0	9	4	16	2	1	23	0	34	1	0	35	73
08:00 AM	0	0	0	0	0	2	2	1	0	5	0	13	1	0	14	0	9	0	0	9	28
08:15 AM	5	0	0	0	5	0	0	1	0	1	1	6	1	0	8	0	13	1	0	14	28
08:30 AM	2	0	0	1	3	1	0	1	0	2	0	6	2	0	8	0	5	3	0	8	21
08:45 AM	1	0	0	0	1	0	0	0	0	0	1	4	1	0	6	0	14	0	0	14	21
Total	8	0	0	1	9	3	2	3	0	8	2	29	5	0	36	0	41	4	0	45	98
*** BREAK ***																					
12:00 PM	1	0	0	0	1	0	0	1	0	1	1	5	0	0	6	1	2	0	0	3	11
12:15 PM	0	0	1	0	1	1	0	0	0	1	1	7	0	0	8	0	4	0	0	4	14
12:30 PM	1	1	0	0	2	0	1	0	0	1	2	5	1	0	8	0	7	2	0	9	20
12:45 PM	0	1	1	0	2	0	1	0	0	1	1	10	0	1	12	1	4	0	0	5	20
Total	2	2	2	0	6	1	2	1	0	4	5	27	1	1	34	2	17	2	0	21	65
01:00 PM	3	0	0	0	3	0	0	0	0	0	1	5	0	0	6	0	3	0	1	4	13
01:15 PM	1	1	0	2	4	1	0	2	0	3	0	7	0	0	7	0	5	0	0	5	19
01:30 PM	0	0	0	0	0	0	0	0	0	0	1	2	1	0	4	0	3	0	0	3	7
01:45 PM	0	0	0	1	1	2	1	0	0	3	0	6	1	0	7	0	6	1	0	7	18
Total	4	1	0	3	8	3	1	2	0	6	2	20	2	0	24	0	17	1	1	19	57
02:00 PM	0	0	0	0	0	0	2	1	0	3	2	3	0	0	5	0	5	1	0	6	14
02:15 PM	2	0	1	0	3	1	1	3	0	5	4	3	0	0	7	1	6	1	0	8	23
02:30 PM	1	0	0	0	1	2	1	0	0	3	0	3	0	0	3	0	3	0	0	3	10
02:45 PM	0	0	0	0	0	0	3	0	0	3	1	4	0	1	6	0	9	0	0	9	18
Total	3	0	1	0	4	3	7	4	0	14	7	13	0	1	21	1	23	2	0	26	65
03:00 PM	2	3	0	0	5	0	0	1	0	1	0	2	0	0	2	0	4	1	0	5	13
03:15 PM	1	1	0	0	2	0	0	2	0	2	1	3	0	0	4	1	6	1	0	8	16
03:30 PM	1	0	0	0	1	1	0	0	0	1	0	5	1	0	6	0	2	0	0	2	10
03:45 PM	0	0	0	0	0	0	0	0	0	0	2	5	0	0	7	0	4	0	0	4	11
Total	4	4	0	0	8	1	0	3	0	4	3	15	1	0	19	1	16	2	0	19	50
04:00 PM	0	0	0	0	0	0	0	3	0	3	1	7	1	0	9	0	10	1	0	11	23
04:15 PM	1	1	0	0	2	0	0	1	0	1	0	4	0	0	4	0	6	0	0	6	13
04:30 PM	0	1	0	0	1	0	0	1	0	1	0	0	1	0	1	0	1	0	0	1	4
04:45 PM	0	2	0	0	2	1	0	2	0	3	0	7	1	0	8	0	3	0	1	4	17
Total	1	4	0	0	5	1	0	7	0	8	1	18	3	0	22	0	20	1	1	22	57
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	5	1	0	6	0	2	0	0	2	8
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	4	2	0	6	7
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	5
05:45 PM	3	0	0	0	3	0	0	0	0	0	0	5	2	1	8	0	3	0	0	3	14
Total	3	0	0	0	3	0	0	0	0	0	0	15	4	1	20	0	9	2	0	11	34
Grand Total	27	12	5	5	49	16	12	25	0	53	24	153	18	4	199	4	177	15	2	198	499
Apprch %	55.1	24.5	10.2	10.2		30.2	22.6	47.2	0		12.1	76.9	9	2		2	89.4	7.6	1		
Total %	5.4	2.4	1	1	9.8	3.2	2.4	5	0	10.6	4.8	30.7	3.6	0.8	39.9	0.8	35.5	3	0.4	39.7	

File Name : TMC (8-hr)
Site Code : 00000000
Start Date : 12/15/2016
Page No : 2

	CLYDE MORRIS BLVD Northbound					CLYDE MORRIS BLVD Southbound					STATE ROAD 421 Eastbound					STATE ROAD 421 Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	0	0	0	**2**	**2**	**1**	0	**5**	0	**13**	1	0	**14**	0	9	0	0	9	**28**
08:15 AM	**5**	0	0	0	**5**	0	0	1	0	1	**1**	6	1	0	8	0	13	1	0	**14**	28
08:30 AM	2	0	0	**1**	3	1	0	1	0	2	0	6	**2**	0	8	0	5	**3**	0	8	21
08:45 AM	1	0	0	0	1	0	0	0	0	0	1	4	1	0	6	0	**14**	0	0	14	21
Total Volume	8	0	0	1	9	3	2	3	0	8	2	29	5	0	36	0	41	4	0	45	98
% App. Total	88.9	0	0	11.1		37.5	25	37.5	0		5.6	80.6	13.9	0		0	91.1	8.9	0		
PHF	.400	.000	.000	.250	.450	.375	.250	.750	.000	.400	.500	.558	.625	.000	.643	.000	.732	.333	.000	.804	.875

Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM					07:15 AM					08:00 AM					07:30 AM				
+0 mins.	1	0	0	0	1	**2**	0	**2**	0	4	0	**13**	1	0	**14**	0	12	0	0	12
+15 mins.	0	0	0	0	0	0	0	1	0	1	**1**	6	1	0	8	0	10	**1**	0	11
+30 mins.	**5**	0	0	0	**5**	1	0	1	0	2	0	6	**2**	0	8	0	9	0	0	9
+45 mins.	2	0	0	**1**	3	2	**2**	1	0	**5**	1	4	1	0	6	0	**13**	1	0	**14**
Total Volume	8	0	0	1	9	5	2	5	0	12	2	29	5	0	36	0	44	2	0	46
% App. Total	88.9	0	0	11.1		41.7	16.7	41.7	0		5.6	80.6	13.9	0		0	95.7	4.3	0	
PHF	.400	.000	.000	.250	.450	.625	.250	.625	.000	.600	.500	.558	.625	.000	.643	.000	.846	.500	.000	.821

Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 12:30 PM

12:30 PM	1	**1**	0	0	2	0	**1**	0	0	1	**2**	5	**1**	0	8	0	**7**	**2**	0	**9**	**20**
12:45 PM	0	1	**1**	0	2	0	1	0	0	1	1	**10**	0	**1**	**12**	**1**	4	0	0	5	20
01:00 PM	**3**	0	0	0	3	0	0	0	0	0	1	5	0	0	6	0	3	0	**1**	4	13
01:15 PM	1	1	0	**2**	**4**	**1**	0	**2**	0	**3**	0	7	0	0	7	0	5	0	0	5	19
Total Volume	5	3	1	2	11	1	2	2	0	5	4	27	1	1	33	1	19	2	1	23	72
% App. Total	45.5	27.3	9.1	18.2		20	40	40	0		12.1	81.8	3	3		4.3	82.6	8.7	4.3		
PHF	.417	.750	.250	.250	.688	.250	.500	.250	.000	.417	.500	.675	.250	.250	.688	.250	.679	.250	.250	.639	.900

Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:30 PM					01:00 PM					12:00 PM					12:30 PM				
+0 mins.	1	**1**	0	0	2	0	0	0	0	0	1	5	0	0	6	0	**7**	**2**	0	**9**
+15 mins.	0	1	**1**	0	2	1	0	**2**	0	**3**	1	7	0	0	8	**1**	4	0	0	5
+30 mins.	**3**	0	0	0	3	0	0	0	0	0	**2**	5	**1**	0	8	0	3	0	**1**	4
+45 mins.	1	1	0	**2**	**4**	**2**	**1**	0	0	3	1	**10**	0	**1**	**12**	0	5	0	0	5
Total Volume	5	3	1	2	11	3	1	2	0	6	5	27	1	1	34	1	19	2	1	23
% App. Total	45.5	27.3	9.1	18.2		50	16.7	33.3	0		14.7	79.4	2.9	2.9		4.3	82.6	8.7	4.3	
PHF	.417	.750	.250	.250	.688	.375	.250	.250	.000	.500	.625	.675	.250	.250	.708	.250	.679	.250	.250	.639

Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 02:00 PM

02:00 PM	0	0	0	0	0	0	2	1	0	3	2	3	0	0	5	0	5	**1**	0	6	14
02:15 PM	**2**	0	**1**	0	**3**	1	1	**3**	0	**5**	**4**	3	0	0	**7**	**1**	6	1	0	8	**23**
02:30 PM	1	0	0	0	1	**2**	1	0	0	3	0	3	0	0	3	0	3	0	0	3	10
02:45 PM	0	0	0	0	0	0	**3**	0	0	3	1	**4**	0	**1**	6	0	**9**	0	0	**9**	18
Total Volume	3	0	1	0	4	3	7	4	0	14	7	13	0	1	21	1	23	2	0	26	65
% App. Total	75	0	25	0		21.4	50	28.6	0		33.3	61.9	0	4.8		3.8	88.5	7.7	0		
PHF	.375	.000	.250	.000	.333	.375	.583	.333	.000	.700	.438	.813	.000	.250	.750	.250	.639	.500	.000	.722	.707

Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	02:15 PM					02:00 PM					03:15 PM					02:00 PM				
+0 mins.	**2**	0	**1**	0	3	0	2	1	0	3	1	3	0	0	4	0	5	**1**	0	6
+15 mins.	1	0	0	0	1	1	1	**3**	0	**5**	0	5	**1**	0	6	**1**	6	1	0	8
+30 mins.	0	0	0	0	0	**2**	1	0	0	3	**2**	5	0	0	7	0	3	0	0	3
+45 mins.	2	**3**	0	0	**5**	0	**3**	0	0	3	1	**7**	1	0	**9**	0	**9**	0	0	**9**
Total Volume	5	3	1	0	9	3	7	4	0	14	4	20	2	0	26	1	23	2	0	26
% App. Total	55.6	33.3	11.1	0		21.4	50	28.6	0		15.4	76.9	7.7	0		3.8	88.5	7.7	0	
PHF	.625	.250	.250	.000	.450	.375	.583	.333	.000	.700	.500	.714	.500	.000	.722	.250	.639	.500	.000	.722

File Name : TMC (8-hr)
Site Code : 00000000
Start Date : 12/15/2016
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Groups Printed- UTurns

	CLYDE MORRIS BLVD Northbound					CLYDE MORRIS BLVD Southbound					STATE ROAD 421 Eastbound					STATE ROAD 421 Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	2
07:15 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	1	0	0	0	1	6
07:30 AM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	1	0	0	0	1	7
07:45 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	2	0	0	0	2	6
Total	0	0	0	0	0	0	0	0	0	0	16	0	0	0	16	5	0	0	0	5	21
08:00 AM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	6
08:15 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	1	0	0	0	1	5
08:30 AM	0	0	0	0	0	0	0	0	0	0	10	0	0	0	10	2	0	0	0	2	12
08:45 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	8	2	0	0	0	2	10
Total	0	0	0	0	0	0	0	0	0	0	28	0	0	0	28	5	0	0	0	5	33
*** BREAK ***																					
12:00 PM	0	0	0	0	0	0	0	0	0	0	14	0	0	0	14	6	0	0	0	6	20
12:15 PM	0	0	0	0	0	0	0	0	0	0	21	0	0	0	21	3	0	0	0	3	24
12:30 PM	0	0	0	0	0	0	0	0	0	0	15	0	0	0	15	3	0	0	0	3	18
12:45 PM	0	0	0	0	0	0	0	0	0	0	11	0	0	0	11	5	0	0	0	5	16
Total	0	0	0	0	0	0	0	0	0	0	61	0	0	0	61	17	0	0	0	17	78
01:00 PM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	5	0	0	0	5	11
01:15 PM	0	0	0	0	0	0	0	0	0	0	10	0	0	0	10	7	0	0	0	7	17
01:30 PM	0	0	0	0	0	0	0	0	0	0	11	0	0	0	11	4	0	0	0	4	15
01:45 PM	0	0	0	0	0	0	0	0	0	0	20	0	0	0	20	4	0	0	0	4	24
Total	0	0	0	0	0	0	0	0	0	0	47	0	0	0	47	20	0	0	0	20	67
02:00 PM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	3	0	0	0	3	9
02:15 PM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	8	2	0	0	0	2	10
02:30 PM	0	0	0	0	0	0	0	0	0	0	12	0	0	0	12	2	0	0	0	2	14
02:45 PM	0	0	0	0	0	0	0	0	0	0	15	0	0	0	15	6	0	0	0	6	21
Total	0	0	0	0	0	0	0	0	0	0	41	0	0	0	41	13	0	0	0	13	54
03:00 PM	0	0	0	0	0	0	0	0	0	0	11	0	0	0	11	2	0	0	0	2	13
03:15 PM	0	0	0	0	0	0	0	0	0	0	20	0	0	0	20	4	0	0	0	4	24
03:30 PM	0	0	0	0	0	0	0	0	0	0	10	0	0	0	10	1	0	0	0	1	11
03:45 PM	0	0	0	0	0	0	0	0	0	0	10	0	0	0	10	6	0	0	0	6	16
Total	0	0	0	0	0	0	0	0	0	0	51	0	0	0	51	13	0	0	0	13	64
04:00 PM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	5	0	0	0	5	11
04:15 PM	0	0	0	0	0	0	0	0	0	0	11	0	0	0	11	5	0	0	0	5	16
04:30 PM	0	0	0	0	0	0	0	0	0	0	13	0	0	0	13	2	0	0	0	2	15
04:45 PM	0	0	0	0	0	0	0	0	0	0	17	0	0	0	17	4	0	0	0	4	21
Total	0	0	0	0	0	0	0	0	0	0	47	0	0	0	47	16	0	0	0	16	63
05:00 PM	0	0	0	0	0	0	0	0	0	0	19	0	0	0	19	5	0	0	0	5	24
05:15 PM	1	0	0	0	1	0	0	0	0	0	20	0	0	0	20	4	0	0	0	4	25
05:30 PM	0	0	0	0	0	0	0	0	0	0	10	0	0	0	10	0	0	0	0	0	10
05:45 PM	0	0	0	0	0	0	0	0	0	0	18	0	0	0	18	2	0	0	0	2	20
Total	1	0	0	0	1	0	0	0	0	0	67	0	0	0	67	11	0	0	0	11	79
Grand Total	1	0	0	0	1	0	0	0	0	0	358	0	0	0	358	100	0	0	0	100	459
Apprch %	100	0	0	0		0	0	0	0		100	0	0	0		100	0	0	0		
Total %	0.2	0	0	0	0.2	0	0	0	0	0	78	0	0	0	78	21.8	0	0	0	21.8	

