Lassiter Transportation Group, Inc.
Engineering and Planning

Ref: 3826.51

TECHNICAL MEMORANDUM

TO: Clint Smith (Tomoka Holdings)

FROM: Dan D'Antonio, PE, PTOE

DATE: June 24, 2014

RE: Ormond Crossings, Phase A – Roundabout Analysis Summary
Ormond Beach, FL

INTRODUCTION

Lassiter Transportation Group, Inc. (LTG) has been retained by Tomoka Holdings, Inc. to conduct a roundabout analysis for two proposed intersections within the Ormond Crossings property boundary. The two intersections included in the study area are (1) Broadway Avenue and (2) Pine Tree Drive. The intersections are planned to be located on the eastside of I-95, just west of the FEC Railroad in the City of Ormond Beach. The memorandum outlines the analysis methodology and determines the effectiveness of the proposed roundabout configurations.

The following analysis evaluates traffic impacts anticipated for build-out of Phase A and complete build-out of the project using Synchro 7 Software to model the proposed geometry. These conditions were compared to determine the overall effectiveness of the intersection configuration for both phases of the project.

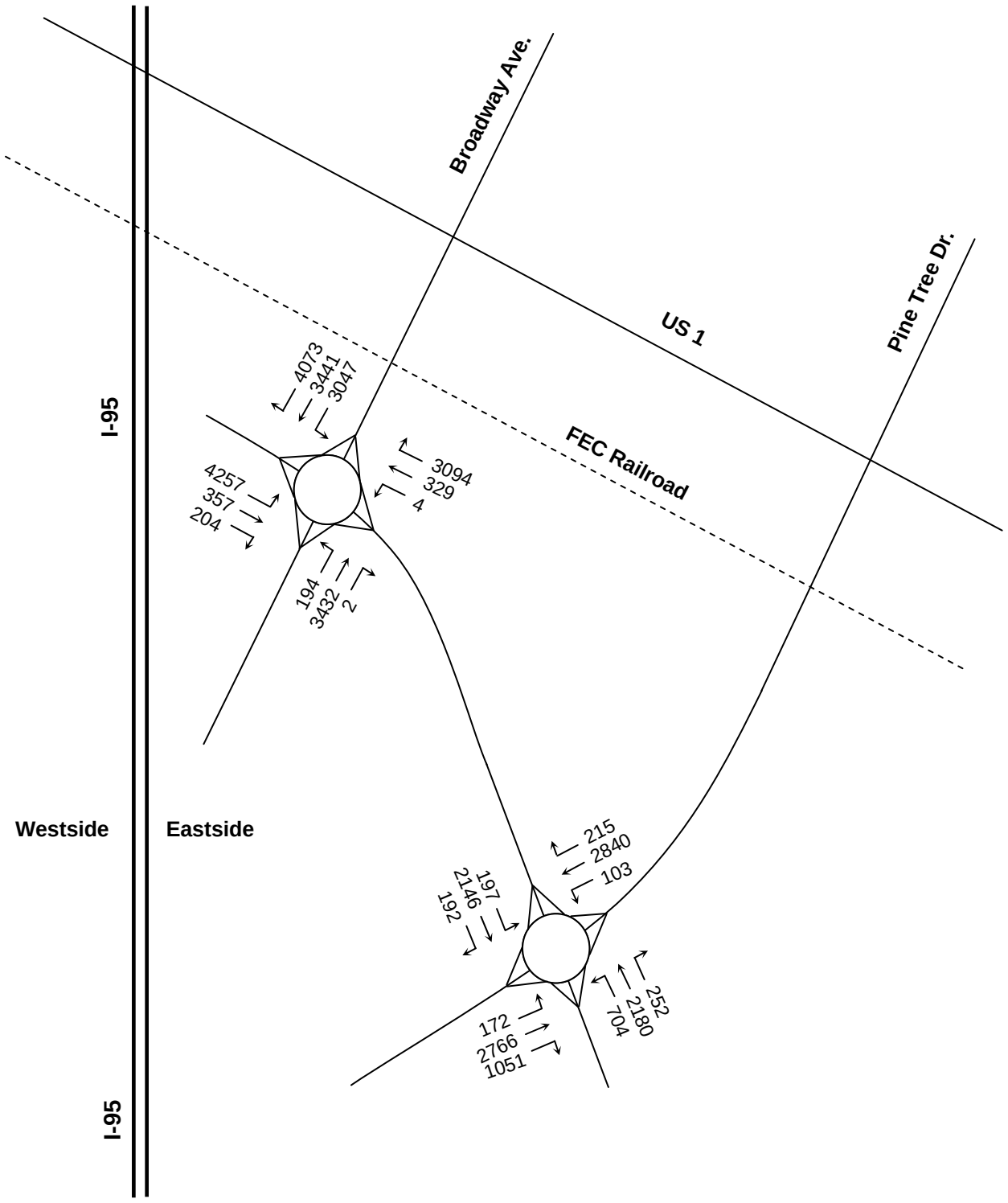
2035 Build-Out Condition

The 2035 build-out condition is the full build-out scenario for the proposed development (east and west-side future traffic). The total daily build-out volumes anticipated to impact the study area intersections were analyzed to test the maximum capacity of the proposed roundabouts located at the study area intersections. The Central Florida Regional Planning Model (CFRPM) was used to obtain the daily build-out volumes (background + project) anticipated at the time of project completion (2035). Figure 1 graphically depicts the projected daily turning movement volumes for each proposed intersection.

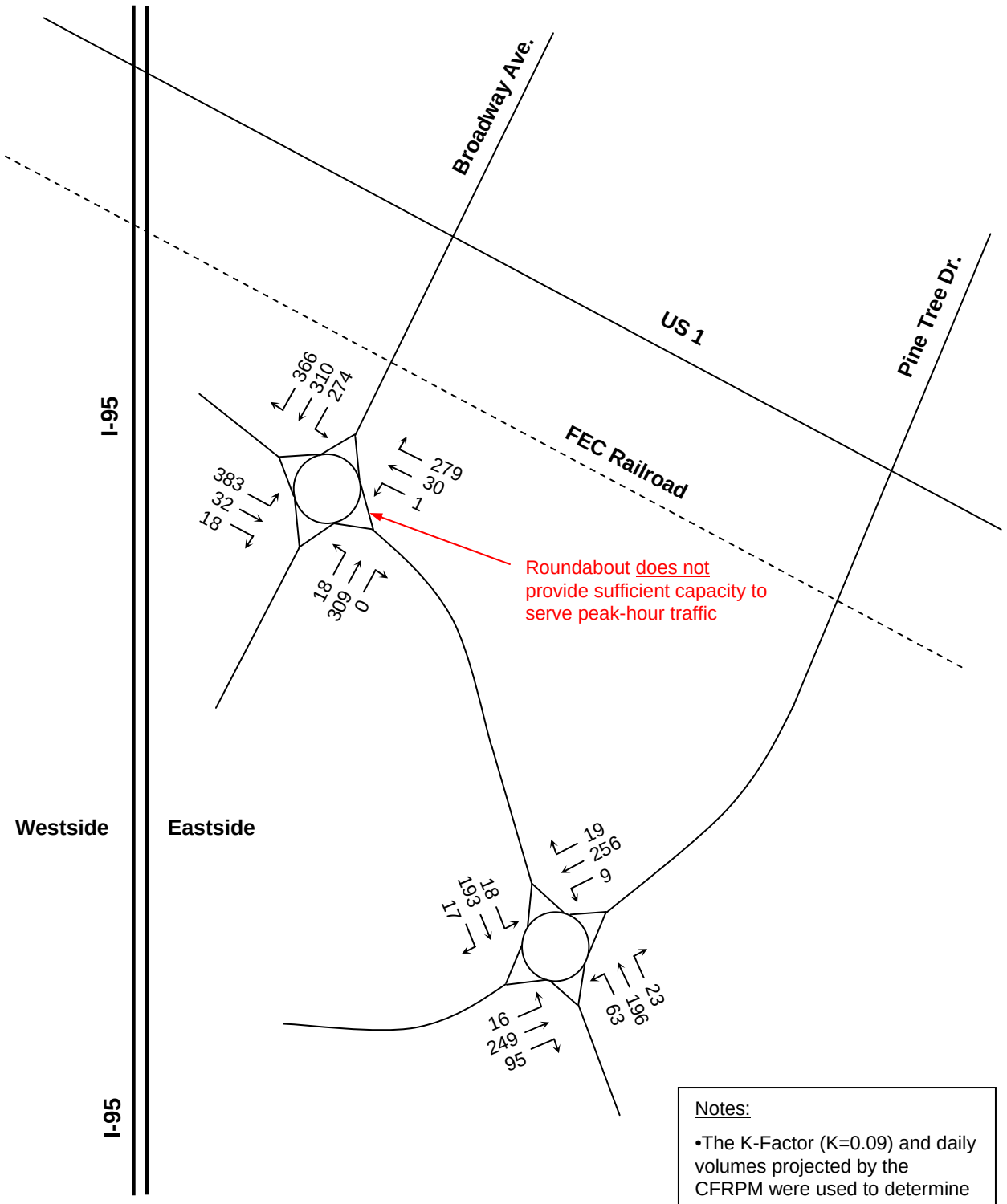
The planning K-factor (0.09) was applied to the total daily build-out volumes to determine the peak-hour traffic expected for full build-out of the project and are graphically depicted in Figure 2. The peak-hour turning movement volumes were then analyzed using Synchro 7 and Highway Capacity Software (HCS) to determine the level of service (LOS). Table 1 provides the results obtained from the HCS analysis under 2035 build-out conditions for the peak-hour. Additionally, constraints due to right-of-way and proximity of the FEC Railroad, queue lengths were observed for each roundabout.

Table 1
2035 Build-Out Peak-Hour Traffic – Roundabout Analysis
Ormond Crossings, Phase A

Intersection	Critical Approach	2035 Build-Out Peak-Hour Volumes		
		Delay (sec.)	LOS	95th% Queue Length (ft.)
Pine Tree Drive	NB	7.9	A	50
Broadway Avenue	WB	43.93	E	475



Ormond Crossings, Phase A	N NTS	**2035 Daily Turning Movement Counts**		*Lassiter Transportation Group, Inc.* *Engineering and Planning*
		Project No.:3826.51	Figure: 1	123 Live Oak Avenue – Daytona Beach, Florida 32114 Telephone: 386.257.2571 Fax: 386.257.6996 EB# 0009227



Notes:

- The K-Factor (K=0.09) and daily volumes projected by the CFRPM were used to determine the p.m. peak-hour turning movement counts.
- Volumes include east and west project traffic

Ormond Crossings, Phase A	N NTS	**2035 Peak-Hour Turning Movement Counts**	Lassiter Transportation Group, Inc. Engineering and Planning
		Project No.:3826.51 Figure: 2	123 Live Oak Avenue – Daytona Beach, Florida 32114 Telephone: 386.257.2571 Fax: 386.257.6996 EB# 0009227

Under the 2035 build-out conditions for the peak-hour, the Pine Tree Drive roundabout operates within an acceptable level of service with minimal delay. However, the Broadway Avenue intersection does not operate acceptably under build-out conditions. The delay and queue length for the westbound direction indicates that the roundabout will not function acceptably under 2035 future traffic and is therefore, not recommended.

Phase A Condition – Broadway Avenue Intersection

The purpose of the Phase A analysis was to establish geometry at Broadway Avenue, with sufficient capacity, intended to serve Phase A traffic and 2035 build-out traffic. The project trip generation was determined by use of the proposed land uses for each stage of development to properly identify project traffic. The proposed land uses are provided in Table 2. Please note that no west side development is anticipated for build-out of Phase A.

Table 2
Land Use Plan (East-Side)
Ormond Crossings, Phase A

Land Use	ITE Code	Size (KSF)	
		Phase A	2035 Build-Out
Industrial	110	45	800
Office	710	607	880
Warehouse	150	175	800
Commercial	820	10	22
Flex Space	770	90	350

The land use plan and ITE *Trip Generation Manual, 9th Edition*, was used to calculate the anticipated project traffic for each stage of development. The total daily project traffic for 2035 full build-out is 22,469 vehicles. Phase A total daily project traffic equals 10,669 vehicles; 47.48% of the total trip generation.

Phase A peak-hour traffic volumes were calculated by reducing the total peak-hour traffic volumes, provided in Figure 2, by 47.48%. However, since the west side of the project is included in the peak-hour turning movement volumes and is not included in Phase A, these trips were removed from the analysis. The project trip distribution included in the Traffic Impact Study, dated January 2010 reflects that 16% of total project traffic is expected to utilize the Broadway Avenue intersection via the north-west leg. This internal road will provide access to the west-side of the project under build-out conditions. A 16% reduction factor was applied to the turning movements utilizing the “west-side connection” to remove these trips from the Phase A analysis. The HCS results for the Phase A peak-hour analysis are provided in Table 3.

