City of Deltona

2345 Providence Blvd.
Deltona, FL 32725

Agenda

Planning and Zoning Board

Chair Tom Burbank
Vice Chair Adam Walosik
Member John Harper
Member Jose Irizarry
Member Donald Philpitt
Member Michael Putkowski
Member Stony Sixma

Wednesday, January 18, 2017 | **7:00 PM** | **Deltona Commission Chambers**

1. CALL TO ORDER:

2. ROLL CALL:

A. Election of Officers

3. APPROVAL OF MINUTES & AGENDA:

A. Minutes of December 21, 2016.

4. PRESENTATIONS/AWARDS/REPORTS:

5. PUBLIC FORUM:

6. OLD BUSINESS:

7. NEW BUSINESS:

A. Resolution No. 2017-01 - Application for a Variance at 2601 Providence Blvd., File No. VR 16-005.

B. Ordinance No. 35-2016 - Application for a Small Scale Comprehensive Plan Amendment to the Future Land Use Map for the S/E Corner of Normandy Blvd. and Saxon Blvd., File No.CP16-001.

C. Ordinance No. 36-2016 - Application to Amend the Official Zoning Map for the S/E Corner of Normandy Blvd. and Saxon Blvd., File No. RZ16-004.

8. STAFF COMMENTS:

9. BOARD/COMMITTEE MEMBERS COMMENTS:

10. ADJOURNMENT:

NOTE: If any person decides to appeal any decision made by the City Commission with respect to any matter considered at this meeting or hearing, he/she will need a record of the proceedings, and for such purpose he/she may need to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based (F.S. 286.0105).

Individuals with disabilities needing assistance to participate in any of these proceedings should contact the City Clerk, Joyce Raftery 48 hours in advance of the meeting date and time at (386) 878-8500.

City of Deltona

2345 Providence Blvd.
Deltona, FL 32725

Minutes

Planning and Zoning Board

Wednesday, December 21, 2016 **7:00 PM** **Deltona Commission Chambers**

1. CALL TO ORDER:

Chairman Burbank called the meeting to order at 7:00 pm.

2. ROLL CALL:

Present: 6 - Chair Tom Burbank
Vice Chair Adam Walosik
Member John Harper
Member Donald Philpitt
Member Michael Putkowski
Member Stony Sixma

Absent: 1 - Member Jose Irizarry

3. APPROVAL OF MINUTES & AGENDA:

A. Minutes of November 16, 2016.

Chairman Burbank noted that the minutes from November 16, 2016, should be amended with the change of the word "wide" to "side" and correction of the word managerment to management.

Motion by Member Harper, seconded by Member Sixma, to approve as amended the Minutes of November 16, 2016. The motion carried by the following vote:

For: 6 - Chair Burbank, Vice Chair Walosik, Member Harper, Member Philpitt, Member Putkowski and Member Sixma

4. PRESENTATIONS/AWARDS/REPORTS:

5. PUBLIC FORUM:

6. OLD BUSINESS:

7. NEW BUSINESS:

A. Ordinance No. 34-2016 amending the Comprehensive Plan of the City of Deltona, by amending the Capital Improvements Element providing for the

replacement of the Capital Improvement Project sheets.

Mr. Paradise provided some information regarding the Capital Improvements Element. He explained that it is to amend the Comprehensive Plan of the City of Deltona, by amending the Capital Improvements Element providing for the replacement of the Capital Improvement Project sheets. Pursuant to s.163.3177 (3)(b) F.S., the Capital Improvements Element of the Comprehensive Plan must be reviewed and updated on an annual basis. It is recommended to send the Capital Improvements Element (CIE) Report to the Department of Economic Opportunity (DEO) when it is adopted by the City Commission each year.

Member Philpitt and Mr. Paradise discussed the alternative water supply, Lake Monroe Reclamation project and the Tivoli Drive intersection improvements. Mr. Paradise noted that the plan doesn't need to be financially feasible. However, the potential cost of the projects could be funded by multiple sources, which include grants.

Member Putkowski noted that most of the of the stormwater projects are associated with a fee for engineering design and asked whether this could be done internally to save money. Mr. Paradise responded that this work is typically performed by a licensed engineering consultant.

Member Walosik asked for an update on the Tivoli Drive improvements. Discussion regarding the Tivoli Drive intersection improvements ensued. Mr. Bowley stated that the previous approval, to add Tivoli Drive to the Thoroughfare Map, allowed the City to apply for grants towards the improvements. Mr. Bowley noted that the City hired a transportation consultant to evaluate the road, that recommended initially improving the intersections only for safety operations.

