

TRAFFIC IMPACT ANALYSIS

MAITLAND STATION
MAITLAND, FLORIDA



Prepared for:

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TPD № 4598

PROFESSIONAL ENGINEERING CERTIFICATION

I hereby certify that I am a Professional Engineer properly registered in the State of Florida practicing with Traffic Planning & Design, Inc., a corporation authorized to operate as an engineering business, EB-3702, by the State of Florida Department of Professional Regulation, Board of Professional Engineers, and that I have prepared or approved the evaluations, findings, opinions, conclusions, or technical advice attached hereto for:

PROJECT: Maitland Station
LOCATION: Maitland, Florida
CLIENT: Epoch Properties, Inc.

I hereby acknowledge that the procedures and references used to develop the results contained in these computations are standard to the professional practice of Transportation Engineering as applied through professional judgment and experience.

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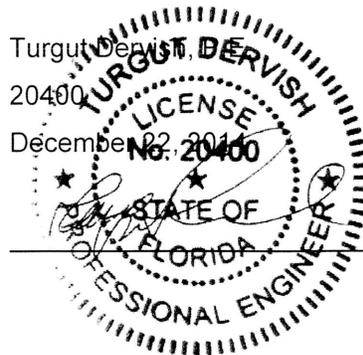


TABLE OF CONTENTS

	Page
Introduction	1
Existing Traffic Conditions	4
Roadway Segment Analysis	
Intersection Capacity Analysis	
PROPOSED DEVELOPMENT AND TRIP GENERATION	9
Trip Generation	
Trip Distribution/Trip Assignment	
Projected Traffic Conditions	13
Roadway Segment Analysis	
Intersection Analysis	
Site Access	
Sidewalk and Pedestrian Facilities	
Transit Accessibility	
Turn Lane Analysis	
Conclusions	18
Appendices	20
APPENDIX A Study Methodology	
APPENDIX B Intersection Counts / Seasonal Factors & Signal Timings	
APPENDIX C Existing HCS Capacity Worksheets	
APPENDIX D Trends Analysis Charts	
APPENDIX E Projected HCS Capacity Worksheets	

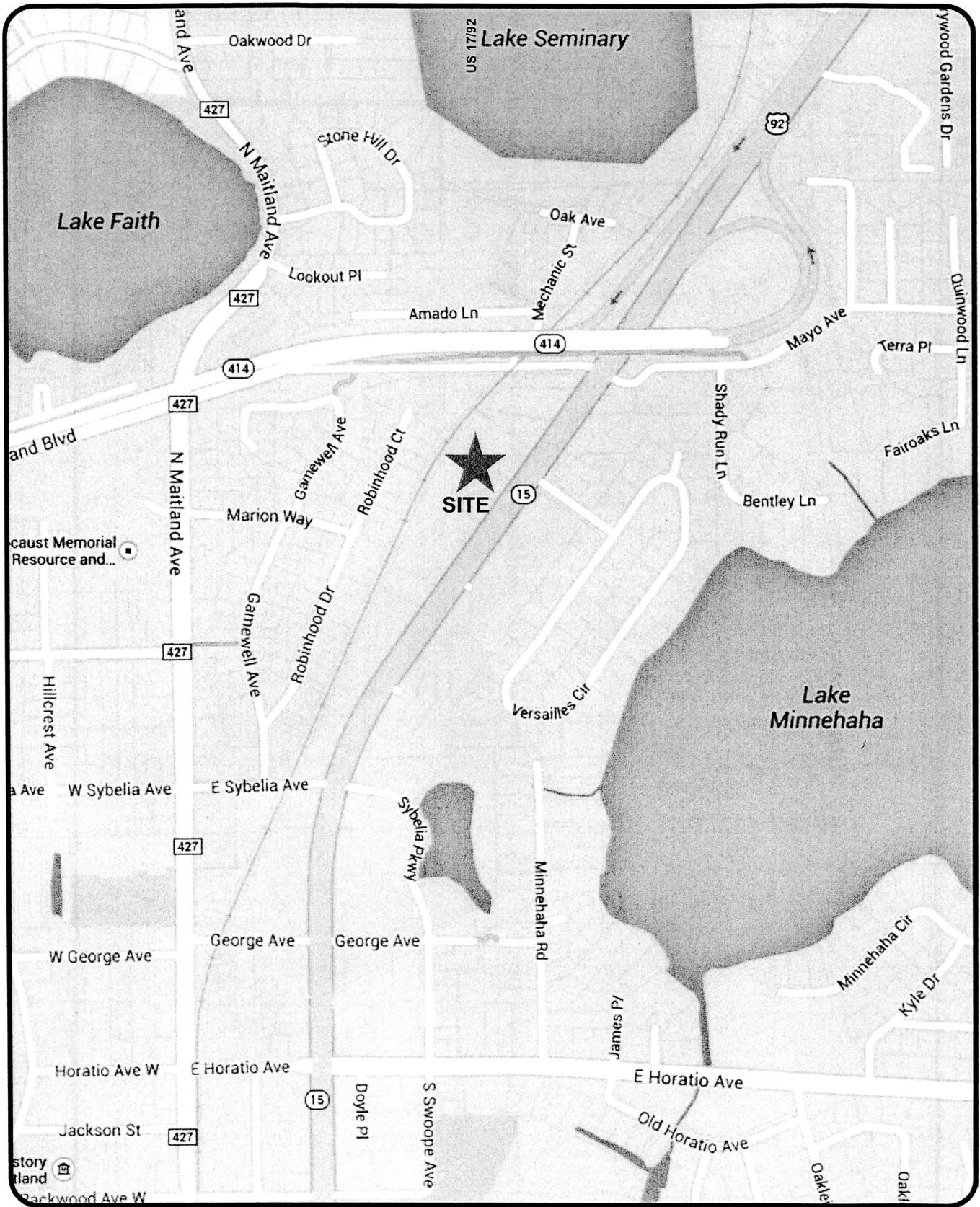
TABLE OF CONTENTS, continued

LIST OF TABLES

	Page
Table 1 Existing Peak Hour Roadway Segment Analysis.....	5
Table 2 Existing Intersection Capacity Analysis	6
Table 3 Trip Generation Calculation Summary	10
Table 4 Projected Peak Hour Roadway Segment Capacity Analysis	13
Table 5 Projected Intersection Capacity Analysis.....	14
Table 6 Left Turn Lane Determination	17

LIST OF FIGURES

Figure 1 Site Location Map	2
Figure 2 Conceptual Site Plan	3
Figure 3 Existing AM Peak Hour Traffic Volumes	7
Figure 4 Existing PM Peak Hour Traffic Volumes	8
Figure 5 Project Trip Distribution	11
Figure 6 Project Trip Assignment.....	12
Figure 7 Projected AM Peak Hour Traffic Volumes	15
Figure 8 Projected PM Peak Hour Traffic Volumes	16



Maitland Station
Project No 4598

Figure 1

Site Location



EXISTING TRAFFIC CONDITIONS

An analysis of the existing traffic conditions of the roadways/intersections was conducted to determine their current operating conditions in terms of Levels of Service. This included the following roadway segments and intersections:

Roadway Segments

US 17-92

Maitland Boulevard to Sybelia Avenue

Sybelia Avenue to Horatio Avenue

Horatio Avenue to Packwood Avenue

Maitland Boulevard

Maitland Avenue to US 17-92

Horatio Avenue

US 17-92 to Dommerich Drive

Intersections

- US 17-92 and Greenwood Drive/Mayo Avenue
- US 17-92 and Sybelia Avenue
- US 17-92 and Horatio Avenue
- US 17-92 and Packwood Avenue
- Site Access Driveways

The roadways and intersections were analyzed for both the AM and PM highway peak hours.

Roadway Segment Analysis

A capacity analysis was conducted for the study roadway segments by comparing their peak hour directional capacities at the adopted Level of Service (LOS) with the respective AM and PM peak hour volumes. The AM/PM peak hour volumes used in the analysis were determined from the turning movement counts at the study intersections. This analysis is summarized in **Table 1**. This table shows the roadway segments, their number of lanes, adopted LOS/capacity values, peak hour volumes and resultant Levels of Service. This analysis indicates that the study roadways currently operate at satisfactory Levels of Service.



**Table 1
Existing Peak Hour Roadway Segment Analysis**

Roadway Segment	No. of Lanes	Period	Adopted LOS		Peak Direction	PHPD Volume	LOS
			Standard	Capacity			
US 17-92							
Packwood Ave to Horatio Ave	6	AM	E	3,020	SB	2,352	C
		PM	E	3,020	NB	2,336	C
Horatio Ave to Sybelia Ave	6	AM	E	3,020	SB	1,592	C
		PM	E	3,020	NB	1,327	C
Sybelia Ave to Maitland Blvd*	6	AM	E	3,020	SB	1,832	C
		PM	E	3,020	NB	1,653	C
Maitland Blvd							
Maitland Ave to US 17-92*	4	AM	D	2,000	WB	1,721	C
		PM	D	2,000	EB	1,429	C
Horatio Ave							
US 17-92 to Dommerich Dr	4	AM	E	1,800	WB	1,381	C
		PM	E	1,800	EB	1,569	C

*From FDOT Hourly 2013 Counts

Intersection Capacity Analysis

A capacity analysis was conducted for each intersection utilizing existing AM and PM peak hour volumes, existing intersection geometry and signal timing data. The AM and PM peak hour volumes (or counts) were collected by TPD personnel and from counts provided by the City. These counts were adjusted with the use of FDOT seasonal factors and are summarized in **Figures 3 and 4**. The unadjusted or raw intersection count data and the seasonal factors are included in **Appendix B** along with signal timing data provided by the City. The analysis was accomplished with the use of HCS software in accordance with the procedures of the *2010 Highway Capacity Manual*. The results of the intersection analysis are summarized in **Table 2** and HCS capacity worksheets are included in **Appendix C**. The results of the intersection capacity analysis indicate that the study intersections currently operate at acceptable overall Levels of Service, LOS E or better.

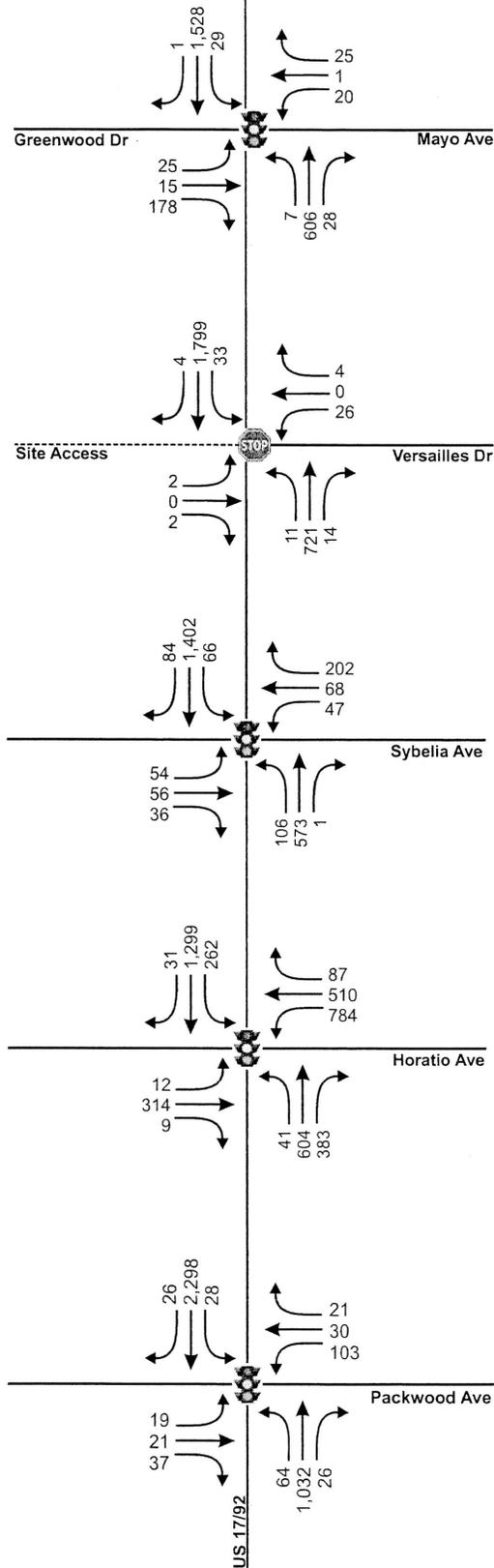
A further review of the capacity analysis results reveals the minor street approaches to US 17-92 operate at LOS F during the AM and PM peak periods on Sybelia Avenue, Horatio Avenue and Packwood Avenue. This is due to the coordinated signal system which allocates maximum green time to the heavy traffic volumes on US 17-92 and reduces the amount of green time for the minor streets resulting in lengthy delays.



**Table 2
Existing Intersection Capacity Analysis**

Intersection	Control	Period	EB		WB		NB		SB		Overall	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
US 17-92 & Greenwood Dr/Mayo Ave	Signal	A.M.	42.6	D	37.5	D	14.9	B	19.4	B	20.6	C
		P.M.	72.7	E	47.1	D	16.5	B	13.5	B	22.2	C
Us 17-92 & Site Access Driveway	Signal	A.M.	23.7	C	20.7	C	11.9	B	8.7	A	-	-
		P.M.	17.9	C	17.8	C	9.2	A	11.7	B	-	-
US 17-92 & Sybelia Ave	Signal	A.M.	102.2	F	295.1	F	26.1	C	25.0	C	61.2	E
		P.M.	119.5	F	106.0	F	26.6	C	26.3	C	38.0	D
US 17-92 & Horatio Ave	Signal	A.M.	84.2	F	74.8	E	43.1	D	53.4	D	60.3	E
		P.M.	101.2	F	92.2	F	62.6	E	57.9	E	70.4	E
US 17-92 & Packwood Ave	Signal	A.M.	64.6	E	79.1	E	7.8	A	12.0	B	13.9	B
		P.M.	74.9	E	95.1	F	16.7	B	12.4	B	20.4	C



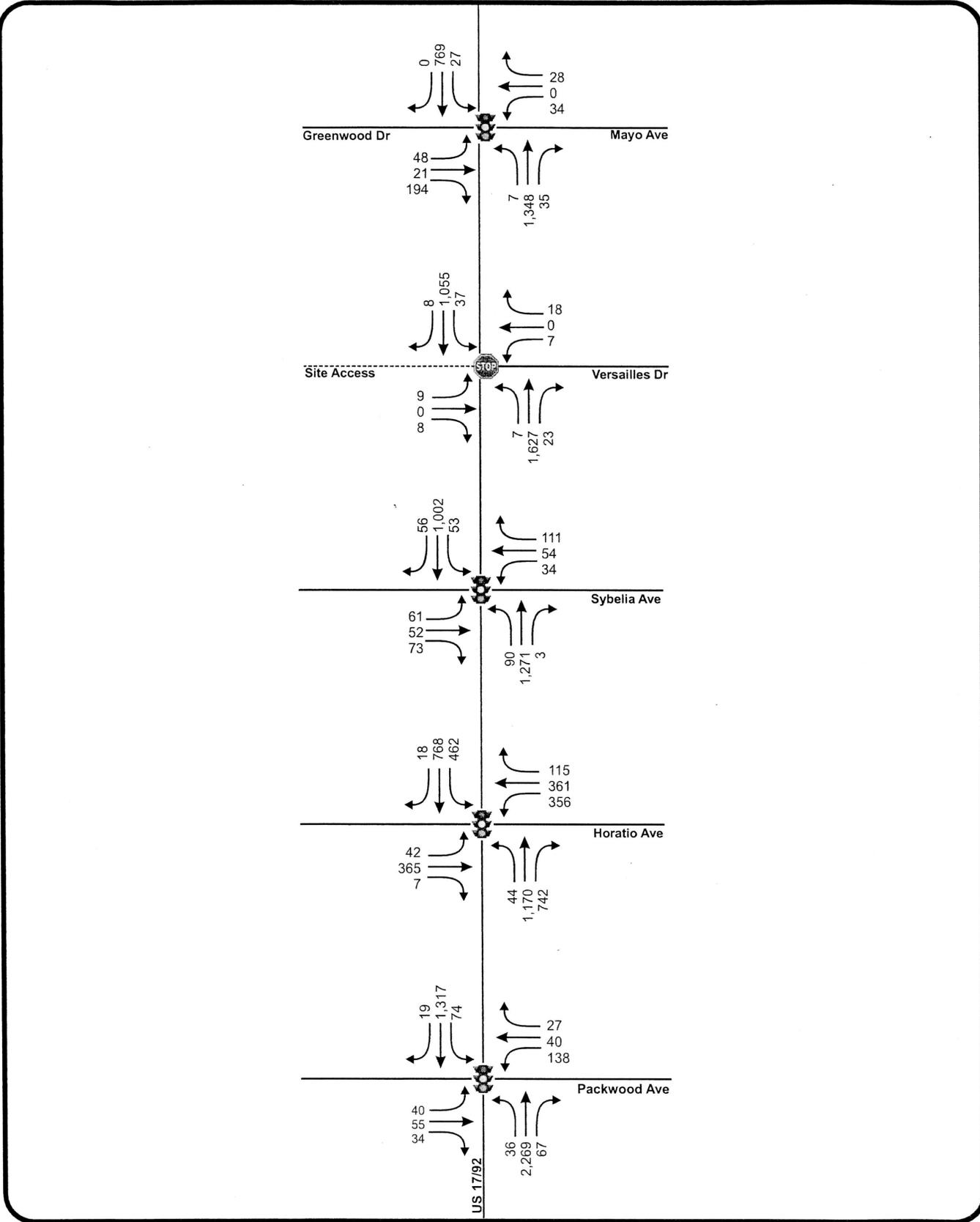


Maitland Station
Project No 4598

Figure 3

**Existing A.M. Peak Hour
Traffic Volumes**





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 Project № 4598
 Figure 4

**Existing P.M. Peak Hour
 Traffic Volumes**



PROPOSED DEVELOPMENT AND TRIP GENERATION

The proposed development consists of 293 apartment units in 5-story buildings with a parking garage. To determine the impact of this development, an analysis of its trip generation characteristics was conducted. This included the determination of the trips to be generated along with their distribution and assignment to the study roadways.

Trip Generation

Trip generation data from the 9th Edition of the ITE *Trip Generation Manual* were used to estimate the number of trips that will be generated by the proposed development. A summary of the trip generation calculation is provided in **Table 3**. This table also shows the trip generation of the commercial buildings that currently occupy the project site.

The proposed development is estimated to generate 1,412 new daily trips, of which 107 will occur in the AM peak hour and 130 in the PM peak hour. Subtracting the trip generation of the existing shopping center results in 1,031 new net daily trips, 95 new net AM peak hour trips and 98 new net PM hour trips to be added to the area roadways as a result of the proposed development.

Trip Distribution/Trip Assignment

A trip distribution pattern for the proposed development was determined with the use of the 2015 E+C network of the 2030 OUATS model along with a select zone analysis. This distribution is illustrated in **Figure 5** which shows the percent distribution of the project trips on major roadways converging upon the site. An areawide model distribution plot is included in the Study Methodology in Appendix A. Utilizing this distribution the development's new net AM and PM peak hour trips were assigned to the area roadways as shown in **Figure 6**.



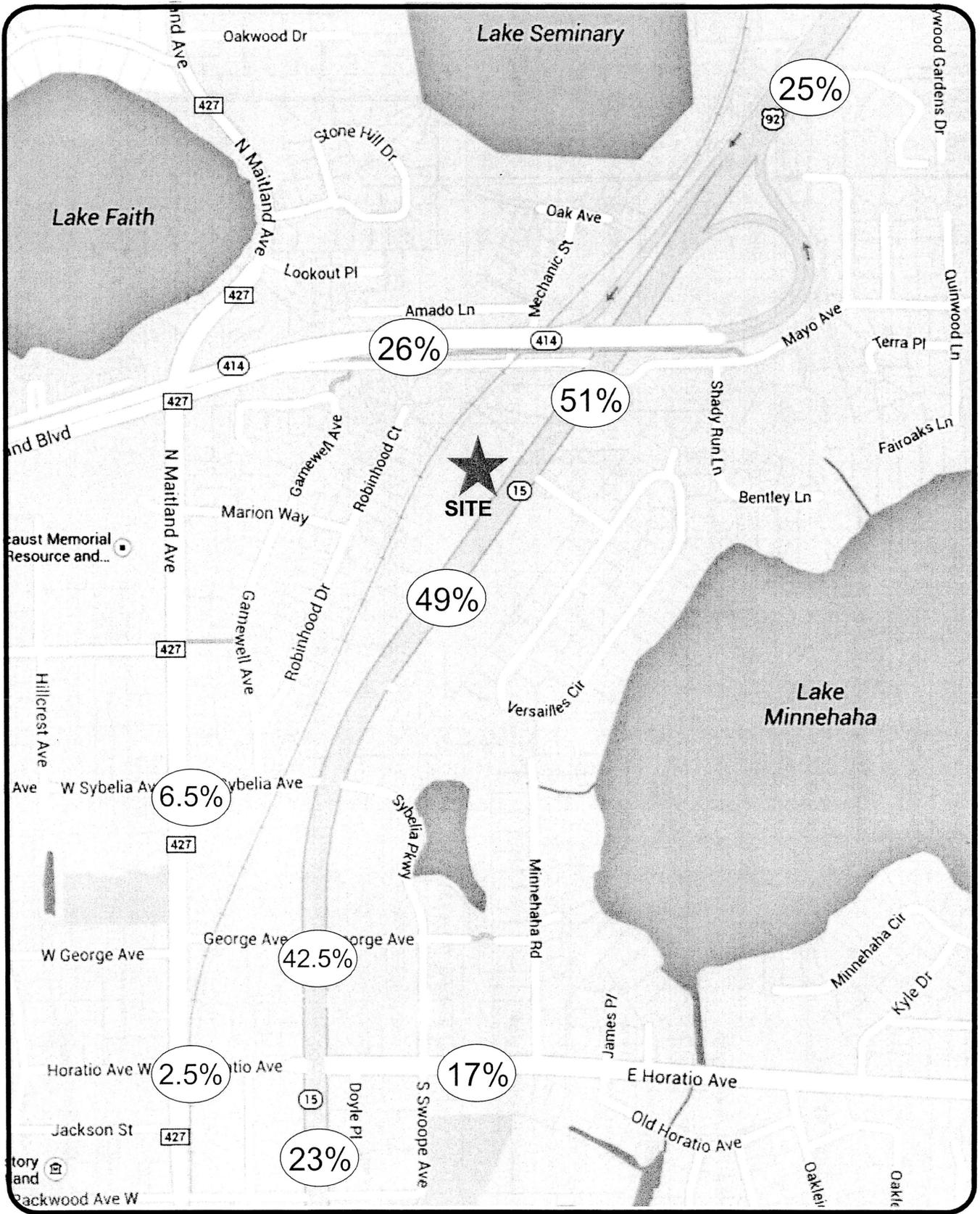
**Table 3
Trip Generation Calculation Summary**

Proposed Development													
ITE Code	Land Use	Size*	Daily Trips			A.M. Peak Hour Generation			P.M. Peak Hour Generation				
			Rate	Trips	Trips	Rate	Enter	Exit	Total	Rate	Enter	Exit	Total
223	Mid-Rise Apartments	293 DU	4.82	1,412	74	0.365	33	74	107	0.44	75	55	130
	Total Trips		--	1,412	74	--	33	74	107	--	75	55	130
Existing Development													
ITE Code	Land Use	Size*	Daily Trips			A.M. Peak Hour Generation			P.M. Peak Hour Generation				
			Rate	Trips	Trips	Rate	Enter	Exit	Total	Rate	Enter	Exit	Total
820	Retail Commercial	9.792 KSF	42.7	418	3	0.96	6	3	9	3.71	17	19	36
942	Automobile Care Center	4.103 KSF	39.0**	160	3	2.25	6	3	9	3.11	6	7	13
	Total Trips		--	578	6	--	12	6	18	--	23	26	49
	Pass-by Trips (34%)		--	197	2	--	4	2	6	--	8	9	17
	Existing Net New Trips		--	381	4	--	8	4	12	--	15	17	32
	Trip Increase Due to Redevelopment		----	1,031	70	----	25	70	95	----	60	38	98

* DU = Dwelling Unit, KSF = Thousand Square Feet

** ITE does not have a daily rate, Estimated from the P.M. peak hour using K=0.091





Maitland Station
 Project No 4598
 Figure 5

Project Trip Distribution



PROJECTED TRAFFIC CONDITIONS

Projected traffic conditions for the proposed development were analyzed for the development's anticipated completion within two years. Therefore, projected traffic conditions were determined by expanding existing traffic volumes to 2016, the buildout year of the development, to obtain background traffic volumes and then adding the project trips plus the approved Maitland City Center trips. Background traffic volumes were determined by applying an annual growth rate of 1% or growth factor of 1.02 to the existing traffic volumes. A trends analysis of historical traffic volumes on US 17-92, Horatio Avenue and Maitland Boulevard revealed a negative growth trend. The trends analysis charts are included in **Appendix D**.

Roadway Segment Analysis

A capacity analysis was performed for the study roadway segments similar to the existing conditions analysis by comparing their projected traffic volumes in the AM and PM peak hours with the respective segment LOS capacity at the adopted LOS standard. **Table 5** summarizes the results of this analysis which shows the roadway segments, their number of lanes, adopted LOS/capacity values and resultant Levels of Service. The results show that the study roadway segments will operate at satisfactory LOS under the projected conditions in 2016 with the addition of project trips.

Table 4
Projected Peak Hour Roadway Segment Capacity Analysis

Roadway Segment	No. of Lanes	Period	Adopted LOS		Peak Direction	PHPD Volume			LOS
			Standard	Capacity		Background	Project	Total	
US 17-92									
Packwood Ave to Horatio Ave	6	AM	E	3,020	SB	2,399	16	2,415	C
		PM	E	3,020	NB	2,383	14	2,396	C
Horatio Ave to Sybelia Ave	6	AM	E	3,020	SB	1,624	29	1,653	C
		PM	E	3,020	NB	1,354	25	1,379	C
Sybelia Ave to Maitland Blvd	6	AM	E	3,020	SB	1,886	34	1,920	C
		PM	E	3,020	NB	1,829	29	1,858	C
Maitland Blvd									
Maitland Ave to US 17-92	4	AM	D	2,000	WB	1,755	18	1,773	C
		PM	D	2,000	EB	1,458	15	1,473	C
Horatio Ave									
US 17-92 to Dommerich Dr	4	AM	E	1,800	WB	1,409	4	1,412	C
		PM	E	1,800	EB	1,600	6	1,607	C



Intersection Analysis

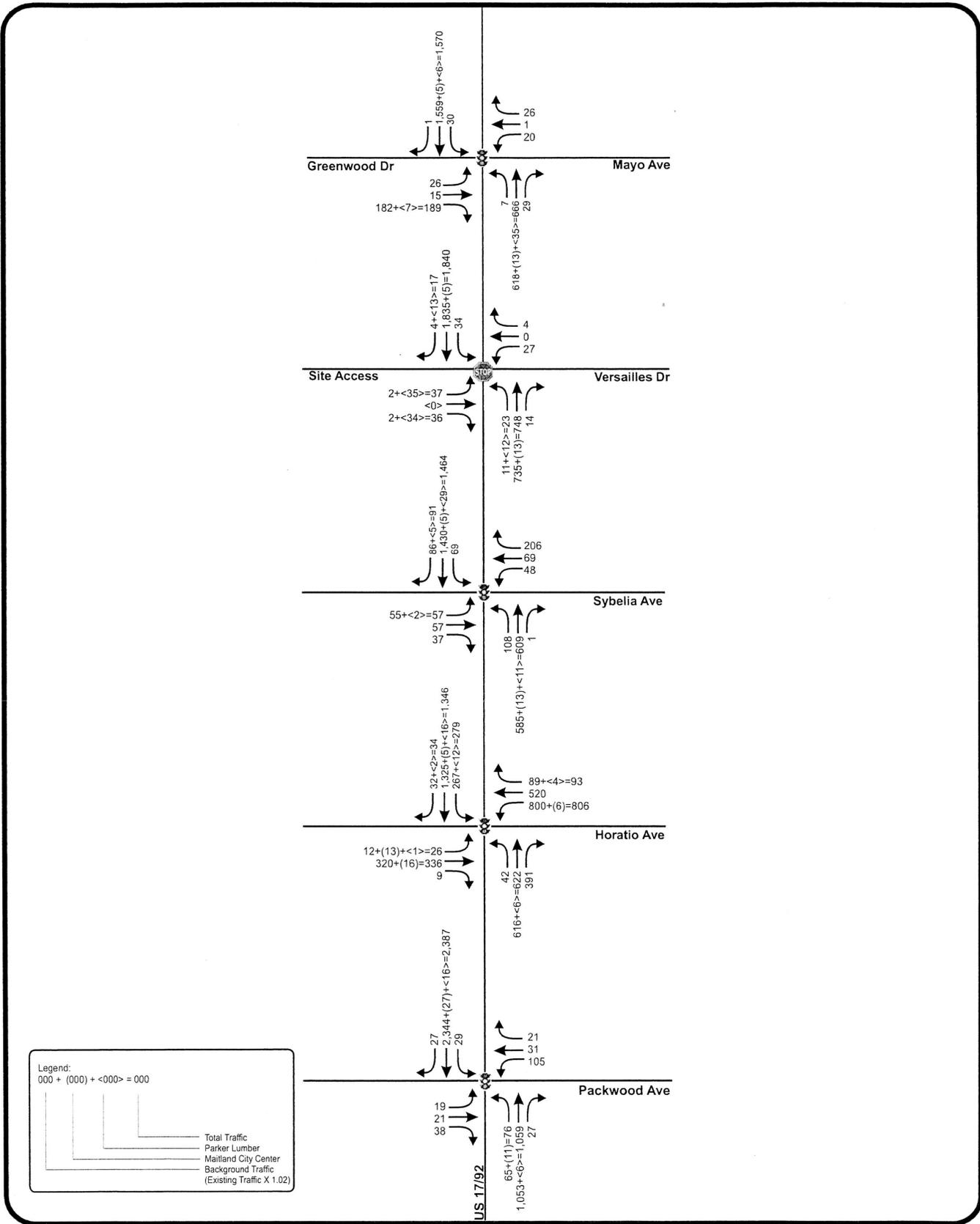
To assess the projected operational conditions at the study intersections, a capacity analysis was conducted for each intersection using projected traffic volumes. The intersections were analyzed for the projected AM and PM peak hour volumes using the *Highway Capacity Software (HCS)*. Projected peak hour volumes were determined by adding project trips to the background intersection volumes. The projected traffic volumes are shown in **Figures 7** for the AM peak hour and **Figures 8** for the PM peak hour.

The results of the intersection capacity analysis for projected conditions are included in the HCS worksheets in **Appendix E**. These results indicate acceptable overall levels of service similar to the existing conditions analysis. Even though the intersections are projected to operate at an acceptable Level of Service according to the adopted LOS standard of E, the minor street approaches to US 17-92 on Sybelia Avenue, Horatio Avenue and Packwood Avenue will operate at LOS F due to the coordinated signal timing which favors the heavy traffic volumes on US 17-92 reducing the amount of green time for the minor streets.

**Table 5
Projected Intersection Capacity Analysis**

Intersection	Control	Period	EB		WB		NB		SB		Overall	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
US 17-92 & Greenwood Dr/Mayo Ave	Signal	A.M.	43.6	D	37.5	D	15.5	B	20.2	C	21.3	C
		P.M.	51.7	D	47.1	D	18.7	B	14.8	B	21.7	C
US 17-92 & Site Access Driveway	Signal	A.M.	38.8	E	23.6	C	12.4	B	8.7	A	-	-
		P.M.	22.2	C	19.3	C	9.6	A	11.9	B	-	-
US 17-92 & Sybelia Ave	Signal	A.M.	82.3	F	79.3	E	31.7	C	34.0	C	41.2	D
		P.M.	98.3	F	97.8	F	27.9	C	27.8	C	37.2	D
US 17-92 & Horatio Ave	Signal	A.M.	66.1	E	56.2	E	53.3	D	63.9	E	59.3	E
		P.M.	94.8	F	94.0	F	65.5	E	76.6	E	76.9	E
US 17-92 & Packwood Ave	Signal	A.M.	63.7	E	79.9	E	8.7	A	13.1	B	15.2	B
		P.M.	73.1	E	95.4	F	17.8	B	13.6	B	21.6	C

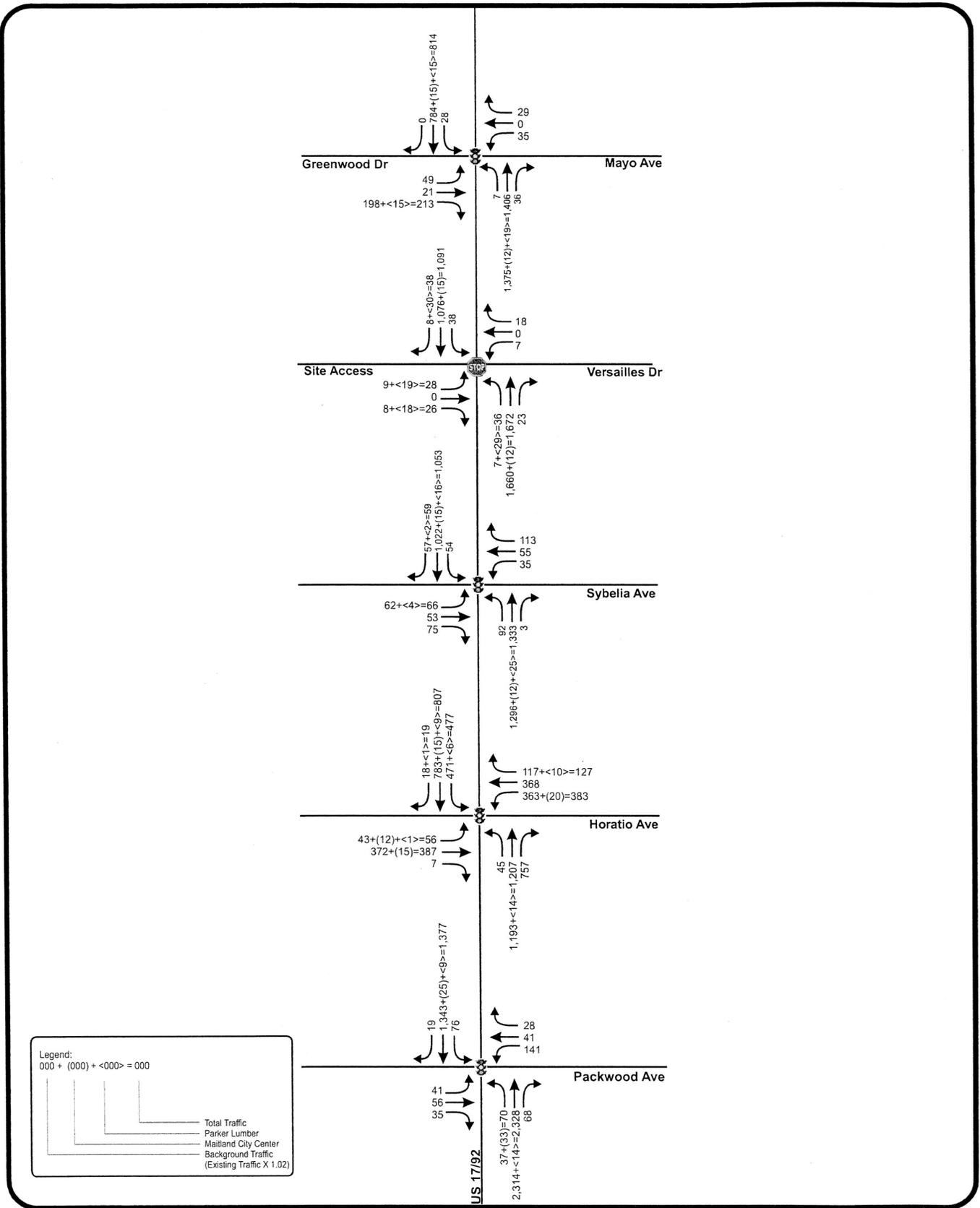




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 Project No 4598
 Figure 7

**Projected A.M. Peak Hour
 Traffic Volumes**





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 Project No 4598
 Figure 8

**Projected P.M. Peak Hour
 Traffic Volumes**



Site Access

The project is proposed to be served by one full driveway, as well as a secondary right in/out driveway on US 17-92.

Sidewalk and Pedestrian Facilities

The existing/proposed sidewalks on the roadways surrounding the site will provide internal and external pedestrian connectivity to the proposed development. The Maitland Station project will include sidewalk improvements along 17-92 as required by the City of Maitland. These improvements will include the sidewalk, benches, trash receptacles, and bike racks. Additionally, the project will provide on-site sidewalks and bike racks for residents.

Transit Accessibility

The project site is strategically located with respect to transit service in the area. The area is served by Lynx which provides fixed bus service along US 17-92 with bus stops in close proximity to the site. Link 102, Orange Avenue to SR 436, runs from Lynx Central Station in Downtown Orlando to SR 436 in Casselberry from 5:00 AM to 11:50 PM with 15-minute headways during peak hours. Additionally, SunRail operates along the existing CSX Railroad corridor with its Maitland station adjacent to the project site.

Turn Lane Analysis

A separate left turn lane on US 17-92 is required for this development to serve the project trips. The length of the left-turn lane was determined to be 260 feet based on the values listed in **Table 6**. The queue length used is based on the HCS analysis shown in Appendix E, which showed a 95th percentile back of queue of one vehicle. However, a minimum of 75 feet is recommended. The deceleration distance is determined to be 185 feet for a speed limit of 45 mph on a curbed roadway based upon FDOT Design Index 301.

Table 6
Left Turn Lane Determination

Left-Turn Lane Length	
Deceleration Distance (ft)	185
Queue Length (ft)	75
Length of Left Turn Lane (ft)	260



CONCLUSIONS

This traffic analysis was conducted in order to assess traffic impact of the proposed Maitland Station, a residential development in Maitland, Florida. Located on US 17-92 adjacent to SunRail station and opposite Versailles Drive, the project site consists of 293 mid-rise apartment units. The following is a summary of the conclusions of the traffic analysis:

- The proposed development will generate 1,412 new trips, 107 AM peak hour trips and 130 PM peak hour trips to be added to the area roadways. Subtracting the trip generation of the existing shopping center results in 1,031 new net daily trips, 95 new net AM peak hour trips and 98 new net PM hour trips to be added to the area roadways as a result of the proposed development.
- The generated trips were distributed and assigned to the area's major roadways and intersections within a one-half mile impact area. The analysis of the major roadways within the one-half mile impact area revealed that these roadways consisting of US 17-92, Horatio Avenue and Maitland Boulevard currently operate at satisfactory Levels of Service and will continue to do so at project buildout in 2016 with project trips added.
- The analysis of the study intersections revealed that these intersections currently operate at acceptable overall Levels of Service, LOS E or better during both the AM and PM peak hours. The same overall levels of service will continue to prevail with the completion of the project in 2016. However, the minor street approaches to US 17-92 experience lengthy delays and will continue to do so at project buildout in 2016. This is due to the coordinated signal timing which favors the heavy traffic volumes on US 17-92 and reduces the amount of green time for the minor streets.
- The project will be served by via a primary access driveway on US 17-92, which will satisfactorily accommodate the trip generation of the proposed development. In addition, the development will have a secondary right in/out driveway on US 17/92.



- The Maitland Station project will include sidewalk improvements along 17-92 as required by the City of Maitland. These improvements will include the sidewalk, benches, trash receptacles, and bike racks. Additionally, the project will provide on-site sidewalks and bike racks for residents.
- The project site is strategically located adjacent to the SunRail's Maitland station, and in close proximity to Lynx facilities. Lynx buses provide service along US 17-92 with bus stops within one-half mile of the site.
- A separate left turn lane is required on US 17-92 at the site access driveway. The length of the left-turn lane is recommended to be 260 feet.