File Name : TMC (8-hr)
Site Code : 00000000
Start Date : 12/15/2016
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	CLYDE MORRIS BLVD Northbound					CLYDE MORRIS BLVD Southbound					STATE ROAD 421 Eastbound					STATE ROAD 421 Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	6
08:15 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	1	0	0	0	1	5
08:30 AM	0	0	0	0	0	0	0	0	0	0	**10**	0	0	0	**10**	**2**	0	0	0	**2**	**12**
08:45 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	8	2	0	0	0	2	10
Total Volume	0	0	0	0	0	0	0	0	0	0	28	0	0	0	28	5	0	0	0	5	33
% App. Total	0	0	0	0		0	0	0	0		100	0	0	0		100	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.700	.000	.000	.000	.700	.625	.000	.000	.000	.625	.688

Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM					07:00 AM					08:00 AM					07:00 AM					
+0 mins.	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	1	0	0	0	1	
+15 mins.	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	1	0	0	0	1	
+30 mins.	0	0	0	0	0	0	0	0	0	0	**10**	0	0	0	**10**	1	0	0	0	1	
+45 mins.	0	0	0	0	0	0	0	0	0	0	8	0	0	0	8	**2**	0	0	0	**2**	
Total Volume	0	0	0	0	0	0	0	0	0	0	28	0	0	0	28	5	0	0	0	5	
% App. Total	0	0	0	0		0	0	0	0		100	0	0	0		100	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.700	.000	.000	.000	.700	.625	.000	.000	.000	.625	

Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 12:00 PM

12:00 PM	0	0	0	0	0	0	0	0	0	0	14	0	0	0	14	**6**	0	0	0	**6**	20
12:15 PM	0	0	0	0	0	0	0	0	0	0	**21**	0	0	0	**21**	3	0	0	0	3	**24**
12:30 PM	0	0	0	0	0	0	0	0	0	0	15	0	0	0	15	3	0	0	0	3	18
12:45 PM	0	0	0	0	0	0	0	0	0	0	11	0	0	0	11	5	0	0	0	5	16
Total Volume	0	0	0	0	0	0	0	0	0	0	61	0	0	0	61	17	0	0	0	17	78
% App. Total	0	0	0	0		0	0	0	0		100	0	0	0		100	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.726	.000	.000	.000	.726	.708	.000	.000	.000	.708	.813

Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	10:00 AM					10:00 AM					12:00 PM					12:45 PM					
+0 mins.	0	0	0	0	0	0	0	0	0	0	14	0	0	0	14	5	0	0	0	5	
+15 mins.	0	0	0	0	0	0	0	0	0	0	**21**	0	0	0	**21**	5	0	0	0	5	
+30 mins.	0	0	0	0	0	0	0	0	0	0	15	0	0	0	15	**7**	0	0	0	**7**	
+45 mins.	0	0	0	0	0	0	0	0	0	0	11	0	0	0	11	4	0	0	0	4	
Total Volume	0	0	0	0	0	0	0	0	0	0	61	0	0	0	61	21	0	0	0	21	
% App. Total	0	0	0	0		0	0	0	0		100	0	0	0		100	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.726	.000	.000	.000	.726	.750	.000	.000	.000	.750	

Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 04:30 PM

04:30 PM	0	0	0	0	0	0	0	0	0	0	13	0	0	0	13	2	0	0	0	2	15
04:45 PM	0	0	0	0	0	0	0	0	0	0	17	0	0	0	17	4	0	0	0	4	21
05:00 PM	0	0	0	0	0	0	0	0	0	0	19	0	0	0	19	**5**	0	0	0	**5**	24
05:15 PM	**1**	0	0	0	**1**	0	0	0	0	0	**20**	0	0	0	**20**	4	0	0	0	4	**25**
Total Volume	1	0	0	0	1	0	0	0	0	0	69	0	0	0	69	15	0	0	0	15	85
% App. Total	100	0	0	0		0	0	0	0		100	0	0	0		100	0	0	0		
PHF	.250	.000	.000	.000	.250	.000	.000	.000	.000	.000	.863	.000	.000	.000	.863	.750	.000	.000	.000	.750	.850

Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM					02:00 PM					04:30 PM					03:45 PM					
+0 mins.	0	0	0	0	0	0	0	0	0	0	13	0	0	0	13	**6**	0	0	0	**6**	
+15 mins.	0	0	0	0	0	0	0	0	0	0	17	0	0	0	17	5	0	0	0	5	
+30 mins.	0	0	0	0	0	0	0	0	0	0	19	0	0	0	19	5	0	0	0	5	
+45 mins.	**1**	0	0	0	**1**	0	0	0	0	0	**20**	0	0	0	**20**	2	0	0	0	2	
Total Volume	1	0	0	0	1	0	0	0	0	0	69	0	0	0	69	18	0	0	0	18	
% App. Total	100	0	0	0		0	0	0	0		100	0	0	0		100	0	0	0		
PHF	.250	.000	.000	.000	.250	.000	.000	.000	.000	.000	.863	.000	.000	.000	.863	.750	.000	.000	.000	.750	

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: Clyde Morris Blvd. @ Dunlawton Ave.
Port Orange

FREE:

DATE: 1/17/2017

SIGNAL #: 191

CO-ORD: X

Design By: M. Tobin

NETWORK #: Port Orange Area Network # 60

Controller Timing Chart

PHASE	1	2	3	4	5	6	7	8	
DIRECTION	EBL	WB	SBL	NB	WBL	EB	NBL	SB	
TURN TYPE	PROT	-	PROT	-	PROT	-	PROT	-	
MIN GREEN	5	15	5	10	5	15	5	10	
WALK		7		8		7		8	
PED CLR		26		37		28		34	
YELLOW	5.5	5.5	5.0	4.5	5.5	5.5	4.5	5.0	
RED CLR	2.5	2.0	2.5	3.0	2.5	2.0	2.5	2.5	
EXTENSION	4	4	3	4	4	4	3	4	
MAX 1	25	50	25	30	25	50	25	30	
MAX 2	32	50	29	55	28	58	32	53	
MAX 3		-		-		-		-	
DYM MAX		60				60			
DYM STP		10				10			
RECALL		MIN		-		MIN		-	
DETECTOR	LOCK	LOCK	NON-LOCK	NON-LOCK	LOCK	LOCK	NON-LOCK	NON-LOCK	
FLASH	RED	YELLOW	RED	RED	RED	YELLOW	RED	RED	

COORDINATION TIMINGS

PATTERN	1	2	3	4	5	6	7	8	
CYCLE	150	150	160	-	-	-	-	-	
OFFSET	7	6	4	-	-	-	-	-	

PHASE	1	2	3	4	5	6	7	8	
PATTERN 1	26	48	23	53	22	52	26	50	
PATTERN 2	30	45	22	53	19	56	24	51	
PATTERN 3	29	51	27	53	26	54	30	50	
PATTERN 4	-	-	-	-	-	-	-	-	
PATTERN 5	-	-	-	-	-	-	-	-	
PATTERN 6	-	-	-	-	-	-	-	-	
PATTERN 7	-	-	-	-	-	-	-	-	

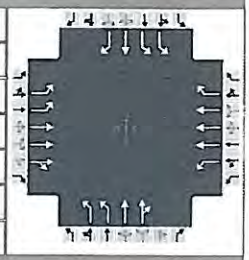
Controller IP	10.40.61.25	Switch IP	10.40.60.25	Camera IP	10.40.62.25
Controller Gateway	10.40.61.1	Switch Gateway	10.40.60.1	Camera Gateway	10.40.62.1

REMARKS:

1	2	3	4
5	6	7	8

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	1/16/2017	Area Type	Other
Jurisdiction		Time Period	7:30 to 8:30 AM	PHF	0.90
Intersection	Clyde Morris Boulevard	Analysis Year	2017	Analysis Period	1> 7:00
File Name	SR 421 at CMB - Existing - AM.xus				
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	288	1177	83	69	979	159	318	400	49	203	227	230

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.1	0.1	59.0	11.9	5.0	27.4	
Yellow	5.5	5.5	5.5	5.0	0.0	5.0	
Red	2.5	2.5	2.0	2.5	0.0	2.5	

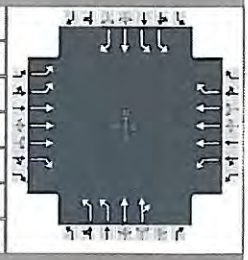
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	2.0	4.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	24.2	74.6	16.1	66.5	24.3	39.9	19.4	34.9
Change Period, (*Y*+*Rc*), s	8.0	7.5	8.0	7.5	7.0	7.5	7.5	7.5
Max Allow Headway (*MAH*), s	3.0	0.0	3.0	0.0	3.0	3.0	3.0	3.0
Queue Clearance Time (*gs*), s	15.6		8.3		17.2	20.5	11.7	25.7
Green Extension Time (*ge*), s	0.7	0.0	0.1	0.0	0.2	1.8	0.2	1.8
Phase Call Probability	1.00		0.96		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.00		1.00	0.00	0.40	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	320	944	456	77	1088	177	353	253	246	226	252	256
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1740	1863	1797	1792	1643	1594	1723	1881	1809	1723	1881	1579
Queue Service Time (*gs*), s	13.6	23.2	24.3	6.3	25.8	11.3	15.2	18.3	18.5	9.7	19.0	23.7
Cycle Queue Clearance Time (*gc*), s	13.6	23.2	24.3	6.3	25.8	11.3	15.2	18.3	18.5	9.7	19.0	23.7
Capacity (*c*), veh/h	376	1667	804	97	1939	627	398	407	391	272	344	289
Volume-to-Capacity Ratio (*X*)	0.851	0.566	0.567	0.793	0.561	0.282	0.887	0.622	0.628	0.829	0.733	0.885
Available Capacity (*ca*), veh/h	805	1667	804	367	1939	627	436	616	593	356	554	465
Back of Queue (*Q*), veh/ln (95th percentile)	10.1	13.8	14.8	5.4	15.6	8.0	12.0	13.4	13.1	8.1	13.9	15.0
Overflow Queue (*Q3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio (*RQ*) (95th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (*d1*), s/veh	65.7	21.4	23.2	70.1	35.4	31.0	65.4	53.2	53.3	68.1	57.8	59.7
Incremental Delay (*d2*), s/veh	2.1	1.4	2.9	5.4	1.2	1.1	17.2	0.6	0.6	9.3	1.1	7.2
Initial Queue Delay (*d3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	67.8	22.8	26.1	75.5	36.6	32.2	82.6	53.8	53.9	77.4	59.0	67.0
Level of Service (LOS)	E	C	C	E	D	C	F	D	D	E	E	E
Approach Delay, s/veh / LOS	32.1	C		38.2	D		65.8	E		67.4	E	
Intersection Delay, s/veh / LOS	45.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.6	B	3.0	C	3.4	C	3.4	C
Bicycle LOS Score / LOS	1.4	A	1.2	A	1.2	A	1.7	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	1/16/2017	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	Clyde Morris Boulevard	Analysis Year	2017	Analysis Period	1> 7:00
File Name	SR 421 at CMB - Existing - AM - Improved.xus				
Project Description	With EBR turn lane				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	288	1177	83	69	979	159	318	400	49	203	227	230

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.1	0.1	59.0	11.9	5.0	27.4	
Yellow	5.5	5.5	5.5	5.0	0.0	5.0	
Red	2.5	2.5	2.0	2.5	0.0	2.5	

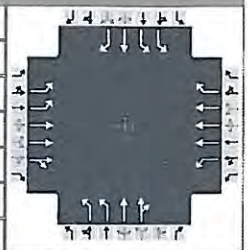
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	24.2	74.6	16.1	66.5	24.3	39.9	19.4	34.9
Change Period, (*Y+Rc*), s	8.0	7.5	8.0	7.5	7.0	7.5	7.5	7.5
Max Allow Headway (*MAH*), s	3.0	0.0	3.0	0.0	3.0	3.0	3.0	3.0
Queue Clearance Time (g_s), s	15.6		8.3		17.2	20.5	11.7	25.7
Green Extension Time (g_e), s	0.7	0.0	0.1	0.0	0.2	1.8	0.2	1.8
Phase Call Probability	1.00		0.96		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.00		1.00	0.00	0.40	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	320	1308	92	77	1088	177	353	253	246	226	252	256
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1740	1691	1533	1792	1643	1594	1723	1881	1809	1723	1881	1579
Queue Service Time (g_s), s	13.6	23.8	5.3	6.3	25.8	11.3	15.2	18.3	18.5	9.7	19.0	23.7
Cycle Queue Clearance Time (g_c), s	13.6	23.8	5.3	6.3	25.8	11.3	15.2	18.3	18.5	9.7	19.0	23.7
Capacity (*c*), veh/h	376	2271	686	97	1939	627	398	407	391	272	344	289
Volume-to-Capacity Ratio (*X*)	0.851	0.576	0.134	0.793	0.561	0.282	0.887	0.622	0.628	0.829	0.733	0.885
Available Capacity (c_a), veh/h	805	2271	686	367	1939	627	436	616	593	356	554	465
Back of Queue (*Q*), veh/ln (95th percentile)	10.1	12.9	3.6	5.4	15.6	8.0	12.0	13.4	13.1	8.1	13.9	15.0
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio (*RQ*) (95th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	65.7	21.5	24.4	70.1	35.4	31.0	65.4	53.2	53.3	68.1	57.8	59.7
Incremental Delay (d_2), s/veh	2.1	1.1	0.4	5.4	1.2	1.1	17.2	0.6	0.6	9.3	1.1	7.2
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	67.8	22.6	24.8	75.5	36.6	32.2	82.6	53.8	53.9	77.4	59.0	67.0
Level of Service (LOS)	E	C	C	E	D	C	F	D	D	E	E	E
Approach Delay, s/veh / LOS	31.1	C		38.2	D		65.8	E		67.4	E	
Intersection Delay, s/veh / LOS	45.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.6	B	3.0	C	3.4	C	3.5	C
Bicycle LOS Score / LOS	1.4	A	1.2	A	1.2	A	1.7	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	1/16/2017	Area Type	Other
Jurisdiction		Time Period	2:45 to 3:45 PM	PHF	0.96
Intersection	Clyde Morris Boulevard	Analysis Year	2017	Analysis Period	1> 7:00
File Name	SR 421 at CMB - Existing - PM.xus				
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	375	1409	110	138	1418	287	489	425	111	310	325	378

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	13.9	4.9	42.3	15.5	3.0	39.9	
Yellow	5.5	0.0	5.5	5.0	0.0	5.0	
Red	2.5	0.0	2.0	2.5	0.0	2.5	

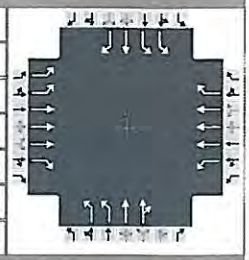
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	2.0	4.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	26.8	54.7	21.9	49.8	26.0	50.4	23.0	47.4
Change Period, (*Y+Rc*), s	8.0	7.5	8.0	7.5	7.0	7.5	7.5	7.5
Max Allow Headway (*MAH*), s	3.0	0.0	3.0	0.0	3.0	3.1	3.0	3.1
Queue Clearance Time (g_s), s	18.6		13.9		21.0	21.6	15.9	38.6
Green Extension Time (g_e), s	0.2	0.0	0.1	0.0	0.0	2.5	0.0	1.3
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.00	1.00	0.80

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	391	1069	514	144	1477	299	509	288	271	323	339	394
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1740	1863	1791	1792	1643	1594	1723	1881	1747	1723	1881	1579
Queue Service Time (g_s), s	16.6	41.3	41.3	11.9	42.3	24.9	19.0	19.3	19.6	13.9	24.2	36.6
Cycle Queue Clearance Time (g_c), s	16.6	41.3	41.3	11.9	42.3	24.9	19.0	19.3	19.6	13.9	24.2	36.6
Capacity (*c*), veh/h	436	1173	564	166	1390	450	436	538	499	356	500	420
Volume-to-Capacity Ratio (*X*)	0.895	0.911	0.911	0.866	1.063	0.665	1.167	0.535	0.542	0.907	0.677	0.938
Available Capacity (c_a), veh/h	478	1173	564	198	1390	450	436	571	530	356	533	447
Back of Queue (*Q*), veh/ln (95th percentile)	13.0	28.1	28.9	10.7	29.9	16.0	21.6	13.9	13.2	11.7	17.1	24.0
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio (*RQ*) (95th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	64.6	49.4	49.4	67.1	46.8	47.6	65.5	45.2	45.3	66.5	49.3	53.9
Incremental Delay (d_2), s/veh	17.1	12.1	21.4	24.6	42.7	7.6	97.5	0.3	0.4	25.4	2.4	26.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	81.7	61.4	70.7	91.7	89.5	55.2	163.0	45.5	45.7	92.0	51.7	80.0
Level of Service (LOS)	F	E	E	F	F	E	F	D	D	F	D	E
Approach Delay, s/veh / LOS	67.9	E		84.3	F		101.6	F		74.6	E	
Intersection Delay, s/veh / LOS	80.3						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.6	B	3.0	C	3.4	C	3.4	C
Bicycle LOS Score / LOS	1.6	A	1.5	A	1.4	A	2.2	B

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	1/16/2017	Area Type	Other
Jurisdiction		Time Period		PHF	0.96
Intersection	Clyde Morris Boulevard	Analysis Year	2017	Analysis Period	1> 7:00
File Name	SR 421 at CMB - Existing - PM - Improved.xus				
Project Description	with EBR turn lane				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	375	1409	110	138	1418	287	489	425	111	310	325	378

Signal Information					EB			WB			NB			SB		
Cycle, s	150.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	13.9	4.9		42.3	15.5	3.0	39.9					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	5.5	0.0		5.5	5.0	0.0	5.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.5	0.0		2.0	2.5	0.0	2.5					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	26.8	54.7	21.9	49.8	26.0	50.4	23.0	47.4
Change Period, *(Y+Rc)*, s	8.0	7.5	8.0	7.5	7.0	7.5	7.5	7.5
Max Allow Headway *(MAH)*, s	3.0	0.0	3.0	0.0	3.0	3.1	3.0	3.1
Queue Clearance Time *(g_s)*, s	18.6		13.9		21.0	21.6	15.9	38.6
Green Extension Time *(g_e)*, s	0.2	0.0	0.1	0.0	0.0	2.5	0.0	1.3
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.00	1.00	0.80

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	391	1468	115	144	1477	299	509	288	271	323	339	394
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1740	1691	1533	1792	1643	1594	1723	1881	1747	1723	1881	1579
Queue Service Time *(g_s)*, s	16.6	41.8	8.3	11.9	42.3	24.9	19.0	19.3	19.6	13.9	24.2	36.6
Cycle Queue Clearance Time *(g_c)*, s	16.6	41.8	8.3	11.9	42.3	24.9	19.0	19.3	19.6	13.9	24.2	36.6
Capacity (*c*), veh/h	436	1597	483	166	1390	450	436	538	499	356	500	420
Volume-to-Capacity Ratio (*X*)	0.895	0.919	0.237	0.866	1.063	0.665	1.167	0.535	0.542	0.907	0.677	0.938
Available Capacity *(c_a)*, veh/h	478	1597	483	198	1390	450	436	571	530	356	533	447
Back of Queue (*Q*), veh/ln (95th percentile)	13.0	25.8	5.8	10.7	29.9	16.0	21.6	13.9	13.2	11.7	17.1	24.0
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (95th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay *(d_1)*, s/veh	64.6	49.5	38.1	67.1	46.8	47.6	65.5	45.2	45.3	66.5	49.3	53.9
Incremental Delay *(d_2)*, s/veh	17.1	10.0	1.2	24.6	42.7	7.6	97.5	0.3	0.4	25.4	2.4	26.1
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	81.7	59.5	39.2	91.7	89.5	55.2	163.0	45.5	45.7	92.0	51.7	80.0
Level of Service (LOS)	F	E	D	F	F	E	F	D	D	F	D	E
Approach Delay, s/veh / LOS	62.8	E		84.3	F		101.6	F		74.6	E	
Intersection Delay, s/veh / LOS	78.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.6	B	3.0	C	3.4	C	3.5	C
Bicycle LOS Score / LOS	1.6	A	1.5	A	1.4	A	2.2	B

