January, 2006

Traffic Impact Study

Study Location: Truman Waterfront

Prepared for City of Key West

Engineer's Certification

I Javier S. Gonzalez, certify that I currently hold on active Professional Engineer's License in the State of Florida and am competent through education and experience to provide engineering services in the civil and traffic engineering disciplines contained in this report. I further certify that this report was prepared by me or under my responsible charge as defined in Chapter 61G15-18.001 F.A.C. and that all statements, conclusions and recommendations made herein are true and correct to the best of my knowledge and ability.

PROJECT: **Traffic Impact Study**
LOCATION: **Truman Waterfront**

Javier S. Gonzalez
PE 49432

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1. Introduction

G. M. Selby and Associates, Inc. in association with Advanced Transportation Engineering Consultants, Inc were retained by the City of Key West to perform a traffic impact study for the Truman Waterfront Development. This is a multi-use development on 33 Acres of former US Navy property. The purpose of this study is to assess the traffic impacts of the proposed new development on the surrounding neighborhood streets.

2. Study Location and Proposed Development

The study area defined for this analysis is bound by Southard Street on the northwest, Truman Avenue on the southeast, Whitehead Street on northeast and Fort Street on the southeast. The study area encompasses almost the entire area known as Bahama Village and abuts the area known as Truman Annex. The nearest major principal highway is SR 5/ US1/ Whitehead Street. Figure 1 depicts an aerial photograph of the study location. The Truman Waterfront Project includes the developing of the entire site into five zoning categories Historic Public Semi-Public District (HPS-1), Historic Neighborhood Commercial District (HNC-2), Historic Medium Density Residential District-1 (HMDR-1), Historic Limited Commercial (HCL) and Truman Waterfront Distric (HRCC-4) as follows:

- (HPS-1) Harborwalk-Parks and recreation, passive and active Community centers

- (HNC-2) Single/two family residential unitsBusiness and professional offices Commercial retail low intensity < 2,500 sq.ft Medical services.

- (HMDR) Single/two family residential units

- (HCL) Bussiness and professional offices. Commercial retail low and medium intensity (generate < 50 pm peak hour vehicle trips per 1,000 sf of gross leasable area). Restaurants, excluding drive-through facilities that generate < 50 pm peak hour vehicle trips per 1,000 sf of gross leasable floor area.

- (HRCC-4) Port and port related uses. Light industrial (marine related). Commercial retail low and medium intensity (Bicycle rental) < 5,000 sf.

Photographs of the existing site, surrounding land use and the approaches for the arterial streets are shown in Figure 2 through Figure 9.

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Figure 1: Study Location

Angela St at Fort St (2A)

Petronia St at Fort St (3A)

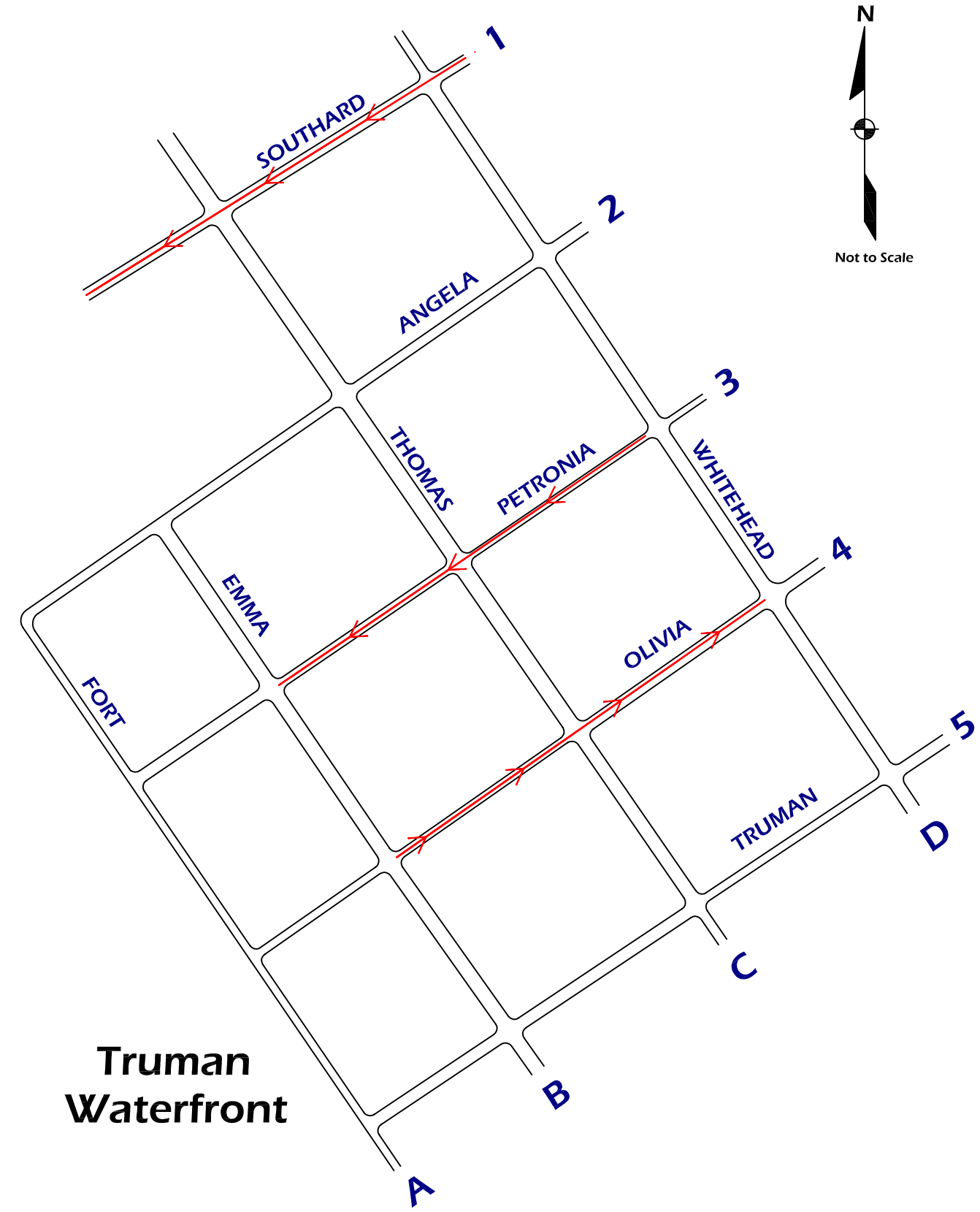

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Figure 2: Study Photographs

Truman Waterfront
Evaluation of Project Traffic

Angela St at Emma St (2B)

Petronia St at Emma St (3B)

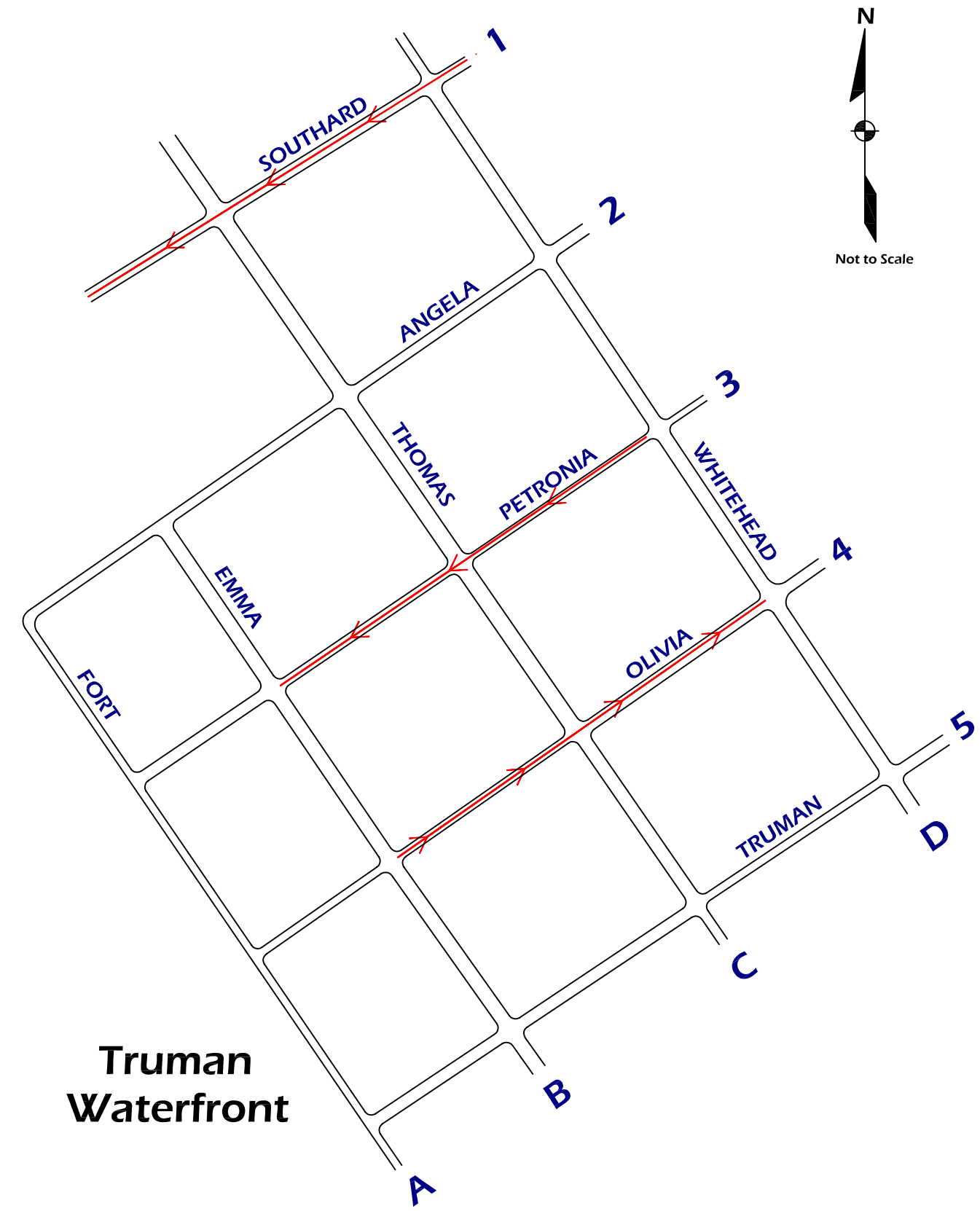

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Figure 3: Study Photographs

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Olivia St at Fort St (4A)

Truman St at Fort St (5A)

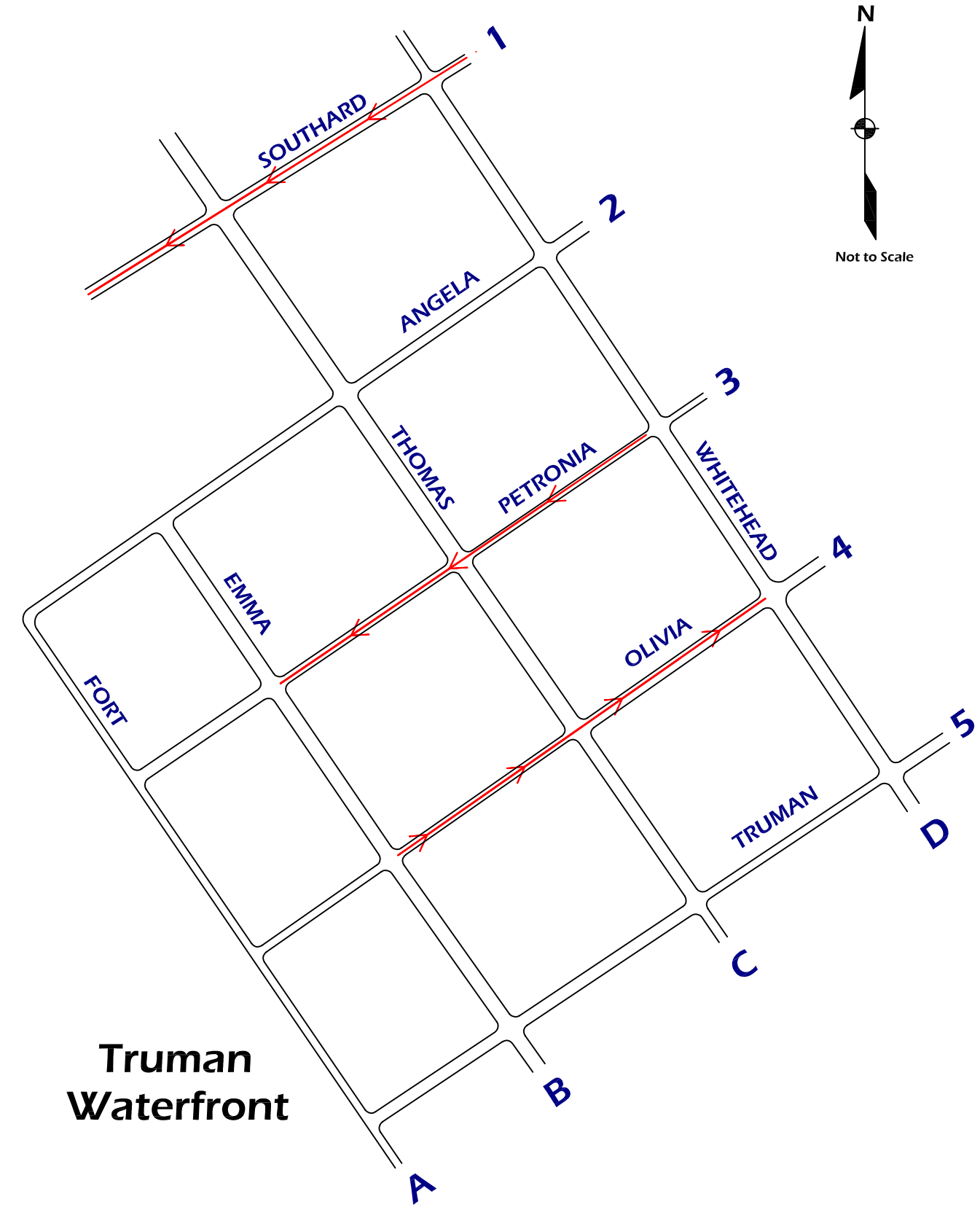

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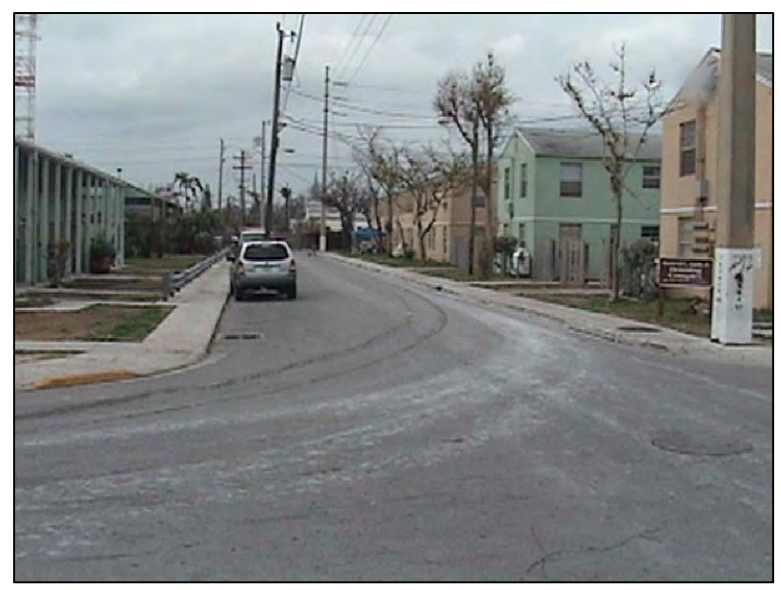
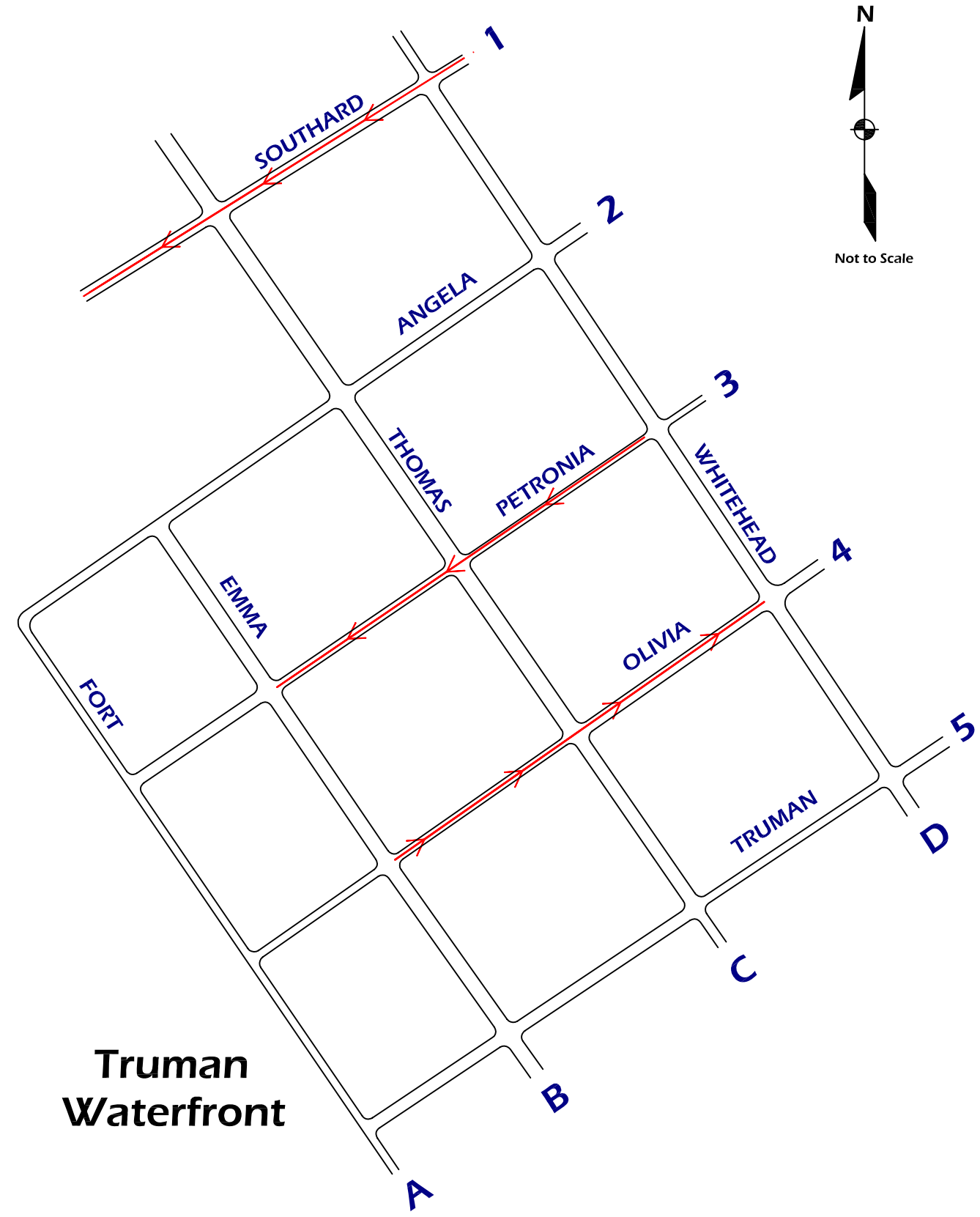
Figure 4: Study Photographs

Truman Waterfront
Evaluation of Project Traffic

Olivia St at Emma St (4B)

Truman St at Emma St (5B)





Olivia St at Thomas St (4C)

Truman St at Tomas St (5C)

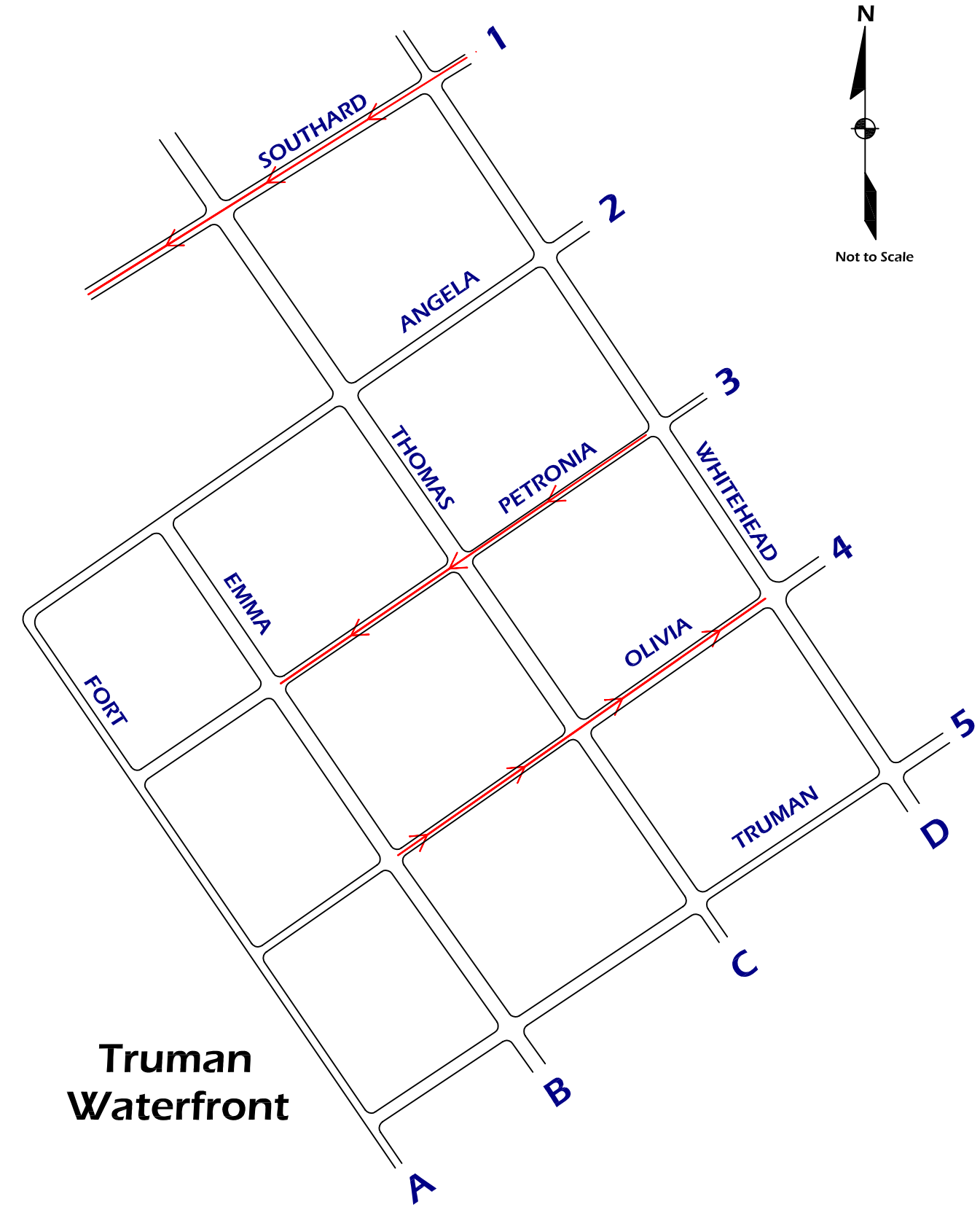


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Figure 6: Study Photographs

Truman Waterfront
Evaluation of Project Traffic

Olivia St at Whitehead St (4D)

Truman St at Whitehead St (5D)

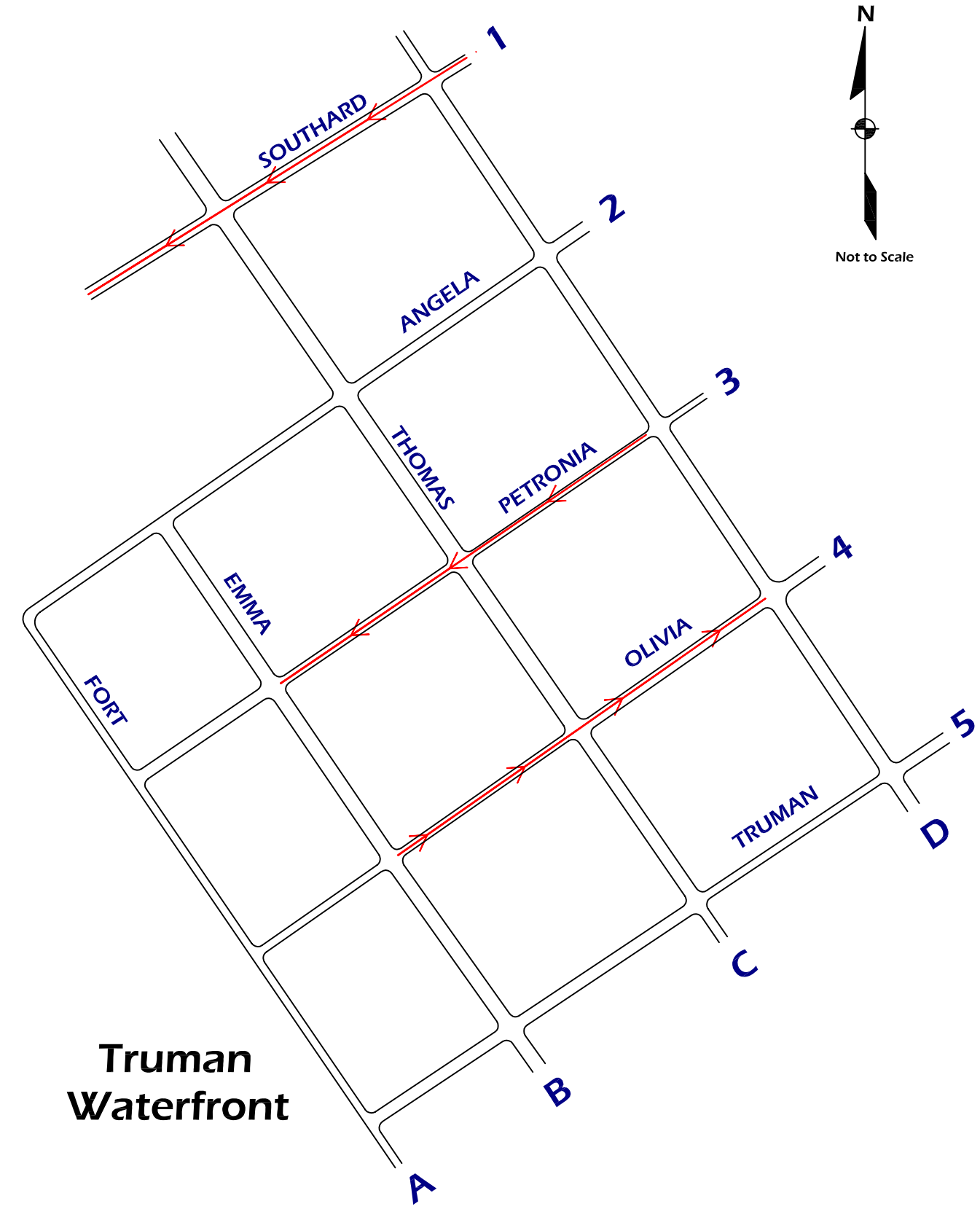

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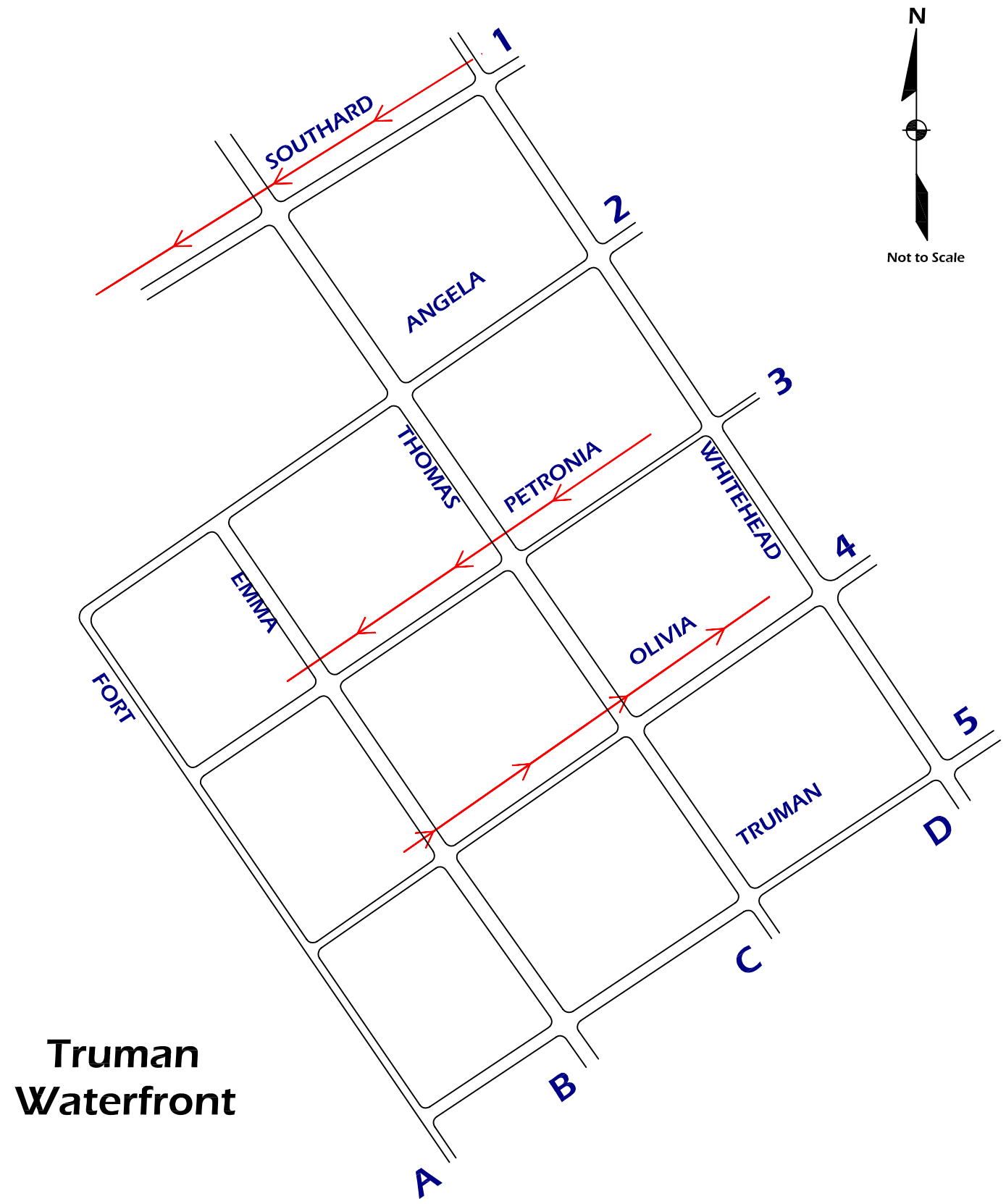
Figure 7: Study Photographs

Truman Waterfront
Evaluation of Project Traffic

Southard St and Thomas St (1C)

Angela St at Thomas St (2C)

Petronia St at Thomas St (3C)

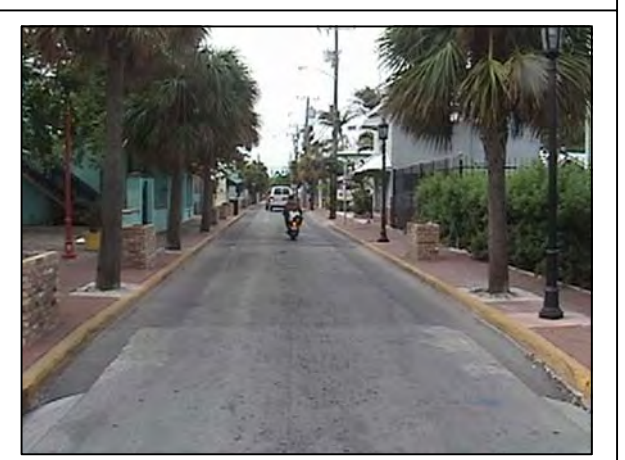


Truman Waterfront

Southard St at Whitehead St

Angela St at Whitehead St

Petronia St at Whitehead St



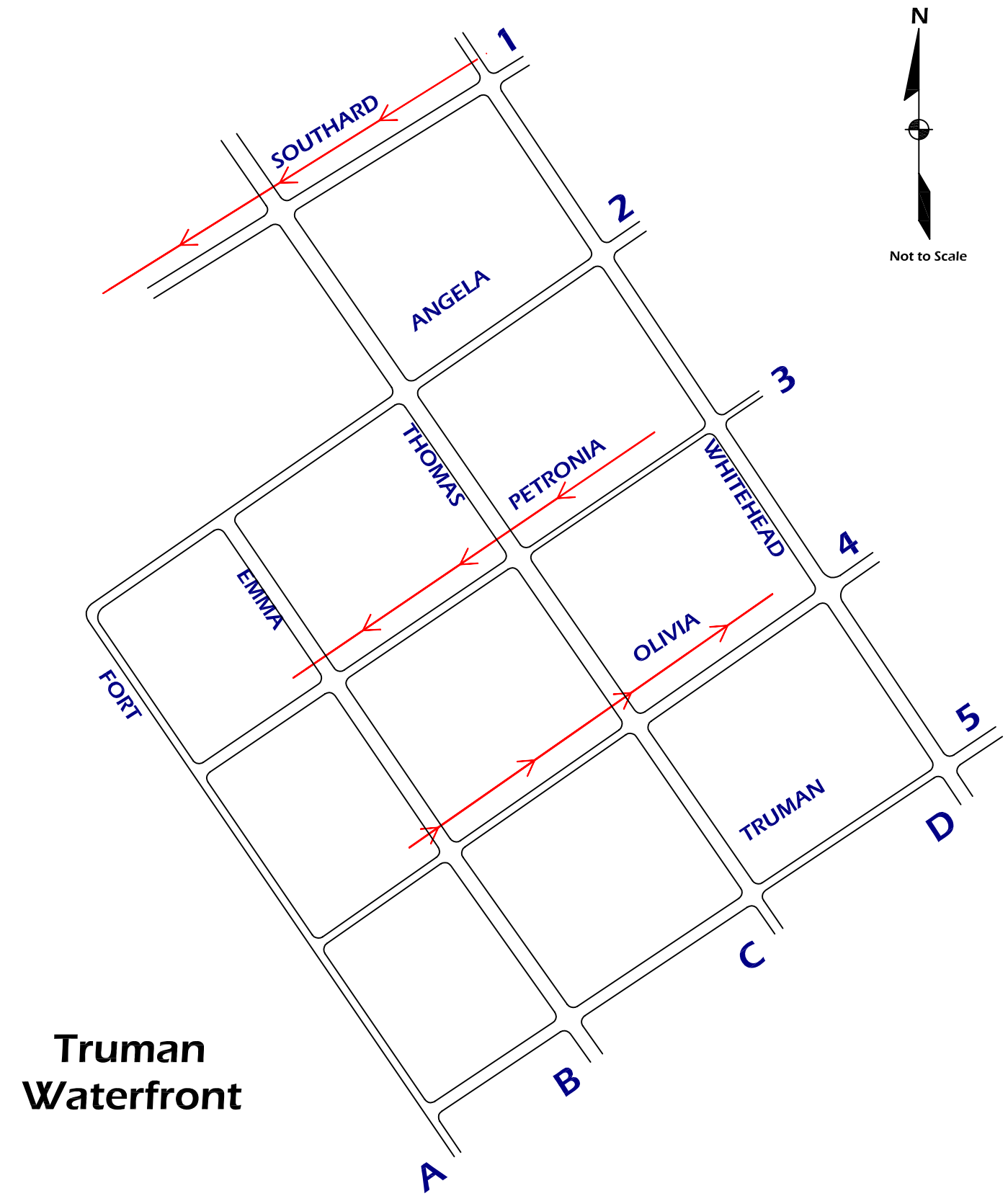


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Figure 9: Study Photographs

3. Methodology

As part of this study a trip generation analysis based on the *Institute of Transportation Engineers (ITE), Trip Generation Report, 7th Edition* was performed to determine the daily trips, AM and PM Peak hour directional trips expected to be generated by the proposed development. The distribution of trips to the adjacent street network was performed taking into consideration the existing traffic volumes within the study area which reflect the current travel patterns in the area. That is, the number of trips assigned to each highway link was proportional to the current traffic volumes per direction. Furthermore, the traffic assignment considered the agreement between the City of Key West and the Truman Annex Homeowners Association (TAMPOA) which outlined the following conditions:

1. "The City shall provide ingress and egress by way of Fort Street through Olivia Street;
2. The City shall provide ingress through Petronia Street; and
3. The City shall provide ingress and egress by way of Truman Avenue to Fort Street."

In addition to trip generation and trip distribution/assignment, intersection level of service capacity analysis was performed at each of the intersections within the study area. This analysis was performed to assess the impacts of project traffic on the current intersection operations. The level of service analysis was performed based on the methodology outlined in the *2000 edition of Highway Capacity Manual.*

4. Analysis and Results

This section is comprised of four sub-sections. Sub-section 4.1 describes all of data collection activities. Section 4.2 describes the trip generation analysis followed by sub-section 4.3 which details the assignment of vehicles trips to the site and surrounding highway links. Sub-section 4.4 presents the Level of Service (LOS) analysis and impacts of the proposed development.

4.1. Data Collection

According to the Florida Department of Transportation's (FDOT) Transportation Statistics Office, the nearest count station is on Whitehead Street 100 feet south of Olivia Street. This segment of US 1 has an Average Annual Daily Traffic (AADT) of 8,300 vehicles per day. Also, the ratio of the traffic volume in the study hour to the annual average daily traffic (K factor), the directional distribution (D factor) and the truck factor (T) is 10.42%, 56.02% and 3.12%, respectively.

Turning Movement Counts were collected at 14 intersections within the study area during the AM peak period from 7:00 AM to 9:00 AM and during the 4:00 PM to 6:00 PM peak hour afternoon period. These counts were summarized and presented on Figure 10. The counts shown along Fort Street were estimated from the traffic entering and exiting Fort Street from Emma Street. Table 1 depicts all of the intersections within the study area and the type of intersection control. Seventy two (72) hours counts were conducted during the third week of December beginning on Tuesday December 20, 2005 through Thursday December 23, 2005. These data are needed to determine the non-pass by trip pattern in the vicinity of the study area as well as to

determine the distribution of local traffic. These volume counts are presented in Table 2. The raw counts are presented in Appendix A. It was assumed that for the purpose of this report Southard Street, Angela Street, Petronia Street, Oliva Street and Truman Avenue are running east and west; Whitehead Street, Thomas Street, Emma Street and Fort Street are running north and south.

Table 1 Intersection Control

Intersection			Intersection Control	
			Signal	Stop
Southard Street	at	Whitehead Street	X	
Southard Street	at	Thomas Street		X
Whitehead Street	at	Angela Street		X
Whitehead Street	at	Petronia Street		X
Whitehead Street	at	Olivia Street		X
Whitehead Street	at	Truman Avenue	X	
Truman Avenue	at	Thomas Street	X	
Truman Avenue	at	Emma Street		X
Olivia Street	at	Thomas Street		X
Olivia Street	at	Emma Street		X
Petronia Street	at	Emma Street		X
Petronia Street	at	Thomas Street	X	
Thomas Street	at	Angela Street		X
Angela Street	at	Emma Street		X

Table 2 Summary of 72-Hour Counts

Street	Between		EB	%	WB	%	NB	%	SB	%
Southard St	Whitehead St	Thomas St	1,777	4.1%	2,033	4.7%				
Whitehead St	Southard St	Angela St	-	-	-	-	2,817	6.5%	2,982	6.9%
Whitehead St	Angela St	Petronia St	-	-	-	-	2,860	6.6%	3,760	8.7%
Whitehead St	Petronia St	Olivia St	-	-	-	-	3,001	6.9%	3,039	7.0%
Whitehead St	Olivia St	Truman Ave.	-	-	-	-	2,948	6.8%	3,052	7.1%
Truman Ave.	Emma St	Thomas St	117	0.3%	96	0.2%	-	-	-	-
Emma St	Olivia St	Truman Ave.	-	-	-	-	671	1.6%	635	1.5%
Emma St	Petronia St	Olivia St	-	-	-	-	691	1.6%	1,167	2.7%
Thomas St	Southard St	Angela St	-	-	-	-	706	1.6%	910	2.1%
Thomas St	Angela St	Petronia St	-	-	-	-	1,080	2.5%	461	1.1%
Thomas St	Olivia St	Petronia St	-	-	-	-	607	1.4%	769	1.8%
Thomas St	Olivia St	Truman Ave	-	-	-	-	656	1.5%	692	1.6%
Angela St	Whitehead St	Thomas St	1,043	2.4%	560	1.3%	-	-	-	-
Angela St	Thomas St	Emma St	346	0.8%	577	1.3%	-	-	-	-
Olivia St	Emma St	Thomas St	676	1.6%	-	-	-	-	-	-
Olivia St	Thomas St	Whitehead St	504	1.2%	-	-	-	-	-	-
Petronia St	Emma St	Thomas St	-	-	901	2.1%	-	-	-	-
Petronia St	Thomas St	Whitehead St	-	-	1,140	2.6%	-	-	-	-
Emma St	Angela St	Petronia St	-	-	0	0.0%	577	1.3%	346	0.8%
Truman Ave.	Thomas St	Whitehead St	486	1.1%	324	0.7%	-	-	-	-

LEGEND

XX A.M. Peak Hour Volume
(XX) P.M. Peak Hour Volume
e Estimated
⇄ ADT

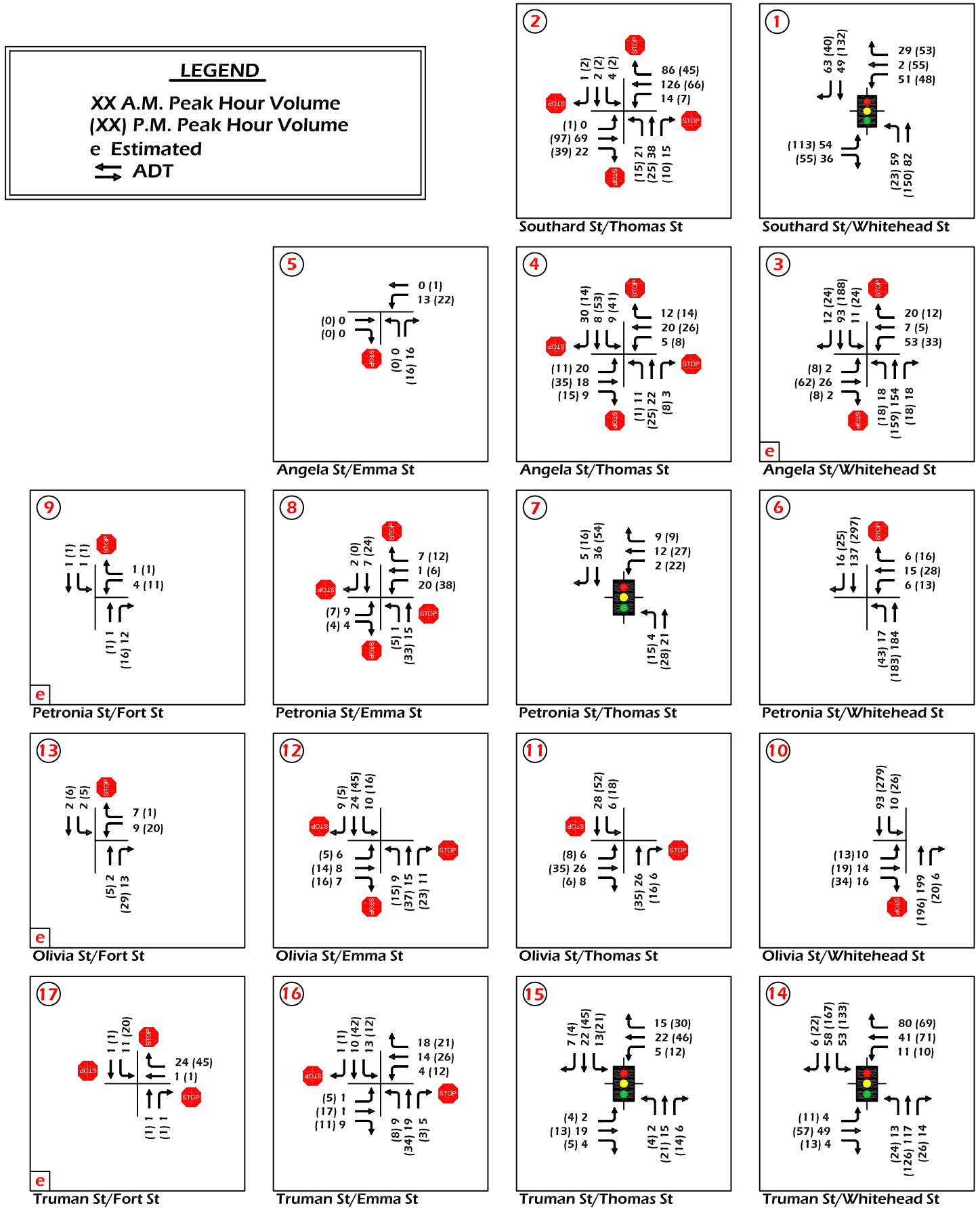

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Figure 10: Existing Turning Movement Counts

Truman Waterfront Evaluation of Project Traffic

4.2. Trip Generation

The methodology outlined in the Institute of Transportation Engineers (ITE), Trip Generation 7th Edition was used to forecast traffic based on future land use. Daily trips and afternoon peak hour directional trips where estimated for the proposed land use.

Twenty-Six Acres of recreation and passive community centers is proposed for this site. Therefore, land use 415 (Beach Park Center) was used for this portion of the analysis. A regression equation, for estimating daily trips, was not available for this type of land use. However, an average rate is available and used for this type of land use.

$$T = 29.81(X) \tag{1}$$

The following average rate was used to estimate morning peak hour volume.

$$T = 0.48(X) \tag{2}$$

And,

The average rate for the afternoon peak hour is:

$$T = 1.30(X) \tag{3}$$

Where,

T = Number of Daily Trips, and
X = Acres

A total of 68,517 SF of commercial and professional was proposed for this project. Therefore, ITE land use 814 (Specialty Retail Center) was used for this analysis. The following regression equation, for estimating daily trips, was used for this type of land use.

$$T = 42.78(X) + 37.64 \qquad R^2 = 0.69 \tag{4}$$

The following regression equation was used to estimate morning peak hour volume.

$$T = 4.91(X) + 115.59 \qquad R^2 = 0.90 \tag{5}$$

The following rate was used to estimate afternoon peak hour volume.

$$T = 5.02(X) \tag{6}$$

Where,

T = Number of Daily Trips, and
X = 1000 Sq. Feet Gross Leasable Area (GLA).

ITE land use 210 (Single Family Detached) was used to estimate the trips generated by the proposed 36 affordable housing units (above commercial) within the site. The following regression equation, for estimating daily trips, was used for this type of land use.

$$Ln(T) = 0.92Ln(X) + 2.71 \qquad R^2 = 0.96 \qquad (7)$$

The following regression equation was used to estimate morning peak hour volume.

$$Ln(T) = 0.70Ln(X) + 12.05 \qquad R^2 = 0.91 \qquad (8)$$

The following regression equation was used to estimate afternoon peak hour volume.

$$Ln(T) = 0.89Ln(X) + 0.61 \qquad R^2 = 0.91 \qquad (9)$$

Where,

T = Number of Daily Trips, and
X = Number of Housing Units

There are fifty group homes of no more that six persons per home are proposed for this development. Therefore, ITE land use 254 (Assisted Living) was used for this analysis assuming a maximum of 50 beds. The following regression equation, for estimating daily trips, was used for this type of land use.

$$T = 1.61(X) + 132.16 \qquad (10)$$

The following rate was used to estimate future project traffic for the am peak period.

$$T = 0.18(X) \qquad (11)$$

The following regression equation was used to estimate afternoon peak hour volume.

$$T = 0.27(X) + 12.83 \qquad (12)$$

Where,

T = Number of Daily Trips, and
X = Number of Beds.

The proposed Marina will allow a maximum of 200 boat slips. ITE land use 420 (Marina) was used for this analysis assuming a maximum of 200 berths. The following regression equation, for estimating daily trips, was used for this type of land use.

$$T = 1.89(X) + 410.80 \quad (13)$$

The following average rate was used to estimate afternoon peak hour volume.

$$T = 0.17(X) \quad (14)$$

The following average rate was used to estimate afternoon peak hour volume.

$$T = 0.21(X) \quad (15)$$

Where,

T = Number of Daily Trips, and
X = Number of Berths.

Table 3 summarizes the results of the trip generation.

Since this is a multi-use development internal capture trips were estimated and discounted from the project trips. The proposed land uses are interrelated and some of the attracted trips will make trips between land uses without using the adjacent roadway network.

Pass-by trips were also accounted for in the calculation of project trip generation. Pass-by trips are trips already on the roadway system that would stop at the project site on an already planned trip.

In addition to vehicles, there are other modes of transportation available in the immediate area such as transit service and pedestrian facilities. It is expected that these modes of transportation will be used in conjunction with vehicles trips to the development.

To account for Internal Capture, Pass-By and Transit/Pedestrian facilities a 10 % reduction was used and discounted from the projected trips. Due the lack of established rates for these reductions a 10% reduction was assumed. Table 3 shows the reduction of these trips for the total daily trips and Table 4 shows the eduction for both peak periods.

Table 3 Results of Trip Generation

ITE Land Use	Unit	Size	AM Peak Hour	PM Peak Hour	Weekday (Trips)
Beach Park (415)	Acre	26.6	13	35	793
Specialty Retail (814)	1000	68.5	452	344	2,969
Assisted Living (254)	Beds	50	9	26	213
Single-Family Detached Housing (210)*	Units	36	37	45	406
Marina (420)	Berths	200	34	42	789
Sub-Total	-	-	545	492	5,169
Internal Capture (10%)	-	-	-55	-49	-517
Pass-by Trips (10%)	-	-	-55	-49	-517
Transit and Pedestrian (10%)	-	-	-55	-49	-517
Adjusted Total	-	-	382	344	3,619

* This ITE land use was used as a surrogate for 36 affordable housing units

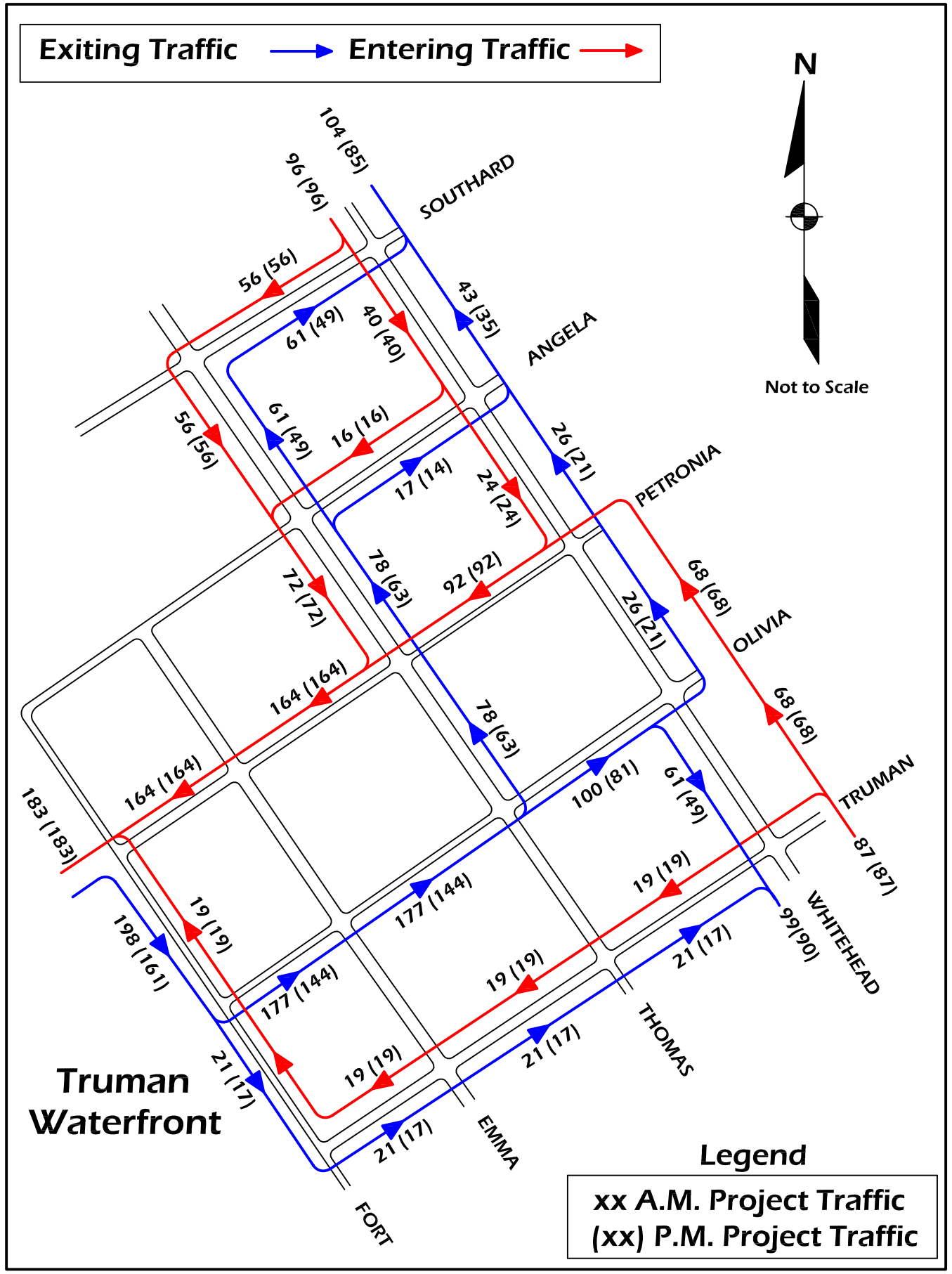
4.3. Trip Distribution

The AM and PM peak hour project trip distributions are shown on Figure 11. The total, existing plus project traffic, are presented on Figure 12. Trips generated by the proposed project were assigned to the roadway system based on the percentages of entering and exiting as outlined in *The Institute of Transportation Engineers (ITE), Trip Generation Report, 7th Edition* for each land use as summarized in Table 4. The location of project entrance points and the location of available parking within the site were also taken into consideration in the assignment of project trips. The majority of the trips will enter through Petronia Street and exit through Olivia Street.

Table 4 Adjusted Peak Period Volumes

ITE Land Use	AM Peak Hour				PM Peak Hour			
	% Entering	Trips Entering	% Exiting	Trips Exiting	% Entering	Trips Entering	% Exiting	Trips Exiting
Beach Park (415)	59%	5	41%	4	29%	7	71%	17
Specialty Retail (814)	48%	152	52%	165	56%	135	44%	106
Assisted Living (254)	67%	4	33%	2	36%	7	64%	12
Single-Family Detached Housing (210)*	26%	7	74%	19	64%	20	36%	11
Marina (420)	64%	15	36%	9	51%	15	49%	14
Adjusted Total	-	183	-	198	-	183	-	161

* This ITE land use was used as a surrogate for 36 affordable housing units



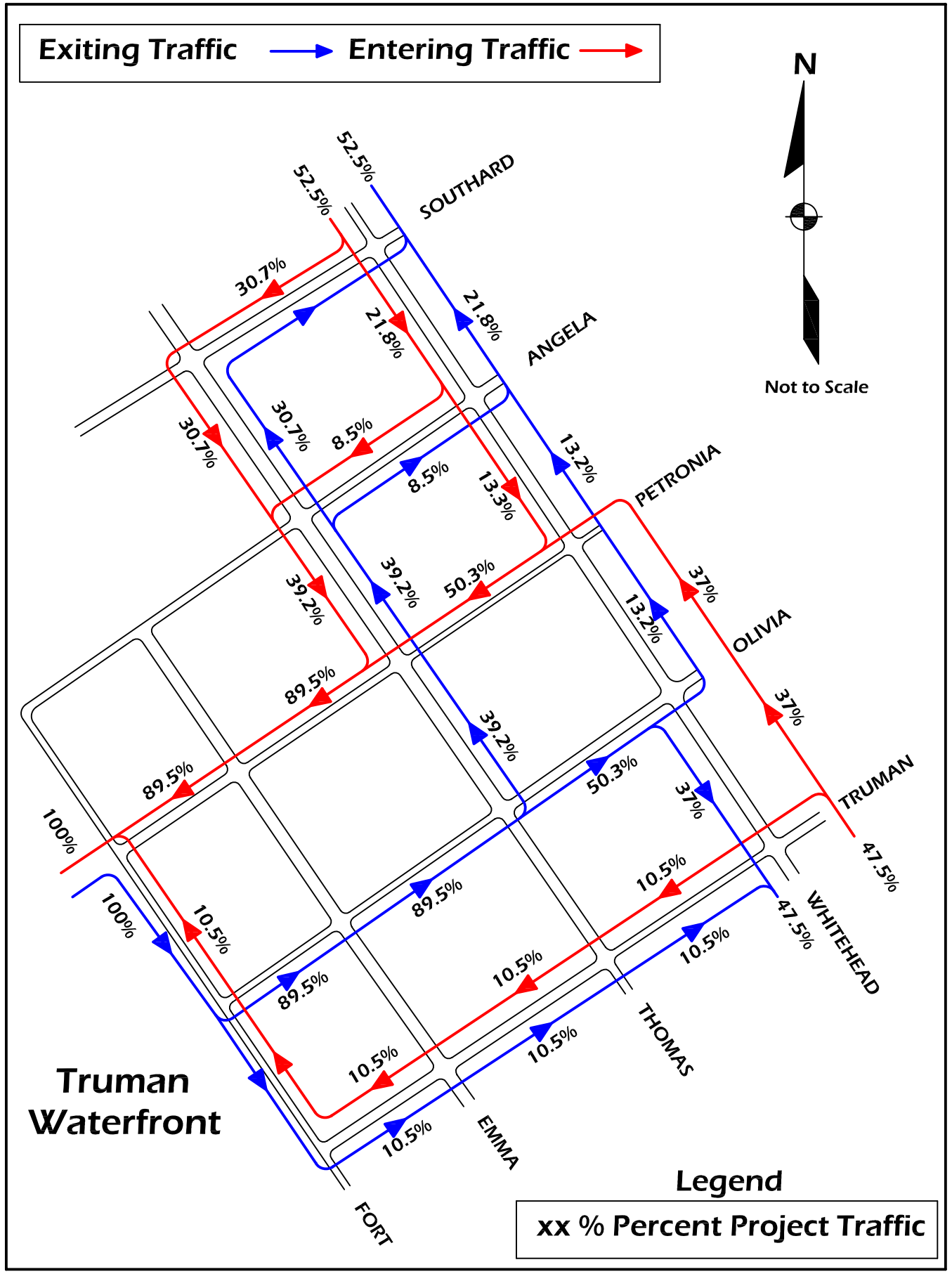


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Figure 11: Project Trip Distribution

Truman Waterfront
Evaluation of Project Traffic

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XX A.M. Peak Hour Volume
(XX) P.M. Peak Hour Volume
e Estimated
⇄ ADT

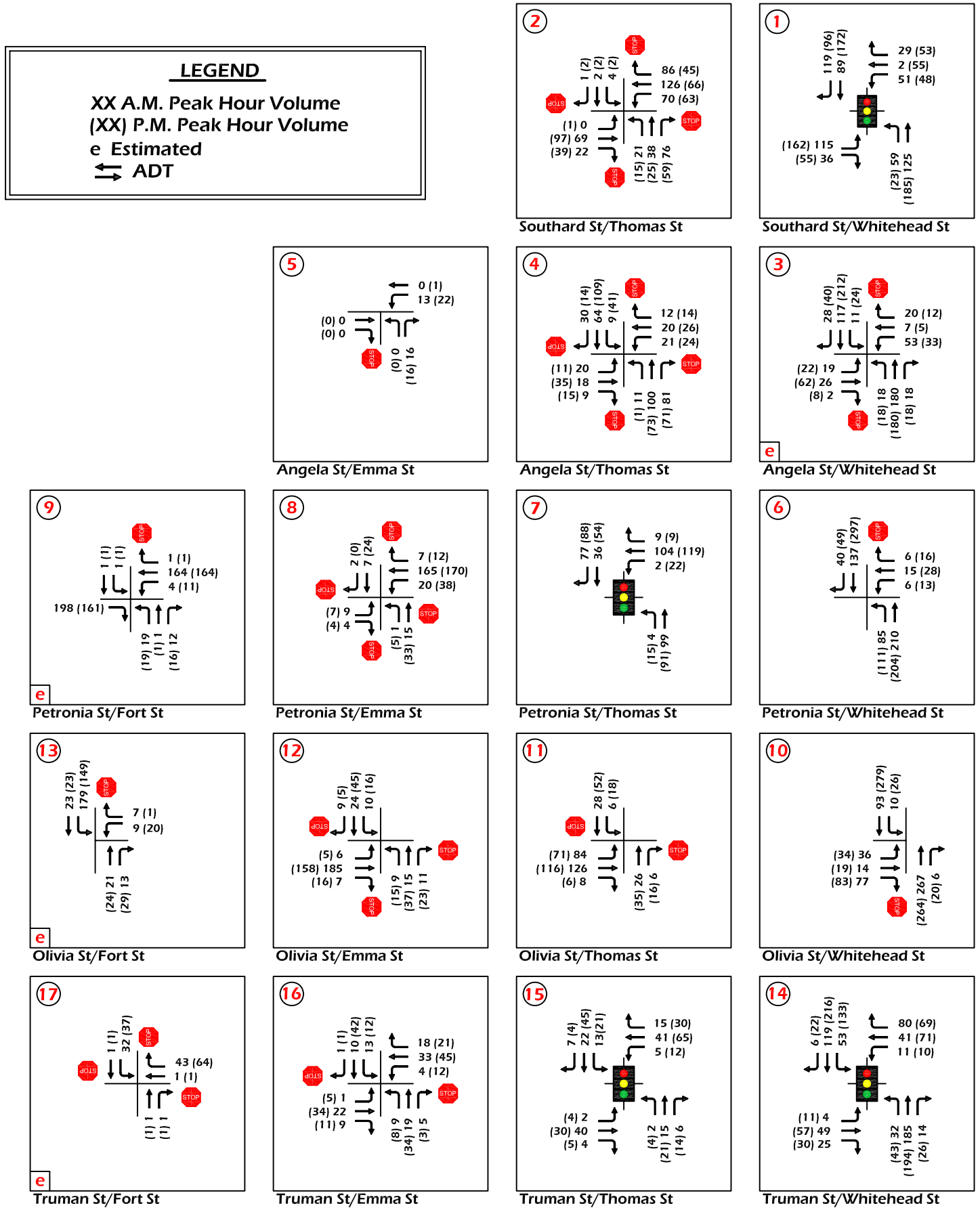

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Figure 12: Future Turning Movement Counts

Truman Waterfront Evaluation of Project Traffic

4.4. Level of Service Analysis

Level of Service Analysis was performed for all of the intersections within the study area, un-signalized and signalized. Table 5 summarizes the Level of Service (LOS) criteria for un-signalized and signalized intersections.

Table 5 Intersection Level of Service Criteria (Based on HCM 2000, TRB, 2000)

LOS	Un-Signalized Intersection (Ave. Control Delay s/veh)	Signalized Intersection (Ave. Control Delay s/veh)
A	0–10	0-10
B	>10-15	>10 – 20
C	>15-25	>20 – 35
D	>25-35	>35 – 55
E	>35-50	>55 – 80
F	>50	> 80

Traffic operations at un-signalized intersections using the Highway Capacity Manual 2000 methodology for un-signalized intersections were utilized. With this methodology, operations are defined by the average control delay per vehicle for each stop-controlled movement. This incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. For side-street stop-controlled intersections, the delay is typically represented for each movement from the minor approaches only. Table 6 and 7 shows the level of service results for the stopped approach under the existing and future prevailing traffic conditions, respectively. For the purpose of this report Southard Street, Angela Street, Petronia Street, Oliva Street and Truman Avenue are running east and west. Also, Whitehead Street, Thomas Street, Emma Street and Fort Street are running north and south.

Table 6 Summary of LOS for Stopped Approach at Un-Signalized Intersection (Existing)

Un-Signalized Intersection			Stopped Approach LOS							
			EB		WB		NB		SB	
			AM	PM	AM	PM	AM	PM	AM	PM
Southard Street	at	Thomas Street	A	A	A	A	A	A	A	A
Whitehead	at	Angela Street	B	C	B	C	-	-	-	-
Whitehead Street	at	Petronia Street	-	-	B	C	-	-	-	-
Whitehead Street	at	Olivia Street	B	B	-	-	-	-	-	-
Truman Avenue	at	Emma Street	-	-	-	-	B	B	B	B
Olivia Street	at	Thomas Street	-	-	-	-	B	B	B	B
Olivia Street	at	Emma Street	A	A	-	-	A	A	A	A
Petronia Street	at	Emma Street	A	A	A	A	A	A	A	A
Thomas Street	at	Angela Street	A	A	A	A	A	A	A	A
Angela Street	at	Emma Street	-	-	-	-	A	A	-	-
Truman Avenue	at	Fort Street	-	-	A	A	A	A	A	A
Olivia Street	at	Fort Street	-	-	A	A	-	-	-	-
Petronia Street	at	Fort Street	-	-	A	A	-	-	-	-

Table 7 Summary of LOS for Stopped Approach at Un-Signalized Intersection (Future)

Un-Signalized Intersection			Stopped Approach LOS							
			EB		WB		NB		SB	
			AM	PM	AM	PM	AM	PM	AM	PM
Southard Street	at	Thomas Street	A	A	A	A	A	A	A	A
Whitehead	at	Angela Street	C	C	C	C	-	-	-	-
Whitehead Street	at	Petronia Street	-	-	C	C	-	-	-	-
Whitehead Street	at	Olivia Street	B	C	-	-	-	-	-	-
Truman Avenue	at	Emma Street	-	-	-	-	B	B	B	B
Olivia Street	at	Thomas Street	-	-	-	-	B	B	C	C
Olivia Street	at	Emma Street	A	A	-	-	A	A	A	A
Petronia Street	at	Emma Street	A	A	A	A	A	A	A	A
Thomas Street	at	Angela Street	A	A	A	A	A	A	A	A
Angela Street	at	Emma Street	-	-	-	-	A	A	-	-
Truman Avenue	at	Fort Street	-	-	A	A	A	A	A	A
Olivia Street	at	Fort Street	-	-	B	B	-	-	-	-
Petronia Street	at	Fort Street	B	B	B	B	-	-	-	-

At signalized intersections, traffic conditions were evaluated using the Highway Capacity Manual 2000 methodology. This operation analysis uses various intersection characteristics (i.e., traffic volumes, lane geometry, and signal phasing) to estimate the average control delay experienced by motorists traveling through an intersection. Table 8 through 11 shows the results of the level of service for the existing and future traffic levels, respectively.

Table 8 Summary of LOS for Signalized Intersection (AM Existing)

Signalized Intersection			Int	Approach LOS				Approach Delay (s/veh)			
			LOS	EB	WB	NB	SB	EB	WB	NB	SB
Southard Street	at	Whitehead St.	B	B	B	B	A	15.3	15.6	10.9	9.5
Whitehead Street	at	Truman Avenue	B	A	B	B	B	9.2	10	11.5	10.9
Truman Avenue	at	Thomas Street	A	A	A	A	A	7.5	7.7	7.4	7.9
Petronia Street	at	Thomas Street	A	-	A	A	A	-	8.5	8.7	9

Table 9 Summary of LOS for Signalized Intersection (PM Existing)

Signalized Intersection			Int	Approach LOS				Approach Delay (s/veh)			
			LOS	EB	WB	NB	SB	EB	WB	NB	SB
Southard Street	at	Whitehead St.	B	B	B	B	B	18.6	17.9	11.0	10.7
Whitehead Street	at	Truman Avenue	B	A	B	B	C	9.6	10.5	13.0	26.2
Truman Avenue	at	Thomas Street	A	A	A	A	A	7.3	8.3	7.6	8.4
Petronia Street	at	Thomas Street	A	-	A	A	A	-	9.1	9.1	9.4

Table 10 Summary of LOS for Signalized Intersection (AM Future)

Signalized Intersection			Int	Approach LOS				Approach Delay (s/veh)			
			LOS	EB	WB	NB	SB	EB	WB	NB	SB
Southard Street	at	Whitehead St.	B	B	B	B	A	18.1	15.6	12.0	11.0
Whitehead Street	at	Truman Avenue	B	A	B	B	B	9.2	10.0	15.4	12.5
Truman Avenue	at	Thomas Street	A	A	A	A	A	7.5	8.1	7.4	7.9
Petronia Street	at	Thomas Street	B	-	B	B	B	-	10.5	10.6	10.1

Table 11 Summary of LOS for Signalized Intersection (PM Future)

Signalized Intersection			Int	Approach LOS				Approach Delay (s/veh)			
			LOS	EB	WB	NB	SB	EB	WB	NB	SB
Southard Street	at	Whitehead St.	B	C	B	B	B	22.2	17.9	11.8	12.9
Whitehead Street	at	Truman Avenue	C	A	B	C	D	9.8	10.5	19.6	41.3
Truman Avenue	at	Thomas Street	A	A	A	A	A	7.3	8.8	7.6	8.5
Petronia Street	at	Thomas Street	B	-	B	B	B	-	10.9	10.3	10.3

5. Conclusions and Recommendations

The total trips generated by the proposed development are 3,619 new vehicles trips per day, 382 vehicles and 344 vehicles during the morning and afternoon peak hour, respectively. These trips will be attracted by the proposed development. Below is a summary of the findings and recommendations.

1. Currently all of the un-signalized intersections are operating at level of service C or better for the stopped approach during the morning and afternoon peak periods under existing traffic conditions. However, most are operating at level of service A. All of the signalized intersections are operating at level of service C or better during both peak periods.

2. The analysis did not reveal a discernable difference between the existing and proposed traffic levels for the un-signalized intersections of Southard Street at Thomas Street, Olivia Street at Emma Street, Petronia Street at Emma Street, Thomas Street at Angela Street and Truman Avenue at Fort Street. In terms of overall intersection level of service

there is virtually no difference between the existing and future traffic conditions. However, some of the approaches experience minor degradation of approach delay or a slight increase in delay. Please note that the intersection level of service is based on the evaluation of each intersection individually and does not take into account the overall effect within the entire study area. Therefore, we recommend using a microsimulation traffic analysis tool which will allow for a network analysis rather than isolated intersections. This analysis will allow the evaluation of queues at each of the intersections within the study area. This is a key aspect that should be further evaluated due to the potential impacts of significant queuing on residential streets.

3. The geometry on Truman Avenue Between Emma Street and Thomas Street is constrained since there is approximately 18 feet of pavement for two-way traffic. In addition, on street parking is provided on the west side of the street. Even though two-way traffic is allowed on this portion of Truman Avenue, our field observations revealed that it currently operates as a one-way street since vehicular two-way traffic can not be accommodated within the current lane widths. Therefore, we recommend converting Truman Avenue between Emma Street and Thomas Street into a one-way street in the westbound direction toward Front Street.

4. Petronia Street should be converted from two-way traffic to one-way operation in the westbound direction between Fort Street and Emma Street. This improves the efficiency of the ingress operation of the development.

5. Consideration should be given to changing the intersection control from all-way stop to two-way stop control for the intersection of Angela Street at Thomas Street stopping east-west traffic on Angela Street. Also, the all-way stop control at the intersections of Petronia Street at Emma Street and Olivia Street at Emma Street should also be considered for two-way stop control stopping north-south traffic on Emma Street. Additional study to evaluate the appropriate traffic control device for these intersections is recommended.

6. The four signalized intersections within the study area should be retimed to accommodate the additional project traffic. The intersections are Southard Street at Whitehead Street, Petronia Street at Thomas Street, Truman Avenue at Thomas Street and Truman Avenue at Whitehead Street.

7. Consideration should be given to a more in-depth assessment of existing transit service and pedestrian facilities. This assessment will identify the need for improvements in transit service and pedestrian facilities which may result in a reduction of vehicular traffic.

8. As a general note, all of the streets within the study area are narrow and appear to have sub-standard roadway design features. These streets should be evaluated and improved from a geometric standpoint wherever possible. Therefore, we recommend an exhaustive evaluation of the existing geometric conditions. One key aspect that should be further

investigating is the necessary turning radii to accommodate additional transit vehicles within the study area.