Table 3
Phase A Peak-Hour Traffic – All-Way Stop Controlled
Ormond Crossings, Phase A

Intersection	Critical Approach	Phase A		2035 Build-Out	
		Delay (sec.)	LOS	Delay (sec.)	LOS
Broadway Avenue	WB	17.04	C	745.92	F

The all-way stop controlled intersection reduces overall delay and level of service at Broadway Avenue. However, under the 2035 build-out conditions the intersection will need additional capacity. Due to the increase in traffic under the 2035 build-out condition, the following improvements are recommended to improve delay and LOS upon completion of the development:

- Addition of exclusive turn lanes: southbound left-turn lane, northbound right-turn lane and westbound left-turn lane
- Signalization

The proposed improvements were analyzed under the 2035 build-out condition for the peak-hour. The HCS and Synchro 7 results are provided in Table 4. Please note that optimization was used to determine appropriate signal timings and splits.

Table 4
2035 Build-Out Peak-Hour Traffic – Signalized Intersection
Ormond Crossings, Phase A

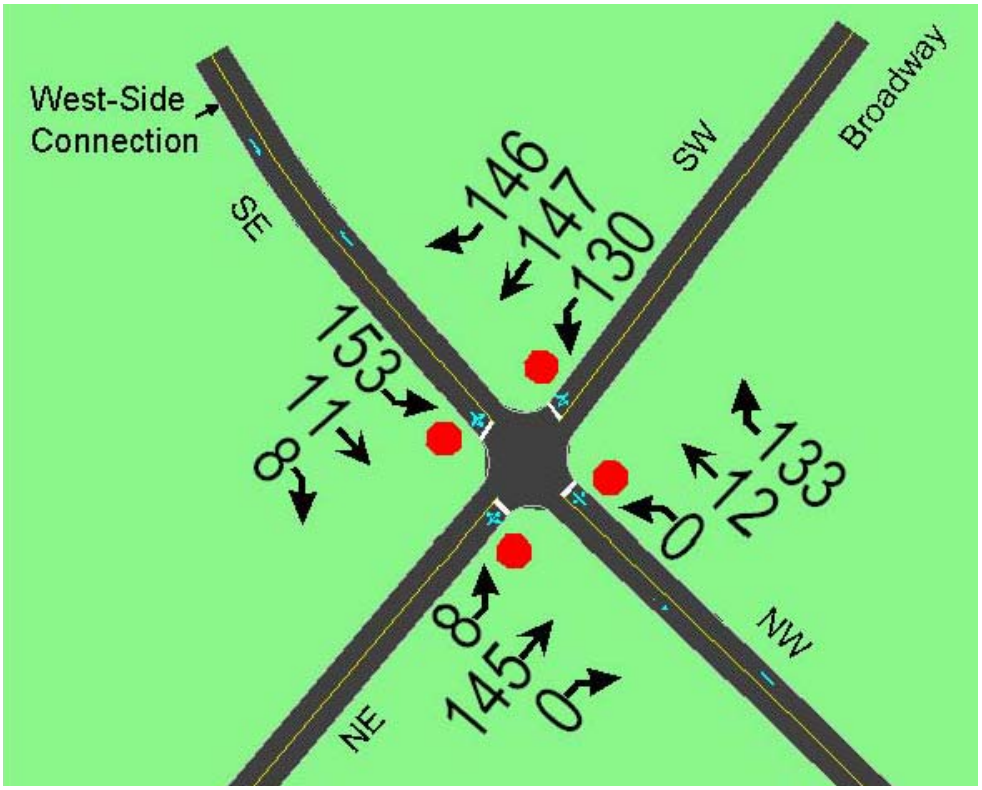
Intersection	HCS Results		Synchro 7 Results	
	Delay (sec.)	LOS	Delay (sec.)	LOS
Broadway Avenue	26.3	C	25.2	C

Recommendations

The Pine Tree Drive roundabout will provide a sufficient amount of capacity and operate within an acceptable level of service under 2035 build-out peak-hour conditions. However, the proposed roundabout at the Broadway Avenue intersection is not recommended due to the lack of capacity provided, and proximity to the railroad, to accommodate the anticipated 2035 build-out traffic during the peak-hour.

The geometry configuration at the Broadway Avenue intersection is recommended to be an all-way stop controlled intersection upon completion of Phase A. However, prior to 2035 build-out, it is recommended that the all-way stop intersection be expanded to include turn lanes and signalized to accommodate for the increase in future traffic. The proposed lane configurations for the all-way stop controlled and future signalized intersection are graphically depicted in Figure 3.

Phase A Traffic (Peak-Hour)

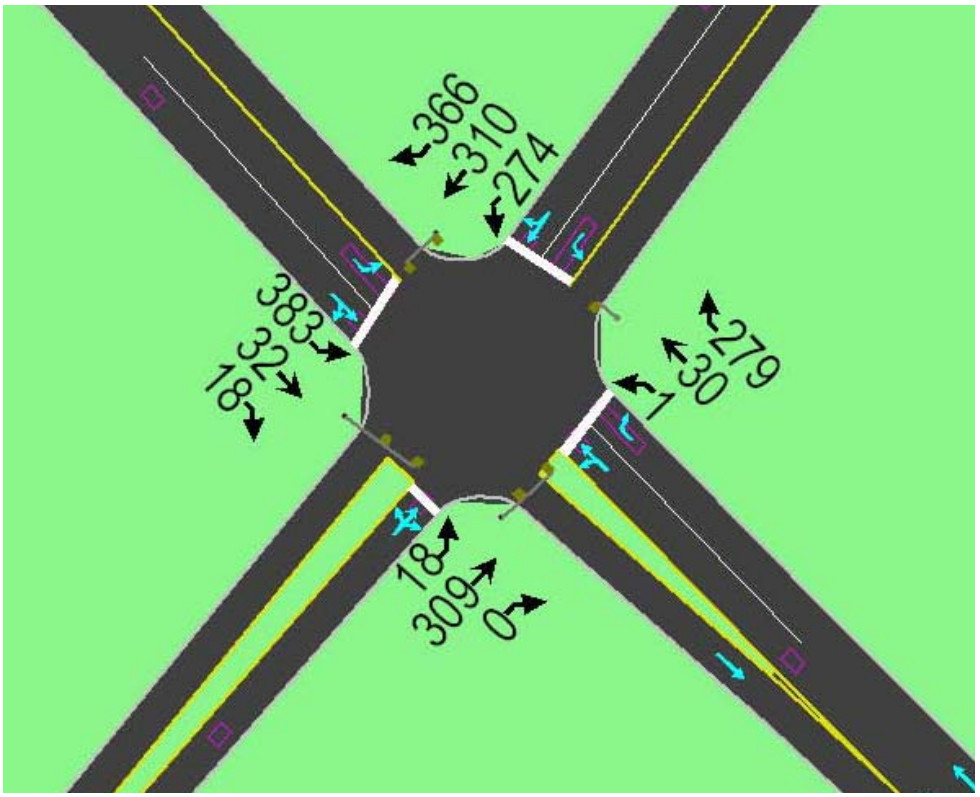


Notes:

•Peak-hour turning movement counts have been reduced by 47.48% to estimate Phase A traffic at the study area intersection

•Since the west-side of the development is not anticipated for build-out of Phase A, the reduction factor of 16% has also been applied to those movements utilizing the west-side access road

2035 Build-Out Traffic (Peak-Hour)



Notes:

•Turn lanes and signalization are recommended to improve intersection level of service upon completion of the final stage of the project to serve 2035 future traffic.

•Turn lane lengths should be provided to accommodate modeled queue lengths per direction obtained from the intersection simulation software, SimTraffic.

Ormond Crossings, Phase A	N NTS	**Proposed Lane Configuration – Broadway Avenue** Project No.:3826.51 Figure: 3	*Lassiter Transportation Group, Inc.* *Engineering and Planning* 123 Live Oak Avenue – Daytona Beach, Florida 32114 Telephone: 386.257.2571 Fax: 386.257.6996 EB# 0009227

The recommended turn lanes for the 2035 build-out condition should be designed based on the queue length per direction to accommodate the increase in traffic. The queue lengths obtained from SimTraffic are provided in Table 2.

Table 2
Queue Lengths – Broadway Avenue
Ormond Crossings, Phase A

Direction of Traffic	95th Percentile Queue Length (ft)	Total Required Queue Length (ft)
SW	116	125
NW	58	75
NE	66	75
SE	96	100

If you have any questions or comments, please feel free to call me at (386) 257-2571.

Sincerely,

LASSITER TRANSPORTATION GROUP, INC.

Daniel M. D'Antonio, PE, PTOE
Project Manager

.