STATE PROJ. NO.	SHEET NO.
79230-3504	41

RET NO.	L	R	Δ		
1	47.69'	30.00'	91°05'00.2"	54' LT P.O.C. STA 50+91.91	24' LT P.T. STA 31+09.60
2	46.20'	30.00'	88°13'49.2"	23' RT P.T. STA 31+09.35	54' LT P.O.C. STA 51+91.05

CONST BALED HAY
3' INSIDE RW LINE
STA 49+00 TO 51+00

EXIST RW R=2009.88' L=742.79'

N 60°02'24" W

47' RDWY

CONST 5' SW

RET 1

RET 2

30' R

CONST TYPE F C&G

RW=79.85'

38' RDWY

SR 421

S-44

S-46

S-48

CONST TYPE E C&G

49 50 51 52 53 54 55

62' RDWY

RW=91.67'

15" PIPE

℄ CONST SR 421

℄ SURVEY

18" PIPE

CONST 5' SW

CONST TYPE F C&G

CONST TYPE E C&G

S-45

30" PIPE

S-47

S-50

S-49

S-51

24" PIPE

P.O.C. ℄ CONST STA 51+41.15

P.O.C. ℄ SURVEY STA 51+34.79
• ℄ SURVEY STA 30+00 (DRIVEWAY)

EXIST RW R=1841.86' L=913.47'

FOR CURVE DATA
CURVES ② & ④
SEE SHEETS 39 & 18

REVISIONS												
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	

	NAME	DATE		NAME	DATE
DESIGNED BY			DRAWN BY		
CHECKED BY			CHECKED BY		
SUPERVISED BY :					

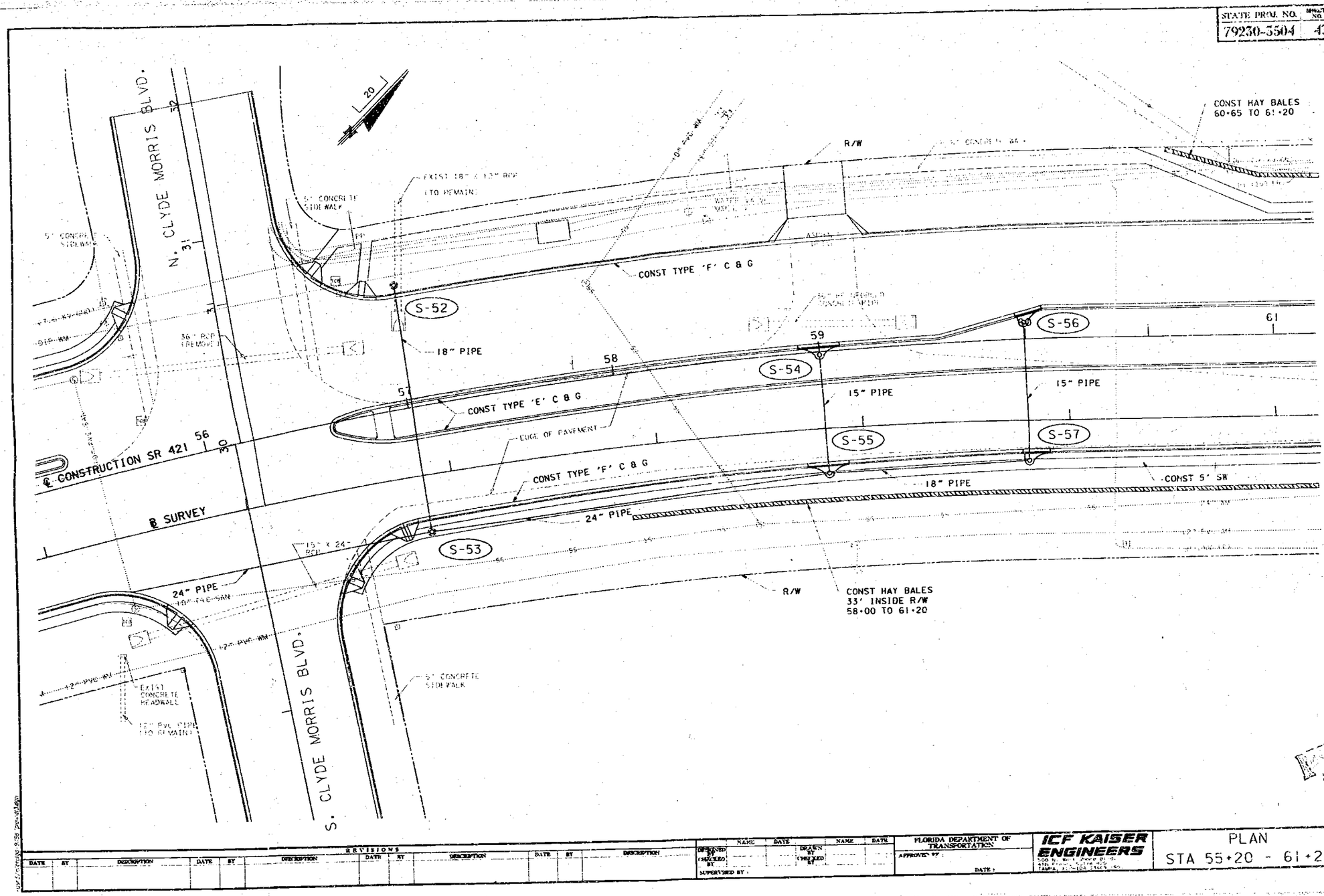
FLORIDA DEPARTMENT OF TRANSPORTATION
APPROVED BY :
DATE :

ICF KAISER ENGINEERS

PLAN
STA 49+00 - 55+20

24x

STATE PROJ. NO.	SHEET NO.
79230-3504	43



REVISIONS												
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	

	NAME	DATE		NAME	DATE
DESIGNED BY (SIGNED)			DRAWN BY (SIGNED)		
SUPERVISED BY :					

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY :

DATE :

ICF KAISER ENGINEERS

500 N. West Shore Blvd.
6th Floor, Suite 600
Tampa, Florida 33609-2450

PLAN

STA 55+20 - 61+20

0 125

24x

Inflation Factors

This *"Transportation Costs"* report is one of a series of reports issued by the Office of Policy Planning. It provides information on inflation factors and other indices that may be used to convert Present Day Costs (PDC) to Year Of Expenditure costs (YOE) or vice versa. This report is updated annually when the factors are posted within the FDOT Work Program Instructions.

Please note that the methodology for Inflationary adjustments relating to specific transportation projects should be addressed with the district office where the project will be located. For general use or non-specific areas, the guidelines provided herein may be used for inflationary adjustments.

Construction Cost Inflation Factors

The table on the next page includes the inflation factors and present day cost (PDC) multipliers that are applied to the Department's Work Program for highway construction costs expressed in Fiscal Year 2017 dollars.

Other Transportation Cost Inflation Factors

Other indices may be used to adjust project costs for other transportation modes or non-construction components of costs. Examples are as follows:

The Consumer Price Index (CPI, also retail price index) is a weighted average of prices of a specified set of products and services purchased by wage earners in urban areas. As such, it provides one measure of inflation. The CPI is a fixed quantity price index and a reasonable cost-of-living index.

The Employment Cost Index (ECI) is based on the National Compensation Survey. It measures quarterly changes in compensation costs, which include wages, salaries, and other employer costs for civilian workers (nonfarm private industry and state and local government).

The monthly series, Producer Price Index for Other Non-residential Construction, is available from the Bureau of Labor Statistics (BLS). It is not exclusively a highway construction index, but it is the best available national estimate of changes in highway costs from month to month.

Work Program
Highway Construction Cost Inflation Factors

Fiscal Year	Inflation Factor	PDC Multiplier
2017	Base	1.000
2018	2.7%	1.027
2019	2.8%	1.056
2020	2.6%	1.083
2021	2.5%	1.110
2022	2.7%	1.140
2023	2.8%	1.172
2024	2.9%	1.206
2025	3.0%	1.242
2026	3.1%	1.281
2027	3.2%	1.322
2028	3.3%	1.365
2029	3.3%	1.410
2030	3.3%	1.457
2031	3.3%	1.505
2032	3.3%	1.555
2033	3.3%	1.606
2034	3.3%	1.659
2035	3.3%	1714
2036	3.3%	1.770
2037	3.3%	1.829
Source: Office of Work Program and Budget, (Fiscal Year 2017 is July 1, 2016 to June 30, 2017)		

Advisory Inflation Factors For Previous Years

Another *"Transportation Costs"* report covers highway construction cost inflation for previous years. "*Advisory Inflation Factors For Previous Years (1987-2015)* provides Present Day Cost (PDC) multipliers that enable project cost estimates from previous years to be updated to FY 2015. This report is updated about once a year. For the table and text providing this information, please go to http://www.dot.state.fl.us/planning/policy/costs/RetroCostInflation.pdf.

Traffic Engineering Data Solutions, Inc.

Ref: 10575, TWO 6

TECHNICAL MEMORANDUM

To: Robert Keeth, Senior Planner

From: Chris J. Walsh, P.E.

Subject: Feasibility Study – State Road 421 at Clyde Morris Boulevard (County Road 483)

Date: March 17, 2017

We have received comments on the Feasibility Study at the State Road 421/Clyde Morris boulevard intersection. We have revised the study accordingly and offer the following responses:

Comments from Mr. Robert Keeth, Senior Planner.

Comment #1: Per Jon Cheney's recommendation, please state in the introduction section that the feasibility study was requested by the City of Port Orange.

Response: Statement added.

Comment #2: On page 17, Qualitative Assessment, in the first sentence, please revise to say the intersection was observed to determine if installing "an eastbound right turn lane" would be potentially beneficial… not "a traffic signal".

Response: Statement modified.

Comment #3: On page 19, Improvement Alternatives, please revise the first sentence to note that the purpose of the study was to evaluate the "need" for the improvement in addition to its feasibility.

Response: Statement modified.

Comment #4: There does not seem to be much of a problem with the eastbound right turn movement. The report notes that morning and afternoon observations showed "no obvious concerns or issues"(pgs 17 and 18). Operational analysis shows full intersection delay is reduced by only 0.3 seconds per vehicle in the morning peak and 1.7 seconds per vehicle in the afternoon peak. Does this justify the project? Is it needed? Please revisit the conclusion section (pg 23) and explain why you are recommending this improvement.

Response: The proposed improvements are anticipated to provide a capacity and safety benefit to the intersection based on current conditions. This benefit is expected to increase as traffic volumes increase. Please see revised conclusion section within the study.

Comment #5: What affect will this proposed improvement have on pedestrian safety? And will intersection capacity be reduced if additional pedestrian crossing time is required?

Response: No issues were noted with vehicle-pedestrian conflicts, and right turns on red currently occur at the intersection and no such crashes occurred relative to this particular eastbound right-turn movement over the past 5 years. Motorists do become more aggressive when they are delayed further, but the right-turn lane is showing an improvement in intersection capacity. Therefore, we do not have a reason to believe pedestrian safety will be diminished. Relative to pedestrian crossing times, they will be increased 3.5 seconds, but pedestrian activity is not significant. Therefore, with the limited number of pedestrian calls and the small increase in pedestrian crossing time, this consideration will have a marginal effect on intersection operations. It should also be noted that if desired, the County could simply provide this additional pedestrian clearance time into the yellow change interval which would therefore have no impact at all on current timings.

Comment #6: Pg 19, Improvement Alternatives – Please revise the first sentence in the second paragraph to say an improvement concept was developed for the installation of an "eastbound" right-turn lane at the State Road 421 at Clyde Morris Boulevard intersection… not "westbound".

Response: Statement modified.

Comment #7: Please provide the project cost estimate for each of three years, 2017, 2018 and 2019 using FDOT's latest available construction inflation factors or other appropriate factors.

Response: The project cost estimates for 2017, 2018 and 2019 have been provided on page 22.

Comments from Mr. Tim Burman, Planning Manager.

Comment #1: Page 1: Include statement that City of Port Orange submitted the application.

Response: Statement added.

Comment #2: Should the project cost estimate page also include estimates for 2018 and 2019?

Response: The project cost estimates for 2017, 2018 and 2019 have been provided on page 22.

Comment #3: Was only the midday peak hour and afternoon peak hour studied based on the 24-hour weekday approach counts? Therefore, the AM peak hour was not reviewed because the AM peak hour counts were less than midday and afternoon peak hour.

Response: Correct.

Comment #4: On Sheet 26, please consider adding button posts ten feet apart, conduits, and splice boxes at grade for future Audible Pedestrian Signals as part of the Engineer's Opinion of Probable Cost. To the best of Community Development's information, intersections of State Highways are highest on the priorities to receive Audible Pedestrian Signals. Recommend the Consultant call FDOT's Chad Lingenfelter at 386-943-5336 to determine the priority of this particular intersection.

Response: The cost estimate and improvement diagram account for providing separate pedestrian detectors which could ultimately be converted to APS. The improvement diagram has been updated to show push-button posts 10 feet apart and a redesigned curb ramp.

Comments from Ms. Melanie Schmotzer, Development Review Technician.

Comment #1: Page 1: Include statement that City of Port Orange submitted the application.

Response: Statement added.

Comment #2: Page 17: Replace “traffic light” with “eastbound right-turn lane” in the 3rd sentence under the Qualitative Assessment section.

Response: Statement modified.

Comment #3: Page19: Replace “westbound” with “eastbound” in the first sentence of the second paragraph.

Response: Statement modified.

Comment #4: Should the project cost estimate page also include estimates for 2018 and 2019?

Response: The project cost estimates for 2017, 2018 and 2019 have been provided on page 22.

Comment #5: Show existing City utilities. As-built drawings are attached.

Response: Existing utility information has been provided by the City and added to the improvement diagram.

Comment #6: Indicate in the F. Study that the existing sewer manhole at the corner of the sidewalk ramp will need to be vertically adjusted. General Comment applicable to both studies:

Response: Statement added to page 19 and improvement diagram updated.

Comment #7: On Sheet 21, consider adding button posts, conduits, and splice boxes at grade for future Audible Pedestrian Signals as part of the Engineer’s Opinion of Probable Cost.

Response: The cost estimate and improvement diagram account for providing separate pedestrian detectors which could ultimately be converted to APS. The improvement diagram has been updated to show push-button posts 10 feet apart and a redesigned curb ramp.

Comments from Mr. Amir Asgarinik, District Transportation Systems Development Manager.

Comment #1: Concept does not provide separate ramps on the reconstructed return to match the other three returns.

Response: The improvement diagram has been updated to show a redesigned curb ramp.

Comment #2: Widening impacts the existing roadside swale: can conveyance be maintained within the existing R/W? What is the proposed ditch width and corresponding side slopes? Typical does not specify.

Response: Conveyance of runoff from roadway areas in SR 421 is provided in a closed drainage system. Based on our review of cross-sections for stations 50+00 through 55+00 in record plans for State Project 79230-3504 (6-lane widening), the depressional area located behind the sidewalk along SR 421 is essentially the result of 2:1 fill slopes that were constructed behind the sidewalk in order to tie to existing ground and minimize embankment required during the state project, thereby creating a sump area that receives runoff from minimal contributing basin area, generally consisting of the landscaped areas in front of the commercial developments, with no outlet provided. Subsequent construction of the pond in front of Walgreens resulted in further reduction of the contributing basin area. Thus, no conveyance in this ditch is required, and impacts to the existing volumes within the depressional area are not expected to compromise the ability of the depressional areas to serve the contributing basin.

Please see revised Typical Section where the front slope of the ditch has been labeled.

Comment #3: The typical section shows the crown on the inside of R1. It appears these two left turn lanes are superelevated to RC in this section. If this is the case, the typical should accurately depict the drainage through this section.

Response: Please see revised Typical Section where the slopes of the existing left turn lanes have been revised to more accurately reflect the existing condition, based on our field observations and record plan information.

Comments from Mr. Jon Cheney, County of Volusia Traffic Engineering.

Comment #1: Both feasibility studies should identify the applicant making the request.

Response: The executive summary and introduction has been modified.

Comment #2: SR 421/Dunlawton & CR 483/CMB: Did the study take into account any impacts to the City of Port Orange's S/W project or SR421/Dunlawton pedestrian lighting project? If I recall, the city was installing a sidewalk on the SW corner along CR 483/CMB.

Response: In an email dated February 14, 2017, from Mr. Robert Keeth to Mr. Jon Cheney, Mr. Keeth said: "The SR 421/Clyde Morris Blvd right turn lane feasibility study report did not address the City of Port Orange's sidewalk project on Clyde Morris Blvd. However, I reviewed the concept plan for the right turn lane with Mark Neiman, project manager for the Port Orange sidewalk project feasibility study. There does not seem to be a conflict. Of course, there will need to be some coordination to make a proper sidewalk connection." Regardless, the improvement concept within the study was revised to extend the sidewalk down to the southern right-of-way line on SR 421, which could ultimately tie into the sidewalk project on Clyde Morris Boulevard.

With regards to the SR 421 (Dunlawton Ave) lighting project, the City of Port Orange's design consultant for the lighting project, Quentin L. Hampton Associates, Inc., had indicated that they had just received their Purchase Order to begin design in February 2016. As such, copies of the Improvement Diagram were provided to them for their considerations during design of the lighting. Given the uncertainty of timing in both projects, costs to relocate the existing lighting was included in the estimate.

Comments from Mr. Travis Terpstra, County of Volusia.

Comment #1: No Comments on justification for new turn lane, but always support new lanes.

Response: Acknowledged.

Comment #2: Not enough information to perform a constructability review, however most construction appears to be in FDOT ROW.

Response: Correct, effectively all construction would be within FDOT ROW.

Comment #3: Suggest FDOT administer project design and construction due to majority of work within FDOT ROW.

Response: A statement has been added on page 20.

Comment #4: Project needs to be coordinated with adjacent City of Port Orange sidewalk project. A new sidewalk section should be installed to the South along Clyde Morris such that the City's project does not impact or touch the FDOT ROW.

Response: Please see the response to comment #2 from Jon Cheney.

Comments from Mr. Michael Sanders, Traffic Services – District 5.

Comment #1: North arrows need to be on all conceptual diagrams. (Figures 5 & 6)

Response: North arrow added to Figures 5 and 6.

Comment #2: On page 3: State Road 421 (Dunlawton Avenue) is an east-west arterial that extends from Interstate 95 through Port Orange to State Road A1A.

Response: Page 3 has been modified.

Comment #3: On page 10: 488/40633 = 1.2%. Please justify the stated approximate 3.8%.

Response: The heavy truck percentage is incorrect and has been updated to 1.2%.

Comment #4: On page 17: The Qualitative Assessment summary sentence at the top of the page says traffic signal where it should say eastbound right turn lane.

Response: Page 17 has been modified.

Comment #5: From field observations there were several instances where right turn on reds were blocked by through vehicles in the outside through/right lane. However, no excessive delay was experienced.

Response: Correct.

Comment #6: There was one instance observed of hard braking behind a right turning vehicle. However, there were no apparent issues in regards to eastbound right turn vehicles interrupting traffic flow in the eastbound outside through lane.

Response: Correct.

Comment #7: There is a concern with the installation of an eastbound right turn lane when it comes to sight distance. There is a horizontal curve just north of the intersection and a vertical curve through the intersection. Therefore, there may be an issue of sight distance for eastbound right turn vehicles with southbound vehicles.

Response: No issues were observed with current right turning on red turning south onto Clyde Morris Boulevard. Also, over the five-year crash history, no issues were noted with regard to the eastbound right-turn lane versus southbound throughs.

Comment #8: Peak hour eastbound right turn volumes appear to correlate with Spruce Creek High School arrival time between 7:00-7:15 am. Were eastbound queues observed to be excessive? Any standing queues not clearing the intersection?

Response: Correct with regards to the school as many of the right turn drivers appeared to be of high school age. These queues were noted to be longer than those in the adjacent inside and middle eastbound through lanes. No phase failures were noted with regard to the eastbound outside through lane.

Comment #9: Crossing distance for pedestrians will be increased which is counter to approach of reducing widths where feasible.

Response: The turn-lane project as requested by the City of Port Orange is intended to provide additional vehicular capacity. No pedestrian-related issues were noted with regard to the intersection.

Comment #10: Will proposed relocated mast arm be beyond maximum signal head placement from SB stop bar?

Response: The mast-arm will be located approximately at 180' from the southbound stop bar. However, the existing cost estimate includes a 78' mast arm to provide greater flexibility relative to pole placement (see pay item 649-31-205 in the cost estimate).

Comment #11: Right turn lane extending across driveway for Pines Plaza may introduce conflict points.

Response: The turn lane was extended across the driveway to provide the necessary deceleration distance and queuing for the eastbound right-turn movement at Clyde Morris Boulevard.

Comment #12: Outside of AM right turn volumes are moderate. There does not appear to be demonstrated justification of the need to construct a dedicated EB right turn lane.

Response: Although not significant, the study does show a capacity benefit as well as a safety benefit. It should also be noted that such benefits are expected to increase as development continues and traffic volumes continue to grow in the area.

Should you have any questions, please contact me at (386) 753-0558.