Safety and Traffic Flow Improvement Study
For
US 17 at Washington Avenue

Task Assignment No. 1

VOLUSIA COUNTY
SECTION 79050
MP 17.190

Prepared for:

VOLUSIA COUNTY MPO

Prepared by:

GMB ENGINEERS & PLANNERS, INC.
Orlando, FL

July 2009

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Professional Engineer: Babuji Ambikapathy
P.E. #50689
July 10, 2009

EXECUTIVE SUMMARY

This report presents the results of a Safety and Traffic flow improvement study completed for the intersection of US 17 and Washington Avenue located in northwest Volusia County. Based upon the crash analyses, qualitative assessment, field observations, intersection analysis and engineering judgment, the following recommendations were developed:

- We recommend installing a westbound right-turn lane at the intersection. The turn lane improvement can be achieved using the existing pavement width on the westbound approach and by widening approximately 3 ft. to the south side on the westbound approach. Adding a right-turn lane would separate the right-turn vehicles from the westbound traffic flow and decrease overall delay at the intersection.
- We recommend constructing a 5 ft. side walk on the south side of Washington Avenue from Gate 1 of the Dewitt Taylor Middle-High School and connect it to the proposed sidewalk along US 17 on west side of the intersection. Providing continuous sidewalk would encourage students to utilize the sidewalk and the crosswalks at the intersection instead of walking on the lawn shoulder and private properties along US 17. A crosswalk should also be installed at on the west side of Gate 1 to facilitate students using the proposed sidewalk on the south side of the road to cross over to the existing sidewalk located on the north side of the road and vice versa.
- We recommend retiming the intersection to provide additional green time on the westbound approach during the school arrival and dismissal periods.
- Reapply the crosswalks at the intersection and stop bars on all four approaches of the intersection.

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INTRODUCTION

GMB Engineers & Planners, Inc. was retained to perform a Safety and Traffic Flow Improvement study for the intersection of US 17 and Washington Avenue. The study intersection is located in the Town of Pierson in Volusia County, Florida as illustrated in Figure 1. The purpose of the study was to evaluate existing geometric characteristics, prevailing operating conditions and traffic flow patterns of the intersection to identify areas where improvements would be potentially beneficial for safety and efficiency reasons. Specifically, the study was requested to address the need for turn lane improvements on east leg of Washington Avenue, need for any turn lane improvements along Washington Avenue at the five driveway entrances to the Dewitt Taylor Middle-High school, and address the discontinuity in the sidewalk system.

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), District Five guidelines and procedures and engineering judgment. The remainder of this report documents existing conditions, vehicle and pedestrian counts, qualitative assessments, crash analyses, SYNCHRO analysis and recommendations.

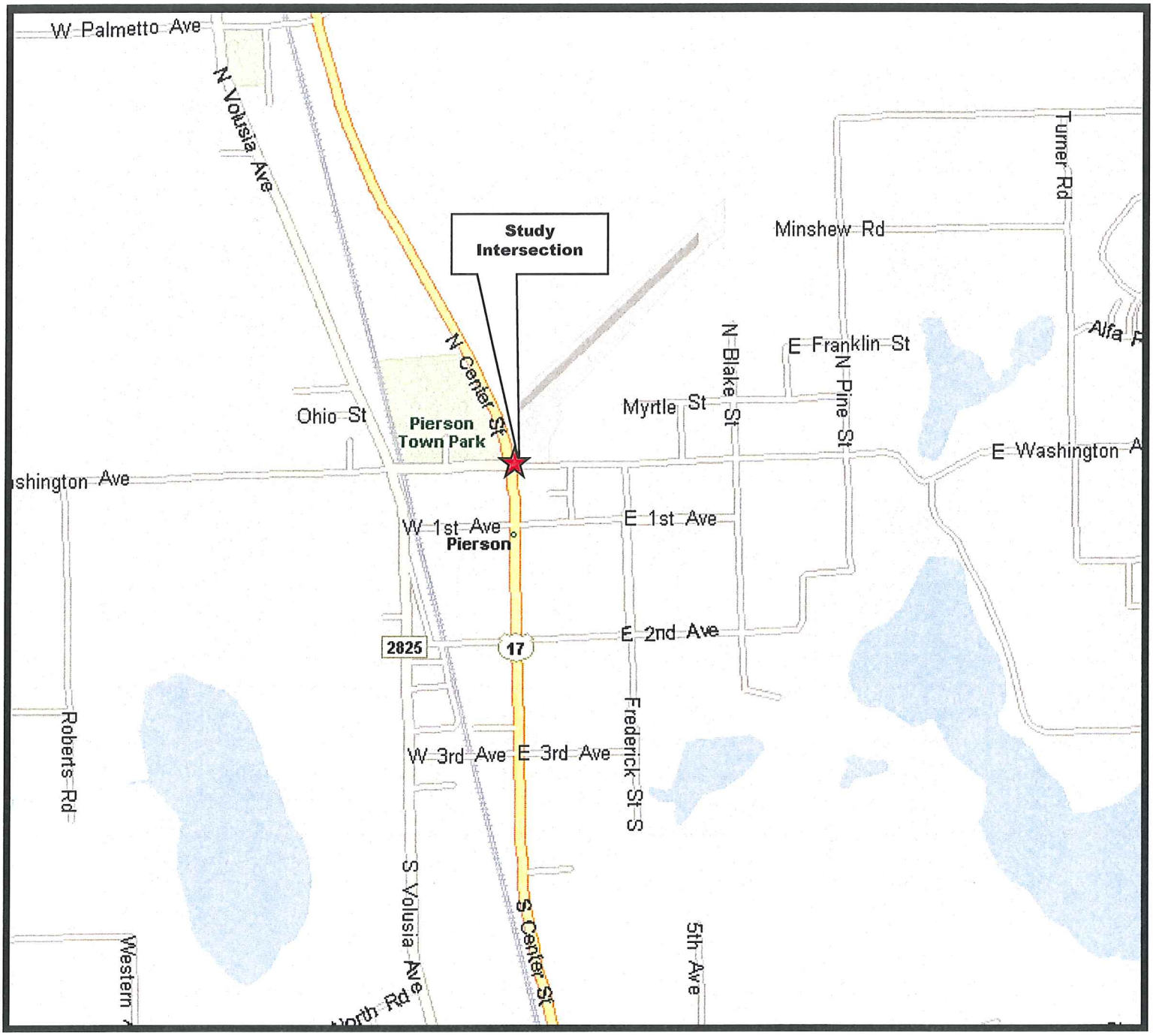

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Figure 1

GMB Engineers & Planners, Inc.

Location Map
US 17 at Washington Avenue
Volusia County
Section 79050
MP 17.190

EXISTING CONDITIONS

Field Inventory

The intersection of US 17 and Washington Avenue is located in Volusia County, in the northwest region of the county. The photographs of existing conditions around the intersection are attached at the end of this section. The conditions stated in this report reflect conditions as observed on the date of the qualitative assessment.

The US 17 and Washington Avenue is plus-shaped, with US 17 oriented north-south. US 17 is a major arterial spanning along the west side of the county serving long distance trips. US 17 is designated as an Emerging Strategic Intermodal System (SIS) facility by Florida Department of Transportation (FDOT). US 17 is a rural design type, two-lane arterial with a 4' paved shoulder in the vicinity of the study intersection. US 17 approaches the intersection with one left-turn lane, and a through lane on both the northbound and southbound approaches. Passing is restricted on both approaches of US 17 marked by 6-inch double yellow stripping. The intersection is located within a 45 mph speed zone along US 17.

Washington Avenue is a rural design type, two-lane local collector road. Washington Avenue approaches the intersection with one through lane on both the eastbound and westbound approaches. Washington Avenue is posted at 30 mph speed to the west leg of the intersection and 35 mph on the east leg of the intersection. The westbound approach widens at the intersection with 19 ft. lane width for approximately 400 ft (shown in Exhibits 5 and 6 in page 7).

The intersection is controlled with a traffic signal with overhead head displays supported by a concrete strain pole mounted in a diagonal span extending from northwest quadrant to southeast quadrant of the intersection. The intersection operates using Standard Signal Operating Plan (SOP) 1 with permissive left-turn operation on US 17. The intersection features special emphasis crosswalks on all four approaches and full-way pedestrian signals. Sidewalk is present on the north side of west approach and discontinues for approximately 400 ft. on the east approach before continuing along the north side of the east approach.

There are no traffic signals located on US 17 in the immediate vicinity of the intersection. There are intersection control beacons at E. 1st Avenue and E. 2nd Avenue located south of the study intersection with flashing circular yellow on US 17 and flashing circular red on the side streets. E 1st Avenue provides access to the Pierson Elementary School on the west side of the intersection. The land use on US 17 south of the intersection includes strip commercial to the east side while an Elementary School and Colonial Bank are on the west side of the intersection. The intersection is occupied with a CITGO gas station on the south east quadrant, auto service on the northeast quadrant, Volusia County School Board Satellite Bus Depot on the southwest quadrant and Pierson Town Park on the northeast quadrant of the intersection.

There is intersection lighting at the southeast corner of the intersection and street lighting is present along east side of US 17 and south side of Washington Avenue. Overhead utilities consisting of local transmission lines extend along the east side of US 17 and south side of Washington Avenue.