Chairman Burbank asked if the William S. Harvey Scholarship fund was in trouble due to the city not able to generate excess money from the solid waste contract.

Discussion regarding installing sewer at the Saxon Blvd. corridor occurred. Chairman Burbank opined that the FDOT plans limit the remaining parcels left for development that would be connecting to the sewer. Mr. Paradise stated that there is a land use change application for southeast corner of Normandy Blvd. and Saxon Blvd.

Motion by Member Harper, seconded by Vice Chair Walosik, to recommend for approval, Ordinance No. 34-2016 amending the Comprehensive Plan of the City of Deltona, by amending the Capital Improvements Element providing for the replacement of the Capital Improvement Project sheets. The motion carried by the following vote:

For: 6 - Chair Burbank, Vice Chair Walosik, Member Harper, Member Philpitt, Member Putkowski and Member Sixma

8. STAFF COMMENTS:

Mr. Paradise asked that those members who's terms are ending and wish to be

reappointed, to contact the City Clerk Department as soon as possible.

9. BOARD/COMMITTEE MEMBERS COMMENTS:

Discussion amongst the board ensued regarding election of officers and sunshine laws.

10. ADJOURNMENT:

The meeting adjourned at 7:33 pm.

_____
Tom Burbank, Chairperson

ATTEST:

_____
Kathrine Kyp, Board Secretary

Staff Report

To: **Planning and Zoning Board**

From: **Ron A. Paradise, Assistant Director, Planning and Development Services**

Date: **December 30, 2016**

Re: **Request for a Variance – Resolution No. 2017-01, 2601 Providence Blvd.**

A. Summary of Application:

Applicant: Alice Pacitti

Request: The request is to encroach 7 feet into the required 10 foot rear yard setback and encroach 2 feet into the required 6 foot side yard setback with a 12'x20' (240 square foot) shed.

Tax Parcel No.: 8130-53-17-0060

Property Acreage: ±0.30 acre (±13,300 square feet)

Property Location: 2601 Providence Blvd.

Legal Description: Lot 6, Block 1415, Deltona Lakes Unit 53, Map Book 28, Pages 32-42

B. Existing Zoning:

1. **Subject Property:** R-1 (Single-family classification)

2. **Adjacent Properties:**
   North: R1
   South: R1
   East: R1
   West: R-1A

C. Zoning Description:

The following zoning description is from the purpose and intent cited in Sec. 110-307 of the City Land Development Code. The purpose and intent covers four single family zoning subsets including the R-1 classification.

These classifications are established within the city to provide areas for single-family dwellings and customary accessory buildings. The regulations for this classification are designed to promote the construction and continued use of land for single-family dwellings, and to provide as conditional uses certain structures and uses required to serve the residents, such as churches and noncommercial recreational areas. Prohibited are uses of land that would create potential nuisances to residential areas, adversely affect residential property values, overburden public facilities or create potentially adverse individual or cumulative impacts to adjacent lakes that would diminish their water quality or aesthetic appeal.

D. Background: The property at 2601 Providence Blvd. is developed with a one story single-family dwelling featuring approximately 2,236 square feet of living area. The house was constructed in 2001. The attached aerial photograph depicts an above ground pool, a shed with a dimension of approximately 10 feet by 8 feet and an enclosed utility trailer. Currently the pool, shed and trailer have been removed from the property. The property was platted as part of the Deltona Lakes subdivision, Unit 53 in 1966. The parcel contains about 13,300 square feet which is larger than many of the lots in the vicinity which are platted at 10,000 square feet. However, the subject lot is located at the corner of Providence Blvd. and Joyner Dr. and it is not uncommon for corner lots to be platted at a larger size than single frontage lots.

The applicant is suggesting locating a 12’x20’, 240 square foot prefabricated shed on the property. The applicant is proposing the shed be located in manner that would not comply with the 10 foot rear or six foot side yard setback requirements. As presented, the shed would encroach 7 feet into the rear yard setback and 2 feet into the side yard setback. The rationale for the variance request is to avoid further cutting into a slope associated with

fill brought in to level the house pad. Based on a field observation, the original lot grade probably sloped down from Providence Blvd. to the east – "C grade".

The proposed location of the shed and setback encroachments are depicted on the 'Proposed Shed' graphic included as part of the map series.

The application justification also makes mention of easements established along the rear and side yards. The easements were platted as part of the Deltona Lakes plat and are made available for drainage and utilities. The easements in the case of the subject lot correspond with the respective side and rear yard setbacks of the R-1 zoning. However, the lack of utility use of the easements is not germane in this case. This is a request to vary from the required rear and side yard setbacks articulated within the R-1 zoning.

Finally, according to Section 110-1001, a variance request needs to be approved by a five vote supermajority of the City Commission.

E. Matters for Consideration:

1. Special conditions and circumstances exist which are peculiar to the land, structure, sign, or building involved and which are not applicable to other lands, structures, signs, or buildings in the same zoning classification.

The proposed 240 square foot accessory building is the largest structure allowed by the City to be considered a shed. Accessory buildings larger than 240 square feet are subject to design and aesthetic requirements. Upon review of the proposal and property in question, there are no special conditions or circumstances associated with the land or structure. The 12'x20' shed can fit on the property in compliance with the City setback requirements.

The preferred alignment of the shed expressed by the applicant is in a north/south manner extending along the rear property line. In order to comply with the 10 foot rear and six foot side yard setbacks, there has been concern expressed about needed modifications to the house pad slope and potential erosion caused by cutting the slope. There is recognition the slope may need to be altered to accommodate a level pad and a field visit revealed the initial site work performed by the applicant included an approximately 16 to 18 inch high 90 degree slope cut from the house pad fill. A method to manage a slope cut on the property is to construct a retaining wall to protect the integrity of the slope. Retaining walls of wood, concrete, castle block, etc. are an accepted, preferred, common and economical way to stabilize slopes. Retaining wall construction is so straight forward, the City does not require a building permit for the construction of retaining walls 24 inches in height or shorter. (If the applicant needs to construct a retaining wall taller than 24

inches, such work can be covered under the building permit needed to site the shed on the property.) Another method to manage erosion around a house pad associated with run off is to install roof gutters and direct the water accordingly through downspouts. Currently the house has gutters and downspouts which would direct water flow away from the subject slope. In conclusion, the 240 square foot shed at a 12x20 size will fit with the preferred alignment and still comply with the City zoning setbacks.

Another option before the applicant which would not involve extensive, if any, modification of the slope is to locate the shed along the six foot side yard setback in an east to west alignment. The 12'x20' shed will fit on the property compliant with the City Code under the aforementioned scenario.

To visualize the above two options see the Option 1 and Option 2 maps included as part of the attached map series.

The shed could also be redesigned. For example, the shed could be fabricated at a size of 10'x24' maintaining the 240 square foot floor plan. The 10 foot width is similar to the old shed on the property which was permitted and did comply with the setbacks. A 10'x24' shed would result in less slope disturbance while still complying with the setbacks.

Finally, a smaller shed is also an option. A smaller shed footprint would require less grading outside of the City setbacks.

2. Special conditions and circumstances exist that do not result from the actions of the applicant.

The need for a variance is self-imposed. As discussed above, there is ample opportunity to locate a shed on the property while complying with the 10 foot rear and six foot side yard setbacks.

3. Literal interpretation of the provisions of this chapter would deprive the applicant of rights commonly enjoyed by other properties in the same zoning classifications, under the terms of the chapter, and would work cause an unnecessary and undue hardship on the applicant.

Yard setbacks have been required in the City dating back to when the Deltona Lakes Plat was being created. For example, the 1973 version of the Deltona Lakes Community Development Plan required 5 foot rear and side yard setbacks for accessory uses but accessory uses were not allowed in easements. The de facto result was a 10 foot rear yard and 6 foot side yard setback. The overwhelming majority lots created within the many units of the Deltona Lakes Plat were associated with a 6 foot easement extending down side lot lines and a 10 foot

easement along rear lot lines. More contemporaneously, in the early 2000's when the house was built, the rear yard setback was increased to 20 feet and a side yard setback of 8 feet was required. The modern setbacks of 10 feet from the rear lot line and 6 feet from the side yard for accessory structures were enacted in the 2010's. The present City Code has evolved to allow greater flexibility to locate accessory structures while still maintaining an appropriate setback standard. Within the literal interpretation of the Code, the applicant has the ability to comply with those standards.

Sheds are very popular accessory buildings within the City. In the last two years City records show 377 permits were issued for sheds associated with residential zoned areas including R-1 zoned land. (The R-1 zoning is the most commonly applied zoning in the City accounting for the majority of the areal land extent in the City.) All of those permits were processed and issued in compliance with the present City setback requirements without a need for a variance. Therefore, the applicant is not being deprived of rights commonly enjoyed by other properties. In addition, since the shed at the requested size can be located on the property in compliance with the zoning setbacks, there is no hardship.

4. The variance granted is the minimum variance that will make possible the reasonable use of the land, building, structure, or sign.

The shed or a similar sized shed can be located on the property without the need for a variance. Therefore, the applicant has reasonable use of the property without the need for a variance.

5. The granting of the variance is in harmony with the general intent and purpose of this chapter and the City of Deltona Comprehensive Plan, as it may be amended from time to time, and that such variance will not be injurious to the area involved.

Goals of the City zoning regulations as illustrated in the purpose and intent of the Zoning chapter of the Land Development Code include but are not limited to the following: "secure safety from fire"; "provide adequate light and air"; and "prevent the overcrowding of land". A method to implement the aforementioned goals is to ensure adequate setbacks for buildings. In addition, setbacks provide a uniform separation of structures and open space which is part of the suburban character of the Deltona community. Setbacks are also intended to promote land use compatibility by providing a buffer and thus not unduly impacting the open space/separation expectations of adjacent landowners/neighbors.

The Comprehensive Plan also establishes land use policy intended to foster land use compatibility. The following provisions are applicable:

Policy FLU1-1.2
The City of Deltona shall utilize land development regulations that contain specific and detailed provisions required to implement the Comprehensive Plan and which:
a. Provide a balance of residential and non-residential land uses that offer opportunities to live, work and play within the City boundaries particularly in compact mixed-use developments;
b. Regulate the subdivision of land;
c. Regulate the use of land and water bodies consistent with this Element and ensure the compatibility of adjacent land uses;
d. Provide for open space;
e. Protect natural resource areas;
f. Regulate areas subject to seasonal and periodic flooding and provide for drainage and stormwater management;
g. Protect potable water well fields and aquifer recharge areas;
h. Regulate signage;
i. Ensure safe and convenient traffic flow on and off site and vehicle parking needs;
j. Provide that development orders and permits issued shall not result in a reduction below the level of services standards adopted in this Comprehensive Plan;
k. Provide for the transfer of development rights;
l. Contain performance standards for protecting archaeological or historically significant properties or areas;
m. Protect against adverse impacts to wildlife and their habitats.
n. Appropriately manage aesthetics and design, i.e. streetscape, building design, etc.
o. Promote an energy efficient urban development form intended to reduce greenhouse gas emissions both locally and regionally.
9J-5.006(3)(c)(1,2,3,4,5,6,7,8)

Subsections "c", "d" and "n" are applicable to the subject application. The subsections establish parameters to promote land use compatibility and community aesthetics. These subsections effectively underpin the rationale for implementing effective and uniform zoning setbacks for the community. Therefore, granting the variance would not be consistent with this policy.

Policy FLU1-5.13
In implementing the Future Land Use Element, the City shall develop and adopt regulations to ensure to the maximum extent feasible, compatibility of use of areas and properties, including but not limited to such factors as traffic circulation, air quality and odor control, noise control, lighting and aesthetics. 9J-5.006(3)(c)(2)

Zoning setbacks are a prime way to ensure land use compatibility and aesthetics through standard separation requirements. As has been stated, the applicant has several viable options to enjoy a shed but still comply with the City setback standards. The variance request is not consistent with this policy.

CONCLUSION/STAFF RECOMMENDATION:

Since there are many options to realize a 240 foot shed on the subject property consistent with the City zoning setbacks, the proposed shed location encroaching 7 feet into the required 10 foot rear yard setback and 2 feet into the 6 foot side yard setback can only be considered a request for convenience. However, zoning setbacks represent a long standing community standard intended to be applied to large areas of the City to implement prime tenets of the City zoning regulations – "secure safety from fire"; "provide adequate light and air"; and "prevent the overcrowding of land". Implementing a uniform community aesthetic is also a goal of consistently required setbacks and evinces the suburban character of much of the City.

The requested variance does not meet the parameters stated to justify such an action. There is no zoning hardship associated with the request and the applicant has a lot similarly situated as many lots within R-1 zoned areas of the City. Finally, the variance request is not in harmony with the purpose and intent of the City zoning regulations and is not consistent with the City Comprehensive Plan. Therefore, Staff suggests the request for the variance be denied.

RESOLUTION NO. 2017-01

A RESOLUTION OF THE CITY OF DELTONA, FLORIDA, APPROVING A ZONING VARIANCE FOR A 12'X20' SHED SITUATED AT THE NORTHEAST CORNER OF THE PROPERTY TO ENCROACH SEVEN FEET INