Oyster Point Transportation Study

HAMPTON ROADS
PLANNING DISTRICT COMMISSION

APRIL 2008

T08-01

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Oyster Point Transportation Study

This report was included in the Work Program for Fiscal Year 2007-2008, which was approved by the Commission and the Metropolitan Planning Organization at their meetings of March 21, 2007.

PREPARED BY:

APRIL 2008

T08-01

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Oyster Point Transportation Study

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ABSTRACT

The City of Newport News requested the Hampton Roads Metropolitan Planning Organization (HRMPO) to conduct a traffic management study of the City's Oyster Point area. The objectives of this study include assessing the existing transportation system and identifying ways to maintain or improve traffic flow in the future with anticipated further development of the area. Significant changes to the area have taken place in recent years, including the establishment of the Oyster Point City Center mixed-use development. This 52-acre high-density mixed-use district combines residential, retail, and office space. Upon completion, this area is anticipated to have one million square feet of office space, 225,000 square feet of retail, and 600,000 square feet of residential space.

Roadway improvements, such as the extension of Middle Ground Blvd from Jefferson Ave to Warwick Blvd and a partial I-64 interchange at Middle Ground Blvd, are being considered by the City to upgrade the roadway network in the area. This study examines the future traffic conditions with and without these roadway improvements and provides other recommendations for improving the overall transportation system as growth continues into the future.

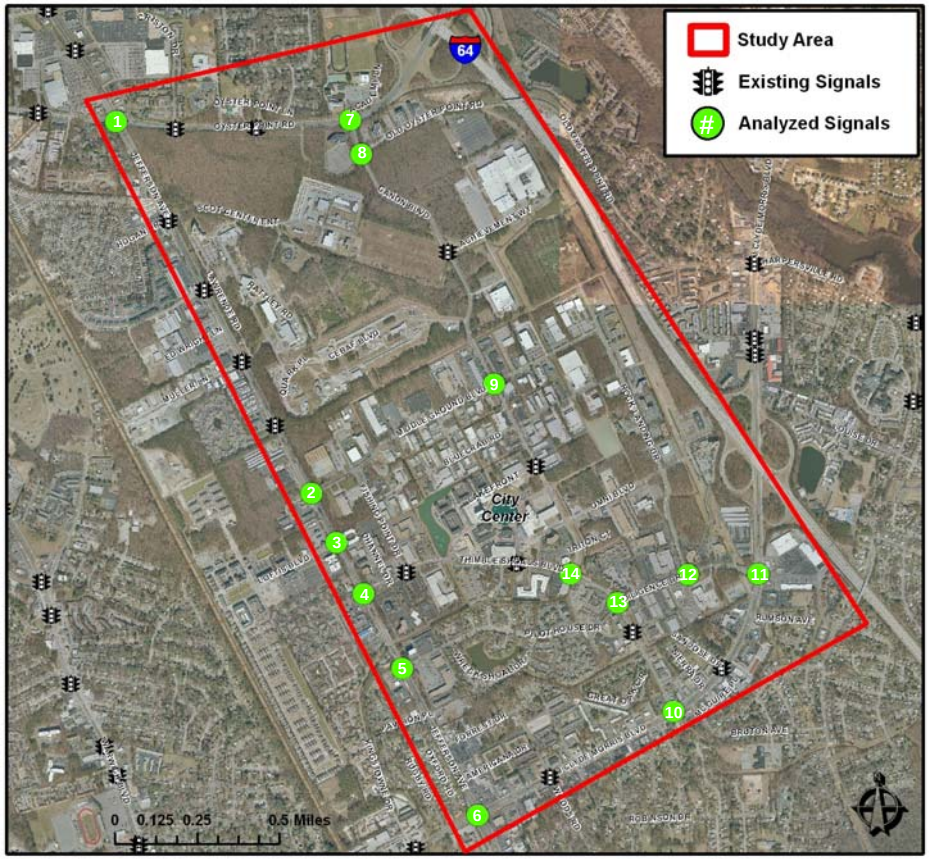
ACKNOWLEDGMENTS

This report was prepared by the HRMPO in cooperation with the City of Newport News, the Virginia Department of Transportation (VDOT), and the Federal Highway Administration (FHWA). The contents of this report reflect the views of the staff of the Hampton Roads Area Metropolitan Planning Organization (MPO). The MPO staff is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the FHWA, VDOT, or HRPDC. This report does not constitute a standard, specification, or regulation. FHWA or VDOT acceptance of this report as evidence of fulfillment of the objectives of this planning study does not constitute endorsement/approval of the need for any recommended improvements nor does it constitute approval of their location and design or a commitment to fund any such improvements. Additional project level environmental impact assessments and/or studies of alternatives may be necessary.

EXECUTIVE SUMMARY

The City of Newport News requested the HRPDC to conduct a traffic management study of the City's Oyster Point area. The objectives of this study include assessing the existing transportation system and identifying ways to maintain or improve traffic flow in the future with anticipated further development of the area. Significant changes to the area have taken place in recent years, including the establishment of the Oyster Point City Center mixed-use development. This 52-acre high-density mixed-use district combines residential, retail, and office space. Upon completion, this area is anticipated to have one million square feet of office space, 225,000 square feet of retail, and 600,000 square feet of residential space.

Oyster Point Study Area



Background Image source: City of Newport News & Virginia Geographic Information Network.

In an effort to predict travel behavior to/from Oyster Point by the year 2030, the Hampton Roads travel demand forecasting model was used. Based upon meetings with the City of Newport News, the 2030 socioeconomic data for Oyster Point was adjusted in Spring 2007 to account for the future plans and development expected for the City Center area.

The map on the left shows the locations of the signalized intersections that were analyzed in this study for the existing and future scenarios. For each intersection, the traffic conditions (levels of service) were determined for the morning and afternoon peak hours for a typical weekday. Turning movement counts were collected for all 14 intersections in 2006 and early 2007 for the existing conditions. The existing and future roadway network within the study area was modeled using Synchro 6.0 Traffic Signal Coordination Software. Synchro uses Highway Capacity Manual methods to calculate control

Description of Signalized Intersection Levels-of-Service

Level of Service (LOS)	Average Control Delay (sec/veh)	Description
A	≤ 10.0	Progression is extremely favorable and most vehicles do not stop at all.
B	10.1 - 20.0	Progression is good, with more vehicles stopping than at LOS A.
C	20.1 - 35.0	Progression is fair, and individual cycle failures may begin to appear at this level.
D	35.1 - 55.0	Congestion becomes noticeable. Many vehicles stop and individual cycle failures become more prevalent.
E	55.1 - 80.0	Individual cycle failures are frequent.
F	> 80.0	Arriving traffic volumes exceed the capacity of the intersection. Significant cycle failures occur.

Source: Highway Capacity Manual 2000.

delay (the delay resulting from slowing and stopping on the approaches of an intersection) and levels-of-service.

The peak hour intersection level of service (LOS) is a measure of the adequacy of the existing lanes and signalization at an intersection for the particular peak hour. Level of service is measured on a scale of "A" through "F," with LOS A representing the best operating conditions and LOS F representing the worst.

Using Synchro, the 2006/07 existing traffic conditions were analyzed using the existing signal timings that are currently operating in the field. Next, the traffic signal timings and network offsets were optimized within Synchro and the results are provided to the right. It is recommended that the City implement the new signal timings. The results show a cumulative reduction in the overall average intersection delay by about 19% for the AM peak and 14% for the PM peak. Intersections #9 – #14 (AM peak) and #1 – #8 (PM peak) are already operating with optimal signal timings.

Three sets of traffic volumes, based on three build alternatives, were developed to determine future 2030 traffic conditions in the study area. The three 2030 traffic alternatives that being considered by the

2006/07 Existing Conditions Intersection Summary

AM Peak Hour

	Existing Signal Timings				Optimized Signal Timings			
Intersection	Avg Delay (sec/veh)	LOS	Failing Movements (LOS E or F)	Cycle Length (sec)	Avg Delay (sec/veh)	LOS	Failing Movements (LOS E or F)	Cycle Length (sec)
1 Jefferson Ave / Oyster Point Rd	80.0	F	SBT,EBL,EBT,WBL	110	50.0	D	SBT,EBT,WBL	110
2 Jefferson Ave / Middle Ground Blvd	52.6	D	NBL,SBL	110	33.0	C	SBL	110
3 Jefferson Ave / Loftis Blvd	7.5	A	NBL	110	5.9	A		110
4 Jefferson Ave / Thimble Shoals Blvd	36.9	D	SBL,EBL,WBT,WBL	110	26.9	C	SBL,EBL	110
5 Jefferson Ave / Pilot House Dr	4.8	A	NBL,SBL,WBT,WBL	110	6.1	A		110
6 Jefferson Ave / J. Clyde Morris Blvd	132.5	F	NBL,SBT,SBR,EBL,EBT,WBL,WBT	110	122.2	F	NBL,SBL,SBT,SBR, EBL,EBT,WBL	110
7 Oyster Point Rd / Canon Blvd	31.1	C	WBL	110	20.4	C	SBT,SBL	110
8 Canon Blvd / Old Oyster Point Rd	6.4	A		110	6.8	A		55
9 Canon Blvd / Middle Ground Blvd	14.2	B		112.8	14.2	B		112.8
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	8.3	A		100	8.3	A		100
11 J. Clyde Morris Blvd / Diligence Dr	22.2	C		100	22.2	C		100
12 Diligence Dr / Rock Landing Dr	10.0	B		100	10.0	B		100
13 Diligence Dr / Thimble Shoals Blvd	10.3	B		100	10.3	B		100
14 Canon Blvd / Thimble Shoals Blvd	11.7	B		100	11.7	B		100
TOTAL	429				348			
Overall Reduction in Average Delay by Optimizing Signal Timings					19%			

PM Peak Hour

	Existing Signal Timings				Optimized Signal Timings			
Intersection	Avg Delay (sec/veh)	LOS	Failing Movements (LOS E or F)	Cycle Length (sec)	Avg Delay (sec/veh)	LOS	Failing Movements (LOS E or F)	Cycle Length (sec)
1 Jefferson Ave / Oyster Point Rd	57.9	E	NBL,NBT,SBL,SBT,EBL,WBL,WBT	140	57.9	E	NBL,NBT,SBL,SBT,EBL,WBL,WBT	140
2 Jefferson Ave / Middle Ground Blvd	23.7	C	SBL,NBL,EBL,WBL,WBT	140	23.7	C	SBL,NBL,EBL,WBL,WBT	140
3 Jefferson Ave / Loftis Blvd	11.6	B	NBL,EBL	140	11.6	B	NBL,EBL	140
4 Jefferson Ave / Thimble Shoals Blvd	33.6	C	EBL,EBT,WBL,WBT	140	33.6	C	EBL,EBT,WBL,WBT	140
5 Jefferson Ave / Pilot House Dr	9.2	A	SBL,NBL,WBL,WBT	140	9.2	A	SBL,NBL,WBL,WBT	140
6 Jefferson Ave / J. Clyde Morris Blvd	99.8	F	NBL,NBT,SBL,SBT,SBR,EBL,EBT,WBL	140	99.8	F	NBL,NBT,SBL,SBT,SBR,EBL,EBT,WBL	140
7 Oyster Point Rd / Canon Blvd	32.8	C	SBL,SBT,EBL,WBL	140	32.8	C	SBL,SBT,EBL,WBL	140
8 Canon Blvd / Old Oyster Point Rd	20.0	C		140	20.0	C		140
9 Canon Blvd / Middle Ground Blvd	14.3	B		82.8	20.4	C		110
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	18.4	B	SBL,SBT,EBL	125	21.8	C		110
11 J. Clyde Morris Blvd / Diligence Dr	39.0	D	SBL,EBL,WBL,WBT,WBR	125	33.4	C	SBL,WBL,WBT,WBR	110
12 Diligence Dr / Rock Landing Dr	39.7	D	SBL,SBT,SBR	62	29.5	C		110
13 Diligence Dr / Thimble Shoals Blvd	13.1	B		62.5	10.6	B		110
14 Canon Blvd / Thimble Shoals Blvd	87.2	F	SBL,SBR,EBL	125	27.7	C	EBL	55
TOTAL	500				432			
Overall Reduction in Average Delay by Optimizing Signal Timings					14%			

Sample turning movement abbreviations: NBR – Northbound Right, SBT – Southbound Through, EBL – Eastbound Left

City and are included in this analysis are described below:

Alternative A – Special 2030 forecast without Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & without I-64 partial Interchange with Middle Ground Blvd.

Alternative B – Special 2030 forecast with Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & without I-64 partial Interchange with Middle Ground Blvd.

Alternative C – Special 2030 forecast with Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & with I-64 partial Interchange with Middle Ground Blvd.

The Middle Ground Blvd extension would be a 4-lane divided roadway. The I-64 partial Interchange with Middle Ground Blvd would only allow I-64 eastbound traffic to exit onto Middle Ground Blvd and only eastbound traffic on Middle Ground Blvd to enter I-64 and travel eastward. Growth factors based on the 2030 traffic forecast were applied to each intersection in Synchro for each Alternative A, B, and C to determine the future 2030 AM and PM peak hour traffic conditions.

The future 2030 analysis reveals that average vehicle delay (among the 14 study area intersections) is expected to be more than three times as much (230% increase) during the AM peak hour and five times as great (413% increase) during the PM peak hour over what it is today if the Middle Ground Blvd Extension project and the I-64 partial interchange with Middle Ground Blvd are not constructed (Alternative A). The Middle Ground Blvd Extension project (Alternative B) will have a small effect on improving average vehicle delay at the surrounding 14 intersections given the high levels of congestion by 2030. The construction of Middle Ground will provide a 5 second average vehicle delay reduction per intersection during the morning peak hour (82 to 77 seconds) and a 6 second reduction during the afternoon peak hour (159 to 153 seconds) compared to Alternative A.

Intersection Average Delay Summary

AM Peak Hour

Intersection	Average Delay (sec/veh) with LOS			
	06/07 Existing Optimized	2030 Alt A	2030 Alt B	2030 Alt C
1 Jefferson Ave / Oyster Point Rd	50 (D)	135 (F)	119 (F)	116 (F)
2 Jefferson Ave / Middle Ground Blvd	33 (C)	51 (D)	31 (C)	31 (C)
3 Jefferson Ave / Loftis Blvd	6 (A)	10 (A)	9 (A)	11 (B)
4 Jefferson Ave / Thimble Shoals Blvd	27 (C)	50 (D)	64 (E)	71 (E)
5 Jefferson Ave / Pilot House Dr	6 (A)	12 (B)	15 (B)	15 (B)
6 Jefferson Ave / J. Clyde Morris Blvd	122 (F)	193 (F)	176 (F)	163 (F)
7 Oyster Point Rd / Canon Blvd	20 (C)	111 (F)	99 (F)	75 (E)
8 Canon Blvd / Old Oyster Point Rd	7 (A)	22 (C)	17 (B)	11 (B)
9 Canon Blvd / Middle Ground Blvd	14 (B)	71 (E)	88 (F)	93 (F)
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	8 (A)	13 (B)	13 (B)	13 (B)
11 J. Clyde Morris Blvd / Diligence Dr	22 (C)	90 (F)	79 (E)	68 (E)
12 Diligence Dr / Rock Landing Dr	10 (A)	220 (F)	208 (F)	195 (F)
13 Diligence Dr / Thimble Shoals Blvd	10 (B)	102 (F)	92 (F)	102 (F)
14 Canon Blvd / Thimble Shoals Blvd	12 (B)	66 (E)	69 (E)	96 (F)
TOTAL	**347**	**1,146**	**1,079**	**1,060**
Percentage Increase (06/07 Existing Opt to 2030 Alt)		**230%**	**211%**	**205%**
Average Delay/Intersection	**25 (C)**	**82 (F)**	**77 (E)**	**76 (E)**

PM Peak Hour

Intersection	Average Delay (sec/veh) with LOS			
	06/07 Existing Optimized	2030 Alt A	2030 Alt B	2030 Alt C
1 Jefferson Ave / Oyster Point Rd	58 (E)	140 (F)	121 (F)	117 (F)
2 Jefferson Ave / Middle Ground Blvd	24 (C)	42 (D)	77 (E)	85 (F)
3 Jefferson Ave / Loftis Blvd	12 (B)	10 (A)	13 (B)	12 (B)
4 Jefferson Ave / Thimble Shoals Blvd	34 (C)	89 (F)	108 (F)	123 (F)
5 Jefferson Ave / Pilot House Dr	9 (A)	13 (B)	15 (B)	16 (B)
6 Jefferson Ave / J. Clyde Morris Blvd	100 (F)	149 (F)	141 (F)	129 (F)
7 Oyster Point Rd / Canon Blvd	33 (C)	128 (F)	109 (F)	78 (E)
8 Canon Blvd / Old Oyster Point Rd	20 (C)	126 (F)	108 (F)	65 (E)
9 Canon Blvd / Middle Ground Blvd	20 (C)	158 (F)	185 (F)	201 (F)
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	22 (C)	102 (F)	84 (F)	92 (F)
11 J. Clyde Morris Blvd / Diligence Dr	33 (C)	209 (F)	195 (F)	215 (F)
12 Diligence Dr / Rock Landing Dr	30 (C)	428 (F)	400 (F)	418 (F)
13 Diligence Dr / Thimble Shoals Blvd	11 (B)	240 (F)	252 (F)	237 (F)
14 Canon Blvd / Thimble Shoals Blvd	28 (C)	393 (F)	327 (F)	360 (F)
TOTAL	**434**	**2,227**	**2,135**	**2,148**
Percentage Increase (06/07 Existing Opt to 2030 Alt)		**413%**	**392%**	**395%**
Average Delay/Intersection	**31 (C)**	**159 (F)**	**153 (F)**	**153 (F)**

Connecting Middle Ground Blvd to I-64 with a partial interchange (Alternative C) is only expected to yield an additional 1 second average vehicle delay savings per intersection during the morning peak hour (77 to 76 seconds) and will not improve the overall average vehicle delay during the afternoon peak hour compared to Alternative B (153 seconds). Alternative C provides some minor relief at 6 of the 14 intersections (AM Peak) and 5 of the 14 intersections (PM Peak); however, the overall impact on the future transportation network in Oyster Point is negligible and would not be cost effective from a traffic reduction perspective. Among other benefits from Alternative C would be direct access to City Center from I-64, enhanced property values, and increased visibility for City Center and surrounding businesses.

It is recommended that the City select Alternative B and proceed with their plans to extend Middle Ground Blvd from Jefferson Ave to Warwick Blvd. This new roadway extension will provide a reduction in daily traffic vehicles along parallel east/west roadways like Oyster Point Rd (17% or 11,000 vpd) and J. Clyde Morris Blvd (16% or 7,000 vpd). It is also expected to decrease traffic along parts of Warwick Blvd (ranging from 2,000 to 12,000 vpd). Furthermore, the roadway extension of Middle Ground Blvd will provide some additional connectivity and another

Intersection Geometric and Channelization Recommendations

Study Area Intersection	Roadway Improvement Recommendation	Notes and Observations
1 Jefferson Ave / Oyster Point Rd	Widen Oyster Point Rd from 2 to 3 lanes (eastbound) between Proposed Liberty Pkwy and Jefferson Ave	Eastbound thru traffic backs up to the intersection of Oyster Pt and HQ Way and blocks left and right turning vehicles from proceeding
	Extend dual left storage lanes (southbound) on Jefferson Ave	Southbound Jefferson Ave thru traffic backs up at Oyster Pt Rd and blocks dual left turn lanes
2 Jefferson Ave / Middle Ground Blvd	None	
3 Jefferson Ave / Loftis Blvd	None	
4 Jefferson Ave / Thimble Shoals Blvd	Add right turn bay (westbound) on Thimble Shoals Blvd	
	Extend right and left turn bays (northbound) on Jefferson Ave	Northbound Jefferson Ave thru traffic backs up at Thimble Shoals Blvd and blocks left and right turn lanes
	Add 2nd left turn lane (eastbound) on Thimble Shoals Blvd *(low priority)*	
5 Jefferson Ave / Pilot House Dr	None	
6 Jefferson Ave / J. Clyde Morris Blvd	Add 3rd thru lane (eastbound) on J. Clyde Morris Blvd from Kingstowne Dr	Eastbound thru traffic backs up to the intersection of Kingstowne Dr and J. Clyde Morris Blvd
	Change northbound right turn channelized lane from free to yield control	
	Add right turn bay (southbound) on Jefferson Ave	
7 Oyster Point Rd / Canon Blvd	Extend right turn bay (eastbound) on Oyster Pt Rd	
8 Canon Blvd / Old Oyster Point Rd	Add right turn bay (northbound) on Canon Blvd	
9 Canon Blvd / Middle Ground Blvd	Add right turn bay (southbound) on Canon Blvd	
	Add right turn bay (eastbound) on Middle Ground Blvd	
	Add right turn bay (westbound) on Middle Ground Blvd	Designate two left lanes for dual lefts. Designate right turn lane for rights only and the middle right lane for thru only
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	None	
11 J. Clyde Morris Blvd / Diligence Dr	Add right turn bay (westbound) with right turn channelized lane with yield control on Diligence Dr	Keep existing two lanes for thru traffic.
	Add left turn bay (westbound) on Diligence Dr	
	Change southbound right turn channelized lane with yield control on J Clyde Morris Blvd to free flow	
12 Diligence Dr / Rock Landing Dr	Add one lane (westbound) on Diligence Dr from J. Clyde Morris Blvd to Rock Landing Dr, including a channelized bay with yield control onto Rock Land Dr	This will allow free flow right turns for southbound J Clyde Morris Blvd traffic onto Diligence Dr to Rock Landing Dr. Consider adding one lane (eastbound) on Diligence Dr)
	Add left turn bay (westbound) on Diligence Dr	Realign eastbound thru lanes along Diligence Dr south of intersection
	Add left turn bay (eastbound) on Diligence Dr	
	Add thru/right turn lane southbound on Rock Landing Dr	Keep existing two lanes for left turns only
13 Diligence Dr / Thimble Shoals Blvd	Add right turn channelized lane (westbound) with yield control on Diligence Dr *(low priority)*	
	Add right turn bay (northbound) on Thimble Shoals Blvd	
	Add left turn bay (southbound) on Thimble Shoals Blvd	Use right lane for thru only, middle lane for left/thru and left lane for lefts only
14 Canon Blvd / Thimble Shoals Blvd	Add right turn bay (westbound) with right turn channelized lane with yield control on Thimble Shoals Blvd	Also consider extending this right turn bay back to Diligence Dr to provide free flow right turns from Diligence Dr to Canon Blvd
	Add right turn bay (southbound) on Canon Blvd	Use two existing lanes for left turns only

alternative route within the Oyster Point area. Even with this improvement, there will only be a slight reduction in delay at the surrounding 14 intersections compared to the no build scenario (Alternative A). Implementation of additional intersection improvements along with other congestion mitigation strategies will be imperative.

Many of the roadways in the study area were not originally built with the anticipation of serving dense developments (i.e. no right or left turn lanes), such as City Center, but rather light industrial and small business uses. In order to accommodate future development, several critical roadway improvements will be necessary. The table on the previous page provides a list of roadway improvement recommendations that should be implemented by the year 2030 in order to keep traffic moving in the Oyster Point study area. A majority of the improvements focused on low cost geometric roadway solutions (i.e. adding turn lanes rather than widening roadways).

Implementing the 2030 Alternative B with the recommended intersection geometric improvements will yield an additional 17 seconds average vehicle delay reduction per intersection during the morning peak hour (77 to 60 seconds) and a 63 second average vehicle delay reduction during the afternoon peak hour (153 to 90 seconds). These improvements will have the highest impact on Intersections #9 and #14 (AM peak) and Intersections #6, #9, #12, #13, & #14 (PM peak). Several intersections are expected to be operating at or near acceptable levels of service by 2030 if the geometric and channelization improvements are constructed (see graphical summary on the following page).

In order to avoid traffic backing up from one intersection to the next by the year 2030, most of these intersection recommendations will need to be implemented as a system wide package. It is important to note that making roadway improvements at one intersection will affect traffic flow at downstream intersections. Therefore, improvements need to be

Intersection Average Delay Summary with Geometric Improvements

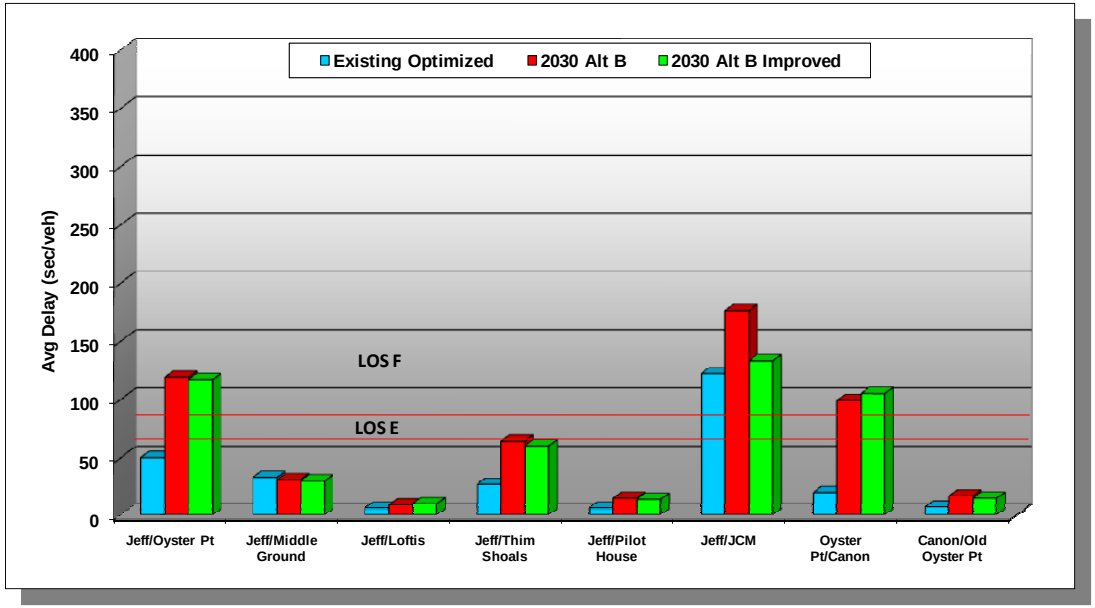
AM Peak Hour

Intersection	Average Delay (sec/veh) with LOS: 06/07 Existing Optimized	2030 Alt A "No Build"	2030 Alt B	2030 Alt B Improved	% Delay Reduction Alt B Imp
1 Jefferson Ave / Oyster Point Rd	50 (D)	135 (F)	119 (F)	117 (F)	2%
2 Jefferson Ave / Middle Ground Blvd	33 (C)	51 (D)	31 (C)	30 (C)	3%
3 Jefferson Ave / Loftis Blvd	6 (A)	10 (A)	9 (A)	10 (A)	-10%
4 Jefferson Ave / Thimble Shoals Blvd	27 (C)	50 (D)	64 (E)	60 (E)	7%
5 Jefferson Ave / Pilot House Dr	6 (A)	12 (B)	15 (B)	14 (B)	7%
6 Jefferson Ave / J. Clyde Morris Blvd	122 (F)	193 (F)	176 (F)	133 (F)	32%
7 Oyster Point Rd / Canon Blvd	20 (C)	111 (F)	99 (F)	105 (F)	-6%
8 Canon Blvd / Old Oyster Point Rd	7 (A)	22 (C)	17 (B)	15 (B)	13%
9 Canon Blvd / Middle Ground Blvd	14 (B)	71 (E)	88 (F)	34 (C)	159%
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	8 (A)	13 (B)	13 (B)	15 (B)	-13%
11 J. Clyde Morris Blvd / Diligence Dr	22 (C)	90 (F)	79 (E)	63 (E)	25%
12 Diligence Dr / Rock Landing Dr	10 (A)	220 (F)	208 (F)	155 (F)	34%
13 Diligence Dr / Thimble Shoals Blvd	10 (B)	102 (F)	92 (F)	72 (E)	28%
14 Canon Blvd / Thimble Shoals Blvd	12 (B)	66 (E)	69 (E)	12 (B)	475%
TOTAL	**347**	**1,146**	**1,079**	**835**	
Percentage Increase (06/07 Existing Opt to 2030 Alt)		**230%**	**211%**	**141%**	
Average Delay/Intersection	**25 (C)**	**82 (F)**	**77 (E)**	**60 (E)**	

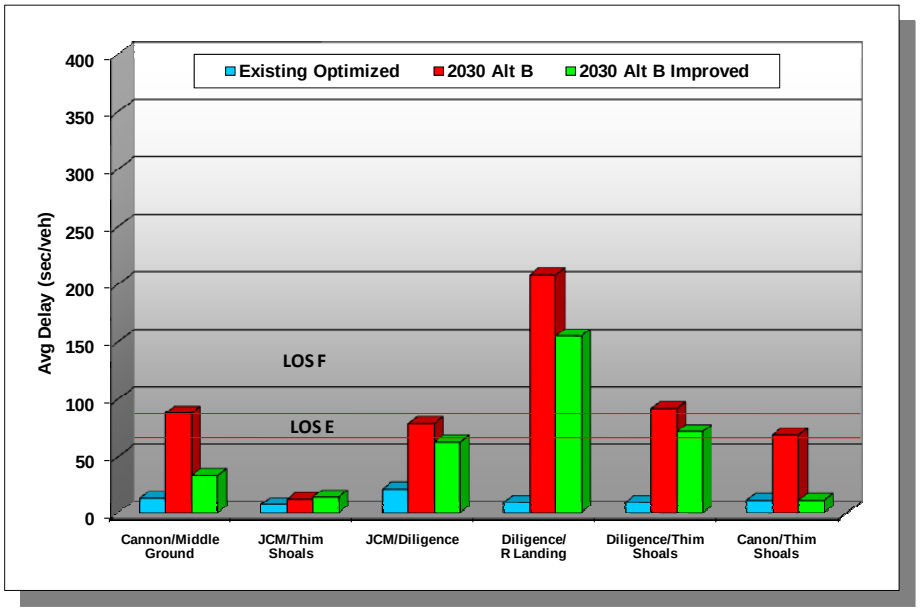
PM Peak Hour

Intersection	Average Delay (sec/veh) with LOS: 06/07 Existing Optimized	2030 Alt A "No Build"	2030 Alt B	2030 Alt B Improved	% Delay Reduction Alt B Imp
1 Jefferson Ave / Oyster Point Rd	58 (E)	140 (F)	121 (F)	121 (F)	0%
2 Jefferson Ave / Middle Ground Blvd	24 (C)	42 (D)	77 (E)	78 (E)	-1%
3 Jefferson Ave / Loftis Blvd	12 (B)	10 (A)	13 (B)	12 (B)	8%
4 Jefferson Ave / Thimble Shoals Blvd	34 (C)	89 (F)	108 (F)	102 (F)	6%
5 Jefferson Ave / Pilot House Dr	9 (A)	13 (B)	15 (B)	15 (B)	0%
6 Jefferson Ave / J. Clyde Morris Blvd	100 (F)	149 (F)	141 (F)	73 (E)	93%
7 Oyster Point Rd / Canon Blvd	33 (C)	128 (F)	109 (F)	111 (F)	-2%
8 Canon Blvd / Old Oyster Point Rd	20 (C)	126 (F)	108 (F)	82 (F)	32%
9 Canon Blvd / Middle Ground Blvd	20 (C)	158 (F)	185 (F)	116 (F)	59%
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	22 (C)	102 (F)	84 (F)	84 (F)	0%
11 J. Clyde Morris Blvd / Diligence Dr	33 (C)	209 (F)	195 (F)	169 (F)	15%
12 Diligence Dr / Rock Landing Dr	30 (C)	428 (F)	400 (F)	87 (F)	360%
13 Diligence Dr / Thimble Shoals Blvd	11 (B)	240 (F)	252 (F)	57 (E)	342%
14 Canon Blvd / Thimble Shoals Blvd	28 (C)	393 (F)	327 (F)	158 (F)	107%
TOTAL	**434**	**2,227**	**2,135**	**1,265**	
Percentage Increase (06/07 Existing Opt to 2030 Alt)		**413%**	**392%**	**191%**	
Average Delay/Intersection	**31 (C)**	**159 (F)**	**153 (F)**	**90 (F)**	

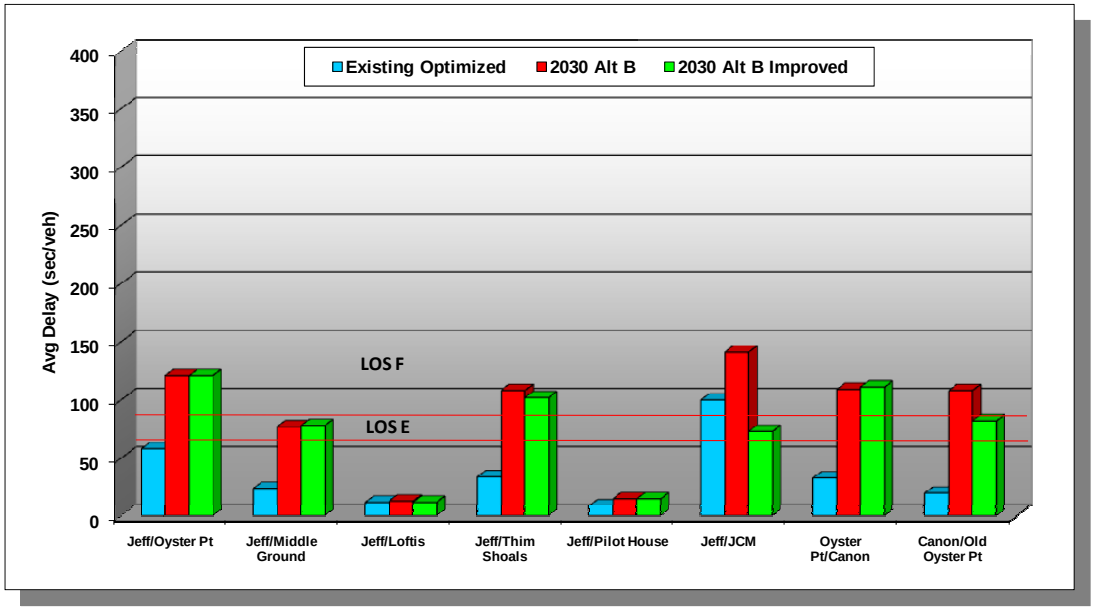
Comparison of Average Delay – Intersections 1 - 8 (AM Peak)



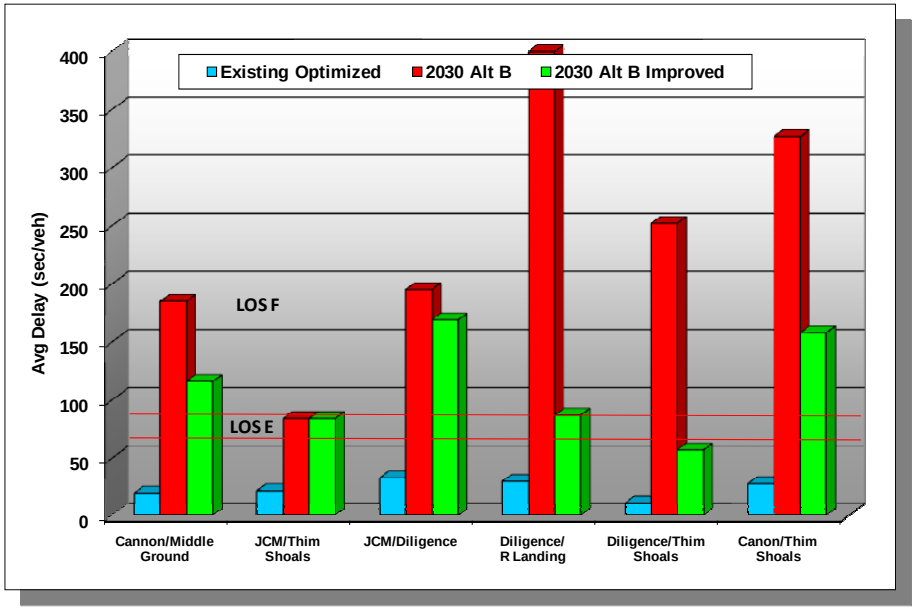
Comparison of Average Delay – Intersections 9 - 14 (AM Peak)



Comparison of Average Delay – Intersections 1 - 8 (PM Peak)



Comparison of Average Delay – Intersections 9 - 14 (PM Peak)



2030 Alternative B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave). 2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page v.

made with the consideration of moving traffic through the entire roadway signal network. It is recommended that the City re-optimize the study area signals upon completion of these roadway geometric improvements.

Even with these improvements, 7 of 14 intersections during the AM peak hour and 12 of 14 intersections during the PM peak hour are still expected to be operating at severely congested levels by 2030 (LOS E or F). Despite these congestion levels, the Synchro/SimTraffic simulation models reveal that traffic will move throughout the network at a reasonable pace in 2030. Much of the delay is associated with specific turn movements, such as heavy left turns. The City could also consider adding triple left turn movements to the following intersections: Diligence Dr. (Westbound) onto J. Clyde Morris Blvd, Rock Landing Dr. (Southbound) onto Diligence Dr., and Canon Blvd (Southbound) onto Thimble Shoals Blvd. Further study and analysis, however, will be necessary for these intersections to determine their effectiveness.

The recommended roadway improvements will need to be implemented in combination with several other congestion mitigation strategies in order to help ease future traffic congestion levels in the Oyster Point study area. The following is a list of congestion mitigation strategies that are recommended in this study:

Strategy #1 – Eliminate Person Trips or Reduce Vehicle Miles Traveled (VMT)

- Land Use Policies/Regulations
- Congestion/Value Pricing (Parking Fees)
- Telecommuting
- Flextime/Compressed Work Week Schedules

Strategy #2 – Shift Trips from Automobile to Other Modes

- Public Transit Capital Improvements
- Public Transit Operational Improvements
- Bicycle and Pedestrian Facility Improvements – Specific location recommendations from this study for bicycle and pedestrian facility improvements for the Oyster Point study area are provided on the following page.

Strategy #3 – Shift Trips from Single Occupancy Vehicle (SOV) to High Occupancy Vehicle (HOV)

- Rideshare Matching Services
- Vanpool/Employer Shuttle Program
- Commuting Subsidies
- Carpooling Incentives
- Indirect Financial Incentives
- Parking Management

Strategy #4 – Improve Roadway Operations

- Traffic Operational Improvements
- Intelligent Transportation Systems (ITS)/Smart Traffic Centers
- Access Management

Strategy #5 – Add Capacity

- Widen Arterial and Collector Lanes
- Grade Separated Intersections
- Continuous Flow Intersections (CFI)
- Improve Alternate Routes

Study Recommendations for Pedestrian and Bicycle Facilities

Background Image source: City of Newport News & Virginia Geographic Information Network.
Existing Data Source: City of Newport News & HRPDC Field Work, Summer 2007.

Legend

- Existing Pedestrian Signals
- Pedestrian Signal Recommendation
- Existing Crosswalk
- Crosswalk Recommendation
- Existing Sidewalk
- Sidewalk Recommendation
- Existing Bike Facility
- Programmed/Planned Bike Facility
- Bike Facility Recommendation

TABLE OF CONTENTS

LIST OF MAPS

INTRODUCTION

The City of Newport News requested the HRPDC to conduct a traffic management study of the City's Oyster Point area. The objectives of this study include assessing the existing transportation system and identifying ways to maintain or improve traffic flow in the future with anticipated further development of the area. This study has been conducted as an update and expansion of a study conducted by HRPDC staff in 1998 entitled "Oyster Point Subarea Transportation Study." Significant changes to the area have taken place since that time, including the establishment of the Oyster Point City Center mixed-use development. This 52-acre high-density mixed-use district combines residential, retail, and office space. Upon completion, this area is anticipated to have one million square feet of office space, 225,000 square feet of retail, and 600,000 square feet of residential space.

Roadway improvements, such as the extension of Middle Ground Blvd from Jefferson Ave to Warwick Blvd and a partial I-64 interchange at Middle Ground Blvd, are being considered by the City to upgrade the roadway network in the area. This study examines the future traffic conditions with and without these roadway improvements and provides other recommendations for improving the overall transportation system as growth continues into the future.

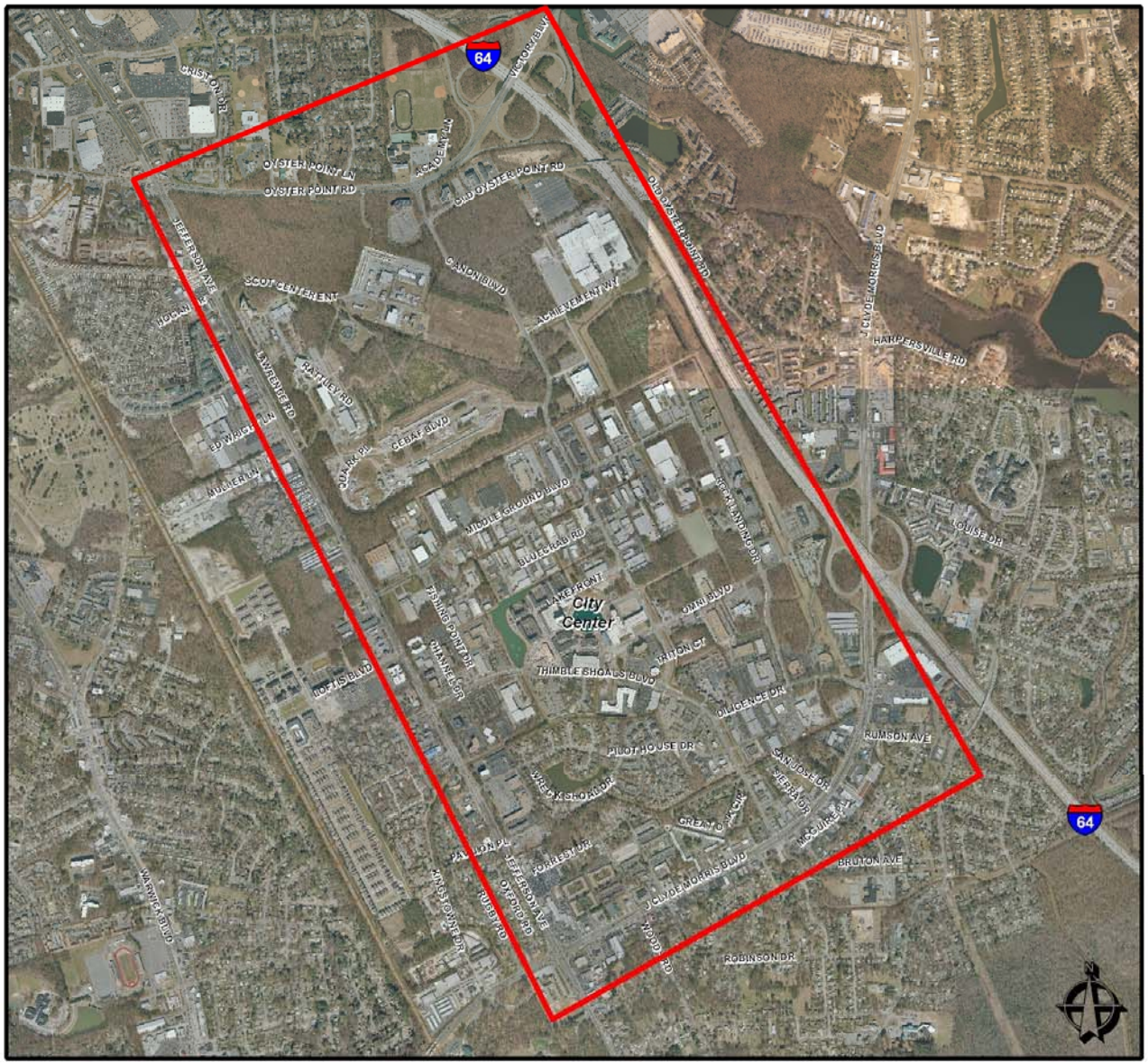
PURPOSE OF STUDY

The purpose of the Oyster Point Transportation Study is to analyze the existing transportation system in the area and to develop mitigation strategies to alleviate future growth and development. Furthermore, this study will investigate alternatives and develop transportation strategies to facilitate ingress and egress to the study area. Ultimately, it is envisioned to have as many people live and work within the City Center area.