US 17 at Washington Avenue
North Approach

Exhibit 1: Looking south into intersection along US 17

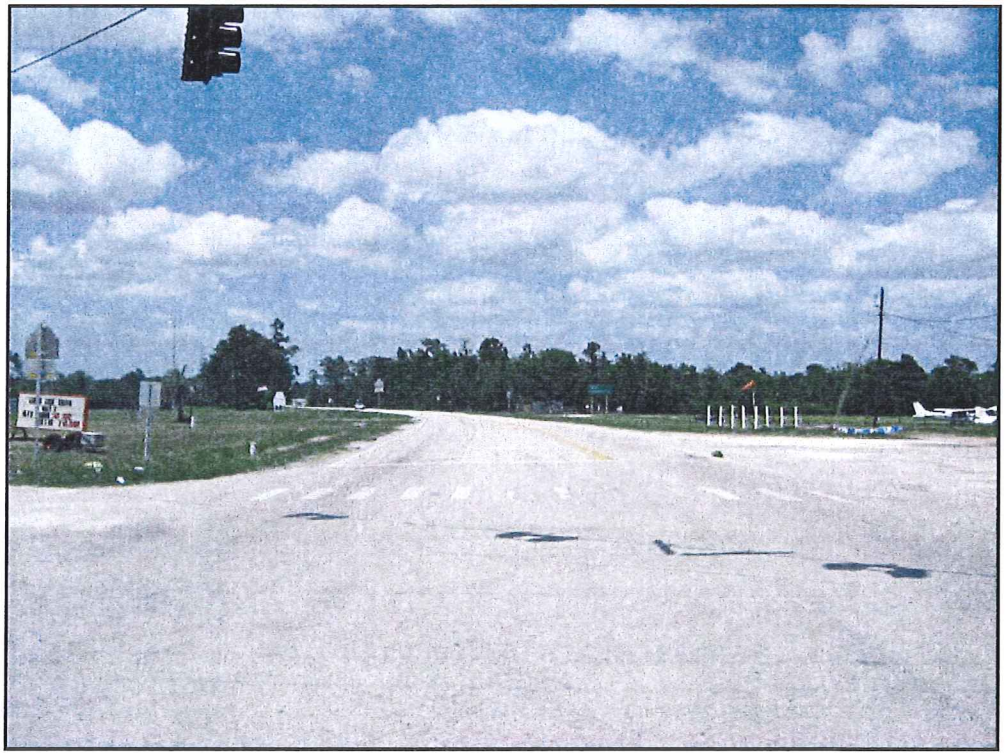


Exhibit 2: Looking north from intersection along US 17

US 17 at Washington Avenue
South Approach

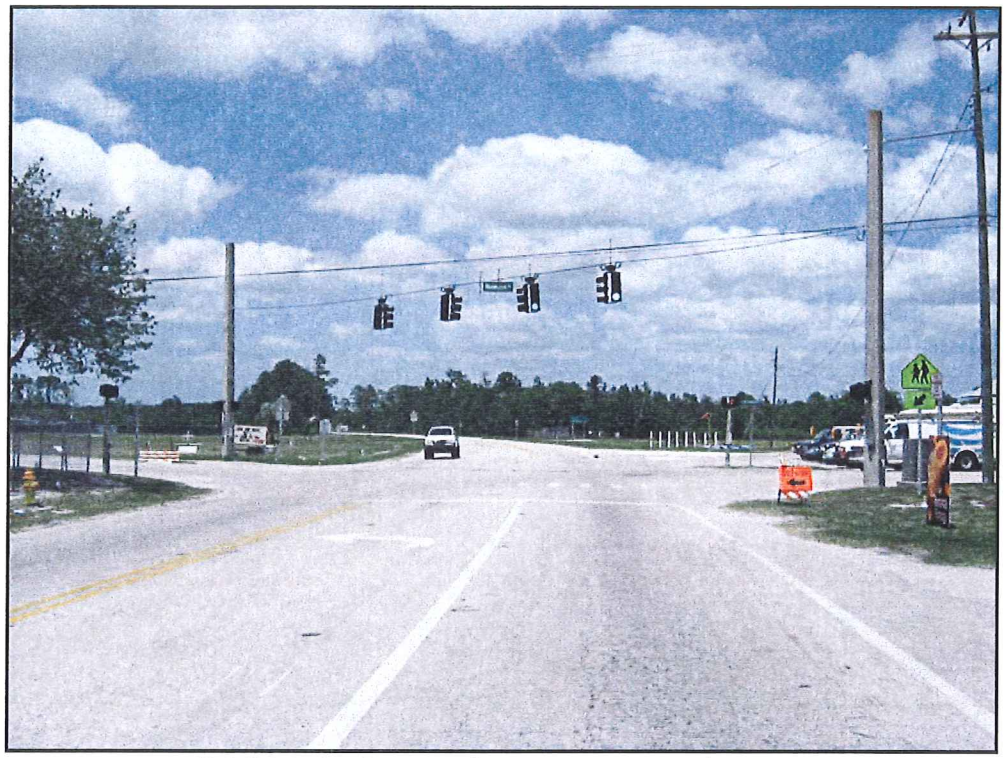


Exhibit 3: Looking north into intersection along US 17

Exhibit 4: Looking south from intersection along US 17

US 17 at Washington Avenue
East Approach

Exhibit 5: Looking west into intersection along Washington Avenue

Exhibit 6: Looking east from intersection along Washington Avenue

US 17 at Washington Avenue
West Approach

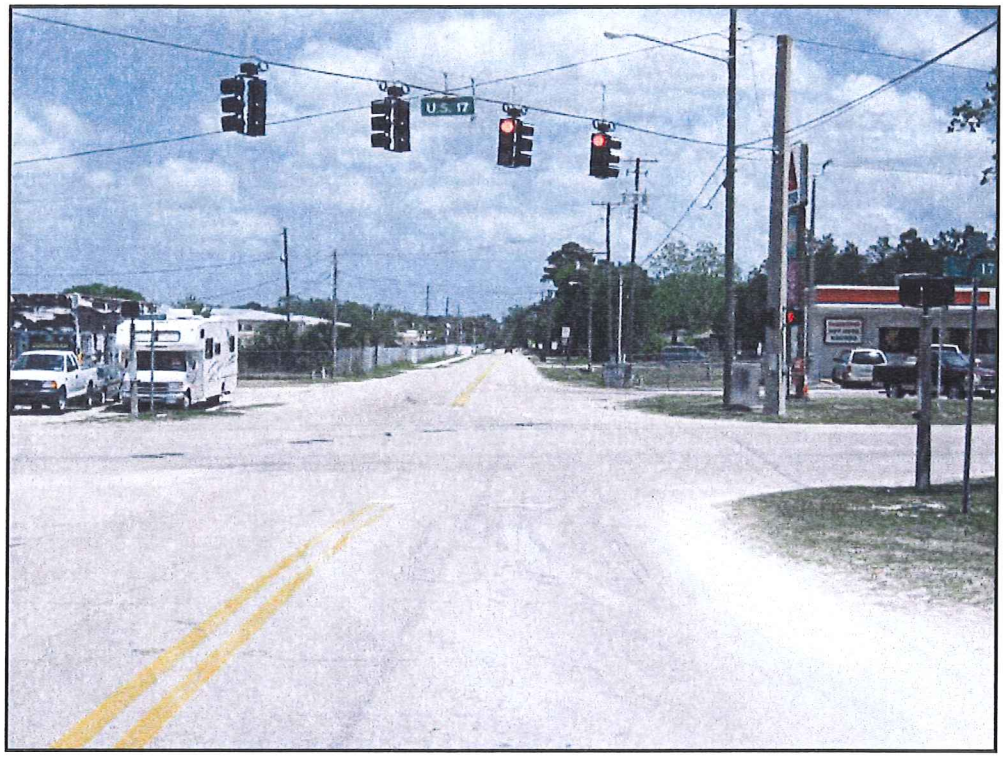
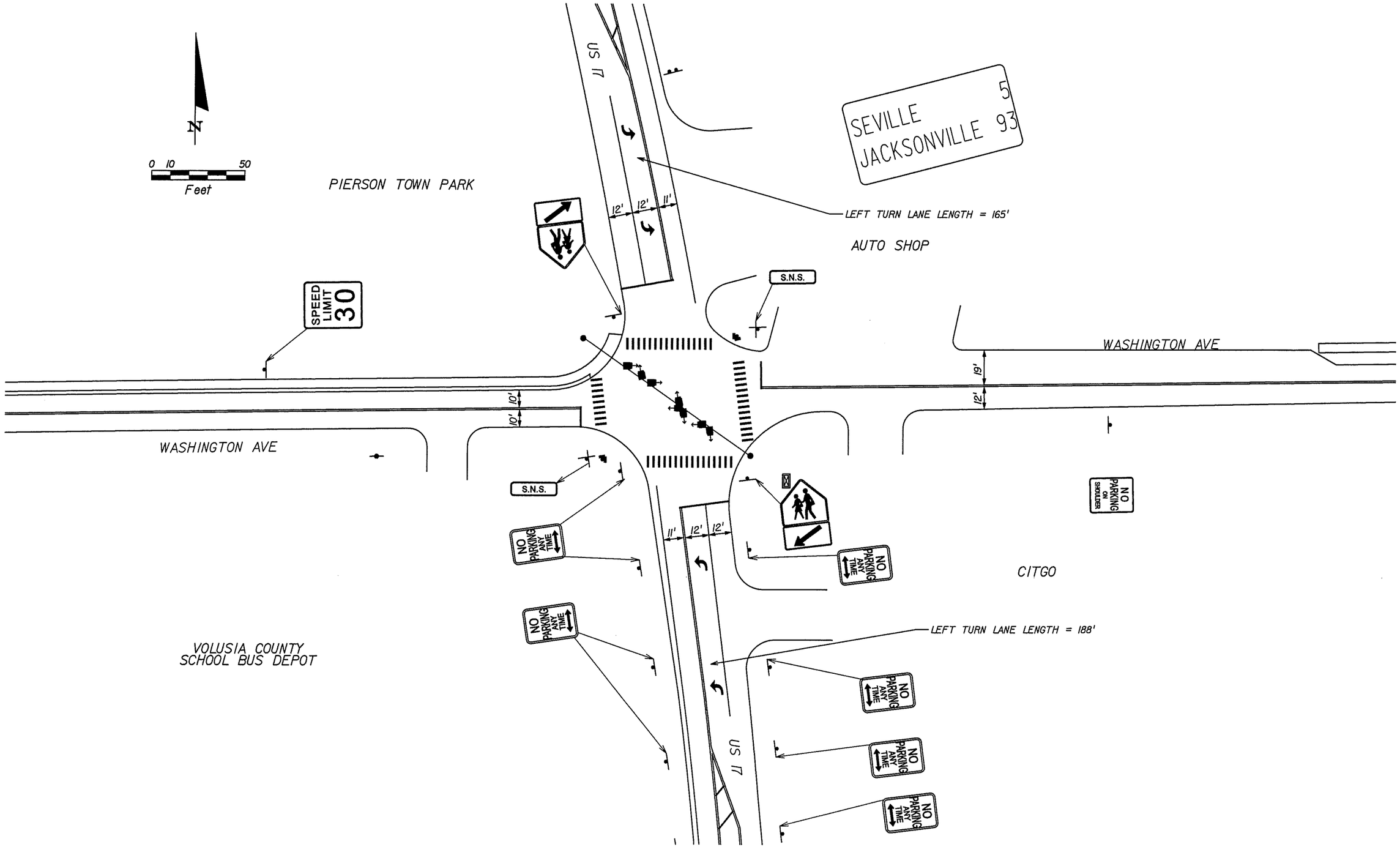


Exhibit 7: Looking east into intersection along Washington Avenue

Exhibit 8: Looking west from intersection along Washington Avenue



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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Phone: 407-898-5424 Fax: 407-898-5425

VOLUSIA COUNTY MPO

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
US 17	VOLUSIA	08-176.01

CONDITION DIAGRAM
US 17 AT WASHINGTON AVE

FIGURE NO. 2

$USER$ $DATE$ $TIME$ $FILE$

Traffic Volume Data

Eight-hour turning movement counts were collected on a weekday during the month of April 2009. The turning movement counts were collected between 6:30 a.m.-9:30 a.m., 11:30 a.m.-12:30 a.m., and 1:30 p.m.-5:30 p.m. The weekday traffic flow patterns on US 17 reveal a directional flow pattern with higher southbound traffic flow during the a.m. peak hours which reverses to the higher northbound flow during the p.m. peak hours. The westbound approach experiences higher traffic flow during the school arrival and dismissal periods while low to moderate flows during the remaining hours. The westbound traffic flow was observed to range between 51 vph to 197 vph. The eastbound traffic flow was observed to range between 31 vph to 104 vph with higher flow during the school arrival period. The eight hour turning movement percentages also show a higher westbound left turning movement (approximately 54%) Pedestrian activity was observed to be light with a total of one pedestrian crossing the Washington Avenue and twenty pedestrians crossing US 17 during the eight-hour count period.

The following table summarizes the distribution of turning movements through the study intersection:

Table 1
Eight Hour Weekday Turning Movement Percentages
US 17 at Washington Avenue

Movement	Northbound	Southbound	Eastbound	Westbound
Right-Turn	23.8%	5.2%	25.5%	20.1%
Through	65.7%	79.6%	55.6%	26.2%
Left-Turn/U-turn	10.5%	15.2%	18.9%	53.7%

Turning movement counts, 24-hour approach counts and pedestrian counts are provided in greater detail in the Appendix.

Crash Data

According to crash records obtained from Volusia County, there were four crashes reported at the intersection during the latest 24-month period covering January 1, 2007 to December 31, 2008. The crashes consisted of two angle crashes, one left-turn crash, and one sideswipe type crash. These crashes led to total property damage amounting to $15,500 and the left-turn crash led to two injuries. Two of the crashes were cited for disregarding traffic signal, one for failing to yield right-of-way, and one crash for improper turn. All the four crashes occurred on dry pavement conditions and during day time.

One of the angle crashes involved a northbound vehicle and a westbound vehicle while the second angle crash involved a northbound vehicle and an east bound vehicle. The left-turn crash involved a southbound left-turn vehicle failed to yield right-of-way and crashed into a northbound through vehicle while subsequently hitting a westbound through vehicle stopped at the intersection. The sideswipe crash occurred when a vehicle with a trailer performing a northbound right-turn hit a westbound through vehicle stopped at the intersection

TABLE 2

COLLISION SUMMARY

MAJOR ROUTE: US 17

INTERSECTING ROUTE: Washington Avenue

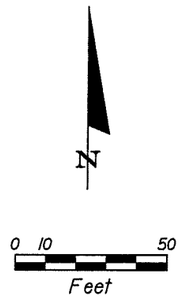
COUNTY: Volusia

STUDY PERIOD: 01-Jan-2007 TO 31-Dec-2008

ENGINEER: SK

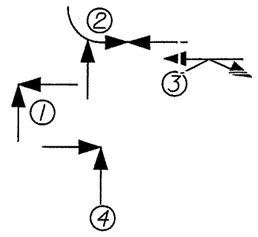
CRASH REFERENCE NUMBER	DATE	DAY	TIME	CRASH TYPE	INJURY SEVERITY		PROPERTY DAMAGE	DAY NIGHT	WET DRY	CONTRIBUTING CAUSE
					FATAL	INJURY				
1	01/29/07	Monday	11:04 AM	Angle	0	0	3,000	Day	Dry	Disregarded Traffic Control
2	04/13/07	Friday	04:30 PM	Left Turn	0	2	10,000	Day	Dry	Failed to Yield ROW
3	01/07/08	Monday	04:54 PM	Sideswipe	0	0	1,000	Day	Dry	Improper Turn
4	03/04/08	Tuesday	12:32 PM	Angle	0	0	1,500	Day	Dry	Disregarded Traffic Control
Total					0	2	$15,500			

TOTAL NO.		FATAL	INJURY	PROPERTY DAMAGE	REAR END	HEAD ON	ANGLE	LEFT TURN	RIGHT TURN	SIDESWIPE	RAN OFF ROAD	PED/ BIKE	OTHER
4		0	1	4	0	0	2	1	0	1	0	0	0
100%		0%	25%	100%	0%	0%	50%	25%	0%	25%	0%	0%	0%
DAY	NIGHT	WET	DRY	CARELESS DRIVING	FTYRW	IMPROPER LANE CHANGE		DROVE LEFT OF CENTER		DISREGARDED TRAFFIC CONTROL		DUI	OTHER
4	0	0	4	0	1	0		0		2		0	1
100%	0%	0%	100%	0%	25%	0%		0%		50%		0%	25%



US 17

WASHINGTON AVE



WASHINGTON AVE

US 17

CRASH PERIOD: JANUARY 1, 2007 - DECEMBER 31, 2008

CRASH SYMBOL LEGEND

Collision w/ Pedestrian	Rear End Crash	Sideswipe	Right Angle Crash
Fatality	Left Turn Crash	Out of Control	
Fixed Object	Head-On Crash	Overturned Vehicle	

REVISIONS			
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CRASH DIAGRAM
US 17 AT WASHINGTON AVE

FIGURE NO. 3

$USER$ $DATE$ $TIME$ $FILE$

QUALITATIVE ASSESSMENT

A qualitative assessment (QA) was conducted in the field in order to evaluate the existing operating conditions occurring on a typical weekday, and to identify areas where improvements would be potentially beneficial to the overall safety and efficiency of the location. A registered professional engineer performed the QA during the school arrival (a.m.) and dismissal (p.m.) peak hour periods.

1. Traffic flow at the intersection was observed to move with minimal operational constraints during the traditional a.m., off peak, and p.m. peak periods (7:00 a.m. - 9:00 a.m., 11:00 a.m. - 1:00 p.m., and 4:00 - 6:00 p.m.) while experienced higher traffic flows and side street delays during the Dewitt Taylor Middle-High School arrival and dismissal periods(6:30 a.m. – 7:30 a.m., and 2:15 p.m. – 3:30 p.m.).

2. Washington Avenue to the east of the intersection primarily serves Dewitt Taylor Middle/High School and local residential trips and to the west primarily serves residential trips and Volusia County School Board Satellite Bus Depot trips.

3. The intersection currently operates with a traffic signal supported by concrete strain poles spanning from northwest quadrant to the southeast quadrant of the intersection. The intersection operates using SOP 1 with permissive left-turn operation on all four approaches.

Qualitative Assessment during School Arrival and Dismissal Periods

4. The northbound traffic flow at the intersection was low to moderate during the both the arrival and dismissal periods. During the arrival periods majority of the northbound vehicles were observed to perform a right-turn maneuver to access the middle/high school. The northbound vehicles were able to clear the intersection with minimal delay. The northbound approach was observed to operate efficiently. The storage length for northbound left-turn lane is adequate to shield the left-turn vehicles from the northbound through volumes.

5. The southbound approach was observed to experience moderate traffic volumes during the arrival period and low volumes during the school dismissal period. The southbound left-turn movement was observed to be high during the arrival period a maximum queue of eight vehicles was observed on the southbound left-turn lane. Occasionally, the southbound left-turn vehicles were observed to spill into the southbound through lane during the arrival period. Due to low opposing through volumes and availability of gaps in the traffic stream the southbound left-turn vehicles were able to clear in single cycle. There were no phase failures observed on the southbound approach. The southbound left-turn movement is operating efficiently with permissive left-turn operation and do not require any additional improvements at this time.

6. There is an existing school zone on US 17 to the south of the intersection posted at 20 mph with a flashing beacon serving the Pierson Elementary School arrival and dismissal periods. The speed reduction zone to the south of the intersection was observed to create gaps for the southbound left-turn vehicles turning into Washington Avenue. Volusia County School Board has programmed to relocate the Pierson Elementary School in Fiscal Year 2010-11 to east side of US 17 to the north of the study intersection.

7. The westbound approach was observed to experience higher traffic flows during the school arrival and dismissal periods. Majority of the westbound vehicles were observed to be left-turn vehicles. A maximum queue length of 23 vehicles (combination of left-turn, through and right-turn vehicles) was observed on the westbound approach during the school dismissal period. The westbound approach was observed to be wide at the intersection allowing two vehicles to turn at the same interval. The westbound right-turn vehicles were observed to utilize the additional pavement and complete the turning maneuver. Phase failures were observed for the westbound approach during the school dismissal period. The westbound vehicles experienced a maximum of two cycle delay during the school arrival and dismissal periods. There were occasional conflicts observed between the heavy westbound left-turn and the eastbound through vehicles.

8. The eastbound approach volume was observed to be moderate during the school arrival period and low during the school dismissal period. A maximum queue length of three vehicles was observed on the eastbound approach. The eastbound vehicles were able to clear the intersection in single cycle with minimal delay.

9. The turning radius for northbound right turning vehicles was found to be adequate. In few instances, when no vehicles were present on westbound approach lane, school buses were observed to encroach on to westbound approach lane while making northbound right turn. The east approach features additional pavement on the receiving lane at the throat of the intersection to facilitate school buses accessing the Volusia County School Board Satellite Bus Depot.

10. Minimal number of pedestrians were observed accessing crosswalks at the intersection. This could be attributed to the lack of sidewalks on US 17, lack of sidewalks on the south side of Washington Avenue, and the discontinuity in sidewalk along the north side of Washington Avenue. Students exiting from the school driveways were observed crossing Washington Avenue into the local street network on the south side or walking along the south side shoulder of Washington Avenue to stay away from the westbound queues. Students were also observed walking in the private properties located to on the east side of US 17.

11. The quality of the road surface on US 17 in the vicinity of the intersection is in poor condition and programmed for resurfacing in next fiscal year. The pavement markings and signs along the US 17 and Washington Avenue conform to FDOT standards. Crosswalks at the study intersection were observed to be worn out and should be reapplied. The stop bars on all four approaches are slightly worn out.

Dewitt Taylor Middle/High School

12. Dewitt Taylor Middle-High School located on Washington Avenue east of the study intersection is one of the major traffic generators in the study area. The school serves grades 6 - 12, with 939 students and with student teacher ratio of 12.7 in the Volusia County Public Schools Districts.

13. The school features five driveways on Washington Avenue facilitating the school traffic. Gate 1 located to the west serves school bus traffic, Gate 2 serves middle school parent pick-up/drop-off, Gate 3 serves high school parent pick-up/drop-off, Gate 4 serves school auditorium and student entrance for high school and Gate 5 located to the east serves gymnasium and school buses.

14. Washington Avenue features School Speed Zone in the vicinity of the school driveways. The school zone is posted at 20 mph with a flashing beacon. The flashing beacon operates during the school arrival and dismissal periods.

15. Gate 2 was observed to be the critical entrance among the school driveways. A total of 93 vehicles were observed entering Gate 2 during the school arrival period. During the School arrival time period, at Gate 2, the traffic arriving in the eastbound direction experienced slight delays due to the opposing westbound traffic along Washington Avenue and the southbound left-turn vehicles exiting (after drop off) from Gate 2. A maximum queue of 8 vehicles was observed along eastbound Washington Avenue at gate 2 and the delay was minimal.

    During the School dismissal time period, at Gate 2, the traffic arriving in the eastbound direction experienced very low delays compared to the arrival period. There were hardly any queues along eastbound Washington Avenue at Gate 2. However, the traffic along the westbound receiving lane was very high during the school dismissal period.

16. Approximately 25 students were observed walking into the school from the surrounding neighborhood area during the arrival period. Out of 25 students, six students were observed crossing US 17. Approximately 50 students were observed walking from the school to the surrounding neighborhood area

during the dismissal period. Out of 50 students, approximately 15 students were observed to walk on the grass on the south side of Washington Avenue. Remaining students were observed to walk on the sidewalk located on the north side of Washington Avenue.

17. The CITGO gas station located in the southeast corner of the study intersection was observed to serve as a pick-up location for the parents. Approximately 15 students were observed to waiting in the gas station parking until their parents come for pick-up. Also, parents were observed to drop off their children along Washington Avenue instead of using Gate 2.

Pierson elementary School

18. Pierson Elementary School located in southwest quadrant of the study intersection is another traffic generator in the study area. This school serves pre kindergarten to Grade 5, with approximately 470 students and with student teacher ratio of 11.6 in the Volusia County Public Schools Districts.

19. There are five driveways to facilitate the school access. Two driveways have access connection to US 17 approaching from the west to the south of the study intersection. Two other driveways were located on the west leg of E 1st Avenue. There is a crosswalk on US 17 in front of the elementary school. School guards were observed operating the crosswalk during the elementary school arrival and dismissal periods.

SYNCHRO Analysis

Signalized Intersection Analysis Software, SYNCHRO 7 was utilized to compare different alternatives for the study intersection using, delay, v/c ratio and queue length on the westbound approach and overall intersection as the measure of effectiveness. The SYNCHRO analysis was performed for both the arrival and dismissal hours.

The different alternatives considered for analysis are presented below. The SYNCHRO output sheets and the signal timings sheet obtained from Volusia County are provided in Appendix of this report.

ALTERNATIVE 1 (EXISTING CONDITION)

Alternative 1 formulates the base condition for the analysis. The analysis is conducted for the school arrival and dismissal periods utilizing the peak hour turning movement volumes and the peak hour factors collected. The existing signal timings provided by the Volusia County were used in the analysis

ALTERNATIVE 2 (STRIP WESTBOUND RIGHT TURN LANE AND OPTIMIZED TIMINGS)

Alternative 2 is similar to Alternative 1 with additional green time for the side street approaches. This alternative also includes the recommended strip westbound right turn lane. The existing cycle length was optimized to provide additional green time for the side street approaches to reduce queuing and delay during the school arrival and dismissal periods.

ALTERNATIVE 3 (ALTERNATIVE 2 AND WESTBOUND LEADING LEFT-TURN)

In alternative 3, the green times were optimized and a leading left-turn phase was introduced on the westbound approach. This alternative also includes the recommended strip westbound right turn lane. The leading left-turn phase would provide green arrow to the westbound approach for a determined minimum green interval before changing to a green ball display concurrent with the eastbound approach. The leading left-turn phase would clear the high westbound traffic volumes during the school arrival and dismissal periods for a pre determined green interval.

ALTERNATIVE 4 (STRIP WESTBOUND RIGHT TURN LANE AND SPLIT PHASE OPERATION)

In alternative 4, split phase operation was considered for the side street approaches. The side street approaches would operate consecutively (with all movements on the westbound approach followed by the eastbound approach) rather than concurrently with this operation. The split phase operation would allow westbound approach to operate without any conflicting traffic. The split phase operation would increase the cycle length and delay at the intersection. This alternative also includes the recommended strip westbound right turn lane.

Performance indicators generated from Synchro analysis are summarized below for the overall intersection and critical westbound approach.

Table 3
US 17 at Washington Avenue
Intersection Analysis - AM Peak Hour (School Arrival Period)

	Intersection		Westbound Approach			
MOE's	LOS	Delays (secs)	V/C	LOS	Delay (Secs)	95% Queue length (ft.)
Alternative 1	B	11.1	0.6	B	12.7	62
Alternative 2	B	10.7	0.51	B	10.2	57
Alternative 3	B	14.7	0.42	A	8.0	58
Alternative 4	B	19.9	0.55	C	17.8	87

Table 4 US 17 at Washington Avenue Intersection Analysis - PM Peak Hour (School Dismissal Period)						
	Intersection		Westbound Approach			
MOE's	LOS	Delays (secs)	V/C	LOS	Delay (Secs)	95% Queue length (ft.)
Alternative 1	A	8.6	0.45	B	10.7	52
Alternative 2	A	8.3	0.40	A	9.6	46
Alternative 3	B	11.7	0.26	A	6.6	47
Alternative 4	B	15.8	0.41	B	16.5	81

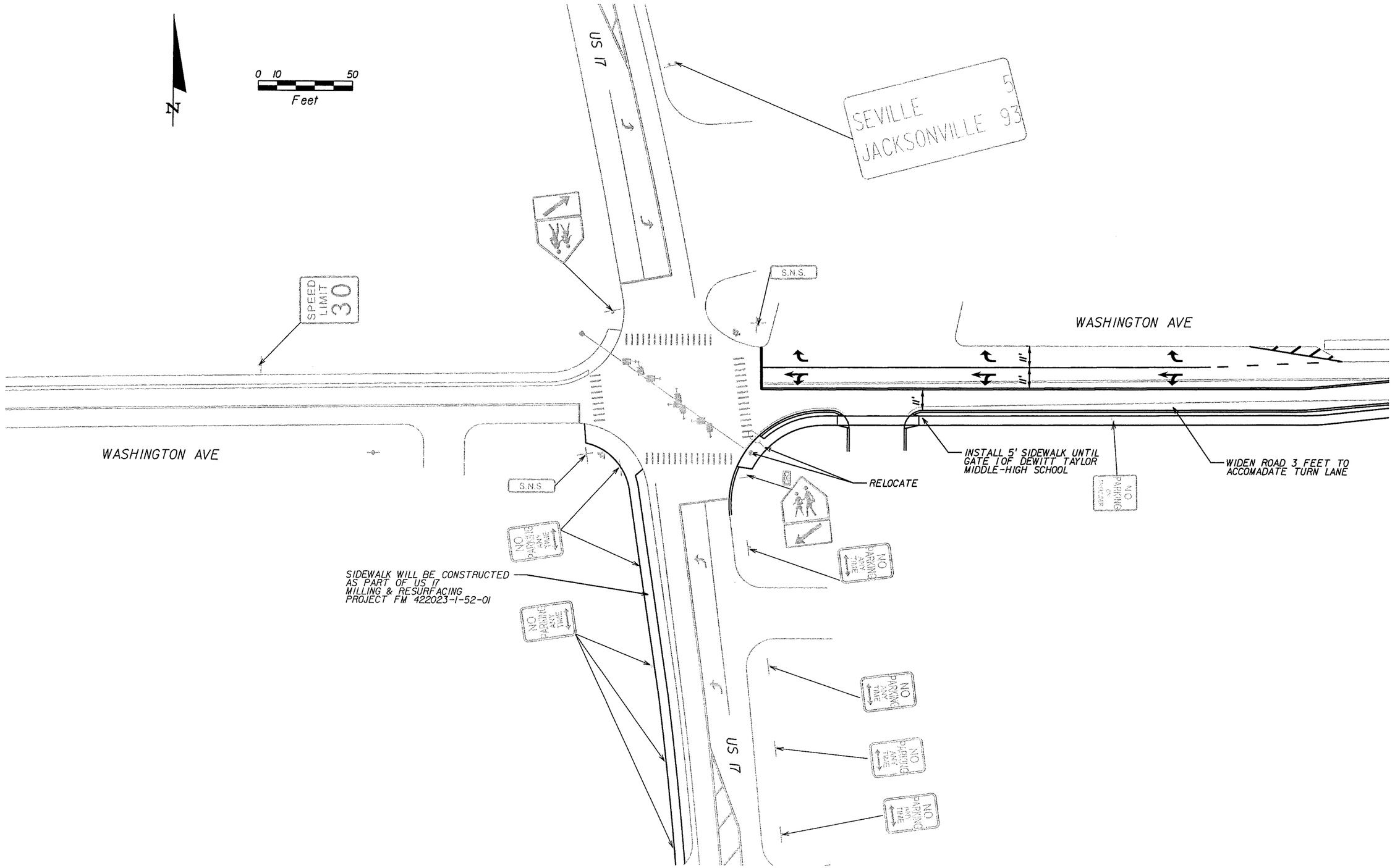
The analysis indicates that Alternative 3 (Strip westbound right-turn lane and westbound leading left-turn operation) achieves slightly better operation characteristics on the peak westbound approach with reduction in v/c ratio, delay during both the arrival and dismissal and improving LOS by one level when compared with the other three alternatives. Alternative 2 (Strip westbound right-turn lane and Optimized timings) achieves reduction in overall intersection delay when compared with the other alternatives and improvement in LOS and reduction in delay and 95% queue length on the peak westbound approach when compared with the existing condition. The Alternative 4 (Side street split phase operation) would increase overall intersection delay, v/c ratio, and delay on the peak westbound approach.

Construction Cost Estimate

Based on the proposed improvements as illustrated in Figure 4 at the intersection, a preliminary construction estimate was conducted. The estimated improvement cost does not include permitting, right-of-way, and utility relocations, either above ground or underground which were not investigated as part of this report.

Estimated Improvement Cost: $154,837.84

The estimated cost summary is included in the following Table 5.



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VOLUSIA COUNTY MPO

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US 17	VOLUSIA	08-176.01

CONCEPTUAL IMPROVEMENT DIAGRAM
US 17 AT WASHINGTON AVE

FIGURE NO. 4

Table 5
US 17 at Washington Avenue
Construction Cost Estimate

SECTION 79050 MP 17.190

PAY ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	QUATITY		GRAND TOTAL
101-1	MOBILIZATION	LS	$15,000.00	1	$15,000.00	$15,000.00
102-1	MAINTENANCE OF TRAFFIC	LS	$20,000.00	1	$20,000.00	$20,000.00
110-1-1	CLEARING & GRUBBING	AC	$12,013.86	0.12	$12,013.86	$1,441.66
120-1	REGULAR EXCAVATION	CY	$2.88	178	$2.88	$512.64
160-4	TYPE "B" STABILIZATION	SY	$2.34	99.5	$2.34	$232.83
285-709	OPTIONAL BASE (GROUP 9)	SY	$12.18	99.5	12.18	$1,211.91
334-1-13	SUPERPAVE ASPHALT CONC. (TRAFFIC C, 1 1/2", 110 LB./SY)	TN	$85.59	5.5	85.59	$470.75
337-7-33	FRICTION COURSE (FC-12.5, 1 1/2", 165 LB./SY)	TN	$113.56	8.2	113.56	$931.19
520-1-10	CONCRETE CURB & GUTTER (TYPE F)	LF	$16.95	803	$16.95	$13,610.85
522-1	CONCRETE SIDEWALK, 4" THICK	SY	$71.07	444.5	$71.07	$31,590.62
641-2-15	PRESTRESSED CONCRETE POLES	EA	$8,280.00	1	$8,280.00	$8,280.00
690-32-1	POLE REMOVAL, SHALLOW, DIRECT BURIAL	EA	$1,631.00	2	$1,631.00	$3,262.00
715-513-150	LIGHT POLE COMPLETE (F&I) (SING. ARM) (50')	EA	$4,700.00	1	$4,700.00	$4,700.00
				Sub Total:		***$101,244.45***
SIGNING AND PAVEMENT MARKINGS						
711-11-170	THERMOPLASTIC - ARROWS	EA	$64.05	2	$64.05	$128.10
711-11-121	THERMOPLASTIC - WHITE (6")	LF	$1.32	883	$1.32	$1,165.56
711-11-122	THERMOPLASTIC - WHITE (8")	LF	$0.99	50	$0.99	$49.50
711-11-122	THERMOPLASTIC - WHITE (12")	LF	$1.94	252	$1.94	$488.88
711-11-124	THERMOPLASTIC - WHITE (18")	LF	$2.41	20	$2.41	$48.20
711-11-125	THERMOPLASTIC - WHITE (24")	LF	$4.57	22	$4.57	$100.54
				Sub Total:		***$1,980.78***
				Construction Total:		***$103,225.23***
				Preliminary Engineering and Construction Inspection Charges (PECEI) (20%):		***$20,645.05***
				Small Project Contingency (30%)		***$30,967.57***
				Project Total:		***$154,837.84***

RECOMMENDATIONS

Based upon the signal warrant analyses, crash analyses, qualitative assessment, field observations and engineering judgment, the following recommendations were developed:

- We recommend installing a westbound right-turn lane at the intersection. The turn lane improvement can be achieved using the existing pavement width on the westbound approach and by widening approximately 3 ft. to the south side on the westbound approach. Adding a right-turn lane would separate the right-turn vehicles from the westbound traffic flow and decrease overall delay at the intersection.
- We recommend constructing a 5 ft. side walk on the south side of Washington Avenue from Gate 1 of the Dewitt Taylor Middle-High School and connect it to the proposed sidewalk along US 17 on west side of the intersection. Providing continuous sidewalk would encourage students to utilize the sidewalk and the crosswalks at the intersection instead of walking on the lawn shoulder and private properties along US 17. A crosswalk should also be installed at on the west side of Gate 1 to facilitate students using the proposed sidewalk on the south side of the road to cross over to the existing sidewalk located on the north side of the road and vice versa.
- We recommend retiming the intersection to provide additional green time on the westbound approach during the school arrival and dismissal periods.
- Reapply the crosswalks at the intersection and stop bars on all four approaches of the intersection.

APPENDIX

15 MINUTE TURNING MOVEMENT COUNTS (ALL VEHICLES)

DATE: April 14, 2009 (Tuesday) TOWN: Pierson

LOCATION: US 17 @ Washington Avenue COUNTY: Volusia

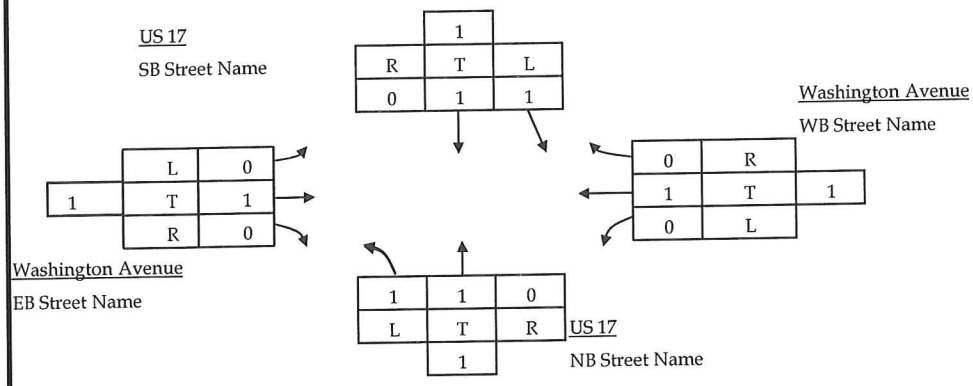
US 17 Washington Avenue

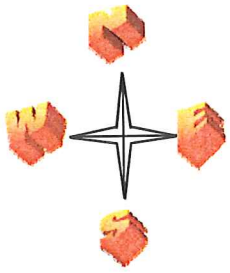
TIME	NORTHBOUND					SOUTHBOUND					N/S	EASTBOUND					WESTBOUND					E/W	GRAND
BEGIN	R	T	L	Peds	TOT	R	T	L	Peds	TOT	TOT	R	T	L	Peds	TOT	R	T	L	Peds	TOT	TOT	TOTAL
06:30	56	17	1	0	74	1	54	31	0	86	160	3	13	1	0	17	12	8	26	0	46	63	223
06:45	37	23	1	0	61	1	56	30	0	87	148	5	38	5	0	48	17	13	62	0	92	140	288
07:00	18	26	0	0	44	1	69	11	0	81	125	1	16	3	0	20	7	5	20	0	32	52	177
07:15	10	21	5	0	36	4	45	9	0	58	94	6	9	4	0	19	7	6	14	0	27	46	140
Total	**121**	**87**	**7**	**0**	**215**	**7**	**224**	**81**	**0**	**312**	**527**	**15**	**76**	**13**	**0**	**104**	**43**	**32**	**122**	**0**	**197**	**301**	**828**
07:30	10	35	9	0	54	6	55	2	0	63	117	3	8	3	0	14	4	6	11	0	21	35	152
07:45	9	26	7	0	42	1	35	4	0	40	82	5	5	3	0	13	3	3	5	0	11	24	106
08:00	10	30	5	0	45	1	25	2	0	28	73	5	12	2	0	19	4	13	5	0	22	41	114
08:15	5	23	1	0	29	3	22	7	0	32	61	5	6	2	0	13	3	2	4	0	9	22	83
Total	**34**	**114**	**22**	**0**	**170**	**11**	**137**	**15**	**0**	**163**	**333**	**18**	**31**	**10**	**0**	**59**	**14**	**24**	**25**	**0**	**63**	**122**	**455**
08:30	7	26	7	0	40	0	34	5	0	39	79	1	5	0	0	6	4	3	7	0	14	20	99
08:45	1	17	4	0	22	1	29	5	0	35	57	2	6	3	0	11	1	2	7	0	10	21	78
09:00	3	28	4	0	35	3	36	3	0	42	77	4	3	1	0	8	2	4	8	0	14	22	99
09:15	4	21	1	0	26	2	30	2	0	34	60	3	2	1	0	6	5	5	3	0	13	19	79
Total	**15**	**92**	**16**	**0**	**123**	**6**	**129**	**15**	**0**	**150**	**273**	**10**	**16**	**5**	**0**	**31**	**12**	**14**	**25**	**0**	**51**	**82**	**355**
11:30	14	25	1	0	40	0	25	6	0	31	71	4	12	1	0	17	4	5	13	0	22	39	110
11:45	11	24	5	0	40	1	22	4	0	27	67	4	7	5	0	16	2	4	7	0	13	29	96
12:00	6	34	4	0	44	1	29	3	0	33	77	5	2	1	0	8	4	3	6	0	13	21	98
12:15	4	21	1	0	26	1	30	3	0	34	60	6	4	3	0	13	5	3	5	0	13	26	86
Total	**35**	**104**	**11**	**0**	**150**	**3**	**106**	**16**	**0**	**125**	**275**	**19**	**25**	**10**	**0**	**54**	**15**	**15**	**31**	**0**	**61**	**115**	**390**
13:30	8	21	2	0	31	2	35	5	0	42	73	3	1	3	0	7	6	2	7	0	15	22	95
13:45	8	25	1	0	34	3	41	7	0	51	85	4	8	2	0	14	2	5	8	0	15	29	114
14:00	6	29	6	1	41	2	32	9	0	43	84	4	12	4	0	20	5	3	4	0	12	32	116
14:15	19	24	3	0	46	1	27	18	0	46	92	6	11	3	1	20	8	13	29	0	50	70	162
Total	**41**	**99**	**12**	**1**	**152**	**8**	**135**	**39**	**0**	**182**	**334**	**17**	**32**	**12**	**1**	**61**	**21**	**23**	**48**	**0**	**92**	**153**	**487**
14:30	9	17	6	0	32	2	27	8	0	37	69	1	10	4	8	15	7	13	29	2	49	64	133
14:45	8	27	5	0	40	1	23	3	0	27	67	1	3	8	0	12	6	8	10	0	24	36	103
15:00	5	29	8	0	42	5	38	3	0	46	88	8	8	4	0	20	6	15	19	0	40	60	148
15:15	2	44	14	0	60	3	32	6	0	41	101	7	19	5	0	31	5	14	36	0	55	86	187
Total	**24**	**117**	**33**	**0**	**174**	**11**	**120**	**20**	**0**	**151**	**325**	**17**	**40**	**21**	**8**	**78**	**24**	**50**	**94**	**2**	**168**	**246**	**571**
15:30	6	39	7	0	52	4	30	0	0	34	86	5	11	3	9	19	7	11	11	0	29	48	134
15:45	7	29	6	0	42	2	26	3	0	31	73	7	6	4	0	17	6	2	7	0	15	32	105
16:00	13	30	6	0	49	3	35	3	0	41	90	4	10	1	0	15	3	6	11	0	20	35	125
16:15	9	38	4	0	51	2	24	0	0	26	77	5	6	6	0	17	6	11	16	0	33	50	127
Total	**35**	**136**	**23**	**0**	**194**	**11**	**115**	**6**	**0**	**132**	**326**	**21**	**33**	**14**	**9**	**68**	**22**	**30**	**45**	**0**	**97**	**165**	**491**
16:30	9	41	7	0	57	7	29	4	0	40	97	6	8	3	0	17	6	5	13	0	24	41	138
16:45	9	48	7	0	64	2	30	3	0	35	99	2	9	1	0	12	2	7	7	0	16	28	127
17:00	6	48	4	0	58	2	26	6	0	34	92	4	6	3	0	13	1	7	18	0	26	39	131
17:15	6	40	7	0	53	2	31	2	0	35	88	0	5	3	0	8	4	6	9	0	19	27	115
Total	**30**	**177**	**25**	**0**	**232**	**13**	**116**	**15**	**0**	**144**	**376**	**12**	**28**	**10**	**0**	**50**	**13**	**25**	**47**	**0**	**85**	**135**	**511**

FLORIDA DEPARTMENT OF TRANSPORTATION

SUMMARY OF VEHICLE MOVEMENTS

SECTION:	79050	TOWN: Pierson	COUNTY:	Volusia
MAJOR ROUTE:	US 17		INTERSECTING ROUTE:	Washington Avenue
OBSERVER:		DATE: April 14, 2009	MILEPOST:	17.19
WEATHER:			ROAD CONDITION:	DRY
REMARKS:				
FORM COMPLETED BY/DATE:				





VEHICLE MOVEMENTS

TIME	NORTHBOUND				SOUTHBOUND				TOTAL	EASTBOUND				WESTBOUND				TOTAL
	L	T	R	TOT	L	T	R	TOT	N/S	L	T	R	TOT	L	T	R	TOT	E/W
6:30 - 7:30	7	87	121	215	81	224	7	312	527	13	76	15	104	122	32	43	197	301
7:30 - 8:30	22	114	34	170	15	137	11	163	333	10	31	18	59	25	24	14	63	122
8:30 - 9:30	16	92	15	123	15	129	6	150	273	5	16	10	31	25	14	12	51	82
11:30 - 12:30	11	104	35	150	16	106	3	125	275	10	25	19	54	31	15	15	61	115
13:30 - 14:30	12	99	41	152	39	135	8	182	334	12	32	17	61	48	23	21	92	153
14:30 - 15:30	33	117	24	174	20	120	11	151	325	21	40	17	78	94	50	24	168	246
15:30 - 16:30	23	136	35	194	6	115	11	132	326	14	33	21	68	45	30	22	97	165
16:30 - 17:30	25	177	30	232	15	116	13	144	376	10	28	12	50	47	25	13	85	135

FLORIDA DEPARTMENT OF TRANSPORTATION

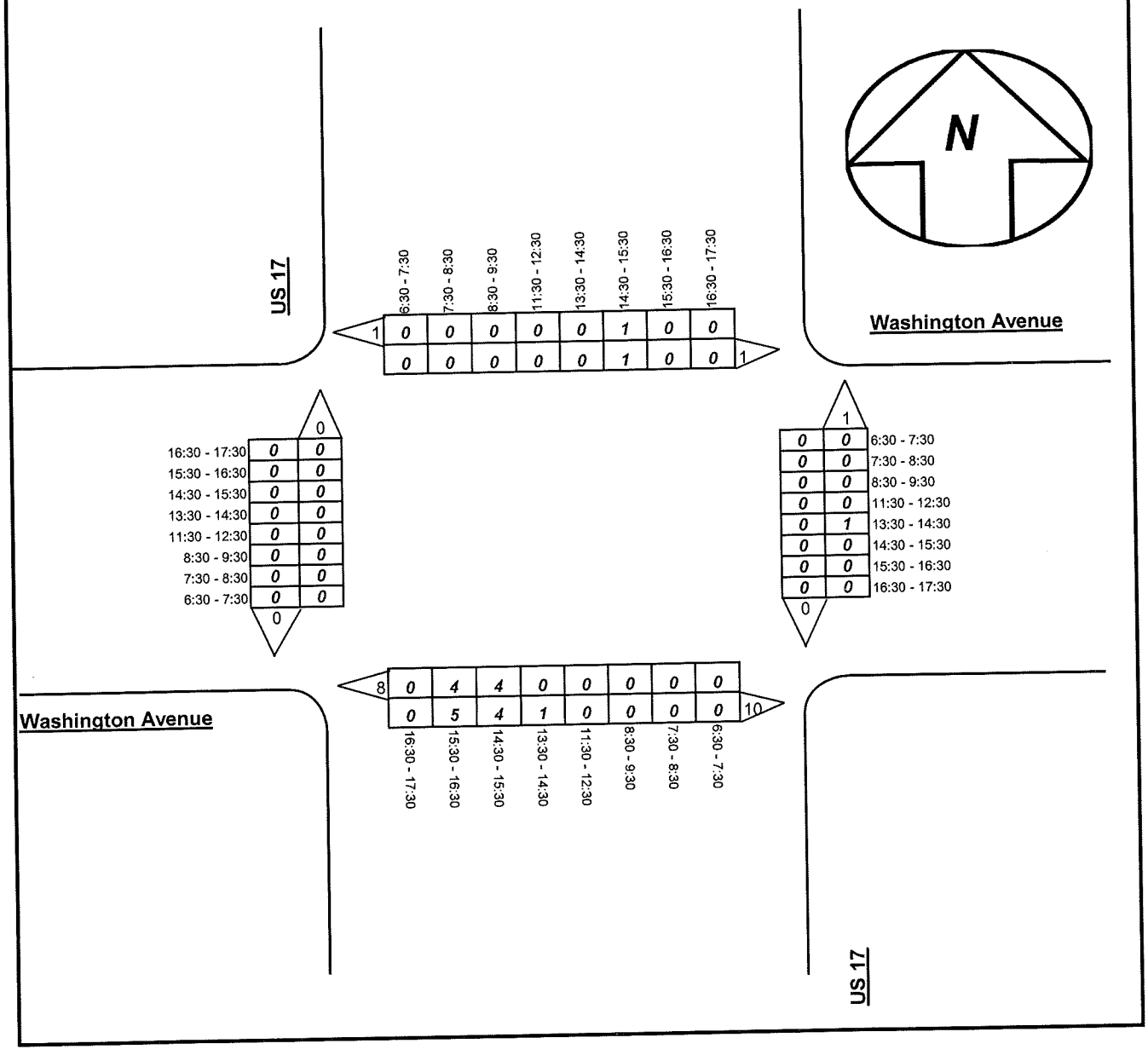
Pedestrian Movement Summary

Section *79050* TOWN *Pierson* County *Volusia*

Major Route *US 17* Intersecting Route *Washington Avenue*

Data By *GMB* Date *04/14/09* Form Completed By *SK*

Remarks



COUNTY OF VOLUSIA TRAFFIC SIGNAL MAINTENANCE INVENTORY SHEET

LOCATION: US-17/92 & WASHINGTON / PIERSON ISOLATED: ✓ NAME: M. CASTELLI DATE: 12-18-08
SIGNAL #: 307 CO-ORD: _____ NAME: _____ DATE: _____
NAME: _____ DATE: _____
NAME: _____ DATE: _____

MASTER INFORMATION:
CLOSED LOOP: MASTER LOC #: _____ PHONE #: CENTRAL PX: _____
LOCAL LOC #: _____ LOCAL PX: _____

MOVEMENT CHART:

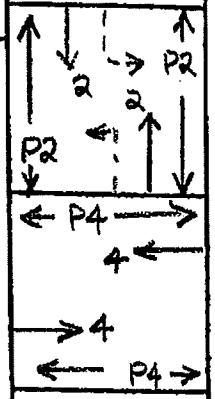
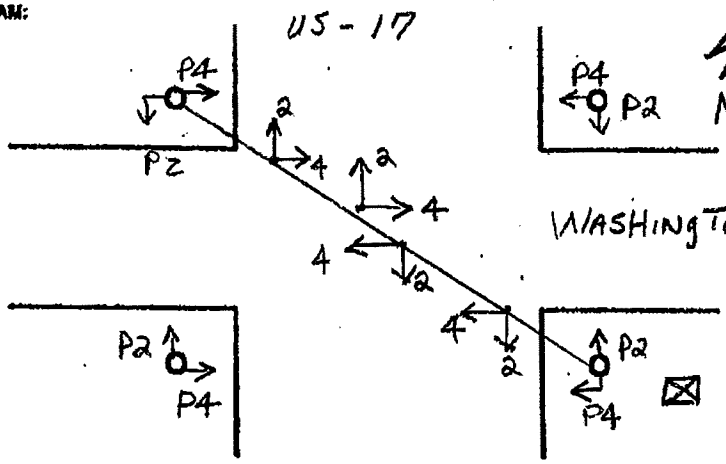


DIAGRAM:



SHOW:
1. POLES
2. SPAN WIRES
3. HEADS
4. CABINET
5. STREET NAMES
6. NORTH ARROW

PH	MOVE	INT	EXT	CLR	RED	MAX1	MAX2	WALK	FDW	RECALL	DET. FUNC	FLASH
2	2	12	3	4	1	35		7	~~10~~ 14	MIN	L	Y
4	4	6	4	4	1	25		7	~~9~~ 19		NL	R

MAX 2

T.O.D.	
DAY OF WEEK:	

MAX 3

PH	LIMIT	ADJ	UP	DOWN

GENERAL INFORMATION

CONTROLLER TYPE PHASES	1880EZ 4D's
PROM NUMBER	92R09
CABINET TYPE	4
MAX 2 CLOCK/TEC MOD	—
CONDITION OF OVERHEAD	Fair
OVERHEAD STREET NAMES	YES ✓ NO _____
ILLUMINATED STREET NAMES	YES _____ NO ✓
PRE-EMPTION	YES _____ NO ✓
TYPE	

LEDS: RED 8 NZ SZ EZ WZ RED ARROW ____ N__ S__ E__ W__
AMBER 8 NZ SZ EZ WZ AMBER ARROW ____ N__ S__ E__ W__
GREEN 8 NZ SZ EZ WZ GREEN ARROW ____ N__ S__ E__ W__
PED 8 NEZ SEZ NWZ SWZ COUNTDOWN

BLANK OUT: N__ S__ E__ W__
Ø

REMARKS:
PED TIMES CHECKED 11-12-07 BY ALLEN CATES

CAB. DATE 04/1991

123/SGMNTIN.WK4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	76	15	122	32	43	7	87	121	81	224	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	170		0	170		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980			0.971			0.913			0.995	
Flt Protected		0.994			0.970		0.950			0.950		
Satd. Flow (prot)	0	1815	0	0	1754	0	1770	1701	0	1770	1853	0
Flt Permitted		0.937			0.737		0.574			0.534		
Satd. Flow (perm)	0	1710	0	0	1333	0	1069	1701	0	995	1853	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			23			147			3	
Link Speed (mph)		31			31			31			31	
Link Distance (ft)		391			411			514			374	
Travel Time (s)		8.6			9.0			11.3			8.2	
Peak Hour Factor	0.54	0.54	0.54	0.53	0.53	0.53	0.72	0.72	0.72	0.89	0.89	0.89
Adj. Flow (vph)	24	141	28	230	60	81	10	121	168	91	252	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	193	0	0	371	0	10	289	0	91	260	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	16		9	16		9	16		9	16		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	7	33		7	33		7	33		7	33	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	7	33		7	33		7	33		7	33	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Detector Phase	4	4		4	4		2	2		2	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		12.0	12.0		12.0	12.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		31.0	31.0		31.0	31.0	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	0.0	40.0	40.0	0.0	40.0	40.0	0.0
Total Split (%)	42.9%	42.9%	0.0%	42.9%	42.9%	0.0%	57.1%	57.1%	0.0%	57.1%	57.1%	0.0%

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	25.0	25.0		25.0	25.0		35.0	35.0		35.0	35.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0		19.0	19.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		19.4			19.4		14.7	14.7		14.7	14.7	
Actuated g/C Ratio		0.46			0.46		0.35	0.35		0.35	0.35	
v/c Ratio		0.24			0.60		0.03	0.42		0.26	0.40	
Control Delay		7.4			12.7		11.1	8.4		13.9	13.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		7.4			12.7		11.1	8.4		13.9	13.8	
LOS		A			B		B	A		B	B	
Approach Delay		7.4			12.7			8.4			13.8	
Approach LOS		A			B			A			B	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 42.3
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 11.1 — Intersection LOS: B
Intersection Capacity Utilization 49.9% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Washington Avenue & US 17

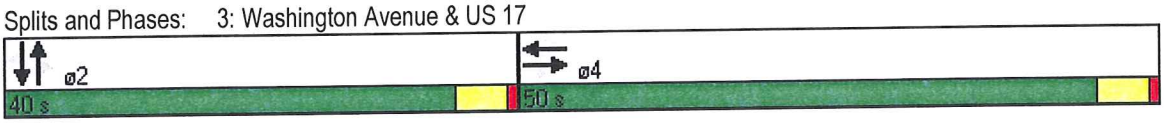
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	76	15	122	32	43	7	87	121	81	224	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		400	170		0	170		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980				0.850		0.913			0.995	
Flt Protected		0.994			0.962		0.950			0.950		
Satd. Flow (prot)	0	1815	0	0	1792	1583	1770	1701	0	1770	1853	0
Flt Permitted		0.944			0.702		0.584			0.546		
Satd. Flow (perm)	0	1723	0	0	1308	1583	1088	1701	0	1017	1853	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14				81		93			2	
Link Speed (mph)		31			31			31			31	
Link Distance (ft)		391			411			514			374	
Travel Time (s)		8.6			9.0			11.3			8.2	
Peak Hour Factor	0.54	0.54	0.54	0.53	0.53	0.53	0.72	0.72	0.72	0.89	0.89	0.89
Adj. Flow (vph)	24	141	28	230	60	81	10	121	168	91	252	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	193	0	0	290	81	10	289	0	91	260	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	16		9	16		9	16		9	16		9
Number of Detectors	1	1		1	1	1	1	1		1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	7	33		7	33	7	7	33		7	33	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	7	33		7	33	7	7	33		7	33	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Detector Phase	4	4		4	4	4	2	2		2	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	6.0	12.0	12.0		12.0	12.0	
Minimum Split (s)	31.0	31.0		31.0	31.0	31.0	31.0	31.0		31.0	31.0	
Total Split (s)	50.0	50.0	0.0	50.0	50.0	50.0	40.0	40.0	0.0	40.0	40.0	0.0
Total Split (%)	55.6%	55.6%	0.0%	55.6%	55.6%	55.6%	44.4%	44.4%	0.0%	44.4%	44.4%	0.0%

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	45.0	45.0		45.0	45.0	45.0	35.0	35.0		35.0	35.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0		19.0	19.0	19.0	19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0		0	0	
Act Effct Green (s)		18.0			18.0	16.9	15.2	15.2		15.2	15.2	
Actuated g/C Ratio		0.43			0.43	0.41	0.37	0.37		0.37	0.37	
v/c Ratio		0.26			0.51	0.12	0.03	0.42		0.24	0.38	
Control Delay		7.9			12.3	2.9	11.1	10.1		13.3	13.2	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		7.9			12.3	2.9	11.1	10.1		13.3	13.2	
LOS		A			B	A	B	B		B	B	
Approach Delay		7.9			10.2			10.2			13.2	
Approach LOS		A			B			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 41.6
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 10.7 — Intersection LOS: B
Intersection Capacity Utilization 47.3% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Washington Avenue & US 17



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	76	15	122	32	43	7	87	121	81	224	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		400	170		0	170		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980				0.850		0.913			0.995	
Flt Protected		0.994			0.962		0.950			0.950		
Satd. Flow (prot)	0	1815	0	0	1792	1583	1770	1701	0	1770	1853	0
Flt Permitted		0.938			0.663		0.507			0.462		
Satd. Flow (perm)	0	1712	0	0	1235	1583	944	1701	0	861	1853	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				81		102			2	
Link Speed (mph)		31			31			31			31	
Link Distance (ft)		391			411			514			374	
Travel Time (s)		8.6			9.0			11.3			8.2	
Peak Hour Factor	0.54	0.54	0.54	0.53	0.53	0.53	0.72	0.72	0.72	0.89	0.89	0.89
Adj. Flow (vph)	24	141	28	230	60	81	10	121	168	91	252	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	193	0	0	290	81	10	289	0	91	260	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	16		9	16		9	16		9	16		9
Number of Detectors	1	1		1	1	1	1	1		1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	7	33		7	33	7	7	33		7	33	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	7	33		7	33	7	7	33		7	33	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			9 4			2			2	
Permitted Phases	4			9 4		9 4	2			2		
Detector Phase	4	4		9 4	9 4	9 4	2	2		2	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0					12.0	12.0		12.0	12.0	
Minimum Split (s)	31.0	31.0					31.0	31.0		31.0	31.0	
Total Split (s)	30.0	30.0	0.0	45.0	45.0	45.0	45.0	45.0	0.0	45.0	45.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	50.0%	50.0%	50.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%

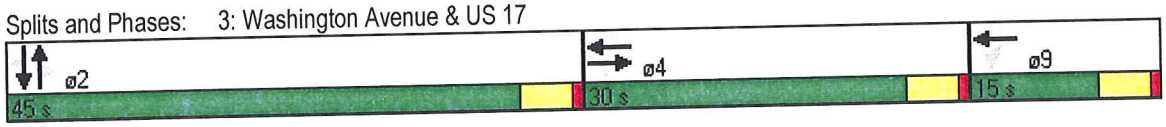
Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	6.0
Minimum Split (s)	11.0
Total Split (s)	15.0
Total Split (%)	17%

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	25.0	25.0					40.0	40.0		40.0	40.0	
Yellow Time (s)	4.0	4.0					4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0					3.0	3.0		3.0	3.0	
Recall Mode	None	None					Min	Min		Min	Min	
Walk Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0					19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0					0	0		0	0	
Act Effct Green (s)		16.8			30.2	29.1	15.8	15.8		15.8	15.8	
Actuated g/C Ratio		0.31			0.56	0.54	0.29	0.29		0.29	0.29	
v/c Ratio		0.36			0.42	0.09	0.04	0.51		0.36	0.48	
Control Delay		16.2			9.6	2.3	16.4	14.7		21.9	20.4	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		16.2			9.6	2.3	16.4	14.7		21.9	20.4	
LOS		B			A	A	B	B		C	C	
Approach Delay		16.2			8.0			14.8			20.7	
Approach LOS		B			A			B			C	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 54.2
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 14.7
Intersection LOS: B
Intersection Capacity Utilization 47.3%
ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Washington Avenue & US 17



Lane Group	ø9
Maximum Green (s)	10.0
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

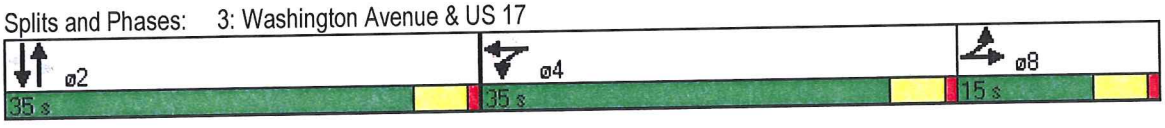
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	76	15	122	32	43	7	87	121	81	224	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		400	170		0	170		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980				0.850		0.913			0.995	
Flt Protected		0.994			0.962		0.950			0.950		
Satd. Flow (prot)	0	1815	0	0	1792	1583	1770	1701	0	1770	1853	0
Flt Permitted		0.994			0.962		0.499			0.453		
Satd. Flow (perm)	0	1815	0	0	1792	1583	930	1701	0	844	1853	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				81		93			2	
Link Speed (mph)		31			31			31			31	
Link Distance (ft)		391			411			514			374	
Travel Time (s)		8.6			9.0			11.3			8.2	
Peak Hour Factor	0.54	0.54	0.54	0.53	0.53	0.53	0.72	0.72	0.72	0.89	0.89	0.89
Adj. Flow (vph)	24	141	28	230	60	81	10	121	168	91	252	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	193	0	0	290	81	10	289	0	91	260	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	16		9	16		9	16		9	16		9
Number of Detectors	1	1		1	1	1	1	1		1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	7	33		7	33	7	7	33		7	33	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	7	33		7	33	7	7	33		7	33	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Split			Split		Perm	Perm			Perm		
Protected Phases	8	8		4	4			2			2	
Permitted Phases						4	2			2		
Detector Phase	8	8		4	4	4	2	2		2	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	6.0	12.0	12.0		12.0	12.0	
Minimum Split (s)	11.0	11.0		11.0	11.0	11.0	17.0	17.0		17.0	17.0	
Total Split (s)	15.0	15.0	0.0	35.0	35.0	35.0	35.0	35.0	0.0	35.0	35.0	0.0
Total Split (%)	17.6%	17.6%	0.0%	41.2%	41.2%	41.2%	41.2%	41.2%	0.0%	41.2%	41.2%	0.0%

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	10.0	10.0		30.0	30.0	30.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Min	Min		Min	Min	
Act Effct Green (s)		11.0			16.3	15.3	15.8	15.8		15.8	15.8	
Actuated g/C Ratio		0.20			0.29	0.28	0.29	0.29		0.29	0.29	
v/c Ratio		0.52			0.55	0.16	0.04	0.52		0.38	0.49	
Control Delay		28.2			21.2	5.4	16.1	15.6		22.4	20.7	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		28.2			21.2	5.4	16.1	15.6		22.4	20.7	
LOS		C			C	A	B	B		C	C	
Approach Delay		28.2			17.8			15.6			21.2	
Approach LOS		C			B			B			C	

Intersection Summary

Area Type: Other
Cycle Length: 85
Actuated Cycle Length: 55.4
Natural Cycle: 45
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 19.9 Intersection LOS: B
Intersection Capacity Utilization 47.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Washington Avenue & US 17



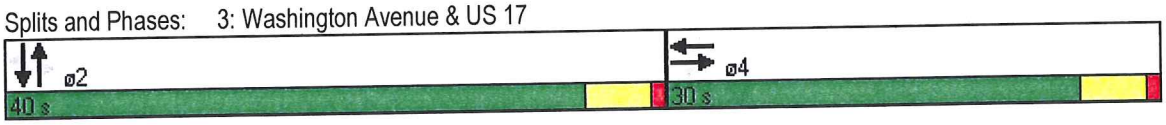
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	40	17	94	50	24	33	117	24	20	120	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	170		0	170		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970			0.981			0.975			0.988	
Flt Protected		0.987			0.973		0.950			0.950		
Satd. Flow (prot)	0	1783	0	0	1778	0	1770	1816	0	1770	1840	0
Flt Permitted		0.880			0.764		0.656			0.635		
Satd. Flow (perm)	0	1590	0	0	1396	0	1222	1816	0	1183	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			14			22			9	
Link Speed (mph)		31			31			31			31	
Link Distance (ft)		391			411			514			374	
Travel Time (s)		8.6			9.0			11.3			8.2	
Peak Hour Factor	0.63	0.63	0.63	0.76	0.76	0.76	0.72	0.72	0.72	0.82	0.82	0.82
Adj. Flow (vph)	33	63	27	124	66	32	46	162	33	24	146	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	123	0	0	222	0	46	195	0	24	159	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	16		9	16		9	16		9	16		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	7	33		7	33		7	33		7	33	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	7	33		7	33		7	33		7	33	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Detector Phase	4	4		4	4		2	2		2	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		12.0	12.0		12.0	12.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		31.0	31.0		31.0	31.0	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	0.0	40.0	40.0	0.0	40.0	40.0	0.0
Total Split (%)	42.9%	42.9%	0.0%	42.9%	42.9%	0.0%	57.1%	57.1%	0.0%	57.1%	57.1%	0.0%

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	25.0	25.0		25.0	25.0		35.0	35.0		35.0	35.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0		19.0	19.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		12.1			12.1		14.4	14.4		14.4	14.4	
Actuated g/C Ratio		0.35			0.35		0.42	0.42		0.42	0.42	
v/c Ratio		0.22			0.45		0.09	0.25		0.05	0.21	
Control Delay		7.1			10.7		8.0	7.8		7.8	8.0	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		7.1			10.7		8.0	7.8		7.8	8.0	
LOS		A			B		A	A		A	A	
Approach Delay		7.1			10.7			7.9			7.9	
Approach LOS		A			B			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 34.6
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.45
Intersection Signal Delay: 8.6
Intersection LOS: A
Intersection Capacity Utilization 46.0%
ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Washington Avenue & US 17



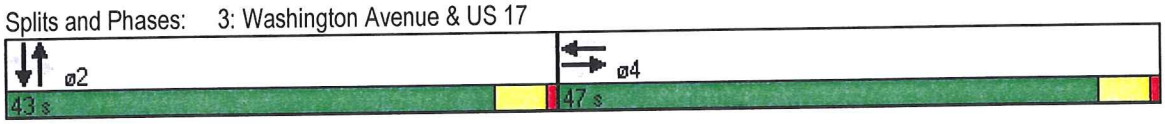
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	40	17	94	50	24	33	117	24	20	120	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		400	170		0	170		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970				0.850		0.975			0.988	
Flt Protected		0.987			0.968		0.950			0.950		
Satd. Flow (prot)	0	1783	0	0	1803	1583	1770	1816	0	1770	1840	0
Flt Permitted		0.887			0.735		0.656			0.635		
Satd. Flow (perm)	0	1603	0	0	1369	1583	1222	1816	0	1183	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				32		14			6	
Link Speed (mph)		31			31			31			31	
Link Distance (ft)		391			411			514			374	
Travel Time (s)		8.6			9.0			11.3			8.2	
Peak Hour Factor	0.63	0.63	0.63	0.76	0.76	0.76	0.72	0.72	0.72	0.82	0.82	0.82
Adj. Flow (vph)	33	63	27	124	66	32	46	162	33	24	146	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	123	0	0	190	32	46	195	0	24	159	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	16		9	16		9	16		9	16		9
Number of Detectors	1	1		1	1	1	1	1		1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	7	33		7	33	7	7	33		7	33	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	7	33		7	33	7	7	33		7	33	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2			2		
Detector Phase	4	4		4	4	4	2	2		2	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	6.0	12.0	12.0		12.0	12.0	
Minimum Split (s)	31.0	31.0		31.0	31.0	31.0	31.0	31.0		31.0	31.0	
Total Split (s)	47.0	47.0	0.0	47.0	47.0	47.0	43.0	43.0	0.0	43.0	43.0	0.0
Total Split (%)	52.2%	52.2%	0.0%	52.2%	52.2%	52.2%	47.8%	47.8%	0.0%	47.8%	47.8%	0.0%

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	42.0	42.0		42.0	42.0	42.0	38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0		19.0	19.0	19.0	19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0		0	0	
Act Effct Green (s)		12.0			12.0	11.0	14.2	14.2		14.2	14.2	
Actuated g/C Ratio		0.35			0.35	0.32	0.42	0.42		0.42	0.42	
v/c Ratio		0.21			0.40	0.06	0.09	0.26		0.05	0.21	
Control Delay		7.1			10.6	3.8	7.9	8.1		7.7	8.0	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		7.1			10.6	3.8	7.9	8.1		7.7	8.0	
LOS		A			B	A	A	A		A	A	
Approach Delay		7.1			9.6			8.0			8.0	
Approach LOS		A			A			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 34.2
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.40
Intersection Signal Delay: 8.3
Intersection LOS: A
Intersection Capacity Utilization 44.5%
ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Washington Avenue & US 17



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	40	17	94	50	24	33	117	24	20	120	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		400	170		0	170		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970				0.850		0.975			0.988	
Flt Protected		0.987			0.968		0.950			0.950		
Satd. Flow (prot)	0	1783	0	0	1803	1583	1770	1816	0	1770	1840	0
Flt Permitted		0.876			0.766		0.656			0.635		
Satd. Flow (perm)	0	1583	0	0	1427	1583	1222	1816	0	1183	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16				32		15			7	
Link Speed (mph)		31			31			31			31	
Link Distance (ft)		391			411			514			374	
Travel Time (s)		8.6			9.0			11.3			8.2	
Peak Hour Factor	0.63	0.63	0.63	0.76	0.76	0.76	0.72	0.72	0.72	0.82	0.82	0.82
Adj. Flow (vph)	33	63	27	124	66	32	46	162	33	24	146	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	123	0	0	190	32	46	195	0	24	159	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	16		9	16		9	16		9	16		9
Number of Detectors	1	1		1	1	1	1	1		1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	7	33		7	33	7	7	33		7	33	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	7	33		7	33	7	7	33		7	33	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			9 4			2			2	
Permitted Phases	4			9 4		9 4	2			2		
Detector Phase	4	4		9 4	9 4	9 4	2	2		2	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0					12.0	12.0		12.0	12.0	
Minimum Split (s)	31.0	31.0					31.0	31.0		31.0	31.0	
Total Split (s)	30.0	30.0	0.0	45.0	45.0	45.0	45.0	45.0	0.0	45.0	45.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	50.0%	50.0%	50.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%

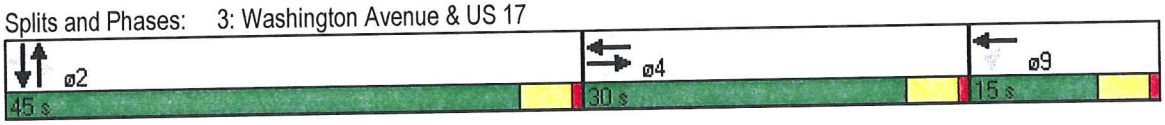
Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	6.0
Minimum Split (s)	31.0
Total Split (s)	15.0
Total Split (%)	17%

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	25.0	25.0					40.0	40.0		40.0	40.0	
Yellow Time (s)	4.0	4.0					4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0					1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0					3.0	3.0		3.0	3.0	
Recall Mode	None	None					Min	Min		Min	Min	
Walk Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0					19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0					0	0		0	0	
Act Effct Green (s)		11.1			23.2	22.2	13.9	13.9		13.9	13.9	
Actuated g/C Ratio		0.25			0.51	0.49	0.31	0.31		0.31	0.31	
v/c Ratio		0.31			0.26	0.04	0.12	0.34		0.07	0.28	
Control Delay		14.7			7.2	2.9	13.2	13.8		12.7	13.6	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		14.7			7.2	2.9	13.2	13.8		12.7	13.6	
LOS		B			A	A	B	B		B	B	
Approach Delay		14.7			6.6			13.7			13.4	
Approach LOS		B			A			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 45.1
Natural Cycle: 95
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.34
Intersection Signal Delay: 11.7
Intersection LOS: B
Intersection Capacity Utilization 44.5%
ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Washington Avenue & US 17



Lane Group	ø9
Maximum Green (s)	10.0
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	19.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	40	17	94	50	24	33	117	24	20	120	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		400	170		0	170		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970				0.850		0.975			0.988	
Flt Protected		0.987			0.968		0.950			0.950		
Satd. Flow (prot)	0	1783	0	0	1803	1583	1770	1816	0	1770	1840	0
Flt Permitted		0.987			0.968		0.656			0.635		
Satd. Flow (perm)	0	1783	0	0	1803	1583	1222	1816	0	1183	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14				32		15			7	
Link Speed (mph)		31			31			31			31	
Link Distance (ft)		391			411			514			374	
Travel Time (s)		8.6			9.0			11.3			8.2	
Peak Hour Factor	0.63	0.63	0.63	0.76	0.76	0.76	0.72	0.72	0.72	0.82	0.82	0.82
Adj. Flow (vph)	33	63	27	124	66	32	46	162	33	24	146	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	123	0	0	190	32	46	195	0	24	159	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	16		9	16		9	16		9	16		9
Number of Detectors	1	1		1	1	1	1	1		1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	7	33		7	33	7	7	33		7	33	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	7	33		7	33	7	7	33		7	33	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Split			Split		Perm	Perm			Perm		
Protected Phases	8	8		4	4			2			2	
Permitted Phases						4	2			2		
Detector Phase	8	8		4	4	4	2	2		2	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	6.0	12.0	12.0		12.0	12.0	
Minimum Split (s)	31.0	31.0		31.0	31.0	31.0	31.0	31.0		31.0	31.0	
Total Split (s)	15.0	15.0	0.0	30.0	30.0	30.0	40.0	40.0	0.0	40.0	40.0	0.0
Total Split (%)	17.6%	17.6%	0.0%	35.3%	35.3%	35.3%	47.1%	47.1%	0.0%	47.1%	47.1%	0.0%

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	10.0	10.0		25.0	25.0	25.0	35.0	35.0		35.0	35.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0		19.0	19.0	19.0	19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0		0	0	
Act Effct Green (s)		9.9			12.2	11.2	19.2	19.2		19.2	19.2	
Actuated g/C Ratio		0.21			0.26	0.23	0.42	0.42		0.42	0.42	
v/c Ratio		0.32			0.41	0.08	0.09	0.25		0.05	0.20	
Control Delay		18.4			18.1	7.1	14.7	14.7		14.3	14.8	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		18.4			18.1	7.1	14.7	14.7		14.3	14.8	
LOS		B			B	A	B	B		B	B	
Approach Delay		18.4			16.5			14.7			14.8	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 85
Actuated Cycle Length: 45.2
Natural Cycle: 95
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.41
Intersection Signal Delay: 15.8 — Intersection LOS: B
Intersection Capacity Utilization 44.5% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Washington Avenue & US 17