STUDY AREA

The study area is bounded by Oyster Point Rd to the north, I-64 to the east, J Clyde Morris Blvd to the south, and Jefferson Ave to the west (**Map 1**).

Map 1 – Oyster Point Study Area



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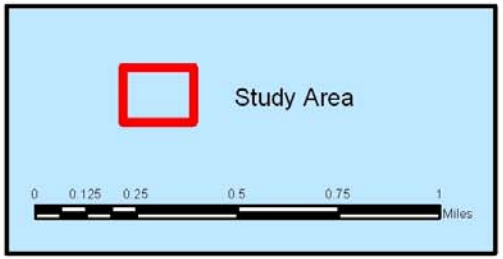


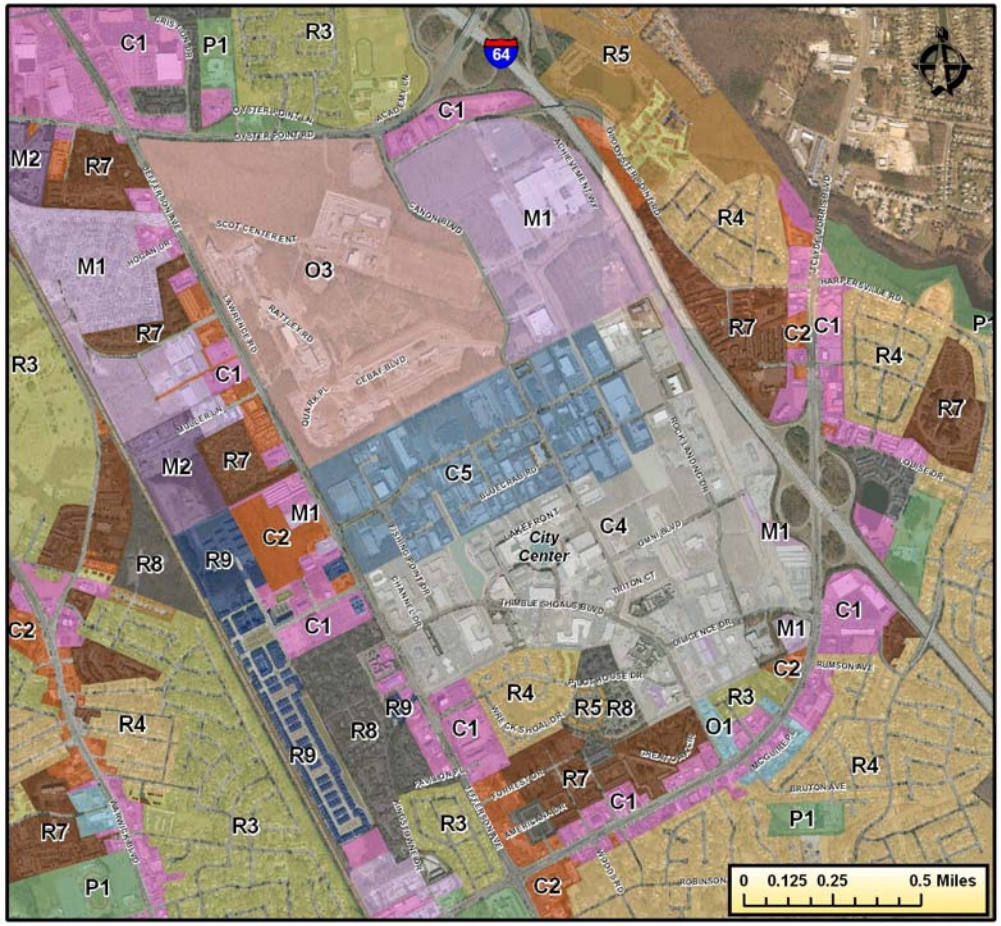
Background Image source: City of Newport News & Virginia Geographic Information Network.

LAND USE

The Oyster Point study area (bounded by Oyster Point Rd, Jefferson Ave, J Clyde Morris Blvd, and I-64) contains a rich diversity of existing land uses (**Map 2**). Office/research and light industrial uses currently occupy the northern end, while business and manufacturing uses are located in the center. The Oyster Point business district includes the City Center development, which includes high density residential, offices, restaurants, hotels, and other mixed-uses. The southern end is predominately residential and retail commercial developments. The study area is also surrounded by significant development and destinations, such as Patrick Henry Mall to the north, Port Warwick (mixed-use community) to the west, and Christopher Newport University to the southwest.

Significant growth is expected in the near future Oyster Point area, particularly in the City Center business district. The envisioned City Center business district area is bounded by Middle Ground Blvd, Rock Landing Dr, Omni Blvd/Thimble Shoals Blvd, and Jefferson Ave. Much of this growth will be occurring west of Canon Blvd and Thimble Shoals and north of Diligence Dr toward I-64. Future development plans in this area include offices, hotels, parks, parking, and mixed-use developments. Plans are also underway to expand residential developments east of Canon Blvd to create more mixed-use, as this area is currently business and light industrial. Some existing industrial land use areas may convert to some other land use in

Map 2 – Oyster Point Existing Land Use



Background Image source: City of Newport News & Virginia Geographic Information Network.

Zoning Designations

- C1 Retail Commercial District
- C2 General Commercial District
- C3 Regional Business District
- C4 Oyster Point Business District
- C5 Oyster Point Business/Manufacturing District
- M1 Light Industrial District
- M2 Heavy Industrial District
- O1 Office District
- O2 Office Park District
- O3 Office/Research and Development District
- P1 Park District
- R1 Single Family Dwelling District
- R2 Single Family Dwelling District
- R3 Single Family Dwelling District
- R4 Single Family Dwelling District
- R5 Low Density Multiple-Family Dwelling District
- R6 Manufactured Home District
- R7 Medium Density Multiple-Family Dwelling District
- R8 High Density Multiple-Family Dwelling District
- R9 Mixed Use District

the future. The City of Newport News may even consider extending City Center west of Jefferson Ave. in the future. With all of the expected future development in this area, it is imperative to develop methods to facilitate future growth of traffic and improve the transportation system.

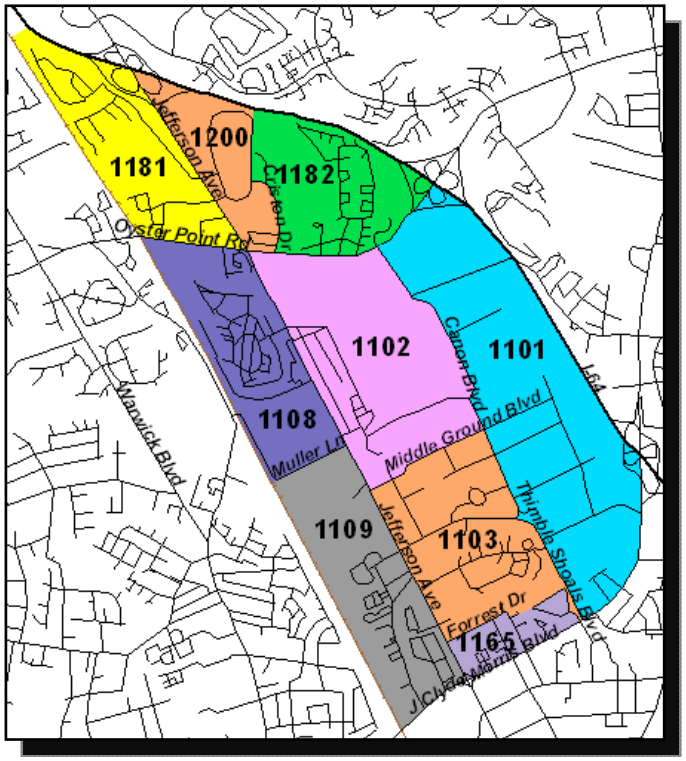
SOCIOECONOMIC DATA AND TRENDS

In an effort to predict travel behavior to/from Oyster Point, the Hampton Roads travel demand forecasting model was used. This model produces vehicle forecasts for the target year as well as trip end data based on socioeconomic and transportation network assumptions. For this study, the target year was 2030.

Based upon meetings with the City of Newport News, the 2030 socioeconomic data for Oyster Point was adjusted in Spring 2007 to account for the future plans and development expected for City Center. The six TAZs (Transportation Analysis Zones) that were analyzed and adjusted were 1101, 1102, 1103, 1108, 1109, and 1165 (**Map 3**). Adjustments were specifically made to TAZs 1101 and 1103 based on recent up-to-date information from the City. The adjusted socioeconomic data forecast will be called "special" 2030 forecast for the remainder of this study. The "special" 2030 forecast contained an increase of nearly 50% for population and households and about 16% for retail and non-retail employment for the City Center area over the original 2030 forecast.

There is also property owned by the College of William & Mary Endowment at the southeast corner of the intersection of Jefferson Ave and Oyster Point Rd (TAZ 1102). This 40-acre land is currently zoned for office/research development district. However, future changes are currently being discussed for this property to be developed as mixed use. Future light rail alignments are also being discussed that may affect future developments in this area as well. Tables containing the Original 2030 TAZ (Transportation Analysis Zone) forecast along with the Special 2030 TAZ forecast can be found on page 5. A graphical summary of the Special 2030 TAZ forecast is included on page 6.

Map 3 – Oyster Point (Newport News) District 109 – Year 2000 TAZ's (Transportation Analysis Zones)



Original 2030 TAZ (Transportation Analysis Zone) Forecast

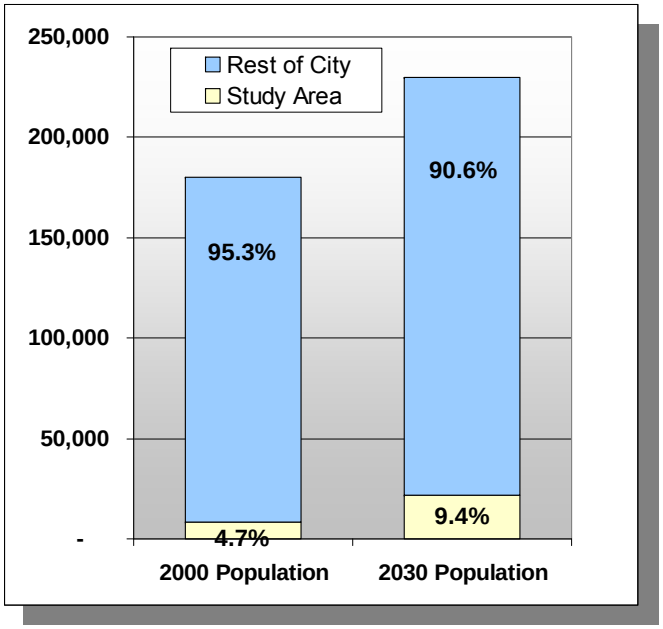
TAZ	District	2000 Pop.	2000 Households	2000 Total Emp.	2000 Retail Emp.	2000 Non-Retail Emp.	2030 Pop.	2030 Households	2030 Total Emp.	2030 Retail Emp.	2030 Non-Retail Emp.
1101	109	36	18	7,363	261	7,102	671	335	10,219	575	9,644
1102	109	8	0	2,726	978	1,748	8	35	4,546	0	4,546
1103	109	1,293	602	7,337	396	6,941	2,663	1,265	11,962	1,400	10,562
1108	109	2,452	1,069	1,328	294	1,034	3,489	1,520	1,920	727	1,193
1109	109	3,158	1,613	1,985	401	1,584	6,074	3,100	2,485	651	1,834
1165	109	1,588	764	119	43	76	1,828	880	530	203	327
Oyster Point Study Area Total		**8,535**	**4,066**	**20,858**	2,373	18,485	**14,733**	**7,135**	**31,662**	3,556	28,106
Percentage (Study Area/City)		**4.7%**	**5.8%**	**17.8%**	13.8%	18.5%	**6.6%**	**8.2%**	**21.2%**	14.5%	22.5%
Newport News TOTAL		**180,150**	**69,686**	**117,365**	17,236	100,129	**223,000**	**87,300**	**149,500**	24,600	124,900

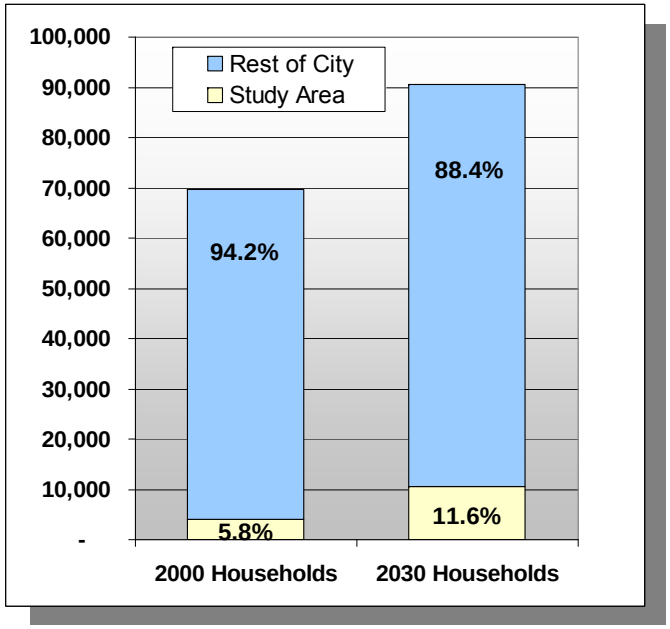
*Special 2030 TAZ (Transportation Analysis Zone) Forecast

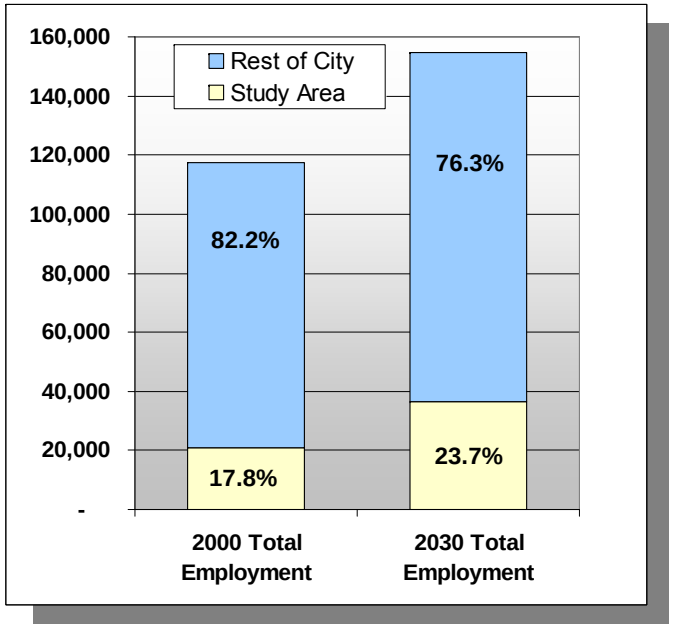
TAZ	District	2000 Pop.	2000 Households	2000 Total Emp.	2000 Retail Emp.	2000 Non-Retail Emp.	2030 Pop.	2030 Households	2030 Total Emp.	2030 Retail Emp.	2030 Non-Retail Emp.
1101	109	36	18	7,363	261	7,102	5,008	2,500	13,719	964	12,755
1102	109	8	0	2,726	978	1,748	8	35	4,546	0	4,546
1103	109	1,293	602	7,337	396	6,941	5,189	2,465	13,462	1,567	11,895
1108	109	2,452	1,069	1,328	294	1,034	3,489	1,520	1,920	727	1,193
1109	109	3,158	1,613	1,985	401	1,584	6,074	3,100	2,485	651	1,834
1165	109	1,588	764	119	43	76	1,828	880	530	203	327
Oyster Point Study Area Total		**8,535**	**4,066**	**20,858**	2,373	18,485	**21,596**	**10,500**	**36,662**	4,112	32,550
Percentage (Study Area/City)		**4.7%**	**5.8%**	**17.8%**	13.8%	18.5%	**9.4%**	**11.6%**	**23.7%**	16.3%	25.2%
Newport News TOTAL		**180,150**	**69,686**	**117,365**	17,236	100,129	**229,863**	**90,665**	**154,500**	25,156	129,344

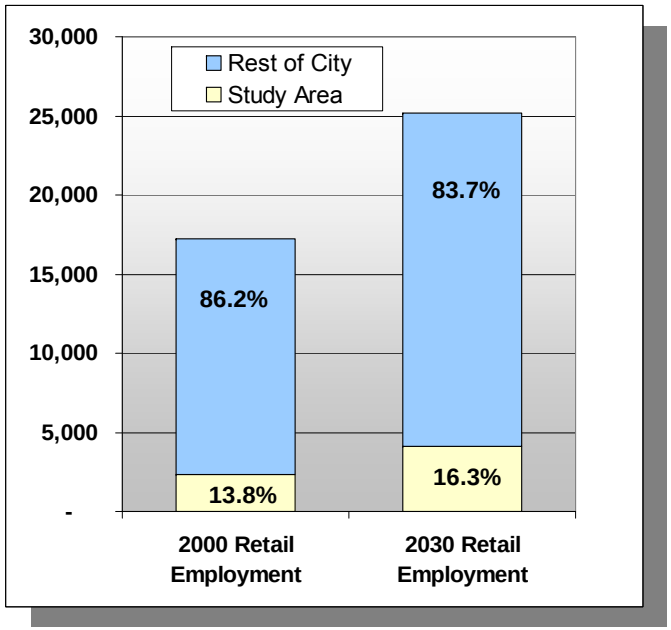
*Special 2030 TAZ Forecast uses the most recent up-to-date data regarding future Oyster Point City Center development plans. Discussion and revisions to the socioeconomic data were made based on meeting with City of Newport News Staff on April 3, 2007.

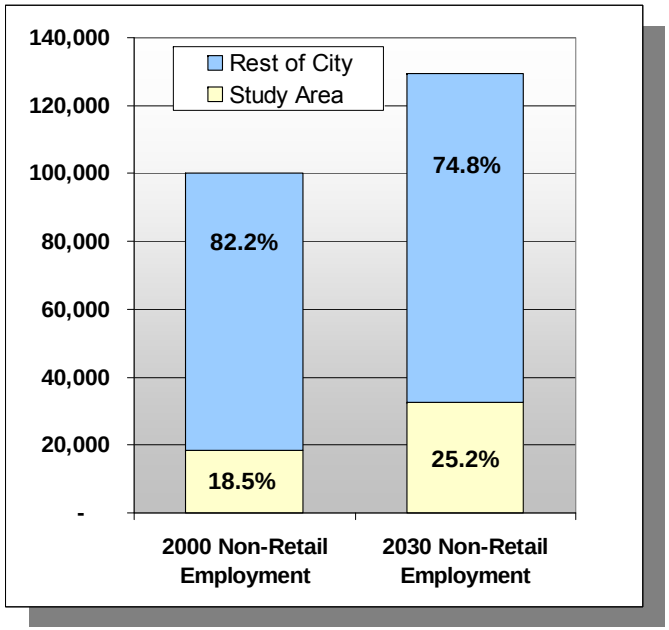
Changes in Socioeconomic Data using *Special 2030 TAZ Forecast (2000 – 2030)











*Special 2030 TAZ Forecast uses the most recent up-to-date data regarding future Oyster Point City Center development plans. Discussion and revisions to the socioeconomic data were made based on meeting with City of Newport News Staff on April 3, 2007.

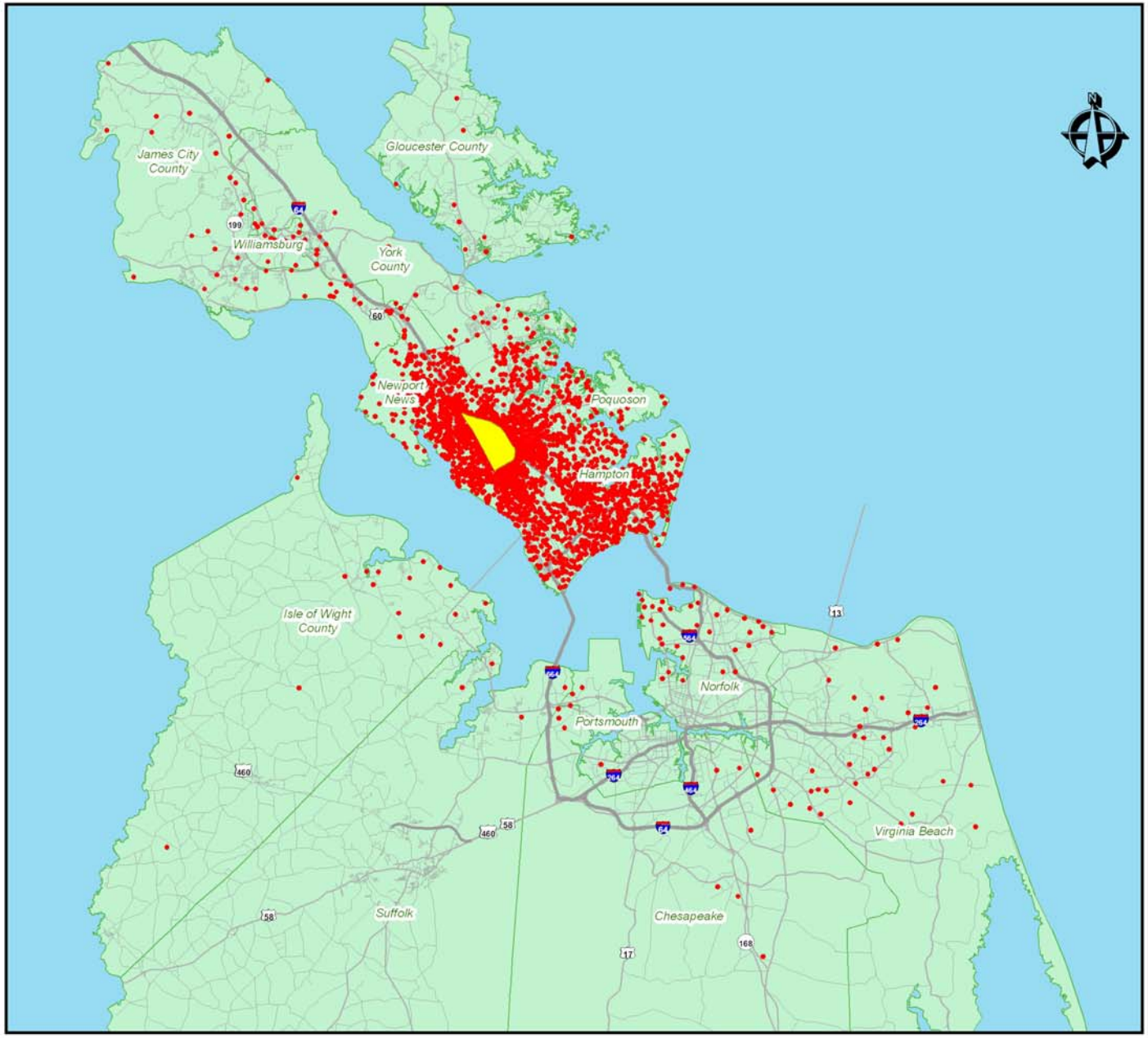
TRAVEL PATTERNS

Another method of analyzing commuting patterns is to analyze the data that is produced by the regional Travel Demand Forecasting Model. This model produces trip end data based on socioeconomic and land use data. An estimate of the origin of trips to Oyster Point was produced by the regional model and is depicted in **Maps 4 and 5** on pages 8 and 9 for the years 2000 and 2030 (target year). The PDC staff investigated trips entering Oyster Point via six gateways (Diligence Dr, Thimble Shoals Blvd at J. Clyde Morris Blvd, Thimble Shoals Blvd at Jefferson Ave, Middle Ground Blvd, Canon Blvd at Oyster Point Rd, and Canon Blvd at Old Oyster Point Rd). These trip origins (symbolized by dots, with each dot equaling 10 trip origins) represent the origin of all trips that have their destination at Oyster Point, regardless of time of day or trip purpose.

According to the model, most of the trips to Oyster Point in 2000 originated from the City of Newport News (77%) and the City of Hampton (13%). Trips were made from various locations throughout Hampton Roads to the study area in 2000 as shown in Map 4.

According to the model, most of the trips to Oyster Point in 2030 originate within the city limits of Newport News (81%). The City of Hampton generates the second most trips (9%) and York County has the third highest trips (6%). In 2030, the coverage of trip origins in Hampton Roads to the study area increases significantly, especially in Williamsburg, James City County, Gloucester County, and most cities on the Southside. Trips are expected to increase from about 35,000 trips in 2000 to about 88,000 trips in 2030.

Map 4 – Origins of Trips to Oyster Point (2000)



Study Area

1 Dot = 10 Trip Origins*

Origin of Trips to Oyster Point by Locality

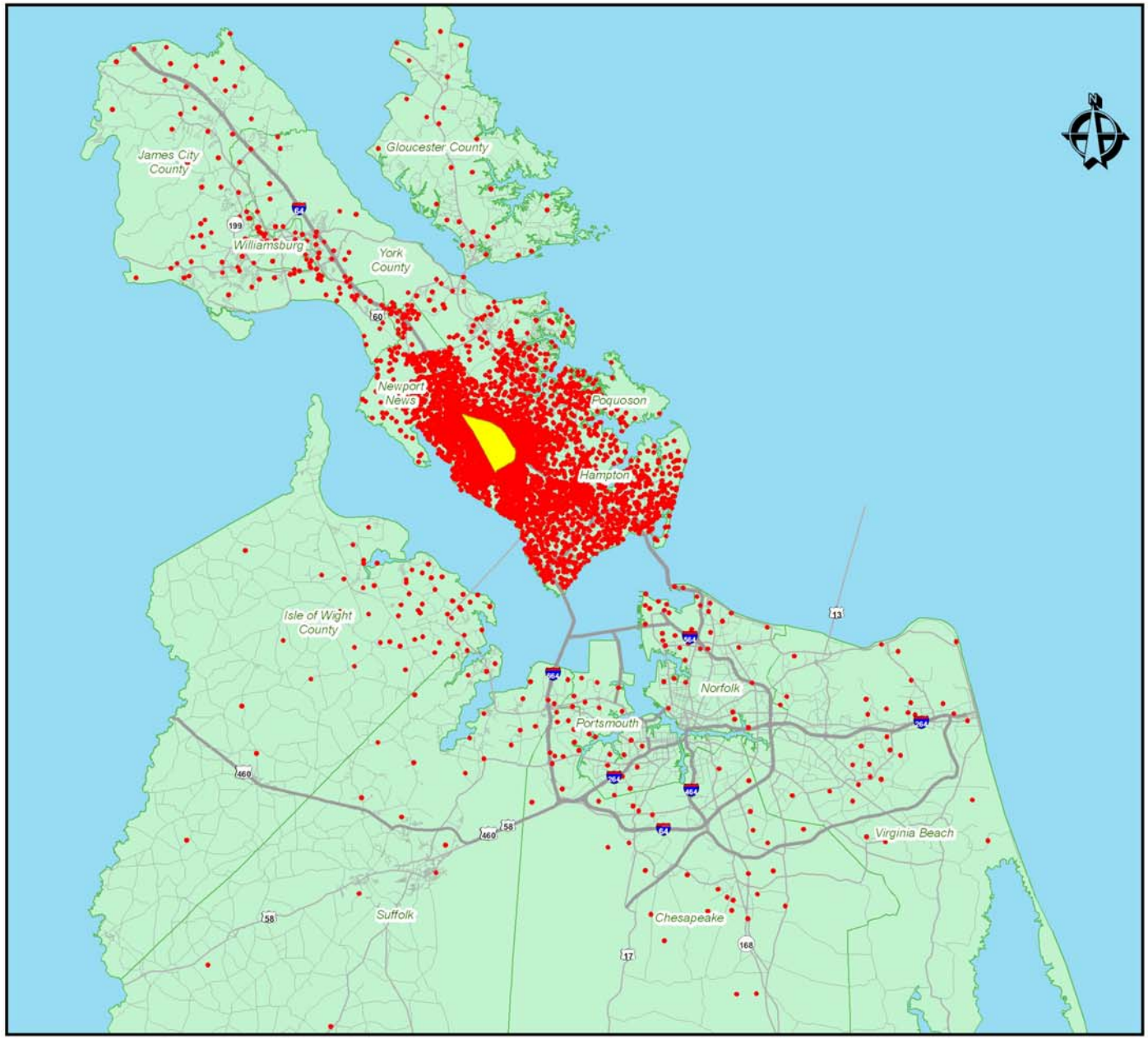
(100% = 35,000 Trips)

Newport News	77%
Hampton	13%
York County	6%
Poquoson	1%
Other	3%

Data Source: 2000 HRPDC Regional Demand Forecasting Model

0 2 4 8 12 Miles

Map 5 – Origins of Trips to Oyster Point (2030)



Study Area

1 Dot = 10 Trip Origins*

Origin of Trips to Oyster Point by Locality

(100% = 88,000 Trips)

Newport News	81%
Hampton	9%
York County	6%
Poquoson	1%
Other	3%

Data Source: HRPDC Regional Demand Forecasting Model - 2030 Plan plus completion of Third Crossing Phase II with modified 2030 Oyster Point landuse assumed.

0 2 4 8 12 Miles

PUBLIC TRANSIT

EXISTING BUS ROUTES AND RIDERSHIP

There are currently three Hampton Roads Transit (HRT) bus routes serving the Oyster Point area in Newport News. A description of each route is provided below along with route maps, which are shown on the following page.

Route #	Transit Route Name	Areas Served	Service Offered	Average Monthly Route Ridership, 2006
111	(Denbigh - TNCC) Thomas Nelson/ Riverside/Denbigh	From Thomas Nelson Comm. Coll. (Hampton) to Riverside Reg. Medical Ctr. to Patrick Henry Mall to Riverside Reg. Convalescent Ctr.	*Weekday & Weekend*	14,678*
112	(Jefferson) Downtown Newport News/ Riverside Hospital	From Downtown Newport News to Riverside Reg. Medical Ctr. to Oyster Point City Center to Christoper Newport University	*Weekday & Weekend*	49,275
119	(Oyster Point) Patrick Henry Mall/Thimble Shoals Blvd	From Patrick Henry Mall to Oyster Point City Center	*Weekday Only*	1,973

*Note: Monthly route ridership for Route 111 includes all riders on the entire length of the route, regardless of whether they embarked or disembarked in Newport News or Hampton.

Oyster Point is one of the major transit generators on the Peninsula in Hampton Roads. The three existing bus routes serving the Oyster Point area had a total monthly ridership of nearly 66,000 passengers in 2006. Route 112 is the busiest route serving approximately 1,600 passengers daily and 50,000 monthly. Route 111 serves the second highest with nearly 500 passengers daily and 15,000 monthly. Route 119 provides interior circulation within Oyster Point with nearly 100 passengers daily and 2,000 monthly.

In June 2006, a new HRT bus shuttle connecting the City Center at Oyster Point with Port Warwick was established called "Jump Over Jeff" with daily hours between 10 am and 10 pm. Due to lack of ridership, this route was canceled in March 2007.

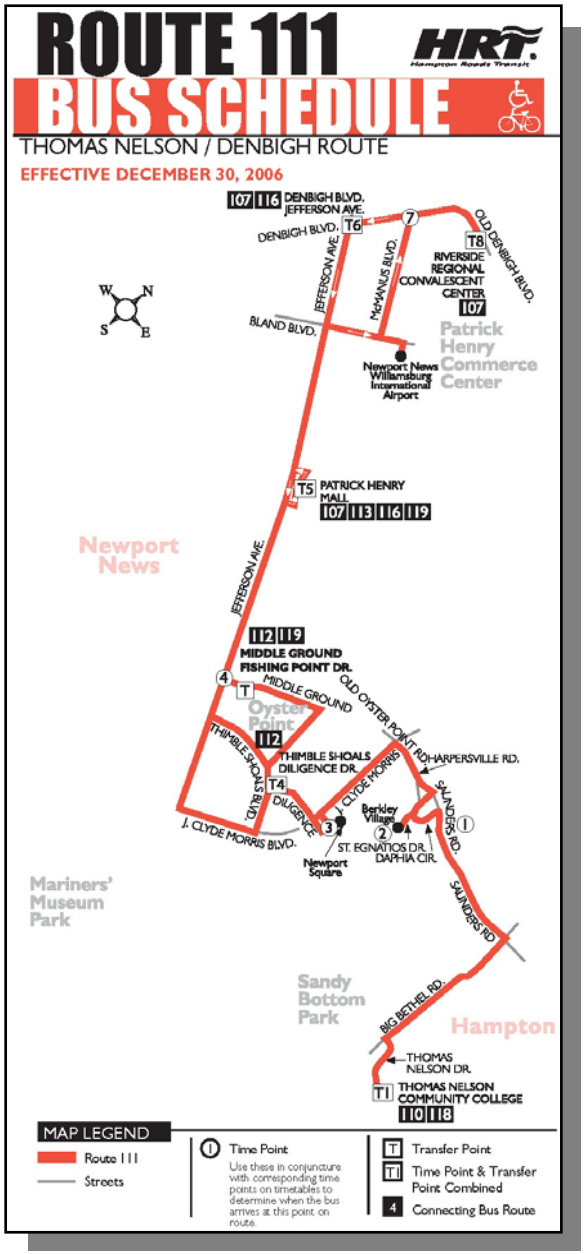
2006 HRT Bus Ridership for Routes Serving Oyster Point

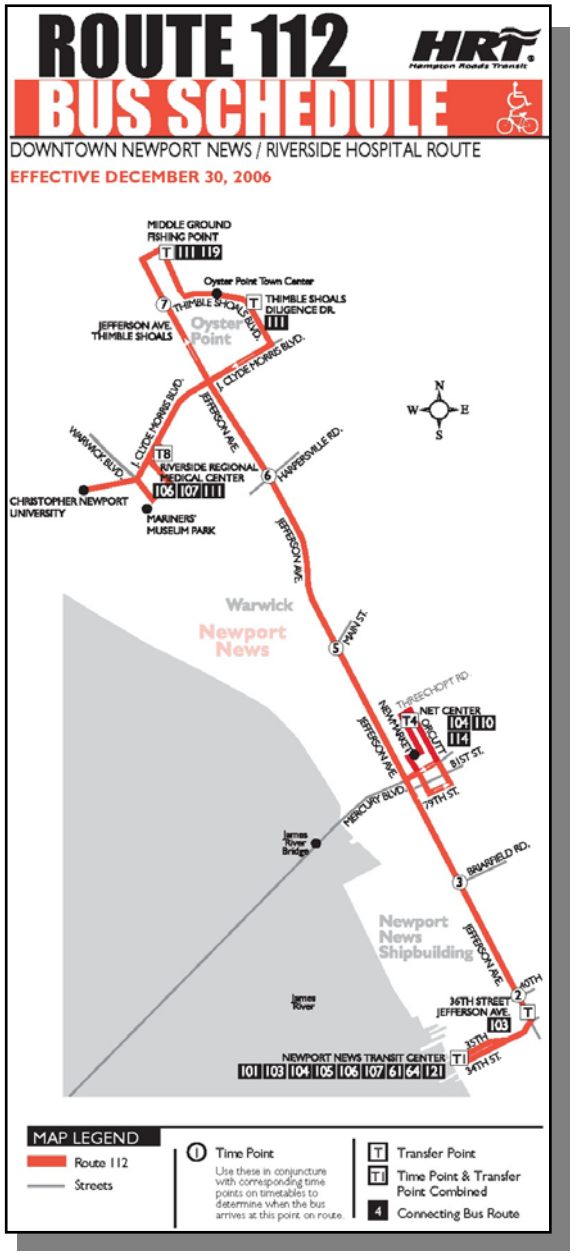
Month	Route 111 Monthly Ridership	Daily Avg.	Route 112 Monthly Ridership	Daily Avg.	Route 119 Monthly Ridership	Daily Avg.
January	14,848	479	48,754	1,573	2,004	91
February	13,833	494	46,161	1,649	1,994	100
March	15,198	490	49,704	1,603	2,086	91
April	14,968	499	47,416	1,581	1,909	95
May	15,137	488	49,324	1,591	2,117	92
June	14,578	486	49,599	1,653	2,066	94
July	13,715	442	47,823	1,543	1,736	83
August	14,837	479	51,600	1,665	2,194	95
September	14,785	493	49,734	1,658	1,887	90
October	15,798	510	50,505	1,629	2,081	95
November	14,065	469	50,621	1,687	1,835	87
December	14,370	464	50,063	1,615	1,768	88

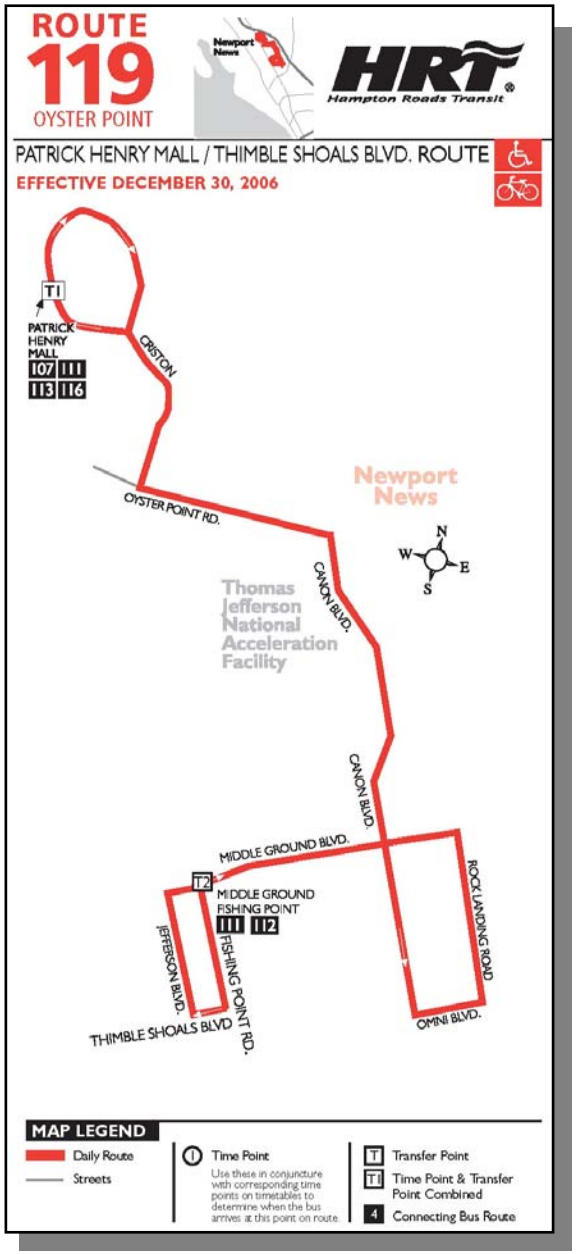
HOURS OF OPERATION

- Bus service is currently provided for Route 111 at 60-minute intervals between 6:20 am and 11:30 pm (Mon – Sat) & 6:25 am and 8:16 pm (Sun).
- Existing bus service for Route 112 operates at 30-minute intervals between 5:15 am and 12:35 am (Mon – Fri), 5:45 am and 12:35 am (Sat), & 6:15 am and 8:35 pm (Sun).
- Existing bus service for Route 119 operates at 40-minute intervals between 6:30 am and 6:45 pm (Mon – Fri).

HRT Bus Routes Serving Oyster Point Area in Newport News







FUTURE 2030 PUBLIC TRANSIT

As part of the Hampton Roads 2030 Long Range Transportation Plan[1], the 2030 Regional Transit Plan includes the following major elements:

1. A light rail Minimum Operable Segment (MOS) in Norfolk.
2. Fixed guideway service on the Peninsula.
3. Approximately 1.5%/year average growth in fixed route bus service.
4. Approximately 0.75%/year average growth in paratransit service.
5. Additional vanpools for the TRAF*FIX* vanpool program.
6. Expanded ferryboat service.

Proposed Bus Routes/Changes

Below are descriptions and planned modifications from the 2030 Regional Transit Plan of HRT Peninsula bus routes affecting the Oyster Point study area:

Route 111: TNCC/Riverside Hospital – This route would be modified slightly in the Oyster Point area, serving the Thimble Shoals Blvd Station. The deviation from Thimble Shoals Blvd via Fishing Point Dr and Middle Ground Blvd would be eliminated. (60 min peak/60 min midday)

Route 112: S. Jefferson – This route's alignment is extended to Patrick Henry Mall. Existing service to the Riverside Regional Medical Center is eliminated. In Oyster Point, the route would be modified slightly, serving the Thimble Shoals Blvd Station. The deviation from Thimble Shoals Blvd via Fishing Point Dr and Middle Ground Blvd would be eliminated. (30 min peak/30 min midday)

Route 116: N. Jefferson/Oyster Point –This route is defined as operating between Lee Hall (at the transfer point to Williamsburg Area Transport), Oakland Industrial Park, Patrick Henry Mall, and Oyster Point, via Jefferson. It will make a short deviation to serve the Denbigh Blvd park-and-ride lot and the deviation through the Habersham retail area would be eliminated. In addition, the portion of the route south of the Patrick Henry Mall Station would follow Route 119's alignment in the No-Build Alternative to Oyster Point. (30 min peak/60 min midday)

HRT Route 112 Bus Stop at Thimble Shoals Blvd & Great Oak Cir. Route 112 is currently the busiest bus route in the City, averaging nearly 50,000 passengers per month.

Route 119: Oyster Point – This route operates from the Oyster Point Transfer Center to the airport via Patrick Henry Mall. This route will be replaced with fixed guideway service. A "fixed guideway" refers to any transit service that uses exclusive or controlled rights-of-way or rails, entirely or in part.

Route 131: Newport News City Hall/Denbigh Blvd - This route would operate as premium limited stop bus service from downtown Newport News to Denbigh Blvd. This route would provide regional connections between the planned Peninsula Rapid Transit Project (PRTP) and downtown Newport News. Where Route 131 parallels the PRTP alignment along Jefferson Ave, transfers between it and the PRTP

[1] HRPDC, "Hampton Roads 2030 Long-Range Transportation Plan," December 2007.

alignment would be possible only at the Thimble Shoals Blvd and Patrick Henry Mall PRTP stations. (30 min peak/60 min midday)

Circulator Routes for the Oyster Point Activity Center

Route 203 – This proposed new circulator route was defined consistent with current HRT plans for a City Center shuttle route between Oyster Point and Port Warwick. This route would be modified slightly to serve the Thimble Shoals Blvd Station. From Loftis Blvd at Jefferson Ave, routing would be south on Jefferson Ave and east on Thimble Shoals Blvd. (15 min peak/15min midday)

Route 204 – This is a proposed new circulator route that would provide service to Port Warwick, the Virginia Living Museum, Riverside Regional Medical Center, Christopher Newport University and the Mariner's Museum. The alignment would be around Styron Square and northeast on Loftis Blvd in Port Warwick, southeast on Jefferson Ave, and southwest on J. Clyde Morris Blvd/Ave of the Arts. (30 min peak/30 min midday).

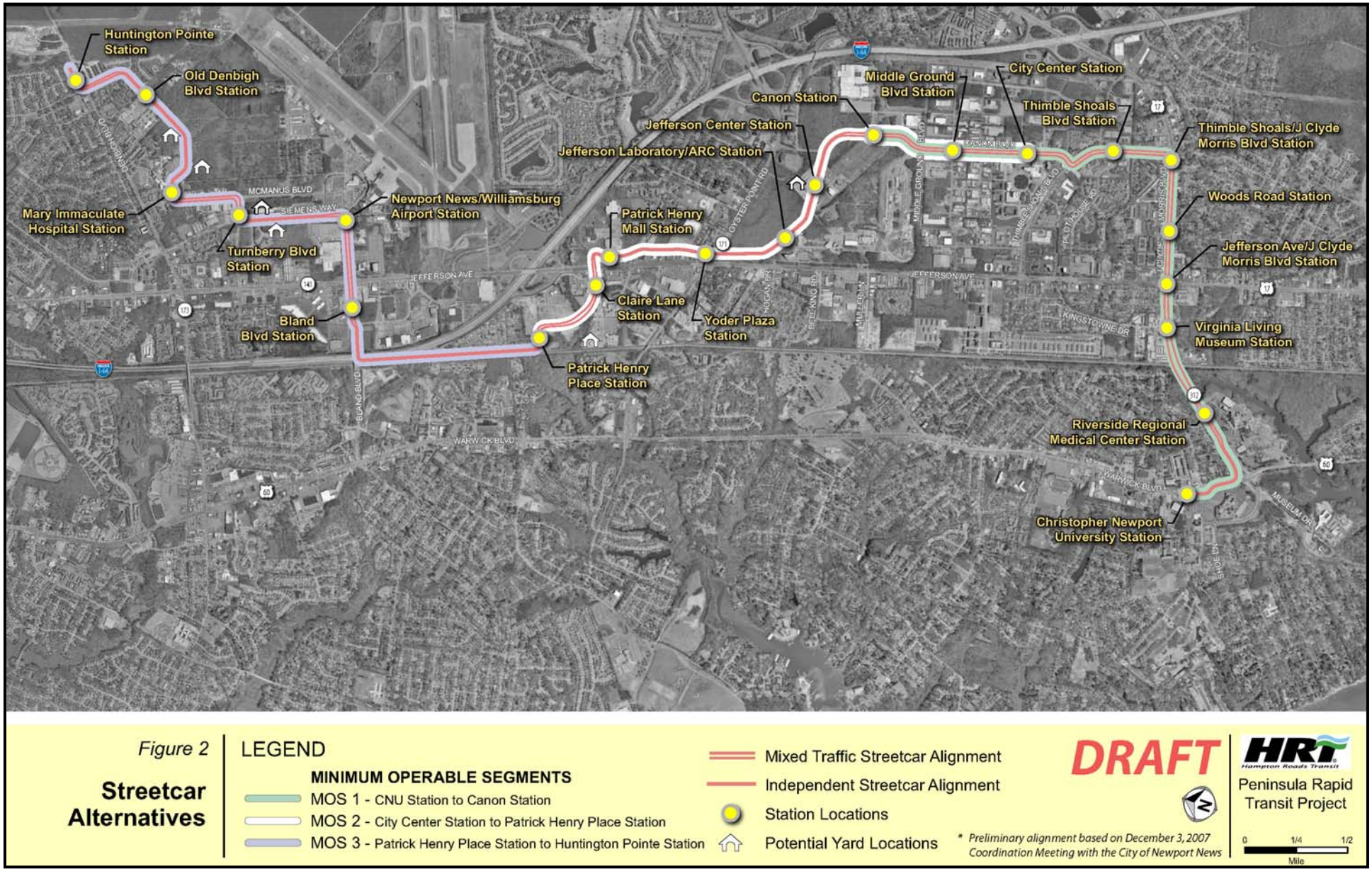
Peninsula Rapid Transit Project

HRT is preparing an AA/DEIS for the Peninsula Rapid Transit Project (PRTP) to study a new transit corridor in the city of Newport News. The alignment and mode have yet to be determined. Depending on the selected technology and the outcome of the AA/DEIS, the alignment may change. The PRTP is intended to complement the existing bus service on the Peninsula. Upon completion of the PRTP, the bus service will be modified to intersect the PRTP at strategic locations allowing passengers to transfer between modes. The location of the starter line for this fixed guideway project is provided below:

Christopher Newport University to Mary Immaculate Hospita (A3 Alignment) – The A3 Alternative Alignment would be totally located within the city of Newport News. The southern terminus would be Christopher Newport University near the intersection of J. Clyde Morris Blvd and Warwick Blvd. The alignment would follow J. Clyde Morris Blvd easterly to Jefferson Ave and turn north on Jefferson Ave to Bland Blvd. The alignment would turn east at Bland Blvd and north at McManus Blvd with a northern terminus at Mary Immaculate Hospital. Figures 1 and 2 on the following pages illustrate the preliminary A3 alignment alternative. This information is still in draft format and is currently awaiting final approval.

The long term vision is to connect this fixed guideway service to Williamsburg and ultimately to the Norfolk Light Rail Transit service via the Third Crossing.

Source: Hampton Roads Transit



Source: Hampton Roads Transit

TRANSPORTATION DEMAND MANAGEMENT TRAFFIX

Transportation Demand Management (TDM) programs are designed to reduce traffic congestion through a variety of mobility options, such as ridesharing, transit usage, and spreading out peak period traffic. TDM strategies focus on alternatives to driving alone by encouraging the use of alternate modes or programs. In Hampton Roads, TRAF*FIX* is a cooperative public service that implements these TDM strategies and offers transportation alternatives to area commuters. TRAF*FIX* offers a wide variety of programs, including carpooling and commuter matching, guaranteed ride programs, vanpooling and van leasing, and telecommuting assistance.

TDM strategies can occur at individual employment sites, or at the area-wide level, where many employers are grouped together, such as the Oyster Point area. Over the last decade, TRAF*FIX*, in coordination with the City of Newport News, Hampton Roads Transit (HRT), VDOT, and HRPDC, has been promoting various TDM programs through major employers (i.e. Canon Virginia, Polly Lowe Group & Omni Hotel) located in the Oyster Point area. Some of the major TDM programs have included:

- Regional Rideshare Program
- Guaranteed Ride Program
- Vanpool leases
- Awareness and Effectiveness of TRAF*FIX*
- Preferential Parking for carpoolers
- Employer Outreach Program

TRAF*FIX* also teams up with HRT to provide Park & Ride lots. These facilities provide ridesharers with free, all-day parking and are a convenient place to catch an Express Bus or meet your carpool or vanpool. There are two existing Park & Ride lots in Newport News: (1) Jefferson Ave (Route 143) & Yorktown Rd and (2) Warwick Blvd (Route 60) & Old Courthouse Way.

TRAF*FIX* also conducts Transportation Needs Assessment Studies for specific areas in Hampton Roads to help in the development and coordination of TDM programs. In December 1998, TRAF*FIX* completed the *Oyster Point Transportation Needs Assessment Study*[2]. The purpose of this study was to determine the perceived severity of the area traffic congestion, identify current transportation modes/routes used, and measure the willingness to adopt and implement transportation alternatives for the Oyster Point area. Some of the key findings and recommendations from the Needs Assessment Study are provided below:

<u>Key Findings:</u>

- Businesses believed there were congestion problems in the Oyster Point area. Many felt that the current level of congestion was an annoyance, but did not yet warrant alternative transportation programs.
- Businesses offered the following suggestions to improve traffic congestion: widen roads, synchronization of traffic signals, ridesharing, better transit (light rail, bus).
- Larger businesses were interested in offering commuter programs to their employees, such as ridematching and other low cost initiatives.
- 88% of commuters surveyed travel to the study area alone to work.
- 26% of commuters show some willingness to share a ride to work at least once a week.
- Carpooling, particularly with co-workers or friends, is the most preferred alternate mode.

[2] The Marketing Source, Inc. and *TRAFFIX*, "Oyster Point Needs Assessment Study: Overall Findings," December 1998

Recommendations:

- Target large employers for ridesharing and alternate mode opportunities.
- Use major employers as case studies.
- Promote commuter programs that are already in existence or require minimal additional funding such as ridematching, reserved parking for carpoolers, Guaranteed Ride Programs, Park & Ride lots, and bus availability.
- Send information to employees who want more information about commute alternatives.
- Focus promotional efforts on carpooling.
- Try to increase awareness of bus service.
- Set reasonable goals and monitor the results.

The HRPDC recommends that a follow-up be completed to the TRAF*FIX* Oyster Point Needs Assessment Study, since the Oyster Point City Center area has experienced a tremendous amount of growth since the study was completed in 1998.

TRAFFIC CHARACTERISTICS

The Oyster Point City Center and surrounding area is quickly becoming one of the highest traveled areas in the City of Newport News, particularly during morning and afternoon peak hours. City Center is an up and coming vibrant community of distinctive apartments and condominiums, modern office buildings, and unique retail shops and restaurants. As the popularity and demand of this new area grows, more and more traffic will be generated into the future.

This section of the report details the characteristics of traffic in the vicinity of the Oyster Point City Center area. The following topics are included in this section:

- Roadway characteristics
- Roadway traffic volumes and trends
- Accident data
- Travel time/speed data

The following topics are covered in the subsequent sections following Traffic Characteristics.

- Peak hour traffic analysis
  - Intersection turning movement counts
  - Existing Intersection Level of Service analysis
  - Planned geometric improvement projects
  - Future 2030 Intersection Level of Service analysis
  - Future 2030 Recommended Alternative

ROADWAY CHARACTERISTICS

Roadways within the Oyster Point City Center study area and their characteristics are provided in the following table.

Oyster Point City Center Study Area Roadway Characteristics

Roadway Name	Number of Lanes	Median Divided	Posted Speed Limit (mph)
Jefferson Ave (Oyster Pt Rd to J Clyde Morris Blvd)	6	Yes	45
J Clyde Morris Blvd (Jefferson Ave to Impala Dr)	5	Yes	45
J Clyde Morris Blvd (Impala Dr to I-64)	6	Yes	45
Canon Blvd (Thimble Shoals Blvd to Old Oyster Pt Rd)	4	No	35
Canon Blvd (Old Oyster Pt Rd to Oyster Pt Rd)	4	Yes	35
Oyster Pt Rd (Jefferson Ave to Criston Dr)	5	Yes	45
Oyster Pt Rd (Criston Dr to I-64)	6	Yes	45
Old Oyster Pt Rd (Canon Blvd to Willow Green Dr)	2	No	35
Old Oyster Pt Rd (Willow Green Dr to J Clyde Morris Blvd)	2	No	25
Middle Ground Blvd (Jefferson Ave to 0.1 mi east of Fishing Pt Dr)	4	Yes	35
Middle Ground Blvd (0.1 mi east of Fishing Pt Dr to Rock Landing Dr)	4	No	35
Rock Landing Dr (Diligence Dr to Middle Ground Blvd)	4	No	35
Thimble Shoals Blvd (Jefferson Ave to Canon Blvd)	4	Yes	35
Thimble Shoals Blvd (Canon Blvd to J Clyde Morris Blvd)	4	No	35
Pilot House Dr (Jefferson Ave to Thimble Shoals Blvd)	2	No	25
Diligence Dr (J Clyde Morris Blvd to Thimble Shoals Blvd)	4	No	35
Fishing Pt Dr (Middle Ground Blvd to Thimble Shoals Blvd)	4	No	35
Interstate 64 (Oyster Pt Rd to J Clyde Morris Blvd)	6 + 2 HOV	Yes	60

Source: HRPDC field work, Summer 2007.

ROADWAY TRAFFIC VOLUMES AND TRENDS

The City of Newport News Department of Engineering collects 24-hour traffic volumes on major roadways (greater than 1,500 vehicles per day) throughout the City of Newport News on an annual basis. Additionally, the Virginia Department of Transportation (VDOT) collects 24-hour traffic volumes on I-64 from Jefferson Ave to Oyster Point & I-64 from J. Clyde Morris Blvd to the Hampton City Line every three years, most recently in 2004. I-64 from Oyster Point Rd to J. Clyde Morris Blvd is a VDOT permanent count station that records traffic volumes every day throughout the year.

Historical weekday traffic volumes in the study area are shown in the table to the right and on **Map 6** on page 20. Of the 24 locations in the study area with data available for the last five years, only 3 experienced a decrease in traffic volumes. A majority of roadways have experienced an increase over the last five years, with an overall average increase of nearly 4% annually.

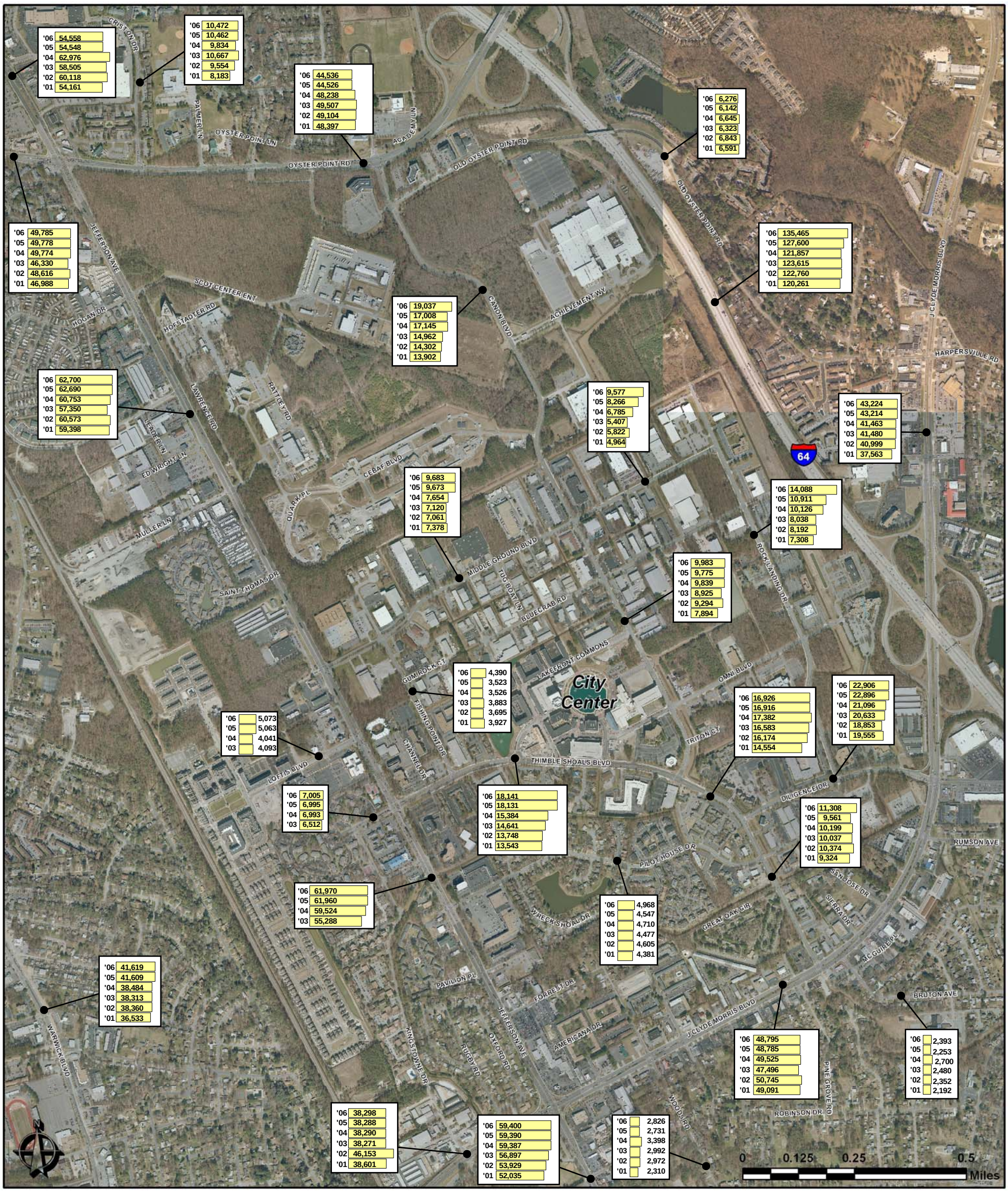
Locations in the study area with yearly average increases in traffic volumes above 5% since 2001 include Canon Blvd, Criston Dr, Middle Ground Blvd, Rock Landing Dr, Thimble Shoals Blvd, and Woods Dr. The significant growth in traffic volumes for all of these facilities (with the exception of Criston Dr and Woods Rd) is attributed to recent growth and development that has occurred in the Oyster Point City Center area. These roadways are the primary entry/exit points to this area.

Historical Weekday Traffic Volumes in the Vicinity of Oyster Point Study Area

									% CHANGE	
STREET	FROM	TO	'01	'02	'03	'04	'05	'06	LAST 5 YEARS ('01-'06)	LAST YEAR ('05-'06)
BRUTON AVE	J.CLYDE MORRIS BLVD	HARPERSVILLE RD	2,192	2,352	2,480	2,700	2,253	2,393	2.25%	6.21%
CANON BLVD	THIMBLE SHOALS BLVD	MIDDLE GROUND BLVD	7,894	9,294	8,925	9,839	9,775	9,983	5.10%	2.13%
CANON BLVD	MIDDLE GROUND BLVD	OYSTER POINT RD	13,902	14,302	14,962	17,145	17,008	19,037	6.64%	11.93%
CRISTON DRIVE	OYSTER POINT RD	MALL PKWY	8,183	9,554	10,667	9,834	10,462	10,472	5.42%	0.10%
DILIGENCE DR	J.CLYDE MORRIS BLVD	THIMBLE SHOALS BLVD	19,555	18,853	20,633	21,096	22,896	22,906	3.33%	0.04%
FISHING PT DR	MIDDLE GROUND BLVD	THIMBLE SHOALS BLVD	3,927	3,695	3,883	3,526	3,523	4,390	2.90%	24.61%
J.CLYDE MORRIS BLVD	WARWICK BLVD	JEFFERSON AVE	38,601	46,153	38,271	38,290	38,288	38,298	0.51%	0.03%
J.CLYDE MORRIS BLVD	JEFFERSON AVE	I-64	49,091	50,745	47,496	49,525	48,785	48,795	-0.05%	0.02%
J.CLYDE MORRIS BLVD	I-64	HARPERSVILLE RD	37,563	40,999	41,480	41,463	43,214	43,224	2.91%	0.02%
JEFFERSON AVE	HARPERSVILLE RD	J.CLYDE MORRIS BLVD	52,035	53,929	56,897	59,387	59,390	59,400	2.71%	0.02%
JEFFERSON AVE	J.CLYDE MORRIS BLVD	MIDDLE GROUND BLVD			55,288	59,524	61,960	61,970	3.92%*	0.02%
JEFFERSON AVE	MIDDLE GROUND BLVD	OYSTER POINT RD	59,398	60,573	57,350	60,753	62,690	62,700	1.16%	0.02%
JEFFERSON AVE	OYSTER POINT RD	I-64	54,161	60,118	58,505	62,976	54,548	54,558	0.52%	0.02%
LOFTIS BLVD	JEFFERSON AVE	NAT TURNER BLVD			4,093	4,041	5,063	5,073	8.07%*	0.20%
MIDDLE GROUND BLVD	JEFFERSON AVE	CANON BLVD	7,378	7,061	7,120	7,654	9,673	9,683	6.10%	0.10%
MIDDLE GROUND BLVD	CANON BLVD	ROCK LANDING DR	4,964	5,822	5,407	6,785	8,266	9,577	14.67%	15.86%
OLD OYSTER POINT RD	CANON BLVD	J.CLYDE MORRIS BLVD	6,591	6,843	6,323	6,645	6,142	6,276	-0.81%	2.18%
OYSTER POINT RD	WARWICK BLVD	JEFFERSON AVE	46,988	48,616	46,330	49,774	49,778	49,785	1.24%	0.01%
OYSTER POINT RD	JEFFERSON AVE	I-64	48,397	49,104	49,507	48,238	44,526	44,536	-1.59%	0.02%
PILOT HOUSE DR	JEFFERSON AVE	THIMBLE SHOALS BLVD	4,381	4,605	4,477	4,710	4,547	4,968	2.67%	9.26%
ROCK LANDING DR	MIDDLE GROUND BLVD	DILIGENCE DR	7,308	8,192	8,038	10,126	10,911	14,088	14.61%	29.12%
THIMBLE SHOALS BLVD	J.CLYDE MORRIS BLVD	DILIGENCE DR	9,324	10,374	10,037	10,199	9,561	11,308	4.33%	18.27%
THIMBLE SHOALS BLVD	DILIGENCE DR	CANON BLVD	14,554	16,174	16,583	17,382	16,916	16,926	3.17%	0.06%
THIMBLE SHOALS BLVD	CANON BLVD	JEFFERSON AVE	13,543	13,748	14,641	15,384	18,131	18,141	6.20%	0.06%
THIMBLE SHOALS BLVD	JEFFERSON AVE	KINGSTOWNE RD			6,512	6,993	6,995	7,005	2.52%*	0.14%
WOODS RD	ROBINSON DR	GROOME RD	2,310	2,972	2,992	3,398	2,731	2,826	5.35%	3.48%
I-64	JEFFERSON AVE	OYSTER POINT RD	104,800			117,732				
I-64**	OYSTER POINT RD	J.CLYDE MORRIS BLVD	120,261	122,760	123,615	121,857	127,600	135,465	2.45%	6.16%
I-64	J.CLYDE MORRIS BLVD	HAMPTON CITY LINE	144,824			136,945				
*Percent change for the last 3 years. **VDOT continuous count station.								Average (Arterials and Locals)	3.88%	4.77%

Source: City of Newport News & VDOT

Map 6 - Existing and Historical Weekday Traffic Volumes



Background Image source: City of Newport News & Virginia Geographic Information Network.

ACCIDENT DATA

The following table summarizes the traffic accidents from January 2004 to December 2006 for all 14 study area intersections included in the peak hour traffic analysis. Intersections are sorted by highest accidents per year over the 3-year period. The intersections of Jefferson Ave and J. Clyde Morris Blvd (41 accidents per year) and Jefferson Ave and Oyster Point Rd (38 accidents per year) were the highest in the study area.

Total Accidents by Intersection (2004 – 2006)

Study Area Intersection	2004	2005	2006	Avg/ Year
6 Jefferson Avenue / J. Clyde Morris Boulevard	39	36	47	**41**
1 Jefferson Avenue / Oyster Point Road	39	40	35	**38**
11 J. Clyde Morris Boulevard / Diligence Drive	22	22	28	**24**
7 Oyster Point Road / Canon Boulevard	16	23	25	**21**
3 Jefferson Avenue / Loftis Boulevard	15	17	23	**18**
4 Jefferson Avenue / Thimble Shoals Boulevard	16	15	17	**16**
5 Jefferson Avenue / Pilot House Drive	11	7	11	**10**
10 J. Clyde Morris Boulevard / Thimble Shoals Boulevard	8	11	9	**9**
2 Jefferson Avenue / Middle Ground Boulevard	17	5	4	**9**
9 Canon Boulevard / Middle Ground Boulevard	2	7	6	**5**
8 Canon Boulevard / Old Oyster Point Road	5	5	3	**4**
12 Diligence Drive / Rock Landing Drive	6	1	3	**3**
14 Canon Boulevard / Thimble Shoals Boulevard	2	5	1	**3**
13 Diligence Drive / Thimble Shoals Boulevard	3	2	1	**2**

TRAVEL TIME/SPEED DATA

Travel time and speed data were collected using a Global Positioning System (GPS) for all of the study area routes from late January 2007 to mid April 2007 for "existing" travel conditions. The purpose of this analysis was to determine the current roadway segment levels of service during peak travel periods in the Oyster Point study area. Data runs were made by the HRPDC staff during the morning, midday, and afternoon peak hours in the peak and non-peak directions of travel. Each route was run three times in each direction and the directional runs were averaged. Data was collected during midweek operating times (Tuesday through Thursday). The collected peak hours varied by roadway segment and were determined from the Hampton Roads Congestion Management System (CMS) database. The morning peak travel runs were collected between 7:15 am – 9:00 am, midday (lunch) peak between 12:00 pm – 1:15 pm, and afternoon peak between 4:00 pm – 5:45 pm.

Level of service designations were computed using methodologies from the 2000 Highway Capacity Manual (HCM)[3]. LOS criteria were based on a ratio between the average travel speed and the free flow speed, which for this analysis was considered to be the speed limit. **Appendix A** on page 47 lists the HCM LOS ranges and speed ratios used in the LOS computations. The roadway segment level of service results are provided below. In addition, the roadway segment average

Roadway Segment Levels of Service (2007)

Route	From	To	Urban St Class	Level of Service (LOS)					
				AM Peak		Midday Peak		PM Peak	
				FT	TF	FT	TF	FT	TF
Canon Blvd	Thimble Shoals Blvd	Middle Ground Blvd	III	A	C	A	C	B	D
	Middle Ground Blvd	Old Oyster Point Rd	III	A	B	A	B	A	A
	Old Oyster Point Rd	Oyster Point Rd	III	F	B	E	A	F	B
Diligence Dr	J Clyde Morris Blvd	Rock Landing Dr	III	B	C	D	E	B	C
	Rock Landing Dr	Thimble Shoals Blvd	III	F	C	B	B	D	B
J Clyde Morris Blvd	Old Oyster Point Rd	I-64	II	A	B	A	C	A	D
	I-64	Diligence Dr	II	C	A	C	A	C	A
	Diligence Dr	Thimble Shoals Blvd	II	A	A	B	B	C	A
	Thimble Shoals Blvd	Jefferson Ave	II	A	B	B	B	D	C
Jefferson Ave	Oyster Point Rd	Middle Ground Blvd	II	B	A	B	B	B	B
	Middle Ground Blvd	Thimble Shoals Blvd	II	D	A	E	B	E	C
	Thimble Shoals Blvd	Pilot House Dr	II	B	A	B	B	B	E
	Pilot House Dr	J Clyde Morris Blvd	II	B	B	B	A	C	C
Middle Ground Blvd	Jefferson Ave	Canon Blvd	III	B	B	A	B	B	B
	Canon Blvd	Rock Landing Dr	III	B	D	B	D	B	C
Old Oyster Point Rd	Canon Blvd	J Clyde Morris Blvd	III	B	A	A	B	A	A
Oyster Point Rd	Warwick Blvd	Jefferson Ave	II	D	C	D	D	C	E
	Jefferson Ave	Canon Blvd	II	A	C	A	D	A	F
	Canon Blvd	I-64	II	A	A	A	A	A	B
Pilot House Rd	Jefferson Ave	Thimble Shoals Blvd	III	B	B	A	B	A	B
Rock Landing Rd	Diligence Dr	Middle Ground Blvd	III	A	A	A	A	A	B
Thimble Shoals Blvd	Jefferson Ave	Canon Blvd	III	A	C	B	C	B	D
	Canon Blvd	Diligence Dr	III	A	B	B	A	A	C
	Diligence Dr	Pilot House Dr	III	B	B	A	C	B	C
	Pilot House Dr	J Clyde Morris Blvd	III	C	B	D	B	C	C

Levels of Service are provided by direction and are an average of 3 travel runs.
FT – From To TF – To From

[3] Transportation Research Board, National Research Council, "Highway Capacity Manual 2000," Washington, DC, October 2000.

speed results are provided below. Levels-of-service A through D are considered to be acceptable operating conditions, while levels-of-service E and F are generally considered to be unacceptable operating conditions. Level of service D, despite being an acceptable level, is the "warning" level condition where favorable traffic conditions are on the verge of becoming unfavorable.

Roadway Segment Average Speeds (2007)

Route	From	To	Speed Limit (mph)	Average Speed (mph)					
				AM Peak		Midday Peak		PM Peak	
				FT	TF	FT	TF	FT	TF
Canon Blvd	Thimble Shoals Blvd	Middle Ground Blvd	35	33	19	31	22	26	17
	Middle Ground Blvd	Old Oyster Point Rd	35	39	27	36	30	37	31
	Old Oyster Point Rd	Oyster Point Rd	35	5	29	14	33	6	29
Diligence Dr	J Clyde Morris Blvd	Rock Landing Dr	35	26	21	18	10	26	18
	Rock Landing Dr	Thimble Shoals Blvd	35	10	21	27	26	15	28
J Clyde Morris Blvd	Old Oyster Point Rd	I-64	45	43	39	40	31	41	22
	I-64	Diligence Dr	45	29	48	27	44	28	49
	Diligence Dr	Thimble Shoals Blvd	45	44	45	34	32	29	42
	Thimble Shoals Blvd	Jefferson Ave	45	44	33	33	34	24	30
Jefferson Ave	Oyster Point Rd	Middle Ground Blvd	45	35	40	39	35	39	34
	Middle Ground Blvd	Thimble Shoals Blvd	45	19	44	17	37	16	28
	Thimble Shoals Blvd	Pilot House Dr	45	39	45	38	34	39	19
	Pilot House Dr	J Clyde Morris Blvd	45	35	38	39	42	30	26
Middle Ground Blvd	Jefferson Ave	Canon Blvd	35	28	25	31	29	25	26
	Canon Blvd	Rock Landing Dr	35	30	16	27	16	24	23
Old Oyster Point Rd	Canon Blvd	J Clyde Morris Blvd	25/35	23	26	28	24	28	34
Oyster Point Rd	Warwick Blvd	Jefferson Ave	45	22	31	21	24	26	19
	Jefferson Ave	Canon Blvd	45	41	26	41	21	44	10
	Canon Blvd	I-64	45	44	54	45	46	46	34
Pilot House Rd	Jefferson Ave	Thimble Shoals Blvd	25	21	21	22	21	22	20
Rock Landing Rd	Diligence Dr	Middle Ground Blvd	35	32	32	34	31	37	26
Thimble Shoals Blvd	Jefferson Ave	Canon Blvd	35	31	24	25	19	28	17
	Canon Blvd	Diligence Dr	35	35	30	29	33	31	21
	Diligence Dr	Pilot House Dr	35	29	29	33	22	24	21
	Pilot House Dr	J Clyde Morris Blvd	35	21	26	16	28	24	22

Average travel speeds are provided by direction and are an average of 3 travel runs.
FT – From To TF – To From

PEAK HOUR TRAFFIC ANALYSIS

This section examines existing peak hour traffic characteristics, including average delay and levels-of-service, at selected intersections in the vicinity of the Oyster Point City Center study area for an average weekday. Future conditions at these intersections with and without the construction of Middle Ground Blvd Extended (4-lane divided roadway) and an I-64 partial interchange at Middle Ground Blvd will be examined later in this section. It is important to note that weekend, off-peak, and special events traffic conditions are not included in this analysis, however, need to be carefully planned for in order to optimize traffic flow.

INTERSECTIONS UNDER STUDY

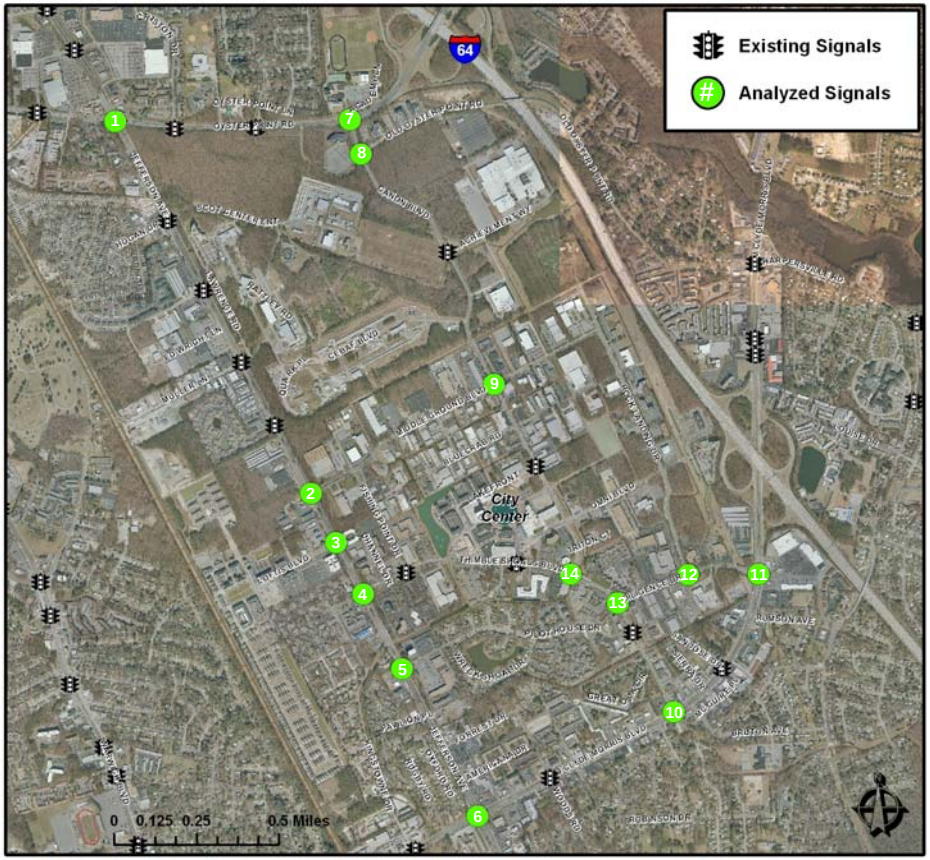
The following is the list of intersections that were analyzed in this study for the existing and future scenarios. **Map 7** displays the study area signalized intersections. Aerial photos of each intersection are provided in **Appendix B** (pages 48-61).

1. Jefferson Avenue / Oyster Point Road
2. Jefferson Avenue / Middle Ground Blvd
3. Jefferson Avenue / Loftis Blvd
4. Jefferson Avenue / Thimble Shoals Blvd
5. Jefferson Avenue / Pilot House Drive
6. Jefferson Avenue / J. Clyde Morris Blvd
7. Oyster Point Road / Canon Blvd
8. Canon Blvd / Old Oyster Point Road
9. Canon Blvd / Middle Ground Blvd
10. J. Clyde Morris Blvd / Thimble Shoals Blvd
11. J. Clyde Morris Blvd / Diligence Drive
12. Diligence Drive / Rock Landing Drive
13. Diligence Drive / Thimble Shoals Blvd
14. Canon Blvd / Thimble Shoals Blvd

TURNING MOVEMENT COUNTS

Traffic data on the roadways were derived from 13 intersection turning movement counts that were taken in 2006, with one intersection count from 2005 (J. Clyde Morris / Thimble Shoals). Counts were collected during morning and afternoon peak periods for a single weekday (Tuesday, Wednesday, or Thursday) at each intersection. In addition, a study was recently completed by Kimley Horn (private consultant), which provided 2007 turning movement counts (PM Peak Hour only)

Map 7 – Study Area Traffic Signals



Background Image source: City of Newport News & Virginia Geographic Information Network.

for all intersections along Jefferson Ave and Oyster Point Rd as well as the intersection of Canon Blvd / Old Oyster Point Rd.

From these peak period turning movement counts, the AM and PM peak travel hours were extracted and used for this analysis (See **Maps C1 and C2** in **Appendix C** on pages 62-63).

TRAFFIC MODELS

The existing and future roadway network within the study area was modeled using Synchro 6.0 Traffic Signal Coordination / SimTraffic Model Software. Synchro uses Highway Capacity Manual[4] methods to calculate control delay (the delay resulting from slowing and stopping on the approaches of an intersection) and levels-of-service.

The roadway model includes roadway geometry and turning movement volumes (AM and PM peak hours) as collected in the field.

EXISTING INTERSECTION LEVEL OF SERVICE (LOS) ANALYSIS

The peak hour intersection level of service (LOS) is a measure of the adequacy of the existing lanes and signalization at an intersection for the particular peak hour. Level of service is measured on a scale of "A" through "F," with LOS A representing the best operating conditions and LOS F representing the worst. This measure is based upon the average control delay experienced by vehicles traveling through the intersection during the peak hour. "Control Delay" is the portion of total delay attributed to traffic control measures or devices, such as traffic signals or stop signs, including deceleration and stop time.

Level-of-service A is considered the best operating condition with control delays of less than 10 seconds per vehicle at signalized intersections. Level-of-service F is considered the worst operating condition with control delays of greater than 80 seconds per vehicle at signalized intersections. Levels-of-service A through D are considered to be acceptable operating conditions, while levels-of-service E and F are generally considered to be unacceptable operating conditions.

The AM and PM peak hour turning movement counts were used to update the existing Synchro Models obtained from the City of Newport News. For the 12 analyzed signalized intersections, the AM peak hour was generally 7:30am to 8:30am and the PM peak hour was generally 4:45pm to 5:45pm. Peak hour factors were also calculated for each intersection and input in the models.

The City of Newport News currently runs numerous signal-timing plans throughout the day in order to optimize traffic flow in the Oyster Point study area. This study focused on the AM and PM peak hours during a typical weekday. Specifically, two major signalized networks are in operation for Oyster Point – Network 1 (study intersections 1-8 on Map 7) and Network 2 (study intersections 9-14 on Map 7). The Network 1 AM (operates 5:45am – 10am), the Network 1 PM (operates 4:30pm – 6pm), Network 2 AM (5:45am – 10am), and Network 2 PM 422

Description of Signalized Intersection Levels-of-Service

Level of Service (LOS)	Average Control Delay (sec/veh)	Description
A	≤ 10.0	Progression is extremely favorable and most vehicles do not stop at all.
B	10.1 - 20.0	Progression is good, with more vehicles stopping than at LOS A.
C	20.1 - 35.0	Progression is fair, and individual cycle failures may begin to appear at this level.
D	35.1 - 55.0	Congestion becomes noticeable. Many vehicles stop and individual cycle failures become more prevalent.
E	55.1 - 80.0	Individual cycle failures are frequent.
F	> 80.0	Arriving traffic volumes exceed the capacity of the intersection. Significant cycle failures occur.

Source: Highway Capacity Manual 2000.

[4] **Highway Capacity Manual**, Transportation Research Board, 2000

(4:30pm – 6pm) were the four Synchro files that were analyzed in this study. All turning movement counts were verified with the City of Newport News staff and then volume balanced within the Synchro models. Existing AM and PM peak hour LOS were extracted from the models for the current conditions. Next, each signalized network was optimized using a cycle lengths between 100 and 130 seconds, allowing half cycle lengths. The network offsets were also optimized. The 2006/07 Existing AM and PM peak hour intersection conditions were extracted for both the existing signal timings as well as the optimized signal timings and are shown in the table to the right.

A summary of the 2006/07 existing and optimized traffic conditions at the fourteen analyzed study area intersections is provided in the table to the right. **Maps D1 – D4** in **Appendix D** (pages 64-67) provide the level of service results by turn movement for each intersection.

During the morning peak hour, all intersections operate at acceptable levels of service, except for two intersections along Jefferson Ave at Oyster Point Rd and J. Clyde Morris Blvd. The intersection of Jefferson Ave and J. Clyde Morris Blvd has the highest average delay (132.5 seconds) among analyzed intersections with a level of service F. The existing signal timings for the 6 intersections along Network 2 were found

2006/07 Existing Conditions Intersection Summary

AM Peak Hour

	Existing Signal Timings				Optimized Signal Timings			
Intersection	Avg Delay (sec/veh)	LOS	Failing Movements (LOS E or F)	Cycle Length (sec)	Avg Delay (sec/veh)	LOS	Failing Movements (LOS E or F)	Cycle Length (sec)
1 Jefferson Ave / Oyster Point Rd	80.0	F	SBT,EBL,EBT,WBL	110	50.0	D	SBT,EBT,WBL	110
2 Jefferson Ave / Middle Ground Blvd	52.6	D	NBL,SBL	110	33.0	C	SBL	110
3 Jefferson Ave / Loftis Blvd	7.5	A	NBL	110	5.9	A		110
4 Jefferson Ave / Thimble Shoals Blvd	36.9	D	SBL,EBL,WBT,WBL	110	26.9	C	SBL,EBL	110
5 Jefferson Ave / Pilot House Dr	4.8	A	NBL,SBL,WBT,WBL	110	6.1	A		110
6 Jefferson Ave / J. Clyde Morris Blvd	132.5	F	NBL,SBT,SBR,EBL,EBT,WBL,WBT	110	122.2	F	NBL,SBL,SBT,SBR, EBL,EBT,WBL	110
7 Oyster Point Rd / Canon Blvd	31.1	C	WBL	110	20.4	C	SBT,SBL	110
8 Canon Blvd / Old Oyster Point Rd	6.4	A		110	6.8	A		55
9 Canon Blvd / Middle Ground Blvd	14.2	B		112.8	14.2	B		112.8
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	8.3	A		100	8.3	A		100
11 J. Clyde Morris Blvd / Diligence Dr	22.2	C		100	22.2	C		100
12 Diligence Dr / Rock Landing Dr	10.0	B		100	10.0	B		100
13 Diligence Dr / Thimble Shoals Blvd	10.3	B		100	10.3	B		100
14 Canon Blvd / Thimble Shoals Blvd	11.7	B		100	11.7	B		100
TOTAL	429				348			
Overall Reduction in Average Delay by Optimizing Signal Timings					19%			

PM Peak Hour

	Existing Signal Timings				Optimized Signal Timings			
Intersection	Avg Delay (sec/veh)	LOS	Failing Movements (LOS E or F)	Cycle Length (sec)	Avg Delay (sec/veh)	LOS	Failing Movements (LOS E or F)	Cycle Length (sec)
1 Jefferson Ave / Oyster Point Rd	57.9	E	NBL,NBT,SBL,SBT,EBL,WBL,WBT	140	57.9	E	NBL,NBT,SBL,SBT,EBL,WBL,WBT	140
2 Jefferson Ave / Middle Ground Blvd	23.7	C	SBL,NBL,EBL,WBL,WBT	140	23.7	C	SBL,NBL,EBL,WBL,WBT	140
3 Jefferson Ave / Loftis Blvd	11.6	B	NBL,EBL	140	11.6	B	NBL,EBL	140
4 Jefferson Ave / Thimble Shoals Blvd	33.6	C	EBL,EBT,WBL,WBT	140	33.6	C	EBL,EBT,WBL,WBT	140
5 Jefferson Ave / Pilot House Dr	9.2	A	SBL,NBL,WBL,WBT	140	9.2	A	SBL,NBL,WBL,WBT	140
6 Jefferson Ave / J. Clyde Morris Blvd	99.8	F	NBL,NBT,SBL,SBT,SBR,EBL,EBT,WBL	140	99.8	F	NBL,NBT,SBL,SBT,SBR,EBL,EBT,WBL	140
7 Oyster Point Rd / Canon Blvd	32.8	C	SBL,SBT,EBL,WBL	140	32.8	C	SBL,SBT,EBL,WBL	140
8 Canon Blvd / Old Oyster Point Rd	20.0	C		140	20.0	C		140
9 Canon Blvd / Middle Ground Blvd	14.3	B		82.8	20.4	C		110
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	18.4	B	SBL,SBT,EBL	125	21.8	C		110
11 J. Clyde Morris Blvd / Diligence Dr	39.0	D	SBL,EBL,WBL,WBT,WBR	125	33.4	C	SBL,WBL,WBT,WBR	110
12 Diligence Dr / Rock Landing Dr	39.7	D	SBL,SBT,SBR	62	29.5	C		110
13 Diligence Dr / Thimble Shoals Blvd	13.1	B		62.5	10.6	B		110
14 Canon Blvd / Thimble Shoals Blvd	87.2	F	SBL,SBR,EBL	125	27.7	C	EBL	55
TOTAL	500				432			
Overall Reduction in Average Delay by Optimizing Signal Timings					14%			

Sample turning movement abbreviations: NBR – Northbound Right, SBT – Southbound Through, EBL – Eastbound Left

to be optimal for the updated turning movement counts. Almost all other intersections (Network 1) that were optimized showed improvement.

During the afternoon peak hour, three of the analyzed intersections currently operate at unacceptable conditions: Canon Blvd at Thimble Shoals Blvd, Jefferson Ave at Oyster Pt Rd, Jefferson Ave at J Clyde Morris Blvd. Traffic signals within the Synchro Network 1 were recently optimized in late spring 2007 by a private consultant so the existing signal timings were already optimal. For the Synchro Network 2, nearly all six intersections showed improvement when the network was optimized. The intersection of Canon Blvd and Thimble Shoals Blvd showed the most improvement in average delay going from 87.2 sec/veh (LOS F) to 27.7 sec/veh (LOS C). If the optimized signal timings are implemented for both AM and PM peak hours, only two intersections will be operating at unacceptable levels of service E or F (Jefferson Ave at Oyster Point Rd during the PM peak hour and Jefferson Ave at J Clyde Morris Blvd during the AM & PM peak hours).

Implementing the optimized signal timings from this study is expected to reduce the overall average intersection delay at all 14 intersections by about 19% for the AM peak hour and about 14% for the PM peak hour.

PLANNED GEOMETRIC IMPROVEMENTS IN THE STUDY AREA

The following list is a description of all programmed and planned intersection geometric improvements by the year 2030 for study area in Newport News. All of these improvements are included in the future 2030 intersection analysis in Synchro.

At the intersection of Jefferson Ave and Thimble Shoals Blvd, an additional southbound left turn lane is being constructed along Jefferson Ave in City Center at Oyster Point. In addition, a westbound right-turn channelized lane (Thimble Shoals Blvd) with yield control is being constructed. Additional improvements include sidewalks and pedestrian signals. This project is scheduled to be completed by May 2008. The additional left turn lane at this intersection and right-turn channelized lane were added to the Synchro signal network for the future 2030 analysis.

At the intersection of Canon Blvd and Middle Ground Blvd, left turn lanes for all approaches and modifications to the existing traffic signal are included in the current TIP. Plans have not been finalized and may be altered to include left turn lanes for only one roadway, however, by 2030 left turn lanes for all approaches are expected.

At the intersection of Diligence Dr and J. Clyde Morris Blvd, the left turn storage lane leading to the eastbound dual lefts from Diligence onto J. Clyde Morris is programmed to be lengthened approximately 200 feet. These changes will be included in the 2030 Synchro signal network for the future 2030 analysis.

Finally, dual left turn lanes and right turn bays are planned for all approaches at the intersection of Jefferson Ave and Middle Ground Blvd as a part of the Middle Ground Blvd extension project.

Canon Blvd at Thimble Shoals Blvd is currently operating at LOS F during the PM peak hour. With optimized signal timings, the intersection will operate at LOS C.

FUTURE 2030 INTERSECTION LEVEL OF SERVICE ANALYSIS

Year 2030 vehicle volumes for study area roadways were forecasted using the "special" 2030 socioeconomic data forecast (See **Appendix E** on page 68 **and Map 8** on page 29). The 2030 "special" forecast was done using the Hampton Roads Travel Demand Model with the Hampton Roads 2030 Long Range Transportation Plan, which includes major roadway projects and fixed guideway services like the Peninsula Rapid Transit Project. For this study, it also assumes that Phase II of the Third Crossing is complete and it incorporates socio-economic adjustments to the Oyster Point area as discussed on page 4 of this report. Three sets of traffic volumes, based on three build alternatives, were developed to determine future 2030 traffic conditions in the study area. The three 2030 traffic alternatives that being considered by the City and are included in this analysis are described below:

Alternative A – Special 2030 forecast without Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & without I-64 partial Interchange with Middle Ground Blvd.

Alternative B – Special 2030 forecast with Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & without I-64 partial Interchange with Middle Ground Blvd.

Alternative C – Special 2030 forecast with Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & with I-64 partial Interchange with Middle Ground Blvd.

The Middle Ground Blvd extension would be a 4-lane divided roadway from Jefferson Ave westward to Warwick Blvd as depicted on Map 8. The estimated cost to design and construct this roadway extension is $68 million[5]. This project was developed in the 1980's as a part of the City's Strategic Transportation Plan and is currently included as a part of the Hampton Roads 2030 Long-Range Transportation Plan.

The I-64 partial Interchange with Middle Ground Blvd would only allow I-64 eastbound traffic to exit onto Middle Ground Blvd and only eastbound traffic on Middle Ground Blvd to enter I-64 and travel eastward. This concept is a new idea by the City of Newport News and has not been adopted into any City plan. According to City staff, the preliminary estimated design and construction cost for the I-64 partial Interchange is $2.4 million and assumes a completion in five years[6]. Right-of-way and utility costs are not included in this estimate.

Growth factors were determined for each signalized intersection in the study area based on the special 2030 forecast (See **Appendix F** on page 69). These factors were applied to each intersection in Synchro for each Alternative A, B, and C to determine the future 2030 AM and PM peak hour traffic conditions. All planned geometric and signal improvements described on the previous page were included in the 2030 Synchro models and then each were re-optimized using a cycle length range from 100 to 150 seconds, allowing half cycle lengths. The network offsets were also optimized for each alternative. The City would ideally like to use cycle lengths below 130 seconds, however, given the high volumes in the year 2030 that might not be ideal.

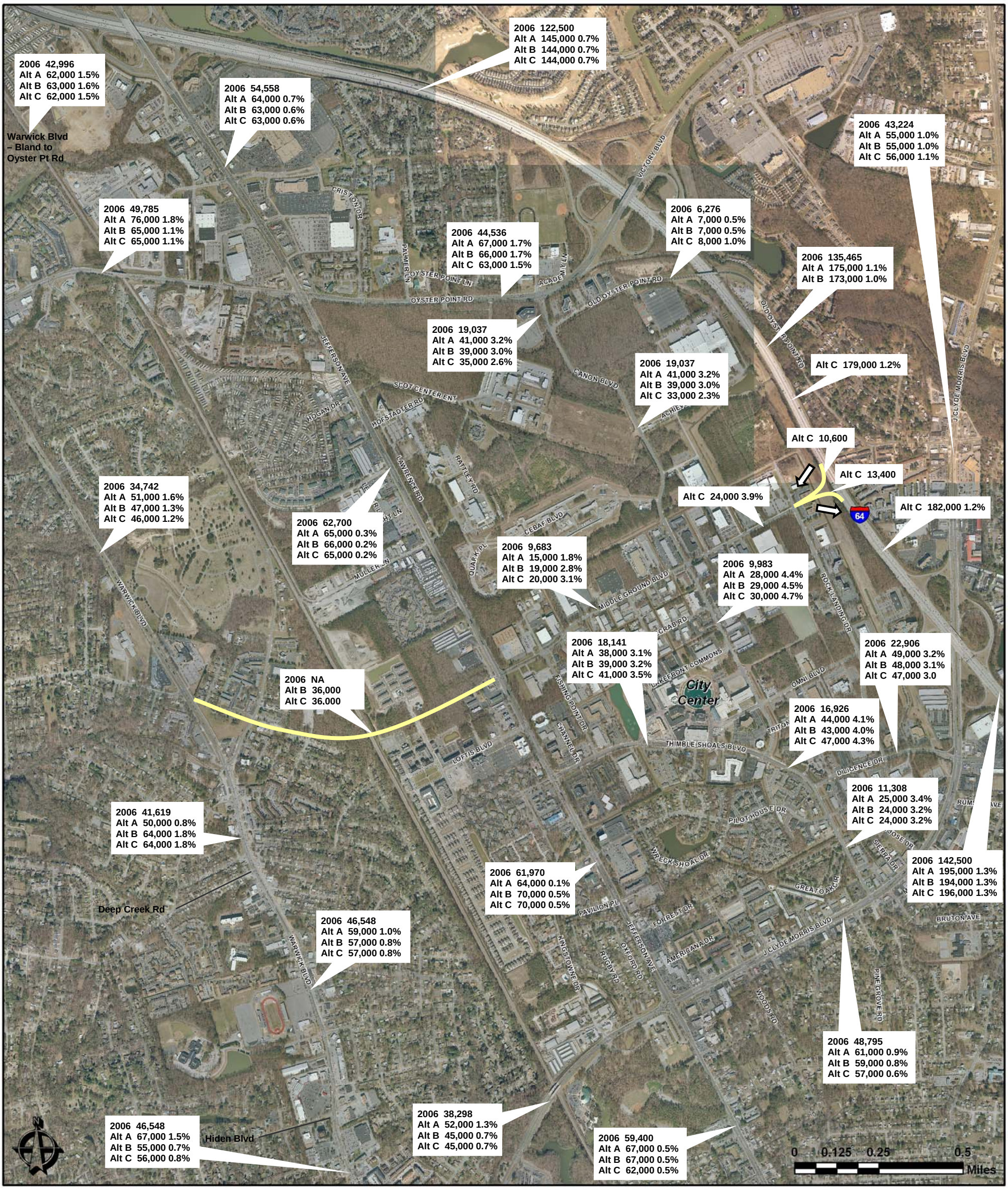
The 2030 level of service results for both AM and PM Peak Hours for Alternatives A, B, C by individual turn movement for each study area intersection are provided in **Maps G1-G6 in Appendix G** (pages 70-75).

A detailed table summary of the 2006/07 existing optimized and future 2030 intersection analysis is provided for all 14 study area intersections in **Appendix H** (pages 76-89). Each intersection summary contains delay (second/vehicle), level of service, and the 95th percentile queue length (feet) by turning movement. It also contains the overall intersection average approach delay, level of service, and the optimized cycle length. A graphical summary of the average delay for each intersection is provided on page 30.

[5] HRPDC, "Hampton Roads 2030 Long-Range Transportation Plan," October 2007.

[6] City of Newport News, "Center-Of-The-City Transportation Study," September 2007.

Map 8 – Existing 2006 & Future 2030 Average Daily Traffic Volumes



Background Image source: City of Newport News & Virginia Geographic Information Network.

Year	ADT	AGR*
2006	46,548	
Alt A	67,000	1.5%
Alt B	55,000	0.7%
Alt C	56,000	0.8%

**Special 2030 Future Alternatives

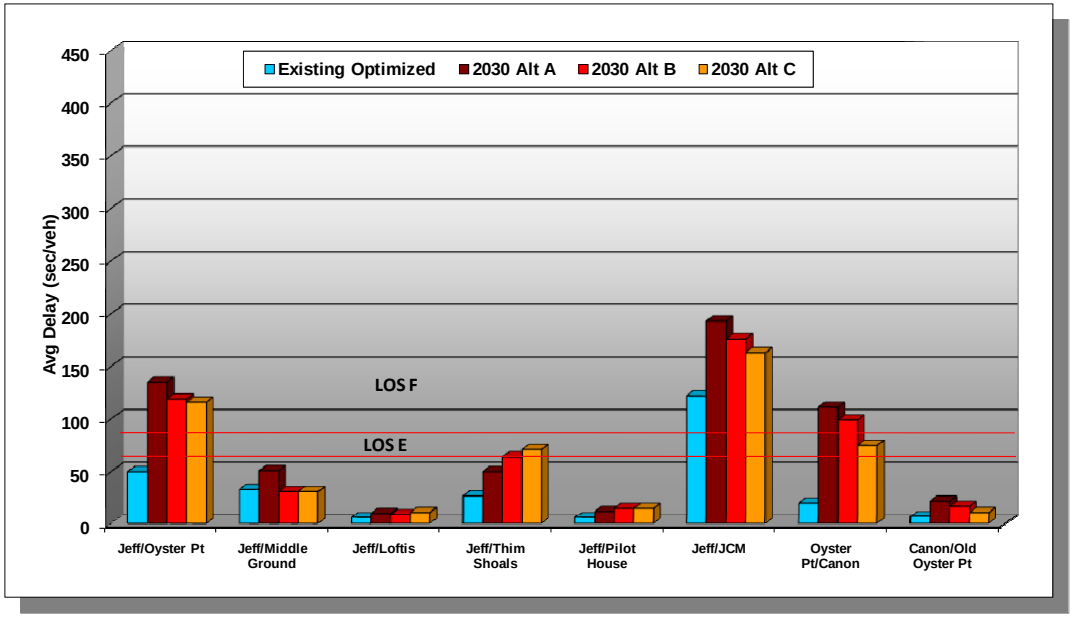
Alternative A – **Special 2030 plan without Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & without I-64 partial Interchange with Middle Ground Blvd.

Alternative B – **Special 2030 plan with Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & without I-64 partial Interchange with Middle Ground Blvd.

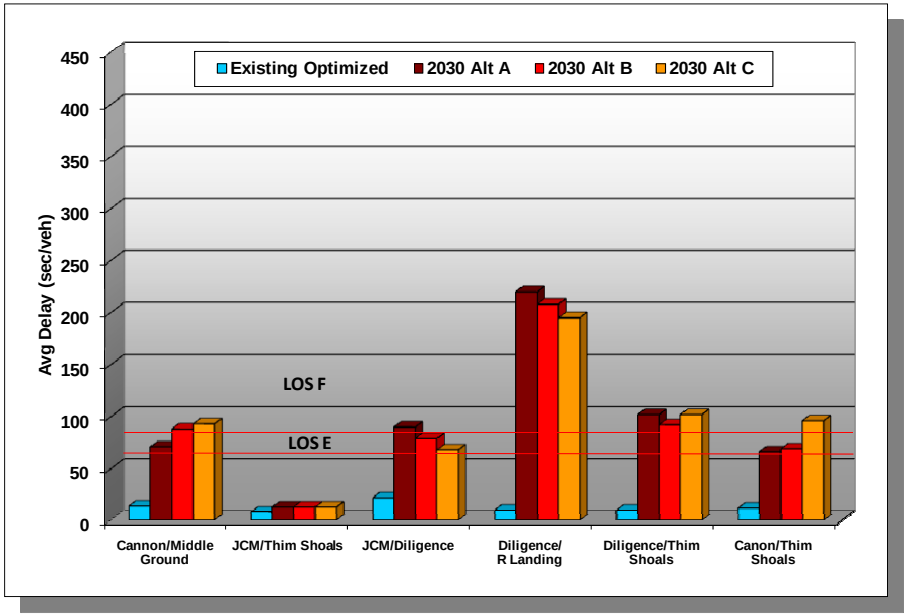
Alternative C – **Special 2030 plan with Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & with I-64 partial Interchange with Middle Ground Blvd.

***AGR** - Average annual growth rates from 2006 to 2030 are provided for each alternative.
****Adjusted 2030 Plan with socioeconomic data changes made for the Oyster Point study area.

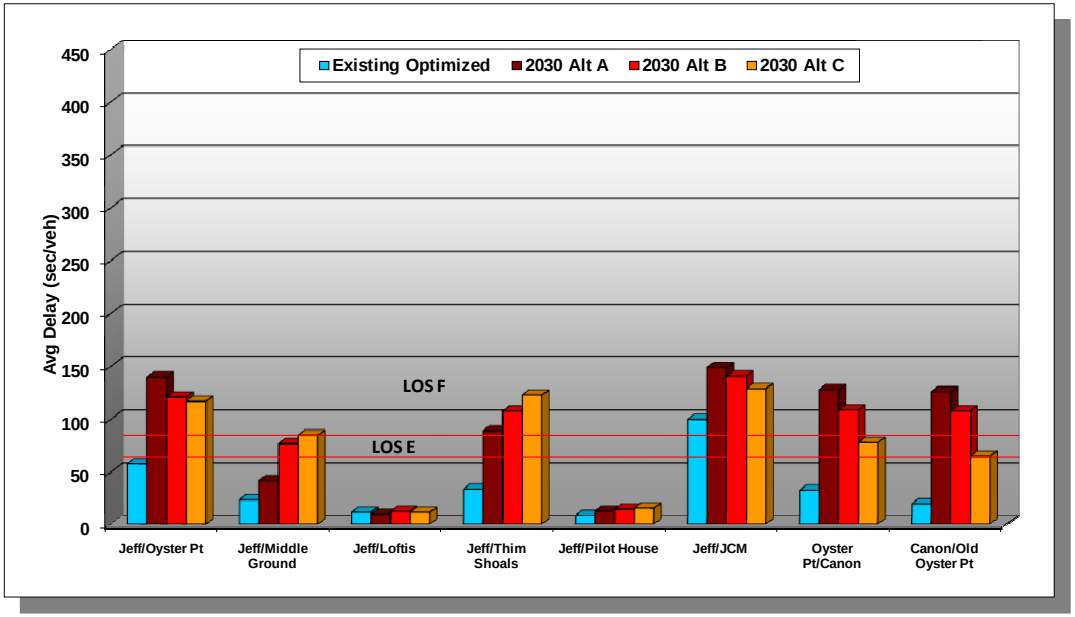
Comparison of Average Delay – Intersections 1 - 8 (AM Peak)



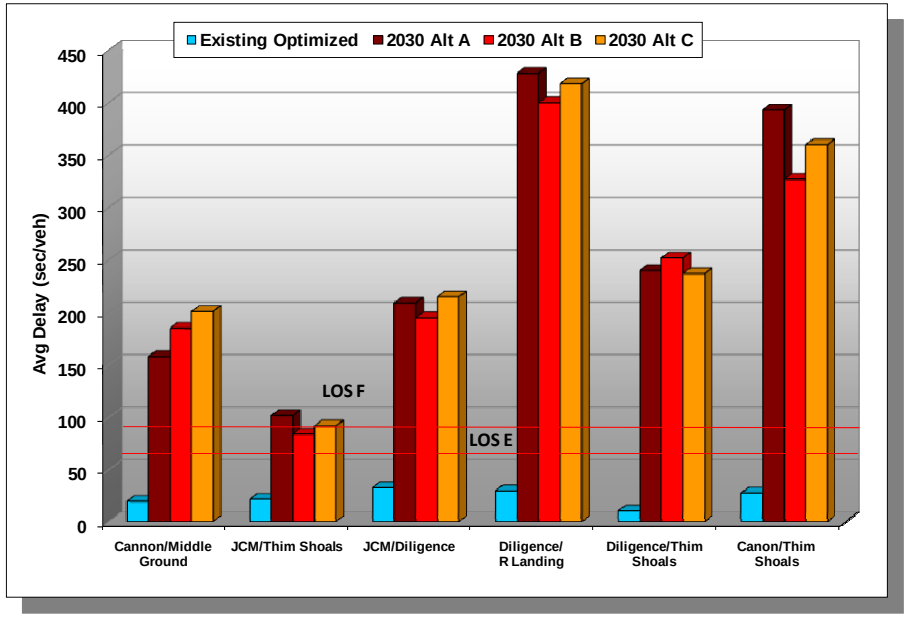
Comparison of Average Delay – Intersections 9 - 14 (AM Peak)



Comparison of Average Delay – Intersections 1 - 8 (PM Peak)



Comparison of Average Delay – Intersections 9 - 14 (PM Peak)



Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

Future 2030 Recommendation – Alternative B

The future 2030 analysis reveals that average vehicle delay (among the 14 study area intersections) is expected to be more than three times as much (230% increase) during the AM peak hour and five times as great (413% increase) during the PM peak hour over what it is today if the Middle Ground Blvd Extension project and the I-64 partial interchange with Middle Ground Blvd are not constructed (Alternative A). The Middle Ground Blvd Extension project (Alternative B) will have a small effect on improving average vehicle delay at the surrounding 14 intersections given the high levels of congestion by 2030. The construction of Middle Ground will provide a 5 second average vehicle delay reduction per intersection during the morning peak hour (82 to 77 seconds) and a 6 second reduction during the afternoon peak hour (159 to 153 seconds) compared to Alternative A.

Connecting Middle Ground Blvd to I-64 with a partial interchange (Alternative C) is only expected to yield an additional 1 second average vehicle delay savings per intersection during the morning peak hour (77 to 76 seconds) and will not improve the overall average vehicle delay during the afternoon peak hour compared to Alternative B (153 seconds). Alternative C provides some minor relief at 6 of the 14 intersections (AM Peak) and 5 of the 14 intersections (PM Peak); however, the overall impact on the future transportation network in Oyster Point is negligible and would not be cost effective from a traffic reduction perspective. Among other benefits from Alternative C include direct access to City Center from I-64, enhanced property values, and increased visibility for City Center and surrounding businesses.

It is recommended that the City select Alternative B and proceed with their plans to extend Middle Ground Blvd from Jefferson Ave to Warwick Blvd. This new roadway extension will provide a reduction in daily traffic vehicles along parallel east/west roadways like Oyster Point Rd (17% or 11,000 vpd) and J. Clyde Morris Blvd (16% or 7,000 vpd). It

Intersection Average Delay Summary

AM Peak Hour

Intersection	Average Delay (sec/veh) with LOS			
	06/07 Existing Optimized	2030 Alt A	2030 Alt B	2030 Alt C
1 Jefferson Ave / Oyster Point Rd	50 (D)	135 (F)	119 (F)	116 (F)
2 Jefferson Ave / Middle Ground Blvd	33 (C)	51 (D)	31 (C)	31 (C)
3 Jefferson Ave / Loftis Blvd	6 (A)	10 (A)	9 (A)	11 (B)
4 Jefferson Ave / Thimble Shoals Blvd	27 (C)	50 (D)	64 (E)	71 (E)
5 Jefferson Ave / Pilot House Dr	6 (A)	12 (B)	15 (B)	15 (B)
6 Jefferson Ave / J. Clyde Morris Blvd	122 (F)	193 (F)	176 (F)	163 (F)
7 Oyster Point Rd / Canon Blvd	20 (C)	111 (F)	99 (F)	75 (E)
8 Canon Blvd / Old Oyster Point Rd	7 (A)	22 (C)	17 (B)	11 (B)
9 Canon Blvd / Middle Ground Blvd	14 (B)	71 (E)	88 (F)	93 (F)
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	8 (A)	13 (B)	13 (B)	13 (B)
11 J. Clyde Morris Blvd / Diligence Dr	22 (C)	90 (F)	79 (E)	68 (E)
12 Diligence Dr / Rock Landing Dr	10 (A)	220 (F)	208 (F)	195 (F)
13 Diligence Dr / Thimble Shoals Blvd	10 (B)	102 (F)	92 (F)	102 (F)
14 Canon Blvd / Thimble Shoals Blvd	12 (B)	66 (E)	69 (E)	96 (F)
TOTAL	**347**	**1,146**	**1,079**	**1,060**
Percentage Increase (06/07 Existing Opt to 2030 Alt)		**230%**	**211%**	**205%**
Average Delay/Intersection	**25 (C)**	**82 (F)**	**77 (E)**	**76 (E)**

PM Peak Hour

Intersection	Average Delay (sec/veh) with LOS			
	06/07 Existing Optimized	2030 Alt A	2030 Alt B	2030 Alt C
1 Jefferson Ave / Oyster Point Rd	58 (E)	140 (F)	121 (F)	117 (F)
2 Jefferson Ave / Middle Ground Blvd	24 (C)	42 (D)	77 (E)	85 (F)
3 Jefferson Ave / Loftis Blvd	12 (B)	10 (A)	13 (B)	12 (B)
4 Jefferson Ave / Thimble Shoals Blvd	34 (C)	89 (F)	108 (F)	123 (F)
5 Jefferson Ave / Pilot House Dr	9 (A)	13 (B)	15 (B)	16 (B)
6 Jefferson Ave / J. Clyde Morris Blvd	100 (F)	149 (F)	141 (F)	129 (F)
7 Oyster Point Rd / Canon Blvd	33 (C)	128 (F)	109 (F)	78 (E)
8 Canon Blvd / Old Oyster Point Rd	20 (C)	126 (F)	108 (F)	65 (E)
9 Canon Blvd / Middle Ground Blvd	20 (C)	158 (F)	185 (F)	201 (F)
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	22 (C)	102 (F)	84 (F)	92 (F)
11 J. Clyde Morris Blvd / Diligence Dr	33 (C)	209 (F)	195 (F)	215 (F)
12 Diligence Dr / Rock Landing Dr	30 (C)	428 (F)	400 (F)	418 (F)
13 Diligence Dr / Thimble Shoals Blvd	11 (B)	240 (F)	252 (F)	237 (F)
14 Canon Blvd / Thimble Shoals Blvd	28 (C)	393 (F)	327 (F)	360 (F)
TOTAL	**434**	**2,227**	**2,135**	**2,148**
Percentage Increase (06/07 Existing Opt to 2030 Alt)		**413%**	**392%**	**395%**
Average Delay/Intersection	**31 (C)**	**159 (F)**	**153 (F)**	**153 (F)**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

is also expected to decrease traffic along parts of Warwick Blvd (ranging from 2,000 to 12,000 vpd). Refer to Map 8 on page 29 for specific changes in traffic volumes. Furthermore, the roadway extension of Middle Ground Blvd will provide some additional connectivity and another alternative route within the Oyster Point area. Even with this improvement, there will only be a slight reduction in delay at the surrounding 14 intersections compared to the no build scenario (Alternative A). Implementation of additional intersection improvements along with other congestion mitigation strategies will be imperative.

As a result of this recommendation, traffic improvements and recommendations will be made later in this report with the assumption that Alternative B will be selected and implemented by the year 2030.

BICYCLE AND PEDESTRIAN FACILITIES

The HRPDC staff conducted a field inventory of the existing bicycle and pedestrian facilities during Summer 2007 for the Oyster Point Center study area. A summary of those observations is detailed in this section and a map of the existing facilities is provided on **Map 9** on page 37.

There is an existing, if incomplete, network of sidewalks throughout the study area. J Clyde Morris Blvd and Jefferson Ave have continuous sidewalks on both sides within the project area and Oyster Point Rd has continuous sidewalk on its north side between Canon Blvd and Jefferson Ave. The Oyster Point City Center area has a complete network of wide sidewalks on both sides of the streets and sidewalks around the central fountain.

Thimble Shoals Blvd and Diligence Dr both have sidewalk that is nearly continuous on one side, but that have gaps near critical connections to Jefferson Ave and J Clyde Morris Blvd. Pilot House Dr has sidewalk along both sides for the majority of its length, but it stops short of Thimble Shoals Blvd. Rock Landing Dr has sidewalk located on its west side from Middle Ground Blvd to Diligence Dr. Middle Ground Blvd has sidewalk on the north side between Rock Landing Dr and Canon Blvd, except for a small gap near Canon Blvd. The only sidewalk segment on Canon Blvd is a short section near Middle Ground Blvd. Hampton Roads Transit has a significant transfer location on Fishing Point Dr, which has no sidewalks to accommodate anyone walking to or from this location, including employees of nearby businesses.

Sidewalks are incomplete around the HRT transfer station at Fishing Point Dr and Gum Rock Dr.

HRT transfer for Bus Routes 111, 112, and 119 at Fishing Point Dr and Gum Rock Dr currently lacks sidewalks to/from surrounding areas.

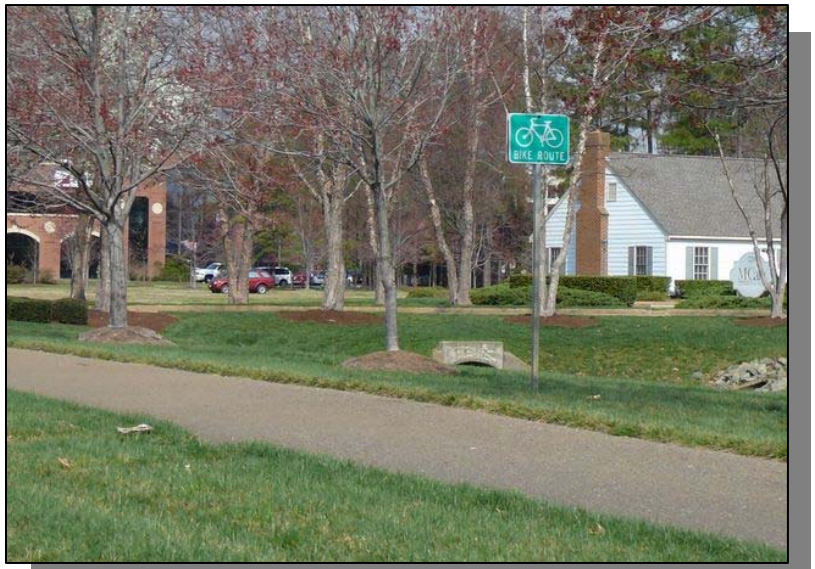
Crosswalks and curb ramps are located at most intersections within the study area. At crossings of two roadways without sidewalks, generally no crosswalks are provided. The crosswalks at the large, busy intersections of Jefferson Ave and Oyster Point Rd and Jefferson Ave and J Clyde Morris Blvd are broken at channelizing islands, which provide a safe refuge for pedestrians while crossing. Pedestrian signals

Curb ramps and sidewalks are needed surrounding the intersection of Middle Ground Blvd and Canon Blvd.

Some crosswalks in the Oyster Point City Center area utilize gray pavers that blend in with the asphalt pavement and are not easily visible to drivers.

that indicate when it is safe for pedestrians to cross are notably lacking at many crossings of major roadways like Jefferson Ave and J Clyde Morris Blvd. No crosswalks exist to provide continuity across Jefferson Ave at Loftis Blvd, the primary access point into nearby Port Warwick, another mixed-use, pedestrian-friendly development. Curb ramps are missing in several locations where crosswalks are present. The lack of curb ramps creates significant accessibility concerns for the physically impaired and could become an issue for the City as a violation of the Americans with Disabilities Act (ADA) requirements. It was also noted that many signalized intersections in the study area do not have pedestrian signals.

The physical characteristics of crosswalks within the study area vary widely. The crosswalks on several arterials streets, such as Jefferson Ave and J Clyde Morris Blvd consist of two relatively narrow, parallel white pavement markings and often have angle points located in the roadway to change direction (i.e. Jefferson Ave & Thimble Shoals Blvd and Middle Ground Blvd & Canon Blvd). These changes in direction can be problematic to the disabled, particularly the sight impaired. Some of these angles are located in painted islands that do not provide safe refuge for pedestrians. Within the Oyster Point City Center, red paver crosswalks are used that are highly visible to drivers and clearly mark pedestrian spaces. Concrete paver crosswalks are also used in other locations on Thimble Shoals Blvd and Diligence Dr. However, these crosswalks utilize gray pavers that blend in with the asphalt pavement and are not easily visible to drivers.



An asphalt separated bike trail is provided along Thimble Shoals Blvd.

Many roadways within study area are labeled as bike routes. These vary between wide concrete sidewalks to accommodate multiple uses, separate alignment bike trails, and signs marking roadways with relatively heavy traffic and little or no actual accommodation for bicycles. Old Oyster Point Rd and Canon Blvd are both identified as bicycle routes, but have narrow roadways with no additional space to allow for safe bicycle travel. Most of the existing bikeways in the study area are used for recreational purposes and not for commuting.

A worn path along Canon Blvd between Triton Ct and Omni Blvd demonstrates pedestrian activity.

Sidewalks are needed along Canon Blvd from Middle Ground Blvd to Thimble Shoals Blvd.

A wide ditch currently separates housing along Pilot House Dr and the Oyster Point City Center area.

In August 2007, the PDC staff spoke with several residents that lived along Pilot House Dr about walking to and from the Oyster Point City Center area. The residents said they would like to walk to City Center, however, a large ditch separates the neighborhood from the area and is too large to traverse. A suggestion was made by one resident to build a pedestrian bridge to allow a safe crossing. Currently, residents need to walk westward to Jefferson Ave or eastward to Thimble Shoals Blvd in order to reach the area. One resident said that many people drive rather than walk all the way around. It is important to note that constructing a pedestrian bridge in this area will require the purchase of private property in order to gain access.

Some residents have thrown pallets and other items into the ditch in order to cross.

Residents would like to have a pedestrian bridge or other facility built in order to walk to the Oyster Point City Center area.

Map 9 – 2007 Existing Pedestrian and Bicycle Facilities

Background Image source: City of Newport News & Virginia Geographic Information Network.
Data Source: City of Newport News & HRPDC Field Work, Summer 2007.

*Note: A pedestrian signal at the Jefferson Ave/Thimble Shoals Blvd intersection is currently under construction. A pedestrian signal at the intersection of Jefferson Ave and Middle Ground Blvd will be implemented as a part of the Middle Ground Blvd extension over to Warwick Blvd.

Legend

- Pedestrian Signals
- Crosswalks
- Sidewalks
- Bike Facility

RECOMMENDATIONS

City Center at Oyster Point is quickly becoming one of the most popular destination points on the Hampton Roads Peninsula. City Center's central business district offers modern offices, elegant shops, entertainment, unique restaurants, apartments and condos. In order to maintain this vibrant, livable community, a combination package of strategies to mitigate future traffic congestion levels to and from the area will need to be implemented. This section provides 5 essential congestion mitigation strategies for the study area. Many of the roadways in the study area were not originally built with the anticipation of serving dense developments (i.e. no right or left turn lanes), such as City Center. As a result, a primary focus and emphasis for recommendations will be on Strategy #4 – Improve Roadway Operations. This strategy focuses on making improvements to intersection geometrics and channelization to improve the overall efficiency and traffic flow operation in the study area. Many of the congestion strategies were obtained from the Congestion Mitigation Strategy "Toolbox" in the Hampton Roads Congestion Management System[7].

<u>Strategy #1 – Eliminate Person Trips or Reduce Vehicle Miles Traveled (VMT)</u>

- **Land Use Policies/Regulations** – Encourage more efficient patterns of commercial or residential development within Oyster Point, particularly the City Center area. Promote land use policies and/or regulations that could significantly decrease both the number of trips and overall trip lengths, as well as making transit use, bicycling and walking more viable. Encourage infill development that enables people to live, work, and play in the same area without the need to drive. Consider a reduction in City real estate taxes for those to choose to live and work within a certain distance. Discourage development outside of designated growth areas. Continue to promote high density and mixed uses in proximity to existing or planned transit services. Establish a policy for new and existing subdivisions in the Oyster Point to include sidewalks, bike paths, and transit facilities where appropriate.

- **Congestion/Value Pricing (Parking Fees)** – Currently, the City of Newport News offers free parking to the traveling public in multiple parking garages within City Center. Develop a market-based strategy to modify mode choice by imposing higher costs for parking private automobiles. Free and ample parking encourages more people to drive and discourages the use of public transit. Charge higher fees during peak travel periods to discourage trips during the busiest times of the day. Maybe offer free or reduced parking rates during off-peak periods in order to shift trips from peak to non-peak times.

- **Telecommuting** – Encourage employers in the study area to consider telecommuting options full or part-time in order to reduce travel demand. Today, more than 11 million Americans telecommute at least one or more days a week and is quickly becoming a feasible option for many businesses. Nearly every home now has a personal computer or work laptop, which allows them to work from home and reduce traffic congestion. In Hampton Roads, TRAF*FIX* is a cooperative public service that implements Transportation Demand Management (TDM) strategies and offers transportation alternatives, like telecommuting, to area commuters. To find out more about teleworking in Virginia, visit Telework!VA (www.teleworkva.org).

- **Flextime/Compressed Work Week Schedules** – Encourage employers in the area to consider allowing employees to work a

[7] HRPDC, "Hampton Roads Congestion Management System, Part 2," April 2005.

flexible schedule. This allows the employee the option of commuting during non-peak travel periods.

Strategy #2 – Shift Trips from Automobile to Other Modes

- **Public Transit Capital Improvements** – Add light rail service to, from, and through the study area. Add new bus routes to support both existing bus routes as well as a future light rail service. Improve stop and transfer facilities with technology and comfort features to encourage more ridership. Strategically locate and add Park & Ride facilities to encourage the use of transit.

- **Public Transit Operational Improvements** – Increase transit service frequency and expand service to cover larger areas. Improve traffic signal progression and consider using preemption to improve transit times and reliability. Consider transit fare reductions system-wide, off-peak discounts or deep discount programs that encourage transit usage. Consider offering free transit passes to selected employers in the Oyster Point area in an effort to reduce SOV travel by automobile. Improve in-vehicle and station information systems to improve the dissemination of transit-related information to the user.

- **Bicycle and Pedestrian Facility Improvements** – Improve and expand bicycle network and facilities to increase coverage and to connect existing bicycle routes. Add bicycle racks in the vicinity of City Center at Oyster Point, Port Warwick, transit stops, and other strategic locations to provide a safe and secure place for bicyclists to store their bicycles. Add sidewalks, pedestrian signs and signals, crosswalks, greenways, and walkways to encourage walking versus driving. Recent studies have shown that pedestrian countdown signals reduce pedestrian-vehicle crashes as well as overall vehicle crashes and are recommended in the City Center and surrounding areas. In addition, the City should implement one or two highly visible crosswalk designs and maintain them throughout the entire Oyster Point area to have consistency and familiarity for drivers when approaching designated crossing locations. Specific location recommendations from this study for bicycle and pedestrian facility improvements for the Oyster Point study area are provided on **Map 10** on the following page.

Strategy #3 – Shift Trips from Single Occupancy Vehicle (SOV) to High Occupancy Vehicle (HOV)

- **Rideshare Matching Services** – Utilize transportation demand management (TDM) techniques and services through programs and assistance from TRAF*FIX*. TRAF*FIX* provides carpool/ vanpool matching and ridesharing information resources and other services.

- **Vanpool/Employer Shuttle Program** – Organize groups of commuters to travel together in a passenger van or employer-provided shuttle on a regular basis.

- **Commuting Subsidies** – Those commuters that use public transit or vanpools are eligible for subsidies via the Commuter Check program. Commuter Checks are tax-free vouchers that employers can give their employees to use toward any HRT bus service, ferry, or vanpool and are able to receive up to $110 each month (or $1,320 per year). Providing Commuter Checks is like giving a tax-free raise and it costs nothing for the employer to provide. In fact, it saves the employer money in payroll taxes and other payroll-associated costs. Contact TRAF*FIX* for more information.

- **Carpooling Incentives** – The NuRide program encourages carpooling by connecting carpoolers based on their route to work and providing incentives to registered participants.

Map 10 – Study Recommendations for Pedestrian and Bicycle Facilities

Background Image source: City of Newport News & Virginia Geographic Information Network.
Existing Data Source: City of Newport News & HRPDC Field Work, Summer 2007.

Legend

- Existing Pedestrian Signals
- Pedestrian Signal Recommendation
- Existing Crosswalk
- Crosswalk Recommendation
- Existing Sidewalk
- Sidewalk Recommendation
- Existing Bike Facility
- Programmed/Planned Bike Facility
- Bike Facility Recommendation

These incentives include gift cards for various restaurants, retailer discounts, and tickets to shows and attractions. TRAF*FIX* has staff dedicated to connect carpoolers with the NuRide program. Also visit www.nuride.com for more details.

- **Indirect Financial Incentives** – This includes additional non-monetary incentives that can be provided by employers to registered carpoolers and those using vanpools or public transportation. These incentives could include extra vacation time or discounts at local retailers. A company in California that provided one to two extra vacation days for those employees that used ridesharing alternatives saw the number of commuters that drove alone to work drop 10%.

- **Parking Management** – Provide preferential parking to encourage carpooling and vanpooling. This is a low-cost incentive that can be effective if unlimited free and close parking is not currently available.

A study[8] was conducted that evaluated approximately 50 employer-based demand management programs in the U.S. to determine cost effectiveness and the reduction in vehicle trips. Results from the study estimated that the average reduction in vehicle trips among all these "successful" programs was 15.3% (at a cost of about $0.75 per trip reduced). However, the employer programs that focused on information/promotion alone demonstrated no measurable decrease in trips. Programs that provided enhanced alternatives, such as vanpools or shuttle buses, achieved a 8.5% reduction in trips. Programs that focused on financial incentives and disincentives achieved a 16.4% reduction of trips and programs that combined enhanced alternatives with incentives/disincentives for their use, achieved a 24.5% reduction in vehicle trips.

[8] COMSIS Corporation. TCRP Project B-4: Cost Effectiveness of TDM Strategies. TRB, National Research Council, Washington, D.C., 1995.

Strategy #4 – Improve Roadway Operations

- **Traffic Operational Improvements** – Make improvements to intersection geometrics and channelization to improve the overall efficiency and traffic flow operation. Refer to the recommendations listed below for specific improvements for the Oyster Point study area. In addition, continue to optimize signal timing and signal progression throughout the study area.

As a result of the 2030 peak hour traffic analysis contained in this report, it was recommended that the City select Alternative B and proceed with their plans to extend Middle Ground Blvd from Jefferson Ave to Warwick Blvd. This new roadway extension will provide a reduction in daily traffic vehicles along parallel east/west roadways like Oyster Point Rd (17% or 11,000 vpd) and J. Clyde Morris Blvd (16% or 7,000 vpd). It is also expected to decrease traffic along parts of Warwick Blvd (ranging from 2,000 to 12,000 vpd). Furthermore, the roadway extension of Middle Ground Blvd will provide some additional connectivity and another alternative route within the Oyster Point area.

Implementing the Middle Ground Blvd extension will not, however, solve all future congestion concerns in the study area. The Synchro / SimTraffic simulation model with Alternative B traffic conditions was studied to observe the future deficiencies within the study area in 2030. In order to accommodate future development, several critical roadway improvements will be necessary. The following table on page 42 provides a list of roadway improvement recommendations that should be implemented by the year 2030 in order to keep traffic moving in the Oyster Point study area. A majority of the improvements focused on low cost roadway solutions (i.e. adding turn lanes rather than widening roadways).

These roadway improvements were implemented in the 2030 Alternative B Synchro / SimTraffic model and the results were extrapulated to determine the effects on the intersection operations and

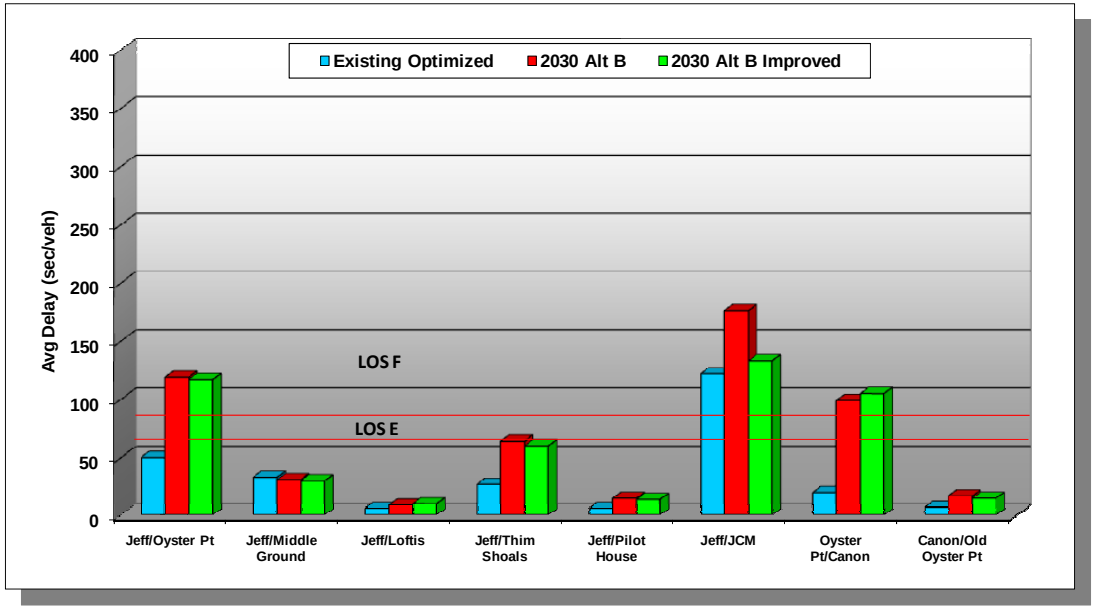
levels of service. The intersection LOS results from this analysis are provided on **Maps I1 and I2** in **Appendix I** (pages 90-91). A detailed comparison of the intersection delay, LOS, and 95th percentile queue length by turning movement is also provided in **Appendix J** (pages 92-105) for the 2006/07 Existing network with optimized signal timings, 2030 Alternative B conditions, and 2030 Alternative B conditions with the recommended roadway improvements.

A graphical summary of the average delay for each intersection is provided on page 43. Despite many intersections still operating at failing levels (LOS E or F) after the improvements, average delay was reduced significantly especially during the PM peak hour for the intersections of Diligence Dr and Rock Landing, Diligence Dr and Thimble Shoals Blvd, and Canon Blvd and Thimble Shoals Blvd.

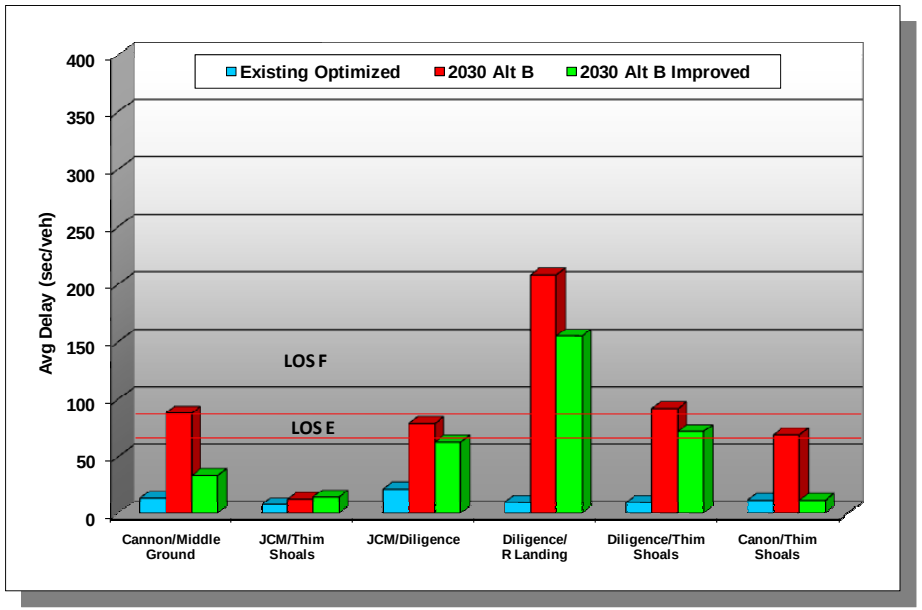
Intersection Geometric and Channelization Recommendations

Study Area Intersection	Roadway Improvement Recommendation	Notes and Observations
1 Jefferson Ave / Oyster Point Rd	Widen Oyster Point Rd from 2 to 3 lanes (eastbound) between Proposed Liberty Pkwy and Jefferson Ave	Eastbound thru traffic backs up to the intersection of Oyster Pt and HQ Way and blocks left and right turning vehicles from proceeding
	Extend dual left storage lanes (southbound) on Jefferson Ave	Southbound Jefferson Ave thru traffic backs up at Oyster Pt Rd and blocks dual left turn lanes
2 Jefferson Ave / Middle Ground Blvd	None	
3 Jefferson Ave / Loftis Blvd	None	
4 Jefferson Ave / Thimble Shoals Blvd	Add right turn bay (westbound) on Thimble Shoals Blvd	
	Extend right and left turn bays (northbound) on Jefferson Ave	Northbound Jefferson Ave thru traffic backs up at Thimble Shoals Blvd and blocks left and right turn lanes
	Add 2nd left turn lane (eastbound) on Thimble Shoals Blvd *(low priority)*	
5 Jefferson Ave / Pilot House Dr	None	
6 Jefferson Ave / J. Clyde Morris Blvd	Add 3rd thru lane (eastbound) on J. Clyde Morris Blvd from Kingstowne Dr	Eastbound thru traffic backs up to the intersection of Kingstowne Dr and J. Clyde Morris Blvd
	Change northbound right turn channelized lane from free to yield control	
	Add right turn bay (southbound) on Jefferson Ave	
7 Oyster Point Rd / Canon Blvd	Extend right turn bay (eastbound) on Oyster Pt Rd	
8 Canon Blvd / Old Oyster Point Rd	Add right turn bay (northbound) on Canon Blvd	
9 Canon Blvd / Middle Ground Blvd	Add right turn bay (southbound) on Canon Blvd	
	Add right turn bay (eastbound) on Middle Ground Blvd	
	Add right turn bay (westbound) on Middle Ground Blvd	Designate two left lanes for dual lefts. Designate right turn lane for rights only and the middle right lane for thru only
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	None	
11 J. Clyde Morris Blvd / Diligence Dr	Add right turn bay (westbound) with right turn channelized lane with yield control on Diligence Dr	Keep existing two lanes for thru traffic.
	Add left turn bay (westbound) on Diligence Dr	
	Change southbound right turn channelized lane with yield control on J Clyde Morris Blvd to free flow	
12 Diligence Dr / Rock Landing Dr	Add one lane (westbound) on Diligence Dr from J. Clyde Morris Blvd to Rock Landing Dr, including a channelized bay with yield control onto Rock Land Dr	This will allow free flow right turns for southbound J Clyde Morris Blvd traffic onto Diligence Dr to Rock Landing Dr. Consider adding one lane (eastbound) on Diligence Dr)
	Add left turn bay (westbound) on Diligence Dr	Realign eastbound thru lanes along Diligence Dr south of intersection
	Add left turn bay (eastbound) on Diligence Dr	
	Add thru/right turn lane southbound on Rock Landing Dr	Keep existing two lanes for left turns only
13 Diligence Dr / Thimble Shoals Blvd	Add right turn channelized lane (westbound) with yield control on Diligence Dr *(low priority)*	
	Add right turn bay (northbound) on Thimble Shoals Blvd	
	Add left turn bay (southbound) on Thimble Shoals Blvd	Use right lane for thru only, middle lane for left/thru and left lane for lefts only
14 Canon Blvd / Thimble Shoals Blvd	Add right turn bay (westbound) with right turn channelized lane with yield control on Thimble Shoals Blvd	Also consider extending this right turn bay back to Diligence Dr to provide free flow right turns from Diligence Dr to Canon Blvd
	Add right turn bay (southbound) on Canon Blvd	Use two existing lanes for left turns only

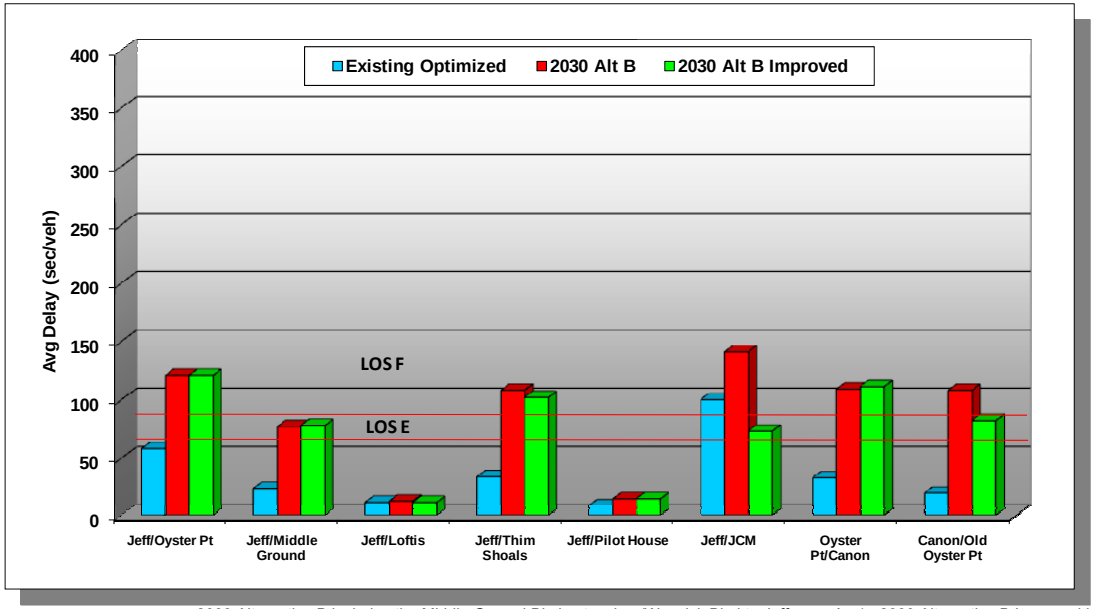
Comparison of Average Delay – Intersections 1 - 8 (AM Peak)



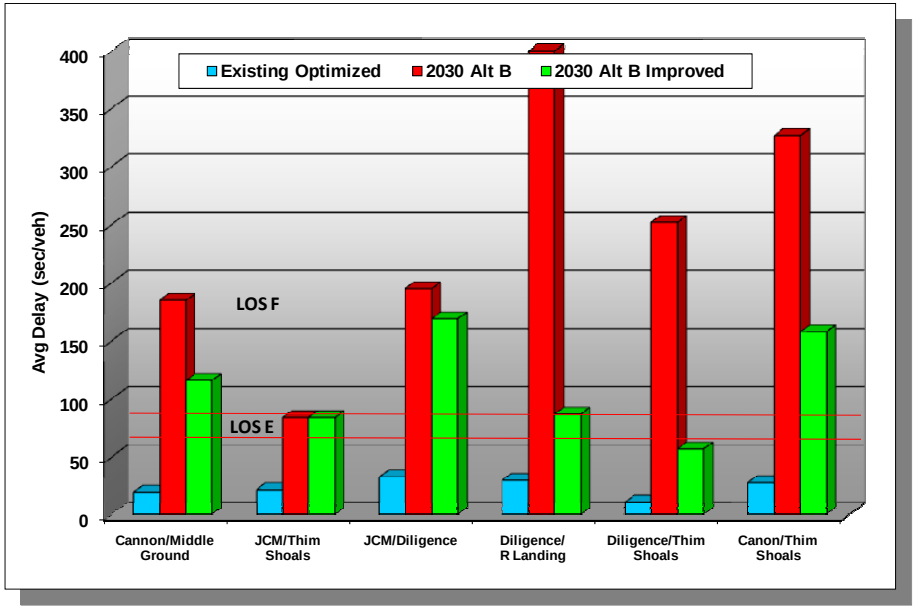
Comparison of Average Delay – Intersections 9 - 14 (AM Peak)



Comparison of Average Delay – Intersections 1 - 8 (PM Peak)



Comparison of Average Delay – Intersections 9 - 14 (PM Peak)



2030 Alternative B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave). 2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Delay Reduction by Implementing 2030 Alternative B with Improvements

Previously mentioned in the peak hour traffic analysis section of this report, the cost of "doing nothing" (Alternative A – no Middle Ground Blvd Extension & no I-64 partial Interchange with Middle Ground Blvd) will result in an increase of overall average delay among all 14 study area intersections by 230% (AM Peak) and 413% (PM Peak) over what it is today. The construction of Middle Ground will provide a 5 second average vehicle delay reduction per intersection during the morning peak hour (82 to 77 seconds) and a 6 second reduction during the afternoon peak hour (159 to 153 seconds) compared to Alternative A. Implementing the 2030 Alternative B with the recommended intersection geometric improvements will yield an additional 17 seconds average vehicle delay reduction per intersection during the morning peak hour (77 to 60 seconds) and a 63 second average vehicle delay reduction during the afternoon peak hour (153 to 90 seconds). These improvements will have the highest impact on Intersections #9 and #14 (AM peak) and Intersections #6, #9, #12, #13, & #14 (PM peak).

The recommendations provided on page 42 focused on methods to improve roadway operations primarily through intersection geometric improvements. In order to avoid traffic backing up from one intersection to the next by the year 2030, a large majority of these recommendations in this section will need to be implemented. It is also important to note that making roadway improvements at one intersection will affect traffic flow at downstream intersections. Therefore, improvements need to be made with the consideration of moving traffic through the entire roadway signal network. It is recommended that the City re-optimize the study area signals upon completion of these roadway geometric improvements.

Even with these improvements, 7 of 14 intersections during the AM peak hour and 12 of 14 intersections during the PM peak hour are still expected to be operating at severely congested levels by 2030 (LOS E or F). Despite these congestion levels, the Synchro/SimTraffic simulation

Intersection Average Delay Summary with Geometric Improvements

AM Peak Hour

Intersection	Average Delay (sec/veh) with LOS: 06/07 Existing Optimized	2030 Alt A "No Build"	2030 Alt B	2030 Alt B Improved	% Delay Reduction Alt B Imp
1 Jefferson Ave / Oyster Point Rd	50 (D)	135 (F)	119 (F)	117 (F)	2%
2 Jefferson Ave / Middle Ground Blvd	33 (C)	51 (D)	31 (C)	30 (C)	3%
3 Jefferson Ave / Loftis Blvd	6 (A)	10 (A)	9 (A)	10 (A)	-10%
4 Jefferson Ave / Thimble Shoals Blvd	27 (C)	50 (D)	64 (E)	60 (E)	7%
5 Jefferson Ave / Pilot House Dr	6 (A)	12 (B)	15 (B)	14 (B)	7%
6 Jefferson Ave / J. Clyde Morris Blvd	122 (F)	193 (F)	176 (F)	133 (F)	32%
7 Oyster Point Rd / Canon Blvd	20 (C)	111 (F)	99 (F)	105 (F)	-6%
8 Canon Blvd / Old Oyster Point Rd	7 (A)	22 (C)	17 (B)	15 (B)	13%
9 Canon Blvd / Middle Ground Blvd	14 (B)	71 (E)	88 (F)	34 (C)	159%
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	8 (A)	13 (B)	13 (B)	15 (B)	-13%
11 J. Clyde Morris Blvd / Diligence Dr	22 (C)	90 (F)	79 (E)	63 (E)	25%
12 Diligence Dr / Rock Landing Dr	10 (A)	220 (F)	208 (F)	155 (F)	34%
13 Diligence Dr / Thimble Shoals Blvd	10 (B)	102 (F)	92 (F)	72 (E)	28%
14 Canon Blvd / Thimble Shoals Blvd	12 (B)	66 (E)	69 (E)	12 (B)	475%
TOTAL	**347**	**1,146**	**1,079**	**835**	
Percentage Increase (06/07 Existing Opt to 2030 Alt)		**230%**	**211%**	**141%**	
Average Delay/Intersection	**25 (C)**	**82 (F)**	**77 (E)**	**60 (E)**	

PM Peak Hour

Intersection	Average Delay (sec/veh) with LOS: 06/07 Existing Optimized	2030 Alt A "No Build"	2030 Alt B	2030 Alt B Improved	% Delay Reduction Alt B Imp
1 Jefferson Ave / Oyster Point Rd	58 (E)	140 (F)	121 (F)	121 (F)	0%
2 Jefferson Ave / Middle Ground Blvd	24 (C)	42 (D)	77 (E)	78 (E)	-1%
3 Jefferson Ave / Loftis Blvd	12 (B)	10 (A)	13 (B)	12 (B)	8%
4 Jefferson Ave / Thimble Shoals Blvd	34 (C)	89 (F)	108 (F)	102 (F)	6%
5 Jefferson Ave / Pilot House Dr	9 (A)	13 (B)	15 (B)	15 (B)	0%
6 Jefferson Ave / J. Clyde Morris Blvd	100 (F)	149 (F)	141 (F)	73 (E)	93%
7 Oyster Point Rd / Canon Blvd	33 (C)	128 (F)	109 (F)	111 (F)	-2%
8 Canon Blvd / Old Oyster Point Rd	20 (C)	126 (F)	108 (F)	82 (F)	32%
9 Canon Blvd / Middle Ground Blvd	20 (C)	158 (F)	185 (F)	116 (F)	59%
10 J. Clyde Morris Blvd / Thimble Shoals Blvd	22 (C)	102 (F)	84 (F)	84 (F)	0%
11 J. Clyde Morris Blvd / Diligence Dr	33 (C)	209 (F)	195 (F)	169 (F)	15%
12 Diligence Dr / Rock Landing Dr	30 (C)	428 (F)	400 (F)	87 (F)	360%
13 Diligence Dr / Thimble Shoals Blvd	11 (B)	240 (F)	252 (F)	57 (E)	342%
14 Canon Blvd / Thimble Shoals Blvd	28 (C)	393 (F)	327 (F)	158 (F)	107%
TOTAL	**434**	**2,227**	**2,135**	**1,265**	
Percentage Increase (06/07 Existing Opt to 2030 Alt)		**413%**	**392%**	**191%**	
Average Delay/Intersection	**31 (C)**	**159 (F)**	**153 (F)**	**90 (F)**	

models reveal that traffic will move throughout the network at a reasonable pace in 2030. Much of the delay is associated with specific turn movements, such as heavy left turns. The City could also consider adding triple left turn movements to the following intersections: Diligence Dr. (Westbound) onto J. Clyde Morris Blvd, Rock Landing Dr. (Southbound) onto Diligence Dr., and Canon Blvd (Southbound) onto Thimble Shoals Blvd. Further study and analysis, however, will be necessary for these intersections to determine their effectiveness.

These roadway improvements will need to be implemented in combination with several other congestion mitigation strategies in order to help ease future traffic congestion levels in the Oyster Point study area.

- **Intelligent Transportation Systems (ITS)/Smart Traffic Centers** – Utilize the latest technology to assist in congestion mitigation, information dissemination, real-time traffic control, event management and traffic planning efforts.

- **Access Management** – One technique to improve traffic flow and safety is to implement good access management practices. This study was very comprehensive, however, it did not directly address access management issues/problems for the Oyster Point study area. Access control and median control help eliminate conflict points of turning vehicles and reduces "side friction". In addition, reducing steep driveway grades at entrances and exits will allow smoother traffic operations in the area.

<u>Strategy #5 – Add Capacity</u>

- **Widen Arterial and Collector Lanes** – Adding additional through lanes increases the capacity and relieves congested roadways. It is not recommended from this study to widen major roadways in the study area. Implementing the intersection geometric improvements contained in strategy #4 in combination with the TDM techniques discussed in strategies #1 – #3 should mitigate traffic for many intersections in the study area by 2030. In order to facilitate traffic growth beyond 2030 or if traffic grows faster than anticipated, the following arterials and collectors in the Oyster Point study area could be considered for widening upon further study and analysis (these improvements are currently part of the City's comprehensive plan, November 2000):
  - Oyster Point Rd from Warwick Blvd to Jefferson Ave (widen from 4 to 6 lanes)
  - J. Clyde Morris Blvd from Warwick Blvd to Jefferson Ave. (widen from 4 to 6 lanes)

- **Grade Separated Intersections** – Grade separating high volume roadways or turn movements is another possible solution to resolve poor levels of service at major intersections. These intersections also improve safety by reducing the number of conflict points. The drawback of these improvements is that they are very expensive and oftentimes have a negative impact on adjacent development. Grade separated improvements can range from a flyover of a single left turn or right turn movement to multiple turn lane flyovers or even to elevating and entire through movement over another. There are currently two grade separated intersections in the City of Newport News: Warwick Blvd & Mercury Blvd and Warwick Blvd & Fort Eustis Blvd. Future candidate intersections for grade separation within the Oyster Point study area are Jefferson Ave & Oyster Point Rd and Jefferson Ave & J. Clyde Morris Blvd.

- **Continuous Flow Intersections (CFI)** – Continuous flow intersections are a relatively new concept and are also known as crossover displaced left-turn (XDL) intersections. CFI is an at-grade intersection that moves the turn conflict (to the left where

traffic drives on the right and vice versa) out of the main intersection. A CFI essentially moves the left-turn down the road several hundred feet eliminating the left-turn traffic signal phase. Recent studies have shown that CFIs have about 3 times more reserve capacity than traditional at-grade improvements. The City of Norfolk is currently considering the first CFI for the region at Military Hwy and Northampton Blvd. More study and analysis will be required to determine the feasibility of CFIs in the Oyster Point study area.

- **Improve Alternate Routes** – Constructing new roadways or increasing the capacity of other roadways will decrease the demand on congested roadways. A Jefferson Ave Bypass or making roadway improvements to Warwick Blvd will help relieve traffic congestion along Jefferson Ave.

Arterial Level of Service Ranges

Arterial Levels of Service			
	Arterial Classification		
	II	III	IV
Range of free-flow speeds (mph)	45 to 35	35 to 30	35 to 25
Typical free-flow speeds (mph)	40	35	30
Level of Service	Average Travel Speed (mph)		
A	>=35	>=30	>=25
B	>=28	>=24	>=19
C	>=22	>=18	>=13
D	>=17	>=14	>=9
E	>=13	>=10	>=7
F	<=13	<=10	<=7

Arterial Levels of Service			
	Arterial Classification		
	II	III	IV
Range of free-flow speeds (mph)	45 to 35	35 to 30	35 to 25
Typical free-flow speeds (mph)	40	35	30
Level of Service	Percent of Free Flow Speed		
A	88%	86%	83%
B	70%	69%	63%
C	55%	51%	43%
D	43%	40%	30%
E	33%	29%	23%
F	33%	29%	23%

Source: 2000 Highway Capacity Manual

$$\textit{Speed Ratio} = \frac{\textit{(Average Travel Speed)}}{\textit{(Average Speed Limit for the Roadway Segment)}}$$

Intersection #1 – Jefferson Avenue at Oyster Point Road

Source: City of Newport News

Intersection #2 – Jefferson Avenue at Middle Ground Blvd

Source: City of Newport News

Intersection #3 – Jefferson Avenue at Loftis Blvd

Source: City of Newport News

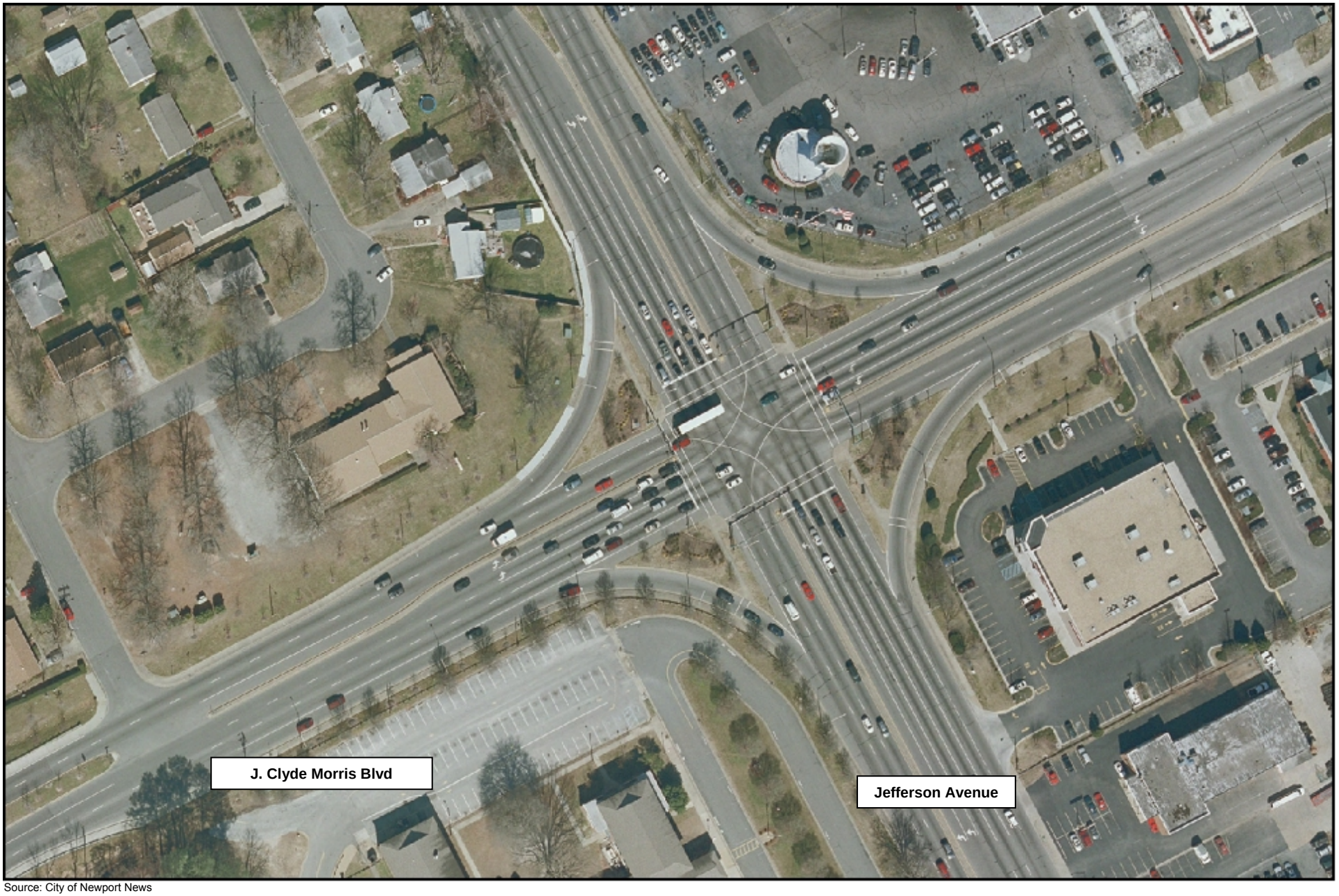
Intersection #4 – Jefferson Avenue at Thimble Shoals Blvd

Source: City of Newport News

Intersection #5 – Jefferson Avenue at Pilot House Drive

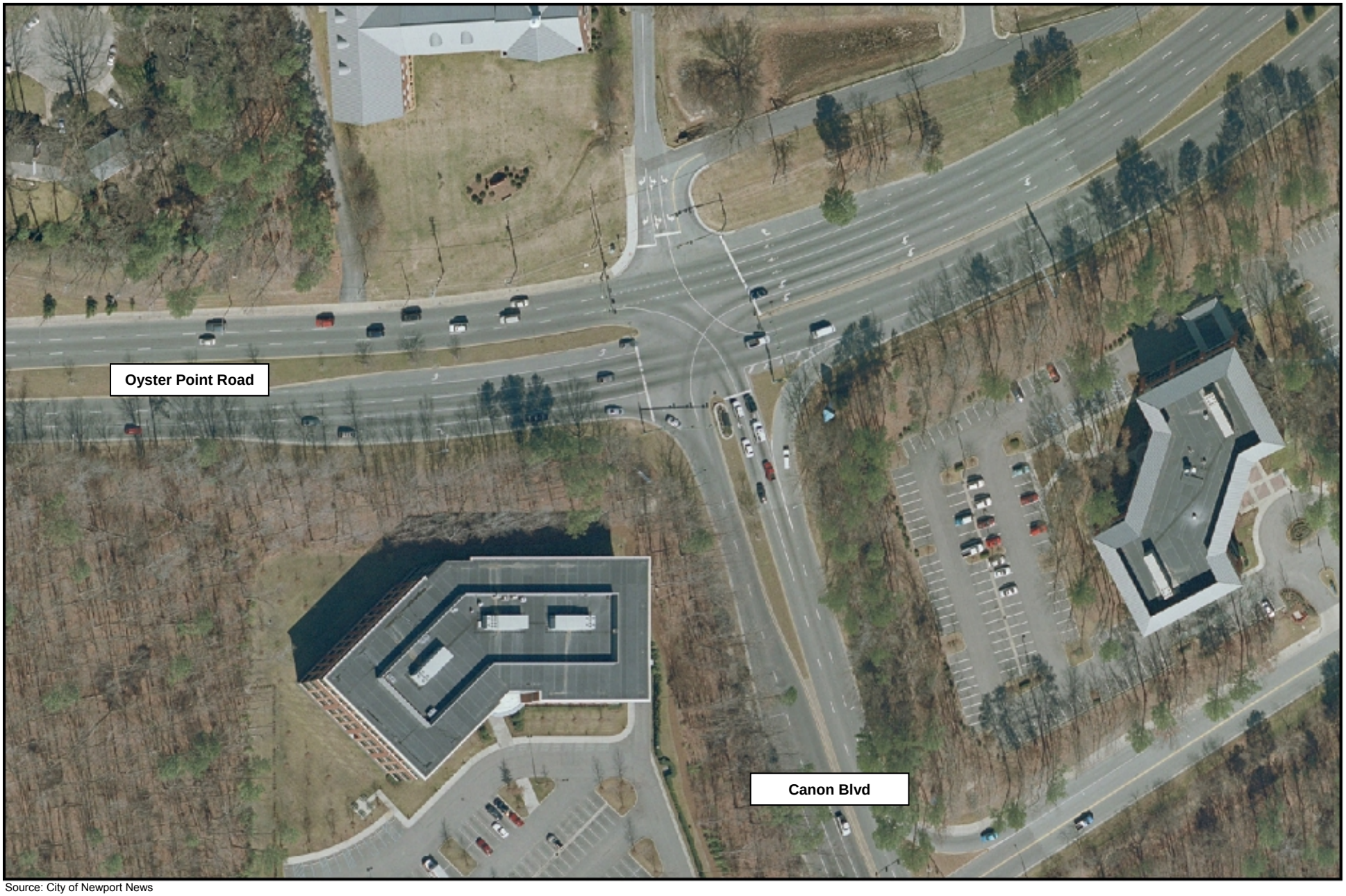
Source: City of Newport News

Intersection #6 – Jefferson Avenue at J. Clyde Morris Blvd



Source: City of Newport News

Intersection #7 – Oyster Point Road at Canon Blvd



Source: City of Newport News

Intersection #8 – Canon Blvd at Old Oyster Point Road

Source: City of Newport News

Intersection #9 – Canon Blvd at Middle Ground Blvd

Source: City of Newport News

Intersection #10 – J. Clyde Morris Blvd at Thimble Shoals Blvd

Source: City of Newport News

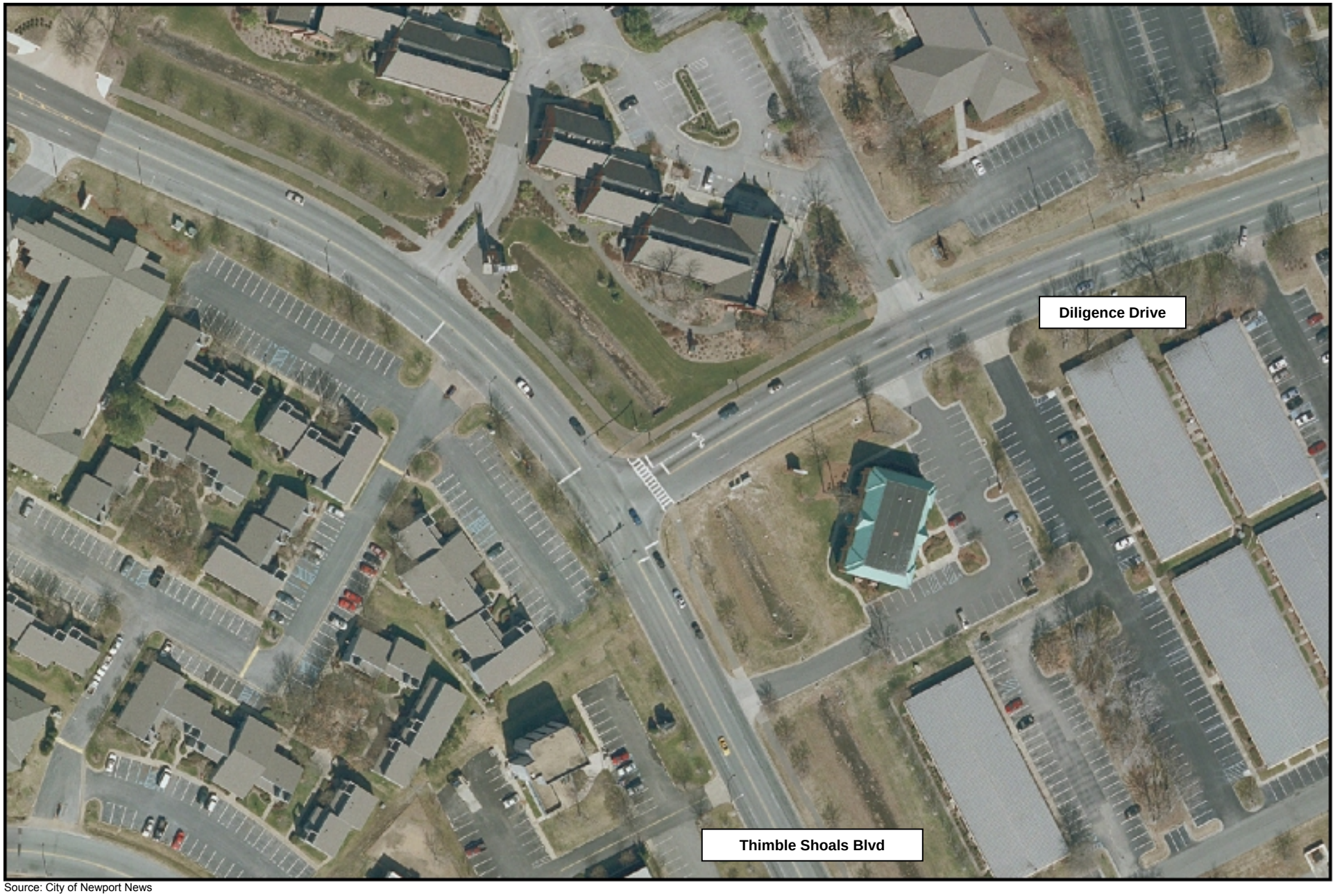
Intersection #11 – J. Clyde Morris Blvd at Diligence Drive

Source: City of Newport News

Intersection #12 – Diligence Drive at Rock Landing Drive

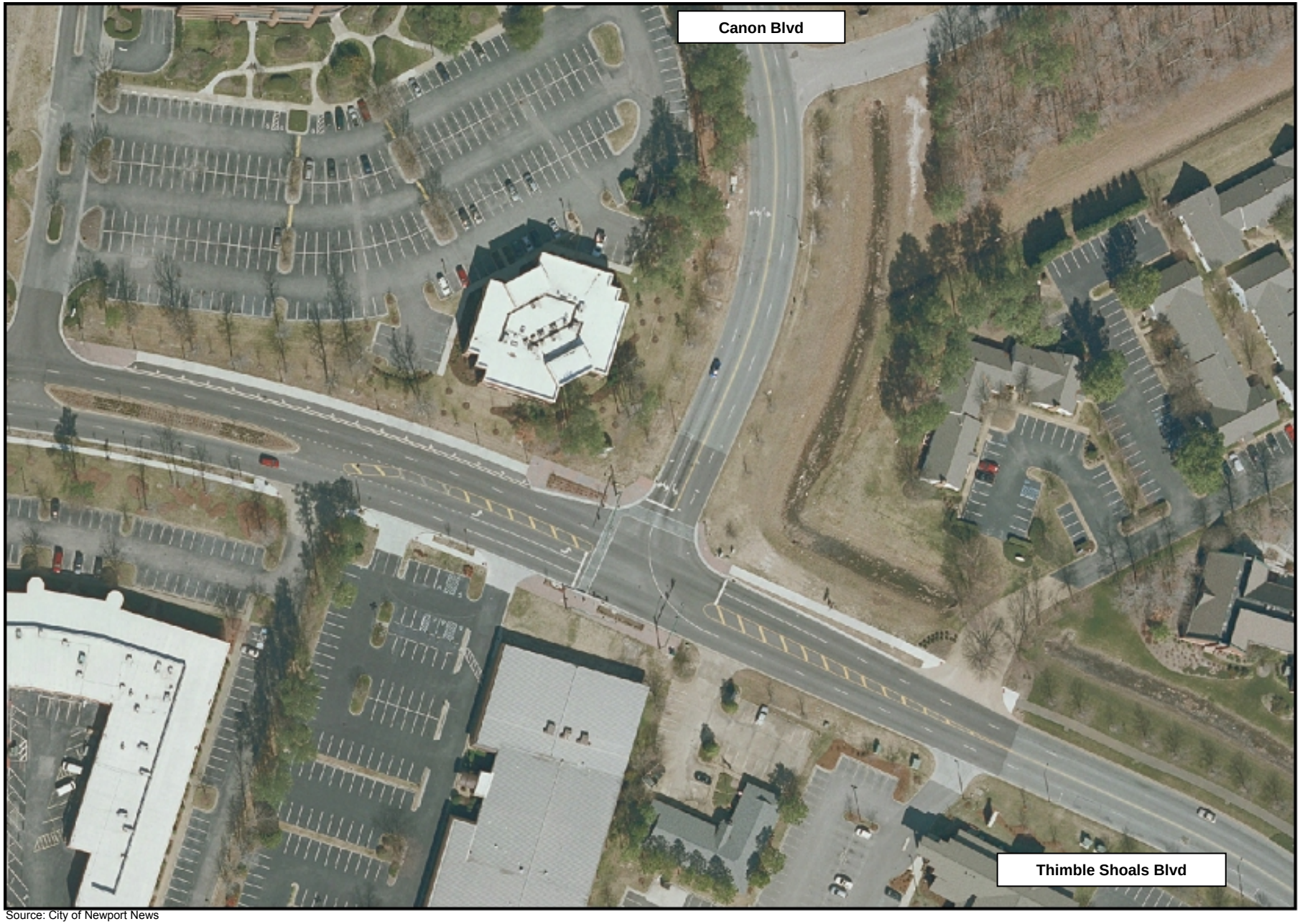
Source: City of Newport News

Intersection #13 – Diligence Drive at Thimble Shoals Blvd



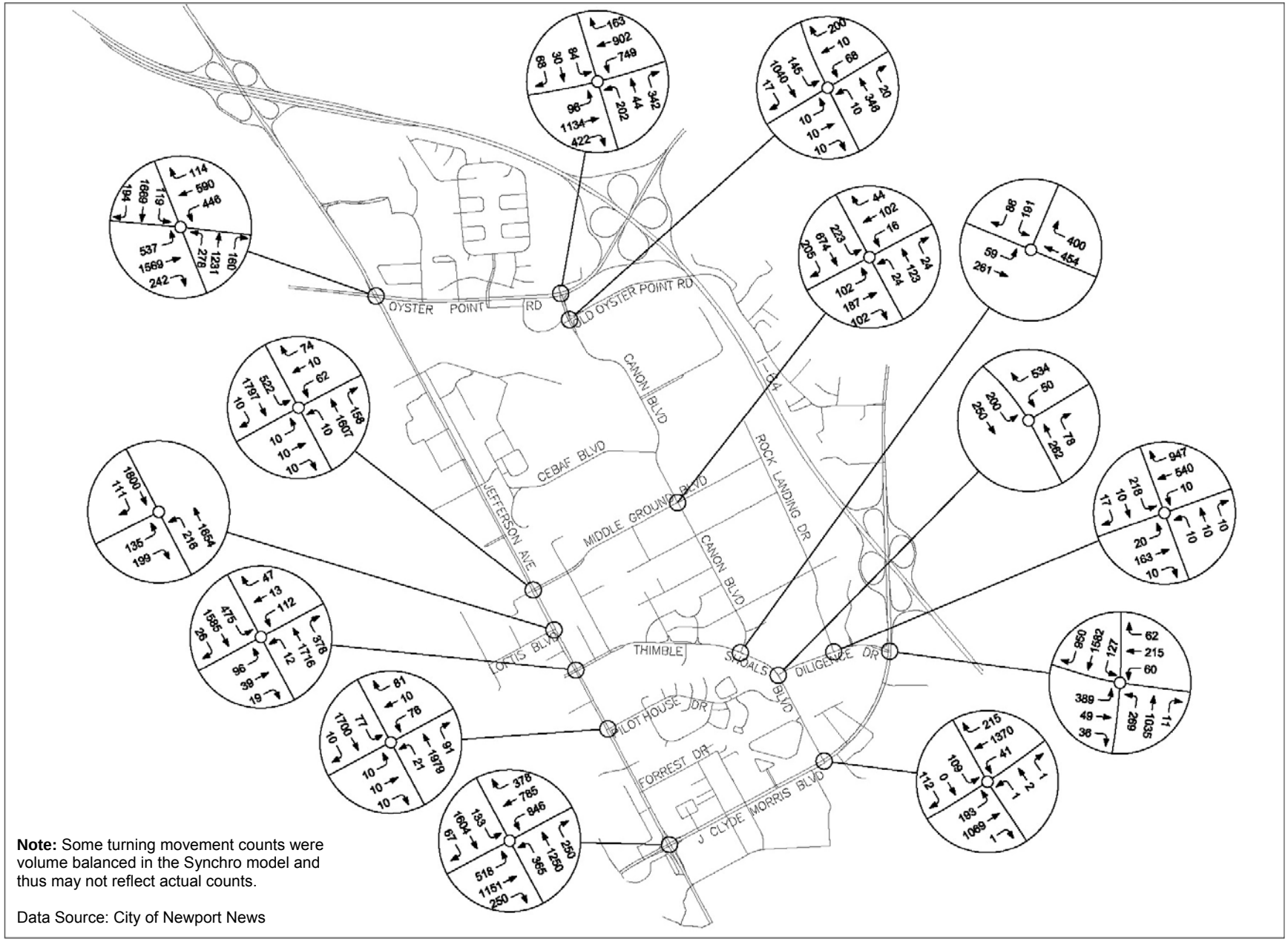
Source: City of Newport News

Intersection #14 – Canon Blvd at Thimble Shoals Blvd



Source: City of Newport News

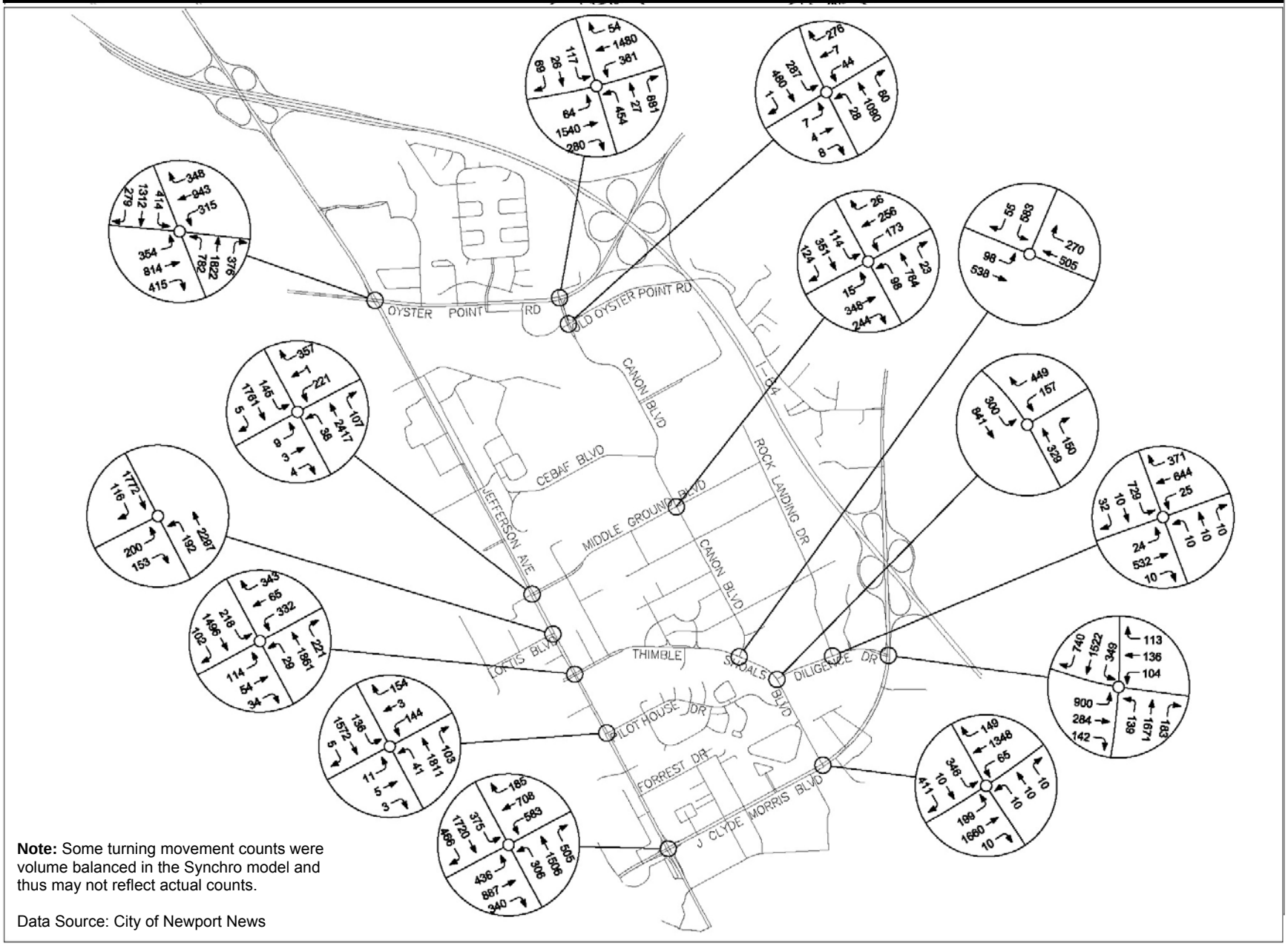
Map C1 – Weekday Turning Movement Counts – 2006/07 Existing (AM Peak)



Note: Some turning movement counts were volume balanced in the Synchro model and thus may not reflect actual counts.

Data Source: City of Newport News

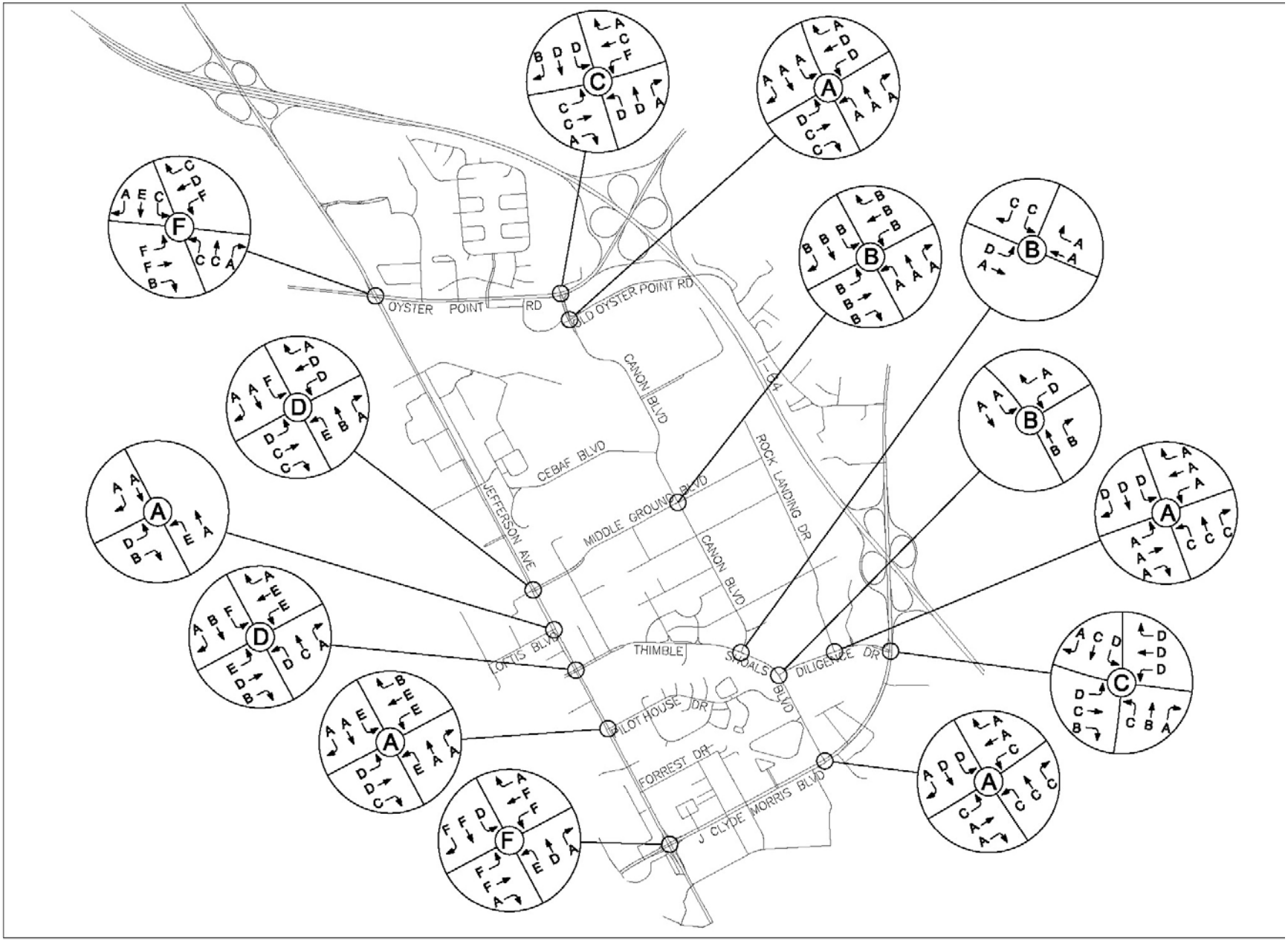
Map C2 – Weekday Turning Movement Counts – 2006/07 Existing (PM Peak)



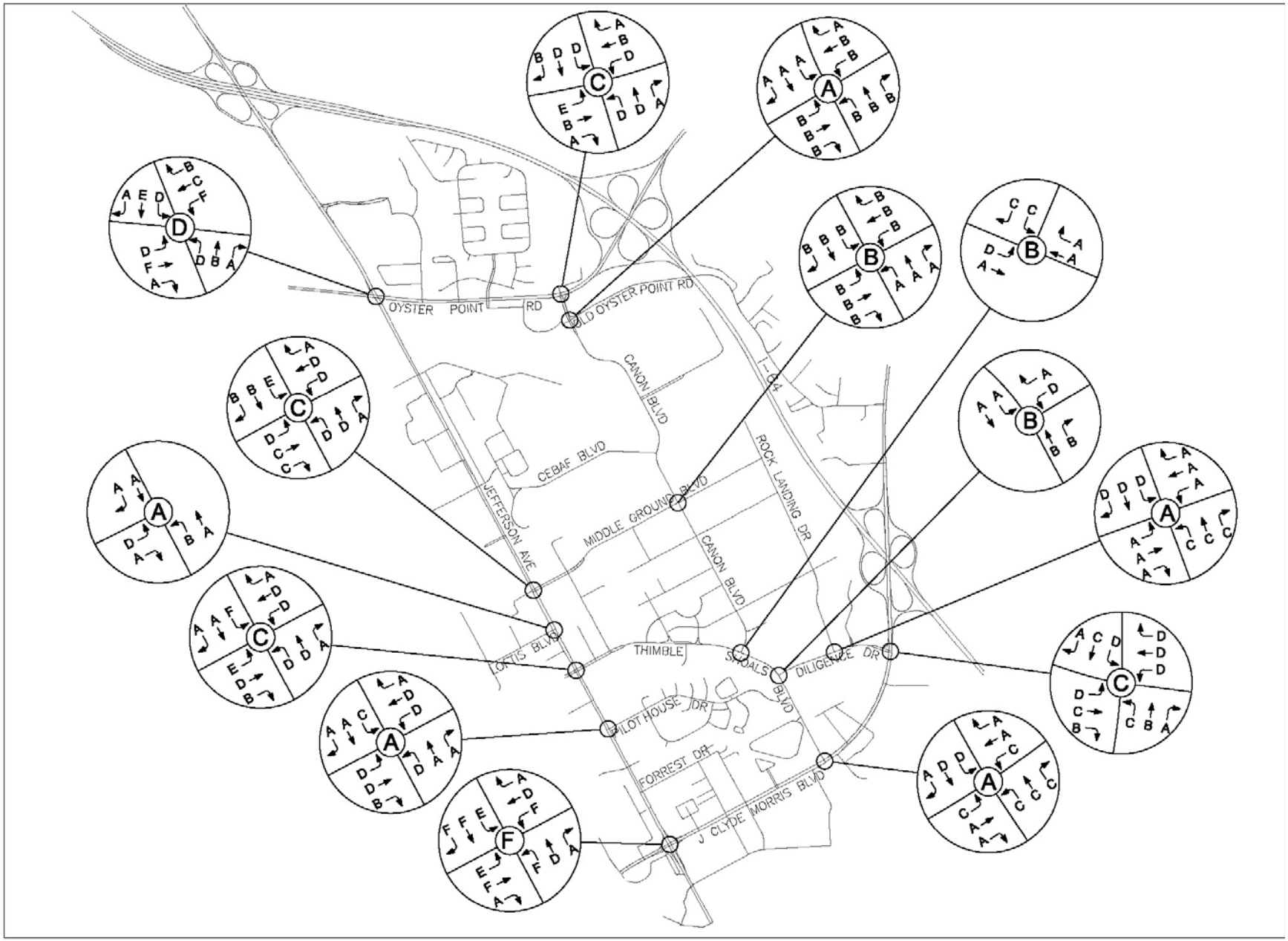
Note: Some turning movement counts were volume balanced in the Synchro model and thus may not reflect actual counts.

Data Source: City of Newport News

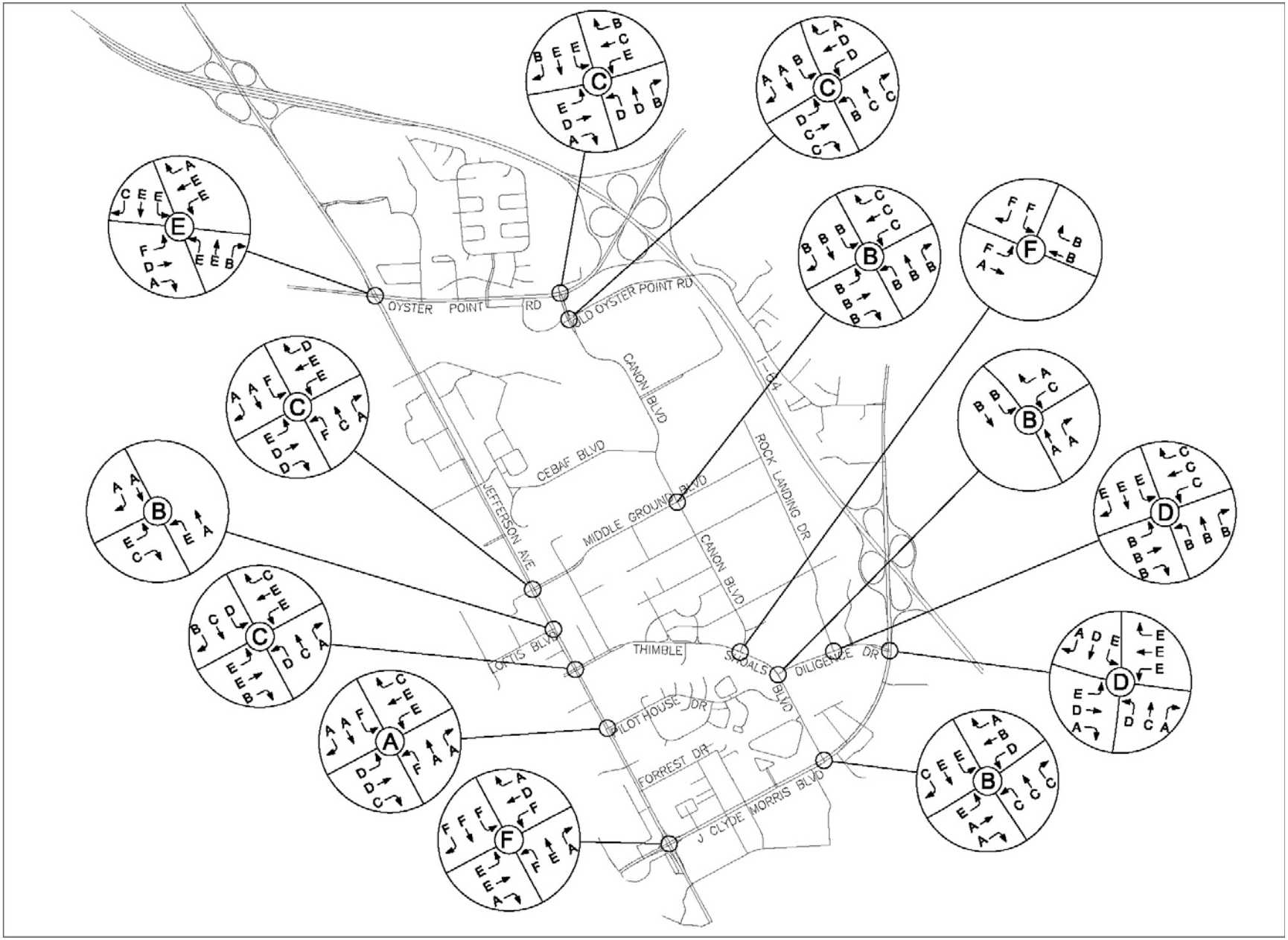
Map D1 – Intersection LOS – 2006/07 Existing (AM Peak)



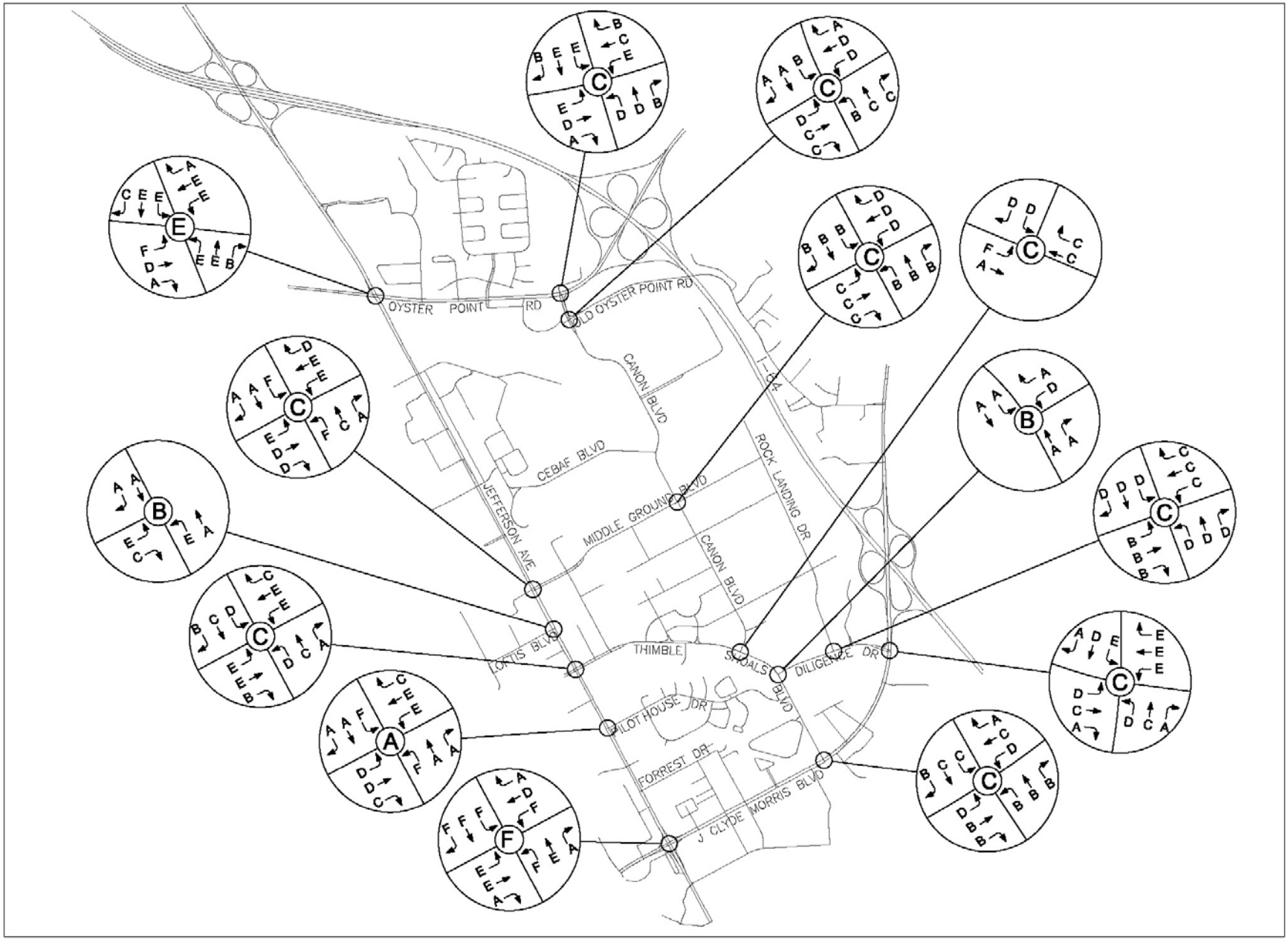
Map D2 – Intersection LOS – 2006/07 Optimized Existing (AM Peak)



Map D3 – Intersection LOS – 2006/07 Existing (PM Peak)



Map D4 – Intersection LOS – 2006/07 Optimized Existing (PM Peak)



Forecasted 2030 Average Daily Traffic for Oyster Point Study Area Roadways

Seg No.	ROADWAY	FROM	TO	*Recent Count (2006)	Alternative A				Alternative B				Alternative C			
					**Special 2030 Forecast	% Change	Growth Factor	AGR (2006 - 2030)	**Special 2030 Forecast	% Change	Growth Factor	AGR (2006 - 2030)	**Special 2030 Forecast	% Change	Growth Factor	AGR (2006 - 2030)
1	I-64	JEFFERSON AVE	OYSTER POINT RD	122,500	145,000	18%	1.18	0.7%	144,000	18%	1.18	0.7%	144,000	18%	1.18	0.7%
2	I-64	OYSTER POINT RD	J C MORRIS BLVD	135,465	175,000	29%	1.29	1.1%	173,000	28%	1.28	1.0%	n.a.			n.a.
3	***I-64 (w/ MG Interchange)	OYSTER POINT RD	MIDDLEGROUND BLVD	135,465	n.a.			n.a.	n.a.			n.a.	179,000	32%	1.32	1.2%
4	***I-64 (w/ MG Interchange)	MIDDLEGROUND BLVD	J C MORRIS BLVD	135,465	n.a.			n.a.	n.a.			n.a.	182,000	34%	1.34	1.2%
5	I-64	J C MORRIS BLVD	HAMPTON CL	142,500	195,000	37%	1.37	1.3%	194,000	36%	1.36	1.3%	196,000	38%	1.38	1.3%
6	BRUTON AVE	J CLYDE MORRIS BLVD	HARPERSVILLE RD	2,393	12,000	401%	5.01	6.9%	12,000	401%	5.01	6.9%	12,000	401%	5.01	6.9%
7	CANON BLVD	THIMBLE SHOALS BLVD	MIDDLEGROUND BLVD	9,983	28,000	180%	2.80	4.4%	29,000	190%	2.90	4.5%	30,000	201%	3.01	4.7%
8	CANON BLVD	MIDDLEGROUND BLVD	OLD OYSTER PT RD	19,037	41,000	115%	2.15	3.2%	39,000	105%	2.05	3.0%	33,000	73%	1.73	2.3%
9	CANON BLVD	OLD OYSTER PT RD	OYSTER PT RD	19,037	41,000	115%	2.15	3.2%	39,000	105%	2.05	3.0%	35,000	84%	1.84	2.6%
10	DILIGENCE DR	J CLYDE MORRIS BLVD	THIMBLE SHOALS BLVD	22,906	49,000	114%	2.14	3.2%	48,000	110%	2.10	3.1%	47,000	105%	2.05	3.0%
11	J C MORRIS BLVD	WARWICK BLVD	JEFFERSON AVE	38,298	52,000	36%	1.36	1.3%	45,000	17%	1.17	0.7%	45,000	17%	1.17	0.7%
12	J C MORRIS BLVD	JEFFERSON AVE	I-64	48,795	61,000	25%	1.25	0.9%	59,000	21%	1.21	0.8%	57,000	17%	1.17	0.6%
13	J C MORRIS BLVD	I-64	HARPERSVILLE RD	43,224	55,000	27%	1.27	1.0%	55,000	27%	1.27	1.0%	56,000	30%	1.30	1.1%
14	JEFFERSON AVE	I-64	OYSTER PT RD	54,558	64,000	17%	1.17	0.7%	63,000	15%	1.15	0.6%	63,000	15%	1.15	0.6%
15	JEFFERSON AVE	OYSTER PT RD	MIDDLEGROUND BLVD	62,700	65,000	4%	1.04	0.2%	66,000	5%	1.05	0.2%	65,000	4%	1.04	0.2%
16	JEFFERSON AVE	MIDDLEGROUND BLVD	J C MORRIS BLVD	61,970	64,000	3%	1.03	0.1%	70,000	13%	1.13	0.5%	70,000	13%	1.13	0.5%
17	JEFFERSON AVE	J C MORRIS BLVD	HARPERSVILLE RD	59,400	67,000	13%	1.13	0.5%	67,000	13%	1.13	0.5%	62,000	4%	1.04	0.2%
18	MIDDLE GROUND BLVD	JEFFERSON AVE	CANON BLVD	9,683	15,000	55%	1.55	1.8%	19,000	96%	1.96	2.8%	20,000	107%	2.07	3.1%
19	MIDDLE GROUND BLVD (TO INTX)	CANON BLVD	I-64	9,577	n.a.			n.a.	n.a.			n.a.	24,000	151%	2.51	3.9%
20	MIDDLE GROUND EXT'D	WARWICK BLVD	JEFFERSON AVE	n.a.	n.a.			n.a.	36,000			n.a.	36,000			n.a.
21	OLD OYSTER POINT RD	CANON BLVD	J CLYDE MORRIS BLVD	6,276	7,000	12%	1.12	0.5%	7,000	12%	1.12	0.5%	8,000	27%	1.27	1.0%
22	OYSTER PT RD	WARWICK BLVD	JEFFERSON AVE	49,785	76,000	53%	1.53	1.8%	65,000	31%	1.31	1.1%	65,000	31%	1.31	1.1%
23	OYSTER PT RD	JEFFERSON AVE	I-64	44,536	67,000	50%	1.50	1.7%	66,000	48%	1.48	1.7%	63,000	41%	1.41	1.5%
24	THIMBLE SHOALS BLVD	J CLYDE MORRIS BLVD	DILIGENCE DR	11,308	25,000	121%	2.21	3.4%	24,000	112%	2.12	3.2%	24,000	112%	2.12	3.2%
25	THIMBLE SHOALS BLVD	DILIGENCE DR	CANON BLVD	16,926	44,000	160%	2.60	4.1%	43,000	154%	2.54	4.0%	47,000	178%	2.78	4.3%
26	THIMBLE SHOALS BLVD	CANON BLVD	JEFFERSON AVE	18,141	38,000	109%	2.09	3.1%	39,000	115%	2.15	3.2%	41,000	126%	2.26	3.5%
27	WARWICK BLVD	BLAND BLVD	OYSTER PT RD	42,996	62,000	44%	1.44	1.5%	63,000	47%	1.47	1.6%	62,000	44%	1.44	1.5%
28	WARWICK BLVD	OYSTER PT RD	MIDDLEGROUND BLVD	34,742	51,000	47%	1.47	1.6%	47,000	35%	1.35	1.3%	46,000	32%	1.32	1.2%
29	WARWICK BLVD	MIDDLEGROUND BLVD	DEEP CREEK RD	41,619	50,000	20%	1.20	0.8%	64,000	54%	1.54	1.8%	64,000	54%	1.54	1.8%
30	WARWICK BLVD	DEEP CREEK RD	HIDEN BLVD	46,548	59,000	27%	1.27	1.0%	57,000	22%	1.22	0.8%	57,000	22%	1.22	0.8%
31	WARWICK BLVD	HIDEN BLVD	J C MORRIS BLVD	46,548	67,000	44%	1.44	1.5%	55,000	18%	1.18	0.7%	56,000	20%	1.20	0.8%

*Includes updates to 1999-2001 Count and Recent Count (used 2006 count from NN)
**Adjusted 2030 Plan with socioeconomic data changes made for the Oyster Point study area.
***Partial Interchange at Middle Ground Blvd (I-64 EB Only)

****Special 2030 Future Alternatives**

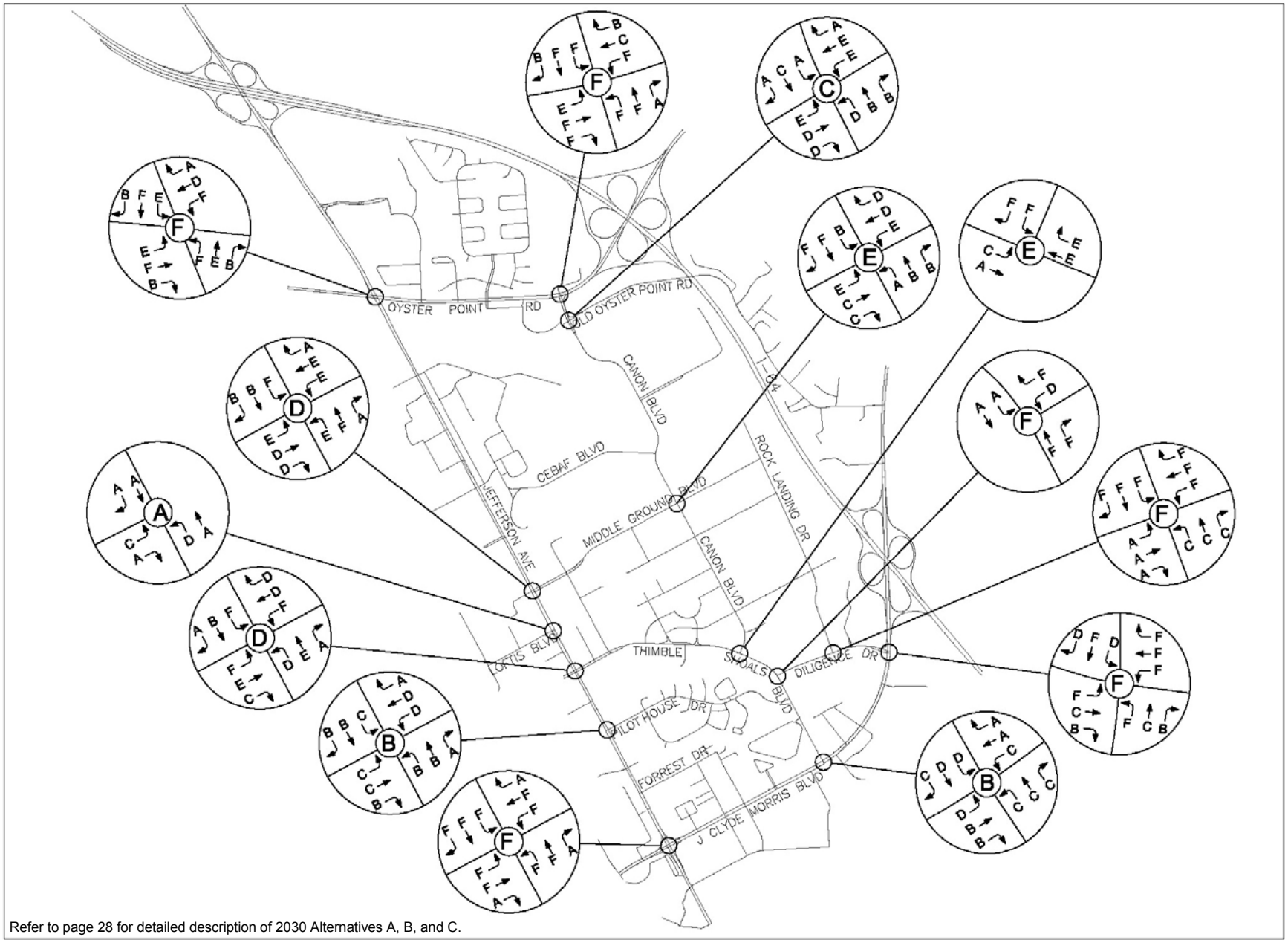
Alternative A – **Special 2030 plan without Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & without I-64 partial Interchange with Middle Ground Blvd.
Alternative B – **Special 2030 plan with Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & without I-64 partial Interchange with Middle Ground Blvd.
Alternative C – **Special 2030 plan with Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave) & with I-64 partial Interchange with Middle Ground Blvd.

AGR - Average annual growth rates from 2006 to 2030 are provided for each alternative.

Intersection Growth at Study Area Intersections (2006 –2030)

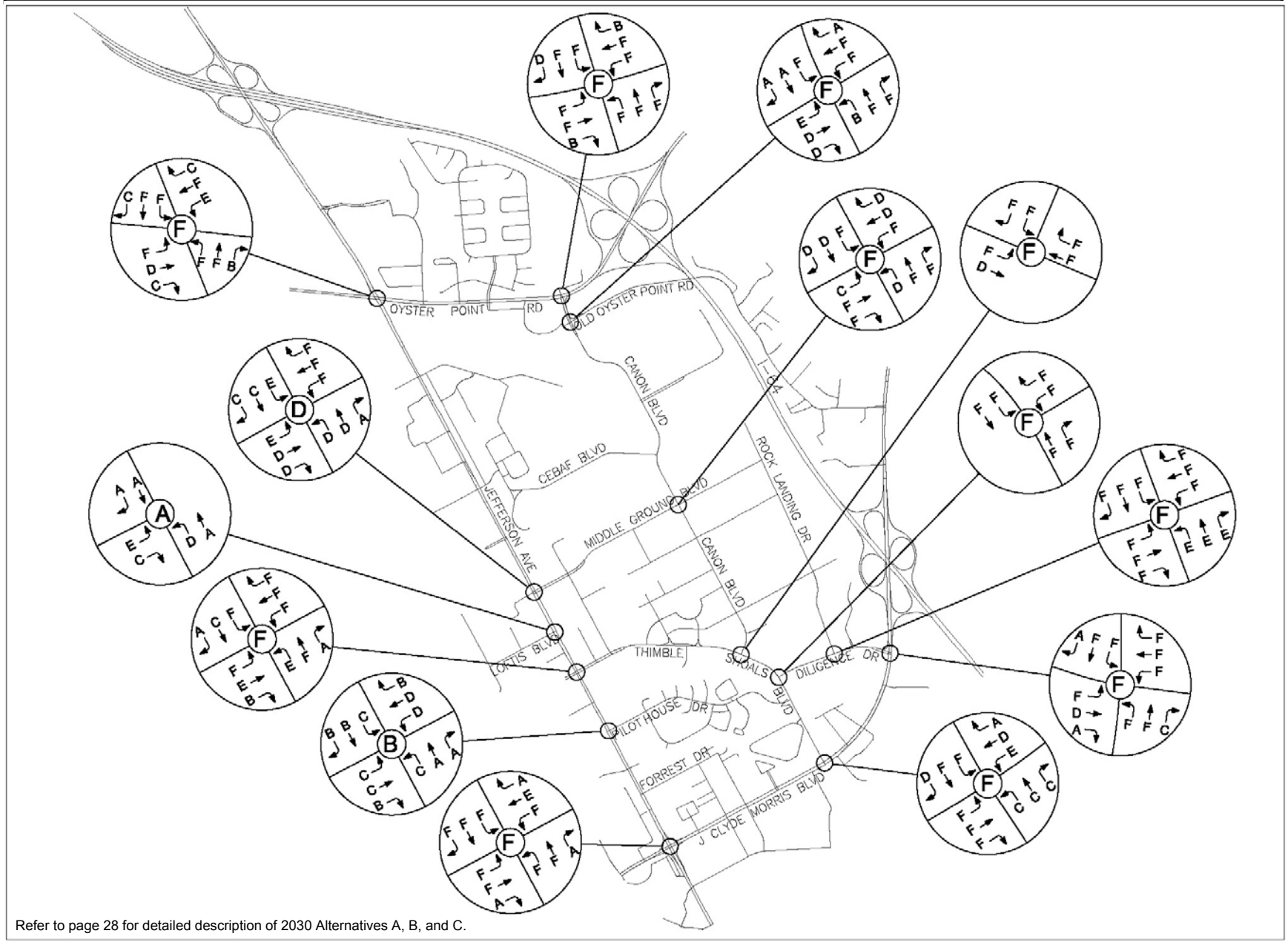
Intersection	Alternative A		Alternative B		Alternative C		Segments Used:
	Growth Factor	AGR (2006 - 2030)	Growth Factor	AGR (2006 - 2030)	Growth Factor	AGR (2006 - 2030)	
1 Jefferson Avenue / Oyster Point Road (N-S)	1.11	0.5%	1.10	0.4%	1.10	0.4%	N-S Avg 14 & 15
1 Jefferson Avenue / Oyster Point Road (E-W)	1.52	1.8%	1.40	1.4%	1.36	1.3%	E-W Avg 22 & 23
2 Jefferson Avenue / Middle Ground Boulevard	1.21	0.7%	1.38	1.2%	1.41	1.2%	Avg 15,16,18
3 Jefferson Avenue / Loftis Boulevard	1.03	0.1%	1.13	0.5%	1.13	0.5%	Use 16
4 Jefferson Avenue / Thimble Shoals Boulevard	1.56	1.6%	1.64	1.9%	1.70	2.0%	Avg 16 & 26
5 Jefferson Avenue / Pilot House Drive	1.03	0.1%	1.13	0.5%	1.13	0.5%	Use 16
6 Jefferson Avenue / J. Clyde Morris Boulevard (N-S)	1.08	0.3%	1.13	0.5%	1.09	0.4%	N-S Avg 16 & 17
6 Jefferson Avenue / J. Clyde Morris Boulevard (E-W)	1.31	1.1%	1.19	0.8%	1.17	0.7%	E-W Avg 11 & 12
7 Oyster Point Road / Canon Boulevard	1.83	2.5%	1.77	2.4%	1.63	2.1%	Average of 23 & 9
8 Canon Boulevard / Old Oyster Point Road (N-S)	2.15	3.2%	2.05	3.0%	1.84	2.6%	N-S use 9
8 Canon Boulevard / Old Oyster Point Road (E-W)	1.12	0.5%	1.12	0.5%	1.27	1.0%	E-W use 21
9 Canon Boulevard / Middle Ground Boulevard	2.17	3.1%	2.30	3.4%	2.33	3.5%	Avg 7,8,18 for Alt A & B; Avg 7,8,18,19 for Alt C
10 J. Clyde Morris Boulevard / Thimble Shoals Boulevard	1.73	2.2%	1.67	2.0%	1.65	1.9%	Avg 12 & 24
11 J. Clyde Morris Boulevard / Diligence Drive	1.70	2.1%	1.66	2.0%	1.61	1.8%	Avg 10 & 12
12 Diligence Drive / Rock Landing Drive	2.14	3.2%	2.10	3.1%	2.05	3.0%	Use 10
13 Diligence Drive / Thimble Shoals Boulevard	2.32	3.6%	2.25	3.4%	2.32	3.5%	Avg 10,24,25
14 Canon Boulevard / Thimble Shoals Boulevard	2.70	4.3%	2.72	4.3%	2.90	4.5%	Avg 7 & 25
J. Clyde Morris Boulevard / San Jose Drive	1.25	0.9%	1.21	0.8%	1.17	0.6%	use 12
J. Clyde Morris Boulevard / Woods Road	1.25	0.9%	1.21	0.8%	1.17	0.6%	use 12
Thimble Shoals Boulevard / Merchants Walk	2.09	3.1%	2.15	3.2%	2.26	3.5%	use 26
Thimble Shoals Boulevard / Fountain Way	2.09	3.1%	2.15	3.2%	2.26	3.5%	use 26
Thimble Shoals Boulevard / Pilot House Drive	2.21	3.4%	2.12	3.2%	2.12	3.2%	use 24
Canon Boulevard / Lakefront Commons	2.80	4.4%	2.90	4.5%	3.01	4.7%	use 7
J. Clyde Morris Boulevard / Kingstowne Drive	1.36	1.3%	1.17	0.7%	1.17	0.7%	use 11
Thimble Shoals Boulevard / Fishing Point Drive	2.09	3.1%	2.15	3.2%	2.26	3.5%	use 26
Thimble Shoals Boulevard / City Center Drive	2.09	3.1%	2.15	3.2%	2.26	3.5%	use 26
Jefferson Avenue / St Thomas Drive	1.04	0.2%	1.05	0.2%	1.04	0.2%	use 15
Jefferson Avenue / Muller Lane / Onnes Drive	1.04	0.2%	1.05	0.2%	1.04	0.2%	use 15
Jefferson Avenue / Bell King Drive	1.04	0.2%	1.05	0.2%	1.04	0.2%	use 15
Jefferson Avenue / Hogan Drive	1.04	0.2%	1.05	0.2%	1.04	0.2%	use 15
Jefferson Avenue / HQ Way	1.17	0.7%	1.15	0.6%	1.15	0.6%	use 14
Jefferson Avenue / Operations Drive / Mall Parkway	1.17	0.7%	1.15	0.6%	1.15	0.6%	use 14
Jefferson Avenue / Claire Lane	1.17	0.7%	1.15	0.6%	1.15	0.6%	use 14
Oyster Point Road / HQ Way	1.53	1.8%	1.31	1.1%	1.31	1.1%	use 22
Oyster Point Road / Criston Drive	1.50	1.7%	1.48	1.7%	1.41	1.5%	use 23
Oyster Point Road / Village Green Parkway	1.50	1.7%	1.48	1.7%	1.41	1.5%	use 23

Map G1 – Intersection LOS – 2030 Alternative A (AM Peak)



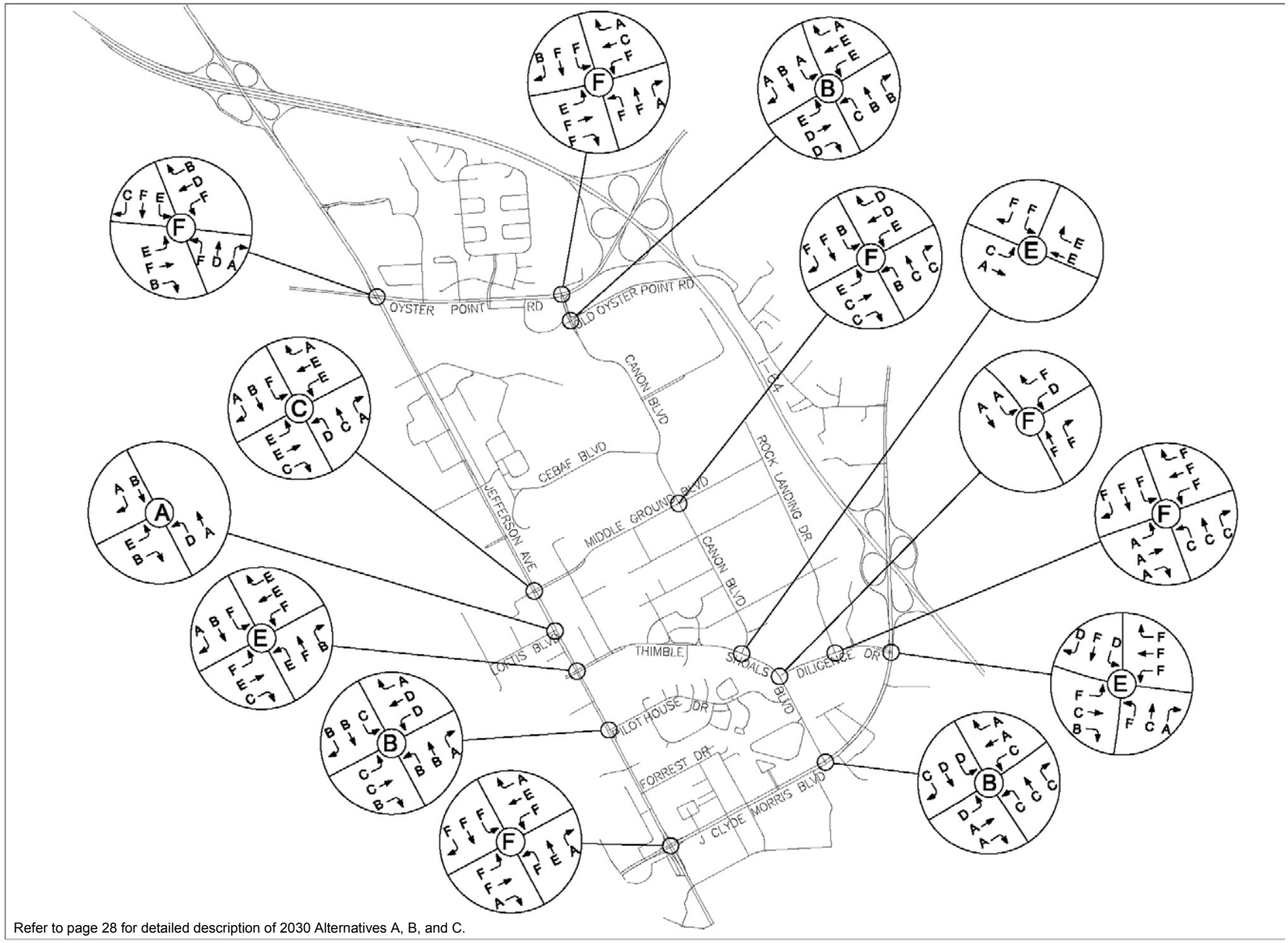
Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

Map G2 – Intersection LOS – 2030 Alternative A (PM Peak)



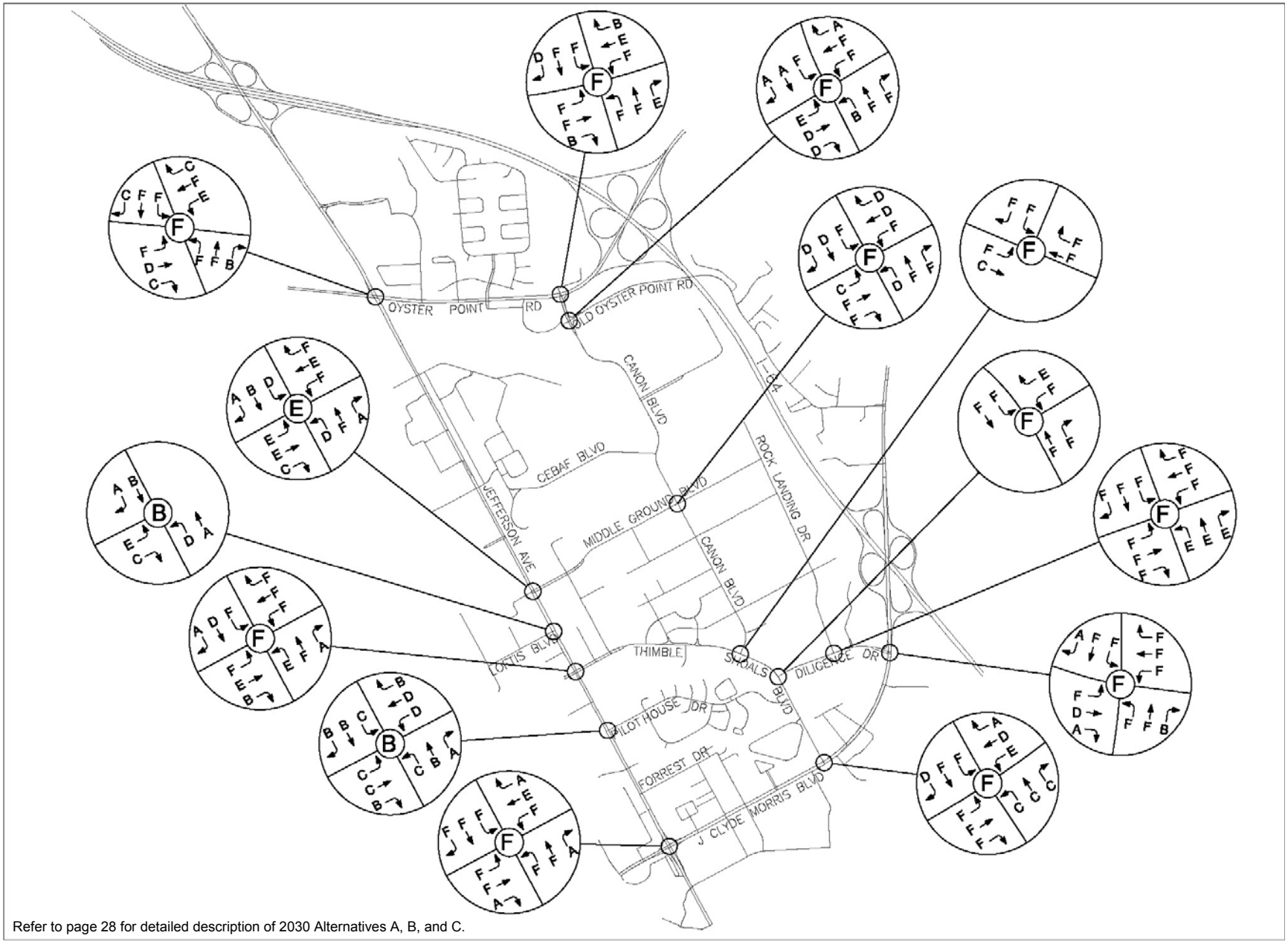
Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

Map G3 – Intersection LOS – 2030 Alternative B (AM Peak)



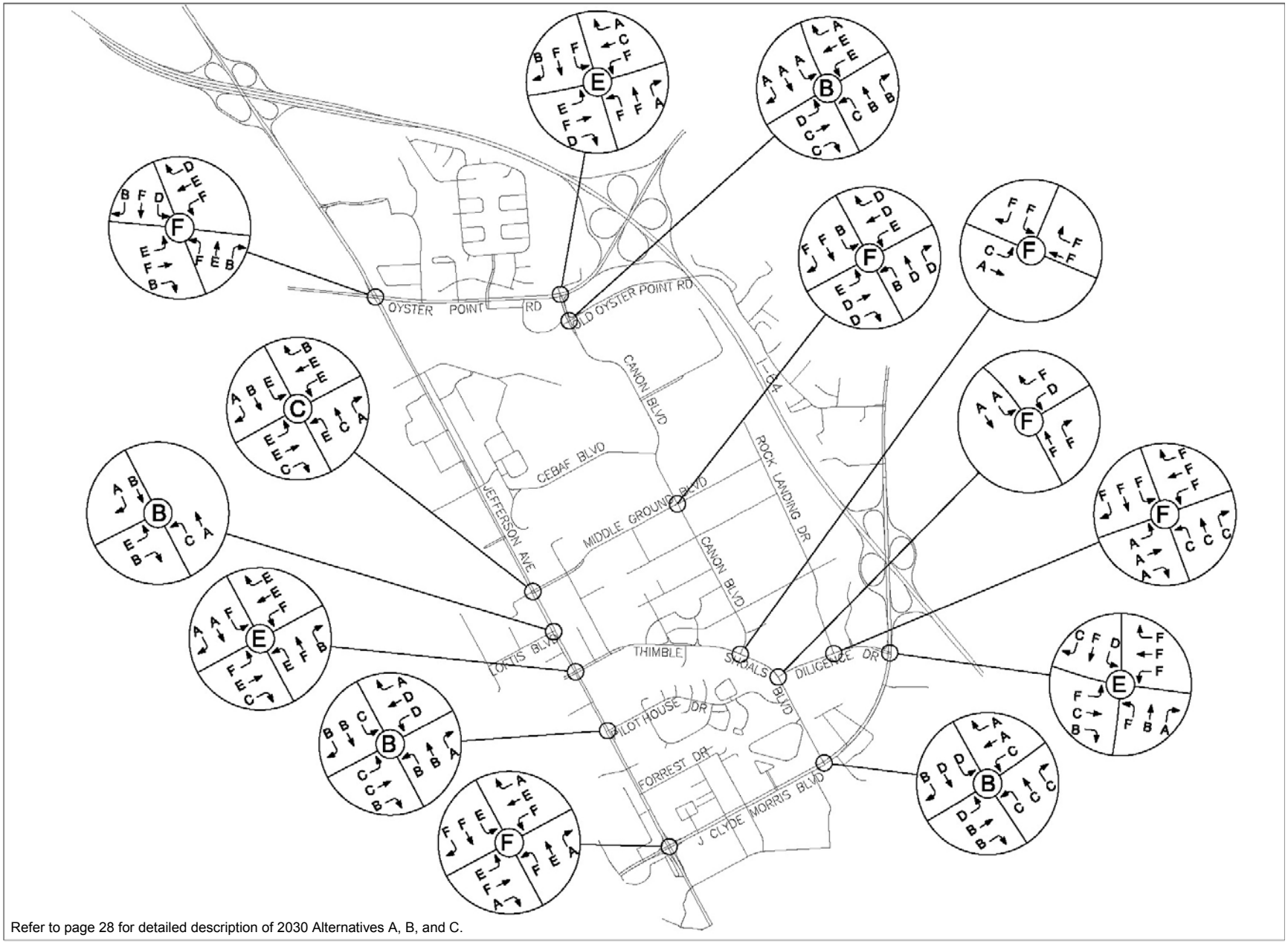
Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

Map G4 – Intersection LOS – 2030 Alternative B (PM Peak)



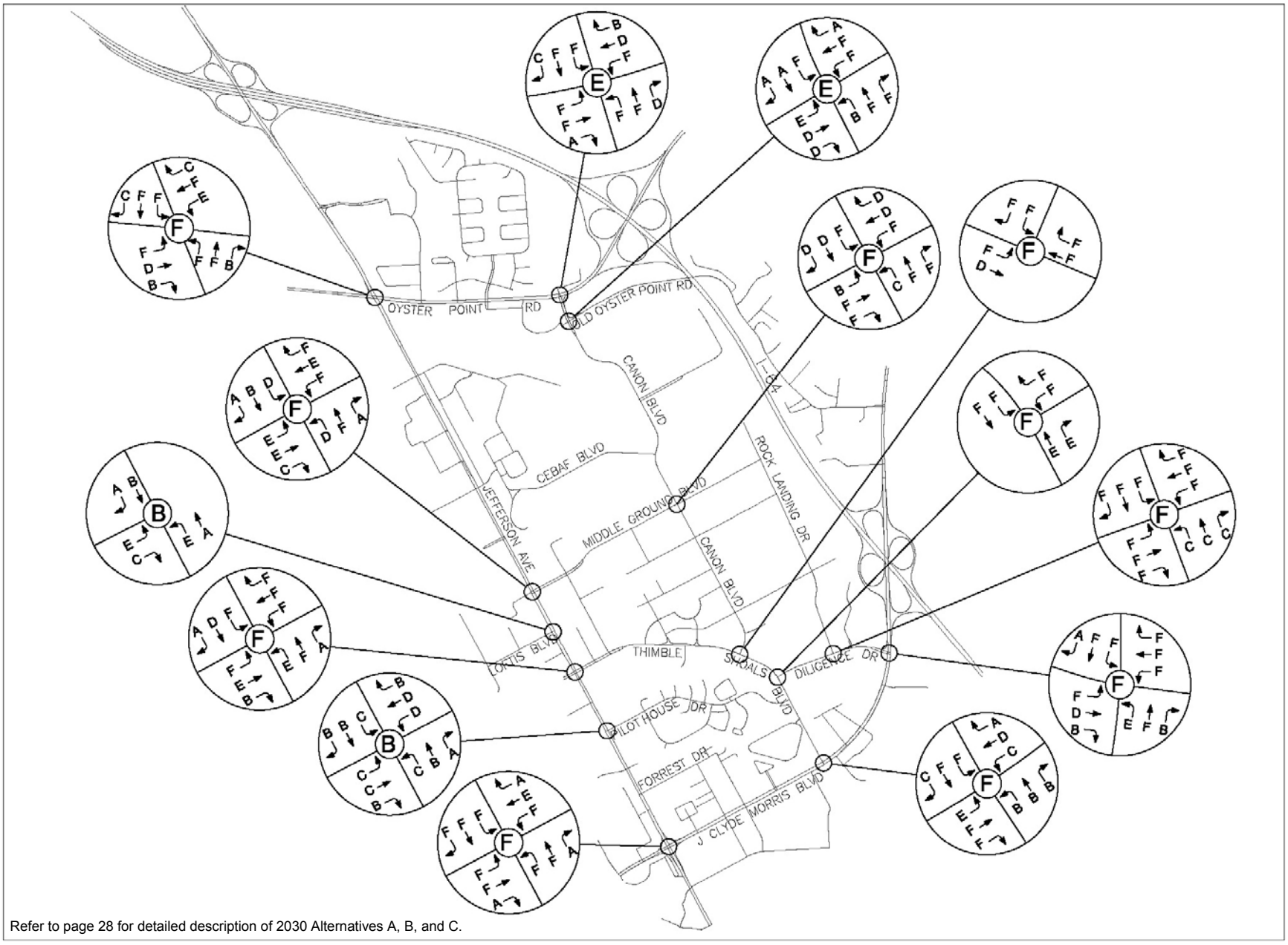
Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

Map G5 – Intersection LOS – 2030 Alternative C (AM Peak)



Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

Map G6 – Intersection LOS – 2030 Alternative C (PM Peak)



Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

Intersection #1 – Jefferson Avenue at Oyster Point Road

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Oyster Point Rd	Left	41	D	m224	64	E	m343	59	E	m384	72	E	m370
	Thru	81	F	m#576	222	F	m#888	193	F	m#1018	179	F	m#963
	Right	10	A	m95	14	B	m119	12	B	m104	16	B	m99
Westbound Oyster Point Rd	Left	90	F	#287	196	F	#634	165	F	#554	151	F	#531
	Thru	34	C	243	44	D	#652	55	D	#626	65	E	#553
	Right	19	B	m80	6	A	40	20	B	m109	37	D	m185
Northbound Jefferson Ave	Left	43	D	#176	156	F	#314	158	F	#312	150	F	#300
	Thru	16	B	215	58	E	631	55	D	615	58	E	520
	Right	3	A	32	18	B	m179	10	A	84	12	B	139
Southbound Jefferson Ave	Left	41	D	m52	65	E	m82	64	E	m85	49	D	m85
	Thru	63	E	#631	196	F	#1043	162	F	#992	156	F	#1029
	Right	7	A	m89	14	B	m136	24	C	m182	19	B	m196
Overall Intersection		**50**	D	**Cycle Length: 110 sec**	**135**	F	**Cycle Length: 150 sec**	**119**	F	**Cycle Length: 150 sec**	**116**	F	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Oyster Point Rd	Left	110	F	#293	173	F	m#398	159	F	#456	146	F	#438
	Thru	37	D	245	54	D	m472	50	D	475	48	D	455
	Right	5	A	66	31	C	m325	23	C	#499	19	B	349
Westbound Oyster Point Rd	Left	55	E	#246	76	E	m#340	62	E	m273	68	E	m#301
	Thru	59	E	#662	216	F	#1216	173	F	#1093	171	F	#1060
	Right	9	A	185	33	C	m#261	28	C	m315	32	C	m258
Northbound Jefferson Ave	Left	80	E	#568	212	F	#771	185	F	#752	168	F	#741
	Thru	66	E	#822	185	F	#1128	157	F	#1089	146	F	#1074
	Right	14	B	m196	18	B	m174	16	B	m168	16	B	m172
Southbound Jefferson Ave	Left	75	E	#335	163	F	m#422	158	F	m#424	157	F	m#424
	Thru	77	E	#645	177	F	m#841	158	F	m#827	158	F	m#827
	Right	22	C	m276	24	C	m282	23	C	m279	23	C	m275
Overall Intersection		**58**	E	**Cycle Length: 140 sec**	**140**	F	**Cycle Length: 150 sec**	**121**	F	**Cycle Length: 150 sec**	**117**	F	**Cycle Length: 150 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #2 – Jefferson Avenue at Middle Ground Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Middle Ground Blvd	Left	45	D	24	66	E	37	64	E	20	64	E	20
	Thru	31	C	31	43	D	45	64	E	20	64	E	20
	Right	31	C	31	43	D	45	27	C	24	27	C	24
Westbound Middle Ground Blvd	Left	48	D	61	73	E	93	69	E	76	69	E	78
	Thru	48	D	65	74	E	97	64	E	20	64	E	20
	Right	3	A	18	4	A	32	9	A	53	11	B	60
Northbound Jefferson Ave	Left	39	D	m12	63	E	m27	46	D	m14	59	E	m15
	Thru	52	D	#597	82	F	#939	28	C	698	35	C	#795
	Right	4	A	46	7	A	99	2	A	12	5	A	28
Southbound Jefferson Ave	Left	66	E	#632	103	F	#999	85	F	#533	76	E	#537
	Thru	10	B	156	13	B	599	20	B	574	16	B	680
	Right	10	B	156	13	B	599	4	A	m6	2	A	m2
Overall Intersection		**33**	**C**	**Cycle Length: 110 sec**	**51**	D	**Cycle Length: 150 sec**	**31**	**C**	**Cycle Length: 150 sec**	**31**	**C**	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Middle Ground Blvd	Left	59	E	27	66	E	34	64	E	19	64	E	38
	Thru	43	D	19	46	D	23	64	E	10	64	E	26
	Right	43	D	19	46	D	23	35	C	16	35	C	26
Westbound Middle Ground Blvd	Left	66	E	184	145	F	#318	153	F	#302	161	F	#368
	Thru	66	E	185	145	F	#317	63	E	5	63	E	#374
	Right	40	D	367	99	F	#669	139	F	#808	149	F	#835
Northbound Jefferson Ave	Left	83	F	m66	55	D	m78	50	D	m41	53	D	m86
	Thru	28	C	#978	41	D	#1312	110	F	#1654	124	F	#1712
	Right	2	A	8	1	A	9	2	A	m11	3	A	m36
Southbound Jefferson Ave	Left	85	F	233	74	E	m256	50	D	m130	52	D	m#346
	Thru	4	A	107	20	C	478	17	B	551	17	B	545
	Right	4	A	107	20	C	478	3	A	m2	3	A	545
Overall Intersection		**24**	**C**	**Cycle Length: 140 sec**	**42**	D	**Cycle Length: 150 sec**	**77**	E	**Cycle Length: 150 sec**	**85**	F	**Cycle Length: 150 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #3 – Jefferson Avenue at Loftis Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Loftis Blvd	Left	40	D	77	29	C	58	58	E	113	58	E	113
	Thru	--	--	--	--	--	--	--	--	--	--	--	--
	Right	9	A	63	9	A	56	11	B	78	11	B	78
Northbound Jefferson Ave	Left	12	B	m84	43	D	m190	43	D	m234	28	C	m158
	Thru	1	A	m19	5	A	m232	0	A	m1	3	A	m72
	Right	--	--	--	--	--	--	--	--	--	--	--	--
Southbound Jefferson Ave	Left	--	--	--	--	--	--	--	--	--	--	--	--
	Thru	7	A	169	9	A	379	10	B	376	14	B	543
	Right	1	A	m7	1	A	m5	1	A	m5	2	A	m21
Overall Intersection		**6**	**A**	**Cycle Length: 110 sec**	**10**	**A**	**Cycle Length: 75 sec**	**9**	**A**	**Cycle Length: 150 sec**	**11**	**B**	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Loftis Blvd	Left	60	E	140	58	E	148	61	E	163	61	E	163
	Thru	--	--	--	--	--	--	--	--	--	--	--	--
	Right	32	C	166	27	C	161	30	C	184	30	C	184
Northbound Jefferson Ave	Left	56	E	m183	48	D	m182	49	D	m189	70	E	m168
	Thru	8	A	671	48	A	m96	6	A	m90	1	A	m31
	Right	--	--	--	--	--	--	--	--	--	--	--	--
Southbound Jefferson Ave	Left	--	--	--	--	--	--	--	--	--	--	--	--
	Thru	5	A	84	4	A	m213	13	B	m393	13	B	m482
	Right	1	A	m4	7	A	m8	1	A	m6	2	A	m13
Overall Intersection		**12**	**B**	**Cycle Length: 140 sec**	**10**	**A**	**Cycle Length: 150 sec**	**13**	**B**	**Cycle Length: 150 sec**	**12**	**B**	**Cycle Length: 150 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #4 – Jefferson Avenue at Thimble Shoals Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Thimble Shoals Blvd	Left	58	E	131	159	F	#337	175	F	#360	186	F	#372
	Thru	48	D	64	74	E	118	74	E	122	75	E	126
	Right	19	B	24	22	C	35	22	C	37	21	C	37
Westbound Thimble Shoals Blvd	Left	44	D	84	97	F	m#192	100	F	m#201	107	F	m#220
	Thru	44	D	88	55	D	123	55	E	128	60	E	133
	Right	6	A	19	55	D	123	55	E	128	60	E	133
Northbound Jefferson Ave	Left	46	D	m0	54	D	m32	69	E	m32	56	E	m33
	Thru	35	D	#582	72	E	#1265	96	F	#1378	115	F	#1460
	Right	3	A	45	9	A	275	10	B	306	13	B	351
Southbound Jefferson Ave	Left	90	F	m#569	103	F	#594	138	F	#651	155	F	#671
	Thru	2	A	37	13	B	664	13	B	362	8	A	206
	Right	0	A	m0	1	A	m4	4	A	m9	1	A	m1
Overall Intersection		**27**	**C**	**Cycle Length: 110 sec**	**50**	D	**Cycle Length: 150 sec**	**64**	E	**Cycle Length: 150 sec**	**71**	E	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Thimble Shoals Blvd	Left	78	E	#197	162	F	#388	179	F	#431	191	F	#429
	Thru	62	E	99	74	E	152	75	E	157	76	E	162
	Right	19	B	36	18	B	46	17	B	47	17	B	47
Westbound Thimble Shoals Blvd	Left	62	E	301	142	F	m#586	163	F	m#621	182	F	m#609
	Thru	62	E	317	121	F	m#550	143	F	m#591	161	F	m#573
	Right	27	C	257	121	F	m#550	143	F	m#591	161	F	m#573
Northbound Jefferson Ave	Left	45	D	m45	64	E	m70	70	E	m76	71	E	m79
	Thru	30	C	762	129	F	#1470	163	F	#1603	184	F	#1693
	Right	3	A	57	7	A	m192	9	A	m170	9	A	m181
Southbound Jefferson Ave	Left	50	D	#328	151	F	#338	139	F	m#337	154	F	m#353
	Thru	31	C	598	26	C	830	36	D	#1090	46	D	#1153
	Right	10	B	m59	2	A	m11	2	A	m9	4	A	m33
Overall Intersection		**34**	**C**	**Cycle Length: 140 sec**	**89**	F	**Cycle Length: 150 sec**	**108**	F	**Cycle Length: 150 sec**	**123**	F	**Cycle Length: 150 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #5 – Jefferson Avenue at Pilot House Drive

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Pilot House Dr	Left	37	D	35	28	C	28	28	C	30	28	C	30
	Thru	37	D	35	28	C	28	28	C	30	28	C	30
	Right	18	B	16	15	B	13	15	B	14	15	B	14
Westbound Pilot House Dr	Left	42	D	106	35	D	84	37	D	91	37	D	91
	Thru	42	D	106	35	D	84	37	D	91	37	D	91
	Right	10	A	42	9	A	37	9	A	38	9	A	38
Northbound Jefferson Ave	Left	51	D	m16	20	B	m17	19	B	m18	19	B	m18
	Thru	4	A	m65	11	B	m506	15	B	m594	15	B	m611
	Right	0	A	m0	1	A	m6	1	A	m8	1	A	m9
Southbound Jefferson Ave	Left	27	C	m82	25	C	m60	29	C	m66	28	C	m67
	Thru	5	A	80	12	B	250	15	B	473	13	B	307
	Right	5	A	80	12	B	250	15	B	473	13	B	307
Overall Intersection		**6**	**A**	**Cycle Length: 110 sec**	**12**	**B**	**Cycle Length: 75 sec**	**15**	**B**	**Cycle Length: 75 sec**	**15**	**B**	**Cycle Length: 75 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Pilot House Dr	Left	45	D	36	24	C	24	25	C	25	25	C	25
	Thru	45	D	36	24	C	24	25	C	25	25	C	25
	Right	28	C	9	16	B	7	17	B	8	17	B	8
Westbound Pilot House Dr	Left	60	E	216	36	D	133	44	D	#170	44	D	#170
	Thru	60	E	216	36	D	133	44	D	#170	44	D	#170
	Right	31	C	165	16	B	94	17	B	106	17	B	106
Northbound Jefferson Ave	Left	89	F	m51	33	C	m28	34	C	m32	33	C	m32
	Thru	3	A	m24	9	A	m222	12	B	m253	12	B	m295
	Right	0	A	m0	1	A	m4	2	A	m7	2	A	m7
Southbound Jefferson Ave	Left	87	F	m222	29	C	m70	31	C	m79	32	C	m76
	Thru	1	A	21	13	B	m222	16	B	m328	16	B	m316
	Right	1	A	21	13	B	m222	16	B	m328	16	B	m316
Overall Intersection		**9**	**A**	**Cycle Length: 140 sec**	**13**	**B**	**Cycle Length: 75 sec**	**15**	**B**	**Cycle Length: 75 sec**	**16**	**B**	**Cycle Length: 75 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #6 – Jefferson Avenue at J. Clyde Morris Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound J Clyde Morris Blvd	Left	62	E	#301	99	F	m#520	82	F	#467	70	E	#439
	Thru	214	F	#752	318	F	#1342	283	F	#1211	272	F	#1177
	Right	0	A	m0	0	A	m0	0	A	m0	0	A	m0
Westbound J Clyde Morris Blvd	Left	217	F	#561	305	F	#987	280	F	#891	269	F	#872
	Thru	47	D	376	82	F	#723	76	E	#647	78	E	#642
	Right	0	A	0	1	A	0	1	A	0	1	A	0
Northbound Jefferson Ave	Left	136	F	#260	192	F	#375	183	F	#385	196	F	#379
	Thru	54	D	#428	93	F	#651	78	E	#652	69	E	#595
	Right	0	A	0	0	A	0	0	A	0	0	A	0
Southbound Jefferson Ave	Left	60	E	72	81	F	121	92	F	126	78	E	123
	Thru	180	F	#709	316	F	#1113	294	F	#1153	257	F	#1076
	Right	180	F	#709	316	F	#1113	294	F	#1153	257	F	#1076
Overall Intersection		**122**	F	**Cycle Length: 110 sec**	**193**	F	**Cycle Length: 150 sec**	**176**	F	**Cycle Length: 150 sec**	**163**	F	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound J Clyde Morris Blvd	Left	73	E	268	94	F	m#421	97	F	#409	103	F	#411
	Thru	66	E	#628	152	F	#964	140	F	#871	119	F	#836
	Right	0	A	0	0	A	m0	0	A	m0	0	A	m0
Westbound J Clyde Morris Blvd	Left	107	F	#455	167	F	#661	156	F	#602	149	F	#587
	Thru	54	D	431	68	E	#660	67	E	#595	59	E	538
	Right	0	A	0	0	A	0	0	A	0	0	A	0
Northbound Jefferson Ave	Left	93	F	#254	154	F	#322	144	F	#330	158	F	#326
	Thru	69	E	#676	115	F	#845	98	F	#856	85	F	#807
	Right	1	A	0	1	A	0	1	A	0	1	A	0
Southbound Jefferson Ave	Left	87	F	#296	145	F	#386	142	F	#397	151	F	#390
	Thru	203	E	#1171	288	F	#1388	267	F	#1425	243	F	#1355
	Right	203	F	#1171	288	F	#1388	267	F	#1425	243	F	#1355
Overall Intersection		**100**	F	**Cycle Length: 140 sec**	**149**	F	**Cycle Length: 150 sec**	**141**	F	**Cycle Length: 150 sec**	**129**	F	**Cycle Length: 150 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #7 – Oyster Point Road at Canon Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Oyster Point Rd	Left	62	E	m117	71	E	m246	74	E	m243	58	E	m178
	Thru	13	B	152	162	F	#1096	145	F	#1040	98	F	#894
	Right	3	A	8	103	F	#1044	80	F	#987	51	D	m#810
Westbound Oyster Point Rd	Left	41	D	342	197	F	#1101	179	F	#1048	138	F	#928
	Thru	16	B	176	29	C	525	27	C	484	24	C	416
	Right	3	A	29	11	B	146	10	A	129	8	A	103
Northbound Canon Blvd	Left	48	D	121	173	F	#483	161	F	#464	163	F	#429
	Thru	49	D	128	188	F	#509	173	F	#485	173	F	#457
	Right	1	A	5	2	A	74	2	A	70	2	A	72
Southbound Canon Blvd	Left	51	D	87	118	F	#234	113	F	#224	103	F	#202
	Thru	52	D	91	122	F	#247	117	F	#238	105	F	#213
	Right	14	B	41	18	B	60	18	B	59	18	B	58
Overall Intersection		**20**	**C**	**Cycle Length: 110 sec**	**111**	**F**	**Cycle Length: 150 sec**	**99**	**F**	**Cycle Length: 150 sec**	**75**	**E**	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Oyster Point Rd	Left	59	E	m117	104	F	m#174	95	F	m#166	81	F	m#149
	Thru	39	D	643	193	F	#1538	162	F	#1453	115	F	#1276
	Right	9	A	101	18	B	m408	12	B	m342	7	A	157
Westbound Oyster Point Rd	Left	58	E	231	210	F	#608	193	F	#584	155	F	#522
	Thru	31	C	475	89	F	#1300	70	E	#1217	46	D	#1050
	Right	11	B	39	12	B	68	12	B	64	11	B	59
Northbound Canon Blvd	Left	49	D	m353	144	F	m#394	143	F	m#431	113	F	m#473
	Thru	51	D	m373	170	F	m#453	167	F	m#473	132	F	m#511
	Right	11	B	857	87	F	m1186	70	E	m838	38	D	m895
Southbound Canon Blvd	Left	67	E	127	156	F	#311	148	F	#298	130	F	#270
	Thru	67	E	134	166	F	#331	157	F	#318	137	F	#287
	Right	16	B	50	42	D	#128	40	D	119	34	C	103
Overall Intersection		**33**	**C**	**Cycle Length: 140 sec**	**128**	**F**	**Cycle Length: 150 sec**	**109**	**F**	**Cycle Length: 150 sec**	**78**	**E**	**Cycle Length: 150 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #8 – Canon Blvd at Old Oyster Point Road

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Old Oyster Point Rd	Left	14	B	12	59	E	32	58	E	32	52	D	34
	Thru	11	B	16	37	D	40	36	D	40	32	C	42
	Right	11	B	16	37	D	40	36	D	40	32	C	42
Westbound Old Oyster Point Rd	Left	16	B	49	72	E	153	69	E	151	60	E	160
	Thru	16	B	49	72	E	153	69	E	151	60	E	160
	Right	0	A	0	0	A	0	0	A	0	0	A	0
Northbound Canon Blvd	Left	18	B	13	45	D	#61	30	C	39	26	C	31
	Thru	19	B	90	12	B	222	13	B	218	17	B	233
	Right	19	B	90	12	B	222	13	B	218	17	B	233
Southbound Canon Blvd	Left	3	A	m22	9	A	m9	7	A	m13	6	A	m42
	Thru	4	A	89	28	C	m36	19	B	m60	9	A	m165
	Right	1	A	m0	0	A	m0	0	A	m0	1	A	m0
Overall Intersection		**7**	**A**	**Cycle Length: 55 sec**	**22**	**C**	**Cycle Length: 150 sec**	**17**	**B**	**Cycle Length: 150 sec**	**11**	**B**	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Old Oyster Point Rd	Left	47	D	22	67	E	28	67	E	28	68	E	30
	Thru	28	C	23	39	D	29	39	D	29	39	D	32
	Right	28	C	23	39	D	29	39	D	29	39	D	32
Westbound Old Oyster Point Rd	Left	50	D	85	87	F	#118	87	F	#118	92	F	#141
	Thru	50	D	85	87	F	#118	87	F	#118	92	F	#141
	Right	0	A	0	0	A	0	0	A	0	0	A	0
Northbound Canon Blvd	Left	19	B	34	17	B	60	17	B	57	15	B	49
	Thru	32	C	568	179	F	#1960	152	F	#1825	92	F	#1528
	Right	32	C	568	179	F	#1960	152	F	#1825	92	F	#1528
Southbound Canon Blvd	Left	17	B	106	199	F	m#798	173	F	m#750	109	F	m#631
	Thru	2	A	20	2	A	m16	2	A	m15	1	A	m14
	Right	0	A	m0	0	A	m0	0	A	m0	0	A	m0
Overall Intersection		**20**	**C**	**Cycle Length: 140 sec**	**126**	**F**	**Cycle Length: 150 sec**	**108**	**F**	**Cycle Length: 150 sec**	**65**	**E**	**Cycle Length: 150 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #9 – Canon Blvd at Middle Ground Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Middle Ground Blvd	Left	18	B	98	62	E	#237	70	E	#260	72	E	#265
	Thru	18	B	98	33	C	247	35	C	266	35	D	272
	Right	18	B	98	33	C	247	35	C	266	35	D	272
Westbound Middle Ground Blvd	Left	13	B	40	64	E	#67	71	E	#74	72	E	#76
	Thru	13	B	40	49	D	#161	54	D	#179	55	D	#183
	Right	13	B	40	49	D	#161	54	D	#179	55	D	#183
Northbound Canon Blvd	Left	6	A	30	10	A	m22	12	B	m24	14	B	m31
	Thru	6	A	30	18	B	109	22	C	133	36	D	141
	Right	6	A	30	18	B	109	22	C	133	36	D	141
Southbound Canon Blvd	Left	14	B	#291	12	B	212	13	B	240	14	B	255
	Thru	14	B	#291	115	F	#987	146	F	#1078	153	F	#1100
	Right	14	B	#291	115	F	#987	146	F	#1078	153	F	#1100
Overall Intersection		**14**	**B**	**Cycle Length: 112.8 sec**	**71**	**E**	**Cycle Length: 100 sec**	**88**	**F**	**Cycle Length: 100 sec**	**93**	**F**	**Cycle Length: 100 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Middle Ground Blvd	Left	24	C	190	24	C	40	24	C	42	18	B	27
	Thru	24	C	190	238	F	#1028	275	F	#1114	302	F	444
	Right	24	C	190	238	F	#1028	275	F	#1114	302	F	444
Westbound Middle Ground Blvd	Left	39	D	201	194	F	#650	225	F	#702	188	F	#707
	Thru	39	D	201	40	D	331	41	D	353	38	D	243
	Right	39	D	201	40	D	331	41	D	353	38	D	243
Northbound Canon Blvd	Left	13	B	248	50	D	m104	51	D	m103	29	C	m66
	Thru	13	B	248	214	F	m652	263	F	m#701	315	F	m#635
	Right	13	B	248	214	F	m652	263	F	m#701	315	F	m#635
Southbound Canon Blvd	Left	14	B	211	158	F	#438	158	F	#460	88	F	#319
	Thru	14	B	211	46	D	582	53	D	#682	51	D	#666
	Right	14	B	211	46	D	582	53	D	#682	51	D	#666
Overall Intersection		**20**	**C**	**Cycle Length: 110 sec**	**158**	**F**	**Cycle Length: 140 sec**	**185**	**F**	**Cycle Length: 140 sec**	**201**	**F**	**Cycle Length: 100 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #10 – J. Clyde Morris Blvd at Thimble Shoals Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound J Clyde Morris Blvd	Left	31	C	71	52	D	#182	47	D	#145	44	D	141
	Thru	5	A	117	11	B	412	9	A	319	10	B	390
	Right	5	A	117	11	B	412	9	A	319	10	B	390
Westbound J Clyde Morris Blvd	Left	21	C	m39	29	C	m62	29	C	m60	30	C	m61
	Thru	5	A	40	8	A	108	9	A	192	9	A	112
	Right	1	A	0	1	A	m0	1	A	m0	1	A	m0
Northbound Thimble Shoals Blvd	Left	27	C	11	29	C	16	28	C	16	28	C	16
	Thru	27	C	11	29	C	16	28	C	16	28	C	16
	Right	27	C	11	29	C	16	28	C	16	28	C	16
Southbound Thimble Shoals Blvd	Left	51	D	126	49	D	#234	41	D	#207	43	D	#210
	Thru	51	D	126	49	D	#234	41	D	#207	43	D	#210
	Right	10	A	49	20	C	170	21	C	163	18	B	153
Overall Intersection		**8**	**A**	**Cycle Length: 100 sec**	**13**	**B**	**Cycle Length: 100 sec**	**13**	**B**	**Cycle Length: 100 sec**	**13**	**B**	**Cycle Length: 100 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound J Clyde Morris Blvd	Left	46	D	m82	115	F	m229	106	F	m225	57	E	m#152
	Thru	14	B	376	153	F	#1331	126	F	#1248	151	F	#957
	Right	14	B	376	153	F	#1331	126	F	#1248	151	F	#957
Westbound J Clyde Morris Blvd	Left	47	D	m69	67	E	#204	66	E	#199	32	C	m109
	Thru	28	C	294	52	D	#959	36	D	#888	40	D	#662
	Right	6	A	32	1	A	2	1	A	0	1	A	0
Northbound Thimble Shoals Blvd	Left	15	B	28	21	C	53	21	C	51	18	B	42
	Thru	15	B	28	21	C	53	21	C	51	18	B	42
	Right	15	B	28	21	C	53	21	C	51	18	B	42
Southbound Thimble Shoals Blvd	Left	30	C	329	162	F	m449	148	F	m457	164	F	m#314
	Thru	30	C	329	162	F	m449	148	F	m457	164	F	m#314
	Right	18	B	285	48	D	m484	45	D	m488	20	C	m203
Overall Intersection		**22**	**C**	**Cycle Length: 110 sec**	**102**	**F**	**Cycle Length: 140 sec**	**84**	**F**	**Cycle Length: 140 sec**	**92**	**F**	**Cycle Length: 100 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #11 – J. Clyde Morris Blvd at Diligence Drive

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Diligence Dr	Left	37	D	191	119	F	m#277	109	F	m#271	96	F	m#263
	Thru	27	C	m62	23	C	m62	25	C	m63	25	C	m62
	Right	11	B	m23	10	B	m19	13	B	m19	14	B	m19
Westbound Shopping Center	Left	44	D	153	117	F	#338	136	F	#341	124	F	#328
	Thru	44	D	153	117	F	#338	136	F	#341	124	F	#328
	Right	44	D	153	117	F	#338	136	F	#341	124	F	#328
Northbound J Clyde Morris Blvd	Left	29	C	91	131	F	#279	118	F	#274	104	F	#263
	Thru	14	B	100	27	C	300	21	C	251	17	B	207
	Right	5	A	m23	11	B	m6	8	A	m5	6	A	m4
Southbound J Clyde Morris Blvd	Left	43	D	69	47	D	109	47	D	106	46	D	104
	Thru	29	C	390	145	F	#915	120	F	#871	105	F	#831
	Right	2	A	0	46	D	#394	38	D	#342	28	C	#274
Overall Intersection		**22**	**C**	**Cycle Length: 100 sec**	**90**	**F**	**Cycle Length: 100 sec**	**79**	**E**	**Cycle Length: 100 sec**	**68**	**E**	**Cycle Length: 100 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Diligence Dr	Left	45	D	#480	332	F	m#449	314	F	m#432	334	F	m#334
	Thru	25	C	m239	43	D	m181	40	D	m172	45	D	m173
	Right	6	A	m41	6	A	m0	5	A	m0	11	B	m7
Westbound Shopping Center	Left	70	E	#214	226	F	#519	213	F	#504	164	F	#353
	Thru	70	E	#214	226	F	#519	213	F	#504	164	F	#353
	Right	70	E	#214	226	F	#519	213	F	#504	164	F	#353
Northbound J Clyde Morris Blvd	Left	36	D	m58	88	F	m#157	84	F	m#155	56	E	m93
	Thru	29	C	#536	326	F	#1546	295	F	#1485	335	F	#1082
	Right	4	A	m31	21	C	m130	18	B	m120	16	B	m114
Southbound J Clyde Morris Blvd	Left	78	E	#226	224	F	#517	242	F	#513	168	F	#358
	Thru	36	D	445	182	F	#1278	169	F	#1234	229	F	#934
	Right	1	A	0	6	A	0	5	A	0	5	A	0
Overall Intersection		**33**	**C**	**Cycle Length: 110 sec**	**209**	**F**	**Cycle Length: 140 sec**	**195**	**F**	**Cycle Length: 140 sec**	**215**	**F**	**Cycle Length: 100 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #12 – Diligence Drive at Rock Landing Drive

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Diligence Dr	Left	6	A	33	4	A	m36	4	A	m31	4	A	m39
	Thru	6	A	33	4	A	m36	4	A	m31	4	A	m39
	Right	6	A	33	4	A	m36	4	A	m31	4	A	m39
Westbound Diligence Dr	Left	4	A	53	260	F	m#1472	247	F	m#1450	230	F	m#1447
	Thru	4	A	53	260	F	m#1472	247	F	m#1450	230	F	m#1447
	Right	4	A	53	260	F	m#1472	247	F	m#1450	230	F	m#1447
Northbound Rock Landing Dr	Left	31	C	42	35	C	73	34	C	71	34	C	71
	Thru	31	C	42	35	C	73	34	C	71	34	C	71
	Right	31	C	42	35	C	73	34	C	71	34	C	71
Southbound Rock Landing Dr	Left	48	D	152	178	F	#417	168	F	#407	141	F	#394
	Thru	45	D	143	157	F	#404	148	F	#393	141	F	#384
	Right	45	D	143	157	F	#404	148	F	#393	141	F	#384
Overall Intersection		**10**	**A**	**Cycle Length: 100 sec**	**220**	**F**	**Cycle Length: 100 sec**	**208**	**F**	**Cycle Length: 100 sec**	**195**	**F**	**Cycle Length: 100 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Diligence Dr	Left	19	B	227	232	F	m#692	210	F	m#700	218	F	m#477
	Thru	19	B	227	232	F	m#692	210	F	m#700	218	F	m#477
	Right	19	B	227	232	F	m#692	210	F	m#700	218	F	m#477
Westbound Diligence Dr	Left	26	C	438	550	F	m#1898	494	F	m#1833	534	F	m#1313
	Thru	26	C	438	550	F	m#1898	494	F	m#1833	534	F	m#1313
	Right	26	C	438	550	F	m#1898	494	F	m#1833	534	F	m#1313
Northbound Rock Landing Dr	Left	35	D	43	59	E	99	59	E	99	35	C	68
	Thru	35	D	43	59	E	99	59	E	99	35	C	68
	Right	35	D	43	59	E	99	59	E	99	35	C	68
Southbound Rock Landing Dr	Left	43	D	409	449	F	#1612	452	F	#1587	448	F	#1152
	Thru	40	D	374	395	F	#1502	401	F	#1484	395	F	#1084
	Right	40	D	374	395	F	#1502	401	F	#1484	395	F	#1084
Overall Intersection		**30**	**C**	**Cycle Length: 110 sec**	**428**	**F**	**Cycle Length: 140 sec**	**400**	**F**	**Cycle Length: 140 sec**	**418**	**F**	**Cycle Length: 100 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #13 – Diligence Drive at Thimble Shoals Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Westbound Diligence Dr	Left	46	D	m56	50	D	m74	50	D	m73	50	D	m79
	Thru	--	--	--	--	--	--	--	--	--	--	--	--
	Right	9	A	107	177	F	m350	157	F	m295	177	F	m#804
Northbound Thimble Shoals Blvd	Left	--	--	--	--	--	--	--	--	--	--	--	--
	Thru	13	B	81	127	F	#425	113	F	#405	127	F	#425
	Right	13	B	81	127	F	#425	113	F	#405	127	F	#425
Southbound Thimble Shoals Blvd	Left	6	A	79	2	A	m25	2	A	m32	2	A	m23
	Thru	6	A	79	2	A	m25	2	A	m32	2	A	m23
	Right	--	--	--	--	--	--	--	--	--	--	--	--
Overall Intersection		**10**	**B**	**Cycle Length: 100 sec**	**102**	**F**	**Cycle Length: 100 sec**	**92**	**F**	**Cycle Length: 100 sec**	**102**	**F**	**Cycle Length: 100 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Westbound Diligence Dr	Left	40	D	m96	148	F	m146	724	F	m149	116	F	m98
	Thru	--	--	--	--	--	--	--	--	--	--	--	--
	Right	5	A	m50	90	F	m33	73	E	m32	151	F	m23
Northbound Thimble Shoals Blvd	Left	--	--	--	--	--	--	--	--	--	--	--	--
	Thru	10	A	172	214	F	#766	198	F	#728	73	E	m#481
	Right	10	A	172	214	F	#766	198	F	#728	73	E	m#481
Southbound Thimble Shoals Blvd	Left	9	A	m241	322	F	m225	281	F	m211	356	F	m#646
	Thru	9	A	m241	322	F	m225	281	F	m211	356	F	m#646
	Right	--	--	--	--	--	--	--	--	--	--	--	--
Overall Intersection		**11**	**B**	**Cycle Length: 110 sec**	**240**	**F**	**Cycle Length: 140 sec**	**252**	**F**	**Cycle Length: 140 sec**	**237**	**F**	**Cycle Length: 100 sec**

Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.

Intersection #14 – Canon Blvd at Thimble Shoals Blvd

AM Peak

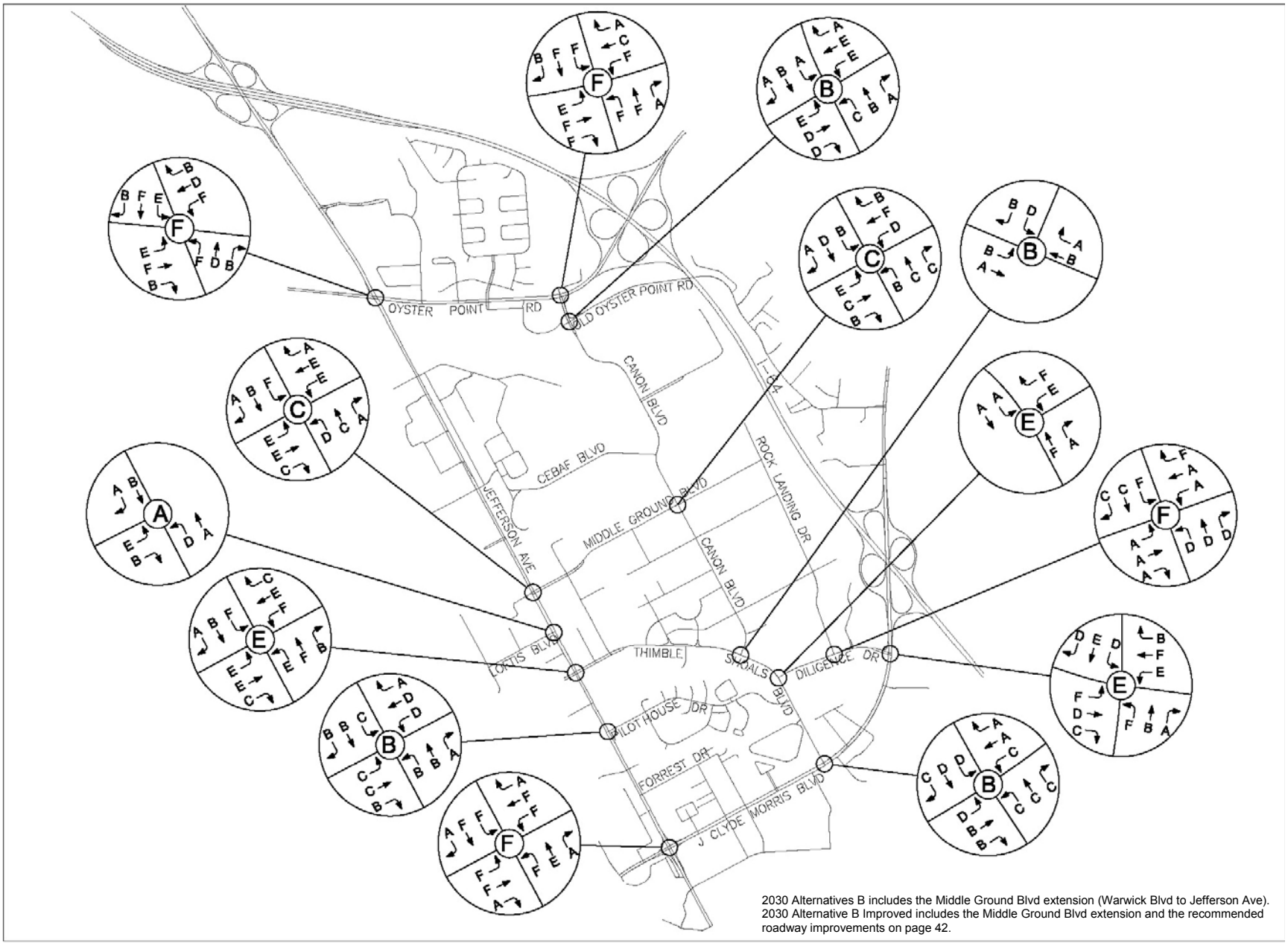
		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Thimble Shoals Blvd	Left	52	D	m#90	25	C	m97	25	C	m97	26	C	m108
	Thru	3	A	36	2	A	m31	2	A	m31	2	A	m32
	Right	--	--	--	--	--	--	--	--	--	--	--	--
Westbound Thimble Shoals Blvd	Left	--	--	--	--	--	--	--	--	--	--	--	--
	Thru	6	A	115	75	E	m464	79	E	m514	123	F	m#606
	Right	6	A	115	75	E	m464	79	E	m514	123	F	m#606
Southbound Canon Blvd	Left	28	C	79	109	F	#292	112	F	#305	118	F	#446
	Thru	--	--	--	--	--	--	--	--	--	--	--	--
	Right	28	C	79	109	F	#292	112	F	#305	118	F	#446
Overall Intersection		**12**	**B**	**Cycle Length: 100 sec**	**66**	**E**	**Cycle Length: 100 sec**	**69**	**E**	**Cycle Length: 100 sec**	**96**	**F**	**Cycle Length: 100 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative A			2030 Alternative B			2030 Alternative C		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Thimble Shoals Blvd	Left	97	F	#106	236	F	#435	236	F	m#425	166	F	m#318
	Thru	4	A	52	35	D	473	35	C	629	49	D	432
	Right	--	--	--	--	--	--	--	--	--	--	--	--
Westbound Thimble Shoals Blvd	Left	--	--	--	--	--	--	--	--	--	--	--	--
	Thru	25	C	170	406	F	m#1615	402	F	#1636	496	F	m#1252
	Right	25	C	170	406	F	m#1615	402	F	#1636	496	F	m#1252
Southbound Canon Blvd	Left	41	D	50	704	F	m#1343	497	F	m#1355	485	F	m#1082
	Thru	--	--	--	--	--	--	--	--	--	--	--	--
	Right	41	D	50	704	F	m#1343	497	F	m#1355	485	F	m#1082
Overall Intersection		**28**	**C**	**Cycle Length: 55 sec**	**393**	**F**	**Cycle Length: 140 sec**	**327**	**F**	**Cycle Length: 140 sec**	**360**	**F**	**Cycle Length: 100 sec**

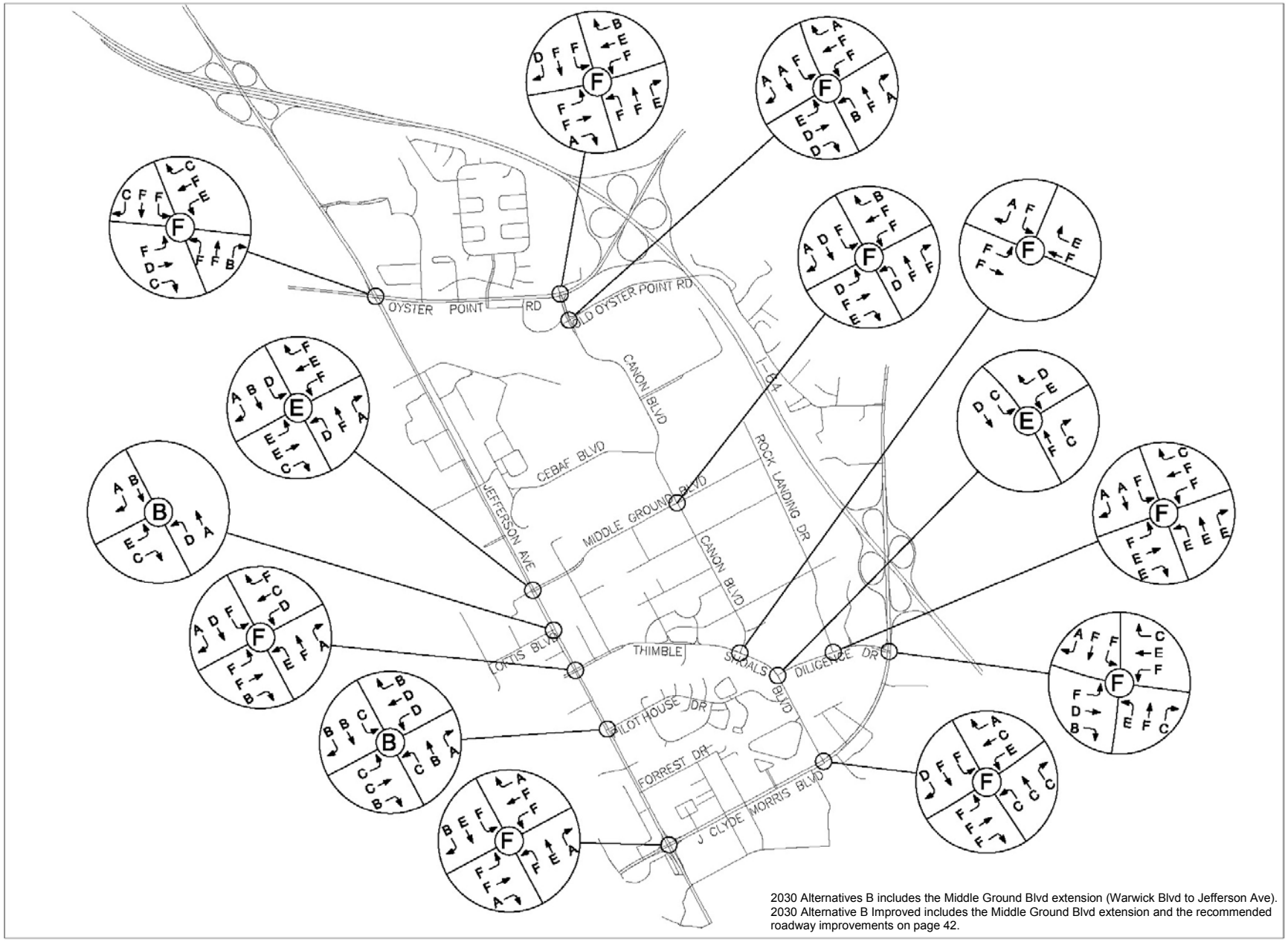
Refer to page 28 for detailed description of 2030 Alternatives A, B, and C.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.

Map I1 – Intersection LOS – 2030 Alternative B with Roadway Improvements (AM Peak)



2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave). 2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Map I2 – Intersection LOS – 2030 Alternative B with Roadway Improvements (PM Peak)



Intersection #1 – Jefferson Avenue at Oyster Point Road

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Oyster Point Rd	Left	41	D	m224	59	E	m384	60	E	m387
	Thru	81	F	m#576	193	F	m#1018	197	F	m#1018
	Right	10	A	m95	12	B	m104	16	B	m150
Westbound Oyster Point Rd	Left	90	F	#287	165	F	#554	181	F	#574
	Thru	34	C	243	55	D	#626	44	D	#596
	Right	19	B	m80	20	B	m109	15	B	m111
Northbound Jefferson Ave	Left	43	D	#176	158	F	#312	154	F	#312
	Thru	16	B	215	55	D	615	46	D	478
	Right	3	A	32	10	A	84	15	B	167
Southbound Jefferson Ave	Left	41	D	m52	64	E	m85	63	E	m83
	Thru	63	E	#631	162	F	#992	154	F	#991
	Right	7	A	m89	24	C	m182	12	B	m129
Overall Intersection		**50**	D	**Cycle Length: 110 sec**	**119**	F	**Cycle Length: 150 sec**	**117**	F	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Oyster Point Rd	Left	110	F	#293	159	F	#456	159	F	#456
	Thru	37	D	245	50	D	475	50	D	475
	Right	5	A	66	23	C	#499	23	C	#499
Westbound Oyster Point Rd	Left	55	E	#246	62	E	m273	62	E	m273
	Thru	59	E	#662	173	F	#1093	173	F	#1094
	Right	9	A	185	28	C	m315	27	C	m316
Northbound Jefferson Ave	Left	80	E	#568	185	F	#752	184	F	#752
	Thru	66	E	#822	157	F	#1089	156	F	#1089
	Right	14	B	m196	16	B	m168	16	B	m168
Southbound Jefferson Ave	Left	75	E	#335	158	F	m#424	158	F	m#424
	Thru	77	E	#645	158	F	m#827	158	F	m#827
	Right	22	C	m276	23	C	m279	23	C	m279
Overall Intersection		**58**	E	**Cycle Length: 140 sec**	**121**	F	**Cycle Length: 150 sec**	**121**	F	**Cycle Length: 150 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #2 – Jefferson Avenue at Middle Ground Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Middle Ground Blvd	Left	45	D	24	64	E	20	64	E	20
	Thru	31	C	31	64	E	20	64	E	20
	Right	31	C	31	27	C	24	27	C	24
Westbound Middle Ground Blvd	Left	48	D	61	69	E	76	69	E	76
	Thru	48	D	65	64	E	20	64	E	20
	Right	3	A	18	9	A	53	9	A	53
Northbound Jefferson Ave	Left	39	D	m12	46	D	m14	45	D	m14
	Thru	52	D	#597	28	C	698	27	C	707
	Right	4	A	46	2	A	12	2	A	9
Southbound Jefferson Ave	Left	66	E	#632	85	F	#533	85	F	#533
	Thru	10	B	156	20	B	574	19	B	574
	Right	10	B	156	4	A	m6	4	A	m6
Overall Intersection		**33**	**C**	**Cycle Length: 110 sec**	**31**	**C**	**Cycle Length: 150 sec**	**30**	**C**	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Middle Ground Blvd	Left	59	E	27	64	E	19	64	E	19
	Thru	43	D	19	64	E	10	64	E	10
	Right	43	D	19	35	C	16	35	C	16
Westbound Middle Ground Blvd	Left	66	E	184	153	F	#302	153	F	#302
	Thru	66	E	185	63	E	5	63	E	5
	Right	40	D	367	139	F	#808	139	F	#808
Northbound Jefferson Ave	Left	83	F	m66	50	D	m41	50	D	m41
	Thru	28	C	#978	110	F	#1654	111	F	#1653
	Right	2	A	8	2	A	m11	2	A	m15
Southbound Jefferson Ave	Left	85	F	233	50	D	m130	50	D	m132
	Thru	4	A	107	17	B	551	18	B	551
	Right	4	A	107	3	A	m2	3	A	m2
Overall Intersection		**24**	**C**	**Cycle Length: 140 sec**	**77**	**E**	**Cycle Length: 150 sec**	**78**	**E**	**Cycle Length: 150 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #3 – Jefferson Avenue at Loftis Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Loftis Blvd	Left	40	D	77	58	E	113	58	E	113
	Thru	--	--	--	--	--	--	--	--	--
	Right	9	A	63	11	B	78	11	B	78
Northbound Jefferson Ave	Left	12	B	m84	43	D	m234	53	D	m247
	Thru	1	A	m19	0	A	m1	1	A	m1
	Right	--	--	--	--	--	--	--	--	--
Southbound Jefferson Ave	Left	--	--	--	--	--	--	--	--	--
	Thru	7	A	169	10	B	376	10	B	363
	Right	1	A	m7	1	A	m5	1	A	m5
Overall Intersection		**6**	**A**	**Cycle Length: 110 sec**	**9**	**A**	**Cycle Length: 150 sec**	**10**	**A**	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Loftis Blvd	Left	60	E	140	61	E	163	61	E	163
	Thru	--	--	--	--	--	--	--	--	--
	Right	32	C	166	30	C	184	30	C	184
Northbound Jefferson Ave	Left	56	E	m183	49	D	m189	47	D	m191
	Thru	8	A	671	6	A	m90	4	A	m75
	Right	--	--	--	--	--	--	--	--	--
Southbound Jefferson Ave	Left	--	--	--	--	--	--	--	--	--
	Thru	5	A	84	13	B	m393	13	B	m395
	Right	1	A	m4	1	A	m6	1	A	m7
Overall Intersection		**12**	**B**	**Cycle Length: 140 sec**	**13**	**B**	**Cycle Length: 150 sec**	**12**	**B**	**Cycle Length: 150 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #4 – Jefferson Avenue at Thimble Shoals Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Thimble Shoals Blvd	Left	58	E	131	175	F	#360	78	E	129
	Thru	48	D	64	74	E	122	77	E	123
	Right	19	B	24	22	C	37	22	C	38
Westbound Thimble Shoals Blvd	Left	44	D	84	100	F	m#201	102	F	m#201
	Thru	44	D	88	55	E	128	73	E	m103
	Right	6	A	19	55	E	128	28	C	m59
Northbound Jefferson Ave	Left	46	D	m0	69	E	m32	69	E	m32
	Thru	35	D	#582	96	F	#1378	90	F	#1374
	Right	3	A	45	10	B	306	10	B	312
Southbound Jefferson Ave	Left	90	F	m#569	138	F	#651	134	F	#655
	Thru	2	A	37	13	B	362	15	B	456
	Right	0	A	m0	4	A	m9	6	A	m14
Overall Intersection		**27**	**C**	**Cycle Length: 110 sec**	**64**	**E**	**Cycle Length: 150 sec**	**60**	**E**	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Thimble Shoals Blvd	Left	78	E	#197	179	F	#431	85	F	#161
	Thru	62	E	99	75	E	157	88	F	#173
	Right	19	B	36	17	B	47	19	B	48
Westbound Thimble Shoals Blvd	Left	62	E	301	163	F	m#621	44	D	m313
	Thru	62	E	317	143	F	m#591	33	C	m189
	Right	27	C	257	143	F	m#591	158	F	m#713
Northbound Jefferson Ave	Left	45	D	m45	70	E	m76	70	E	m76
	Thru	30	C	762	163	F	#1603	171	F	#1616
	Right	3	A	57	9	A	m170	7	A	m143
Southbound Jefferson Ave	Left	50	D	#328	139	F	m#337	139	F	m#337
	Thru	31	C	598	36	D	#1090	40	D	#1104
	Right	10	B	m59	2	A	m9	2	A	m10
Overall Intersection		**34**	**C**	**Cycle Length: 140 sec**	**108**	**F**	**Cycle Length: 150 sec**	**102**	**F**	**Cycle Length: 150 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #5 – Jefferson Avenue at Pilot House Drive

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Pilot House Dr	Left	37	D	35	28	C	30	28	C	30
	Thru	37	D	35	28	C	30	28	C	30
	Right	18	B	16	15	B	14	15	B	14
Westbound Pilot House Dr	Left	42	D	106	37	D	91	37	D	91
	Thru	42	D	106	37	D	91	37	D	91
	Right	10	A	42	9	A	38	9	A	38
Northbound Jefferson Ave	Left	51	D	m16	19	B	m18	19	B	m17
	Thru	4	A	m65	15	B	m594	15	B	m608
	Right	0	A	m0	1	A	m8	1	A	m8
Southbound Jefferson Ave	Left	27	C	m82	29	C	m66	30	C	m65
	Thru	5	A	80	15	B	473	12	B	426
	Right	5	A	80	15	B	473	12	B	426
Overall Intersection		**6**	**A**	**Cycle Length: 110 sec**	**15**	**B**	**Cycle Length: 75 sec**	**14**	**B**	**Cycle Length: 75 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Pilot House Dr	Left	45	D	36	25	C	25	25	C	25
	Thru	45	D	36	25	C	25	25	C	25
	Right	28	C	9	17	B	8	17	B	8
Westbound Pilot House Dr	Left	60	E	216	44	D	#170	44	D	#170
	Thru	60	E	216	44	D	#170	44	D	#170
	Right	31	C	165	17	B	106	17	B	106
Northbound Jefferson Ave	Left	89	F	m51	34	C	m32	34	C	m32
	Thru	3	A	m24	12	B	m253	11	B	m246
	Right	0	A	m0	2	A	m7	2	A	m9
Southbound Jefferson Ave	Left	87	F	m222	31	C	m79	32	C	m89
	Thru	1	A	21	16	B	m328	15	B	m342
	Right	1	A	21	16	B	m328	15	B	m342
Overall Intersection		**9**	**A**	**Cycle Length: 140 sec**	**15**	**B**	**Cycle Length: 75 sec**	**15**	**B**	**Cycle Length: 75 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #6 – Jefferson Avenue at J. Clyde Morris Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound J Clyde Morris Blvd	Left	62	E	#301	82	F	#467	104	F	#492
	Thru	214	F	#752	283	F	#1211	202	F	#786
	Right	0	A	m0	0	A	m0	0	A	m0
Westbound J Clyde Morris Blvd	Left	217	F	#561	280	F	#891	212	F	#843
	Thru	47	D	376	76	E	#647	95	F	#685
	Right	0	A	0	1	A	0	1	A	0
Northbound Jefferson Ave	Left	136	F	#260	183	F	#385	183	F	#385
	Thru	54	D	#428	78	E	#652	56	E	587
	Right	0	A	0	0	A	0	0	A	0
Southbound Jefferson Ave	Left	60	E	72	92	F	126	91	F	126
	Thru	180	F	#709	294	F	#1153	197	F	#1056
	Right	180	F	#709	294	F	#1153	10	A	m29
Overall Intersection		**122**	**F**	**Cycle Length: 110 sec**	**176**	**F**	**Cycle Length: 150 sec**	**133**	**F**	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound J Clyde Morris Blvd	Left	73	E	268	97	F	#409	113	F	#434
	Thru	66	E	#628	140	F	#871	92	F	#561
	Right	0	A	0	0	A	m0	0	A	m0
Westbound J Clyde Morris Blvd	Left	107	F	#455	156	F	#602	114	F	#565
	Thru	54	D	431	67	E	#595	88	F	#645
	Right	0	A	0	0	A	0	0	A	0
Northbound Jefferson Ave	Left	93	F	#254	144	F	#330	123	F	#319
	Thru	69	E	#676	98	F	#856	71	E	#805
	Right	1	A	0	1	A	0	1	A	0
Southbound Jefferson Ave	Left	87	F	#296	142	F	#397	106	F	#373
	Thru	203	E	#1171	267	F	#1425	79	E	#941
	Right	203	F	#1171	267	F	#1425	13	B	206
Overall Intersection		**100**	**F**	**Cycle Length: 140 sec**	**141**	**F**	**Cycle Length: 150 sec**	**73**	**E**	**Cycle Length: 150 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #7 – Oyster Point Road at Canon Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Oyster Point Rd	Left	62	E	m117	74	E	m243	78	E	m243
	Thru	13	B	152	145	F	#1040	144	F	#1043
	Right	3	A	8	80	F	#987	92	F	#997
Westbound Oyster Point Rd	Left	41	D	342	179	F	#1048	184	F	#1048
	Thru	16	B	176	27	C	484	27	C	484
	Right	3	A	29	10	A	129	10	A	129
Northbound Canon Blvd	Left	48	D	121	161	F	#464	162	F	#465
	Thru	49	D	128	173	F	#485	174	F	#486
	Right	1	A	5	2	A	70	2	A	86
Southbound Canon Blvd	Left	51	D	87	113	F	#224	113	F	#224
	Thru	52	D	91	117	F	#238	362	F	#238
	Right	14	B	41	18	B	59	18	B	59
Overall Intersection		**20**	**C**	**Cycle Length: 110 sec**	**99**	**F**	**Cycle Length: 150 sec**	**105**	**F**	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Oyster Point Rd	Left	59	E	m117	95	F	m#166	98	F	m#166
	Thru	39	D	643	162	F	#1453	165	F	#1453
	Right	9	A	101	12	B	m342	9	A	m124
Westbound Oyster Point Rd	Left	58	E	231	193	F	#584	201	F	#584
	Thru	31	C	475	70	E	#1217	70	E	#1217
	Right	11	B	39	12	B	64	12	B	64
Northbound Canon Blvd	Left	49	D	m353	143	F	m#431	149	F	m#487
	Thru	51	D	m373	167	F	m#473	172	F	m#529
	Right	11	B	857	70	E	m838	71	E	m1117
Southbound Canon Blvd	Left	67	E	127	148	F	#298	148	F	#298
	Thru	67	E	134	157	F	#318	157	F	#318
	Right	16	B	50	40	D	119	40	D	119
Overall Intersection		**33**	**C**	**Cycle Length: 140 sec**	**109**	**F**	**Cycle Length: 150 sec**	**111**	**F**	**Cycle Length: 150 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #8 – Canon Blvd at Old Oyster Point Road

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Old Oyster Point Rd	Left	14	B	12	58	E	32	58	E	32
	Thru	11	B	16	36	D	40	36	D	40
	Right	11	B	16	36	D	40	36	D	40
Westbound Old Oyster Point Rd	Left	16	B	49	69	E	151	69	E	151
	Thru	16	B	49	69	E	151	69	E	151
	Right	0	A	0	0	A	0	0	A	0
Northbound Canon Blvd	Left	18	B	13	30	C	39	29	C	38
	Thru	19	B	90	13	B	218	12	B	202
	Right	19	B	90	13	B	218	3	A	15
Southbound Canon Blvd	Left	3	A	m22	7	A	m13	6	A	m9
	Thru	4	A	89	19	B	m60	16	B	m36
	Right	1	A	m0	0	A	m0	0	A	m0
Overall Intersection		**7**	**A**	**Cycle Length: 55 sec**	**17**	**B**	**Cycle Length: 150 sec**	**15**	**B**	**Cycle Length: 150 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Old Oyster Point Rd	Left	47	D	22	67	E	28	67	E	28
	Thru	28	C	23	39	D	29	39	D	29
	Right	28	C	23	39	D	29	39	D	29
Westbound Old Oyster Point Rd	Left	50	D	85	87	F	#118	87	F	#118
	Thru	50	D	85	87	F	#118	87	F	#118
	Right	0	A	0	0	A	0	0	A	0
Northbound Canon Blvd	Left	19	B	34	17	B	57	18	B	59
	Thru	32	C	568	152	F	#1825	123	F	#1646
	Right	32	C	568	152	F	#1825	8	A	77
Southbound Canon Blvd	Left	17	B	106	173	F	m#750	128	F	m#689
	Thru	2	A	20	2	A	m15	1	A	m18
	Right	0	A	m0	0	A	m0	0	A	m0
Overall Intersection		**20**	**C**	**Cycle Length: 140 sec**	**108**	**F**	**Cycle Length: 150 sec**	**82**	**F**	**Cycle Length: 150 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #9 – Canon Blvd at Middle Ground Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Middle Ground Blvd	Left	18	B	98	70	E	#260	79	E	#290
	Thru	18	B	98	35	C	266	34	C	195
	Right	18	B	98	35	C	266	13	B	114
Westbound Middle Ground Blvd	Left	13	B	40	71	E	#74	43	D	29
	Thru	13	B	40	54	D	#179	96	F	#347
	Right	13	B	40	54	D	#179	11	B	49
Northbound Canon Blvd	Left	6	A	30	12	B	m24	17	B	m23
	Thru	6	A	30	22	C	133	33	C	155
	Right	6	A	30	22	C	133	33	C	155
Southbound Canon Blvd	Left	14	B	#291	13	B	240	15	B	273
	Thru	14	B	#291	146	F	#1078	38	D	#762
	Right	14	B	#291	146	F	#1078	3	A	56
Overall Intersection		**14**	**B**	**Cycle Length: 112.8 sec**	**88**	**F**	**Cycle Length: 100 sec**	**34**	**C**	**Cycle Length: 110 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Middle Ground Blvd	Left	24	C	190	24	C	42	39	D	47
	Thru	24	C	190	275	F	#1114	101	F	#603
	Right	24	C	190	275	F	#1114	73	E	#629
Westbound Middle Ground Blvd	Left	39	D	201	225	F	#702	118	F	#337
	Thru	39	D	201	41	D	353	187	F	#337
	Right	39	D	201	41	D	353	16	B	#996
Northbound Canon Blvd	Left	13	B	248	51	D	m103	40	D	52
	Thru	13	B	248	263	F	m#701	177	F	m93
	Right	13	B	248	263	F	m#701	177	F	m349
Southbound Canon Blvd	Left	14	B	211	158	F	#460	134	F	#447
	Thru	14	B	211	53	D	#682	35	D	410
	Right	14	B	211	53	D	#682	6	A	87
Overall Intersection		**20**	**C**	**Cycle Length: 110 sec**	**185**	**F**	**Cycle Length: 140 sec**	**116**	**F**	**Cycle Length: 140 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #10 – J. Clyde Morris Blvd at Thimble Shoals Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound J Clyde Morris Blvd	Left	31	C	71	47	D	#145	45	D	#161
	Thru	5	A	117	9	A	319	15	B	470
	Right	5	A	117	9	A	319	15	B	470
Westbound J Clyde Morris Blvd	Left	21	C	m39	29	C	m60	35	C	m70
	Thru	5	A	40	9	A	192	9	A	134
	Right	1	A	0	1	A	m0	1	A	0
Northbound Thimble Shoals Blvd	Left	27	C	11	28	C	16	31	C	17
	Thru	27	C	11	28	C	16	31	C	17
	Right	27	C	11	28	C	16	31	C	17
Southbound Thimble Shoals Blvd	Left	51	D	126	41	D	#207	45	D	#178
	Thru	51	D	126	41	D	#207	45	D	#178
	Right	10	A	49	21	C	163	24	C	138
Overall Intersection		**8**	**A**	**Cycle Length: 100 sec**	**13**	**B**	**Cycle Length: 100 sec**	**15**	**B**	**Cycle Length: 110 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound J Clyde Morris Blvd	Left	46	D	m82	106	F	m225	106	F	m#225
	Thru	14	B	376	126	F	#1248	126	F	#1248
	Right	14	B	376	126	F	#1248	126	F	#1248
Westbound J Clyde Morris Blvd	Left	47	D	m69	66	E	#199	66	E	#199
	Thru	28	C	294	36	D	#888	35	C	#890
	Right	6	A	32	1	A	0	1	A	1
Northbound Thimble Shoals Blvd	Left	15	B	28	21	C	51	21	C	51
	Thru	15	B	28	21	C	51	21	C	51
	Right	15	B	28	21	C	51	21	C	51
Southbound Thimble Shoals Blvd	Left	30	C	329	148	F	m457	149	F	m459
	Thru	30	C	329	148	F	m457	149	F	m459
	Right	18	B	285	45	D	m488	45	D	m491
Overall Intersection		**22**	**C**	**Cycle Length: 110 sec**	**84**	**F**	**Cycle Length: 140 sec**	**84**	**F**	**Cycle Length: 140 sec**

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m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #11 – J. Clyde Morris Blvd at Diligence Drive

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Diligence Dr	Left	37	D	191	109	F	m#271	121	F	m#288
	Thru	27	C	m62	25	C	m63	49	D	m80
	Right	11	B	m23	13	B	m19	26	C	m20
Westbound Shopping Center	Left	44	D	153	136	F	#341	58	E	128
	Thru	44	D	153	136	F	#341	87	F	#237
	Right	44	D	153	136	F	#341	14	B	52
Northbound J Clyde Morris Blvd	Left	29	C	91	118	F	#274	144	F	#299
	Thru	14	B	100	21	C	251	13	B	195
	Right	5	A	m23	8	A	m5	4	A	m2
Southbound J Clyde Morris Blvd	Left	43	D	69	47	D	106	54	D	118
	Thru	29	C	390	120	F	#871	79	E	#893
	Right	2	A	0	38	D	#342	47	D	#352
Overall Intersection		**22**	**C**	**Cycle Length: 100 sec**	**79**	**E**	**Cycle Length: 100 sec**	**63**	**E**	**Cycle Length: 110 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Diligence Dr	Left	45	D	#480	314	F	m#432	282	F	m#959
	Thru	25	C	m239	40	D	m172	40	D	m383
	Right	6	A	m41	5	A	m0	13	B	m53
Westbound Shopping Center	Left	70	E	#214	213	F	#504	166	F	#355
	Thru	70	E	#214	213	F	#504	76	E	#170
	Right	70	E	#214	213	F	#504	24	C	108
Northbound J Clyde Morris Blvd	Left	36	D	m58	84	F	m#155	74	E	m#160
	Thru	29	C	#536	295	F	#1485	274	F	#1460
	Right	4	A	m31	18	B	m120	24	C	m224
Southbound J Clyde Morris Blvd	Left	78	E	#226	242	F	#513	211	F	#501
	Thru	36	D	445	169	F	#1234	141	F	#1196
	Right	1	A	0	5	A	0	5	A	0
Overall Intersection		**33**	**C**	**Cycle Length: 110 sec**	**195**	**F**	**Cycle Length: 140 sec**	**169**	**F**	**Cycle Length: 140 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #12 – Diligence Drive at Rock Landing Drive

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Diligence Dr	Left	6	A	33	4	A	m31	8	A	25
	Thru	6	A	33	4	A	m31	5	A	41
	Right	6	A	33	4	A	m31	5	A	41
Westbound Diligence Dr	Left	4	A	53	247	F	m#1450	4	A	m5
	Thru	4	A	53	247	F	m#1450	6	A	m136
	Right	4	A	53	247	F	m#1450	277	F	m#2139
Northbound Rock Landing Dr	Left	31	C	42	34	C	71	40	D	78
	Thru	31	C	42	34	C	71	40	D	78
	Right	31	C	42	34	C	71	40	D	78
Southbound Rock Landing Dr	Left	48	D	152	168	F	#407	168	F	#334
	Thru	45	D	143	148	F	#393	24	C	55
	Right	45	D	143	148	F	#393	24	C	55
Overall Intersection		**10**	**A**	**Cycle Length: 100 sec**	**208**	**F**	**Cycle Length: 100 sec**	**155**	**F**	**Cycle Length: 110 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Diligence Dr	Left	19	B	227	210	F	m#700	192	F	m#107
	Thru	19	B	227	210	F	m#700	57	E	697
	Right	19	B	227	210	F	m#700	57	E	697
Westbound Diligence Dr	Left	26	C	438	494	F	m#1833	200	F	m#114
	Thru	26	C	438	494	F	m#1833	93	F	#915
	Right	26	C	438	494	F	m#1833	30	C	#680
Northbound Rock Landing Dr	Left	35	D	43	59	E	99	65	E	104
	Thru	35	D	43	59	E	99	65	E	104
	Right	35	D	43	59	E	99	65	E	104
Southbound Rock Landing Dr	Left	43	D	409	452	F	#1587	132	F	#1042
	Thru	40	D	374	401	F	#1484	8	A	42
	Right	40	D	374	401	F	#1484	8	A	42
Overall Intersection		**30**	**C**	**Cycle Length: 110 sec**	**400**	**F**	**Cycle Length: 140 sec**	**87**	**F**	**Cycle Length: 140 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #13 – Diligence Drive at Thimble Shoals Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Westbound Diligence Dr	Left	46	D	m56	50	D	m73	68	E	#151
	Thru	--	--	--	--	--	--	--	--	--
	Right	9	A	107	157	F	m295	129	F	#1354
Northbound Thimble Shoals Blvd	Left	--	--	--	--	--	--	--	--	--
	Thru	13	B	81	113	F	#405	94	F	#346
	Right	13	B	81	113	F	#405	9	A	38
Southbound Thimble Shoals Blvd	Left	6	A	79	2	A	m32	5	A	m63
	Thru	6	A	79	2	A	m32	1	A	30
	Right	--	--	--	--	--	--	--	--	--
Overall Intersection		**10**	**B**	**Cycle Length: 100 sec**	**92**	**F**	**Cycle Length: 100 sec**	**72**	**E**	**Cycle Length: 110 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Westbound Diligence Dr	Left	40	D	m96	724	F	m149	70	E	m261
	Thru	--	--	--	--	--	--	--	--	--
	Right	5	A	m50	73	E	m32	40	D	m345
Northbound Thimble Shoals Blvd	Left	--	--	--	--	--	--	--	--	--
	Thru	10	A	172	198	F	#728	135	F	m#516
	Right	10	A	172	198	F	#728	20	C	m189
Southbound Thimble Shoals Blvd	Left	9	A	m241	281	F	m211	27	C	m360
	Thru	9	A	m241	281	F	m211	50	D	m460
	Right	--	--	--	--	--	--	--	--	--
Overall Intersection		**11**	**B**	**Cycle Length: 110 sec**	**252**	**F**	**Cycle Length: 140 sec**	**57**	**E**	**Cycle Length: 140 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.

Intersection #14 – Canon Blvd at Thimble Shoals Blvd

AM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Thimble Shoals Blvd	Left	52	D	m#90	25	C	m97	14	B	m60
	Thru	3	A	36	2	A	m31	4	A	m63
	Right	--	--	--	--	--	--	--	--	--
Westbound Thimble Shoals Blvd	Left	--	--	--	--	--	--	--	--	--
	Thru	6	A	115	79	E	m514	11	B	m188
	Right	6	A	115	79	E	m514	5	A	m13
Southbound Canon Blvd	Left	28	C	79	112	F	#305	40	D	#271
	Thru	--	--	--	--	--	--	--	--	--
	Right	28	C	79	112	F	#305	13	B	m89
Overall Intersection		**12**	**B**	**Cycle Length: 100 sec**	**69**	**E**	**Cycle Length: 100 sec**	**12**	**B**	**Cycle Length: 110 sec**

PM Peak

		2006/07 Existing Optimized			2030 Alternative B			2030 Alternative B Improved		
	Movement	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
Eastbound Thimble Shoals Blvd	Left	97	F	#106	236	F	m#425	194	F	m#412
	Thru	4	A	52	35	C	629	88	F	649
	Right	--	--	--	--	--	--	--	--	--
Westbound Thimble Shoals Blvd	Left	--	--	--	--	--	--	--	--	--
	Thru	25	C	170	402	F	#1636	208	F	#955
	Right	25	C	170	402	F	#1636	55	E	253
Southbound Canon Blvd	Left	41	D	50	497	F	m#1355	235	F	m#1087
	Thru	--	--	--	--	--	--	--	--	--
	Right	41	D	50	497	F	m#1355	3	A	m8
Overall Intersection		**28**	**C**	**Cycle Length: 55 sec**	**327**	**F**	**Cycle Length: 140 sec**	**158**	**F**	**Cycle Length: 140 sec**

- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by an upstream signal.
2030 Alternatives B includes the Middle Ground Blvd extension (Warwick Blvd to Jefferson Ave).
2030 Alternative B Improved includes the Middle Ground Blvd extension and the recommended roadway improvements on page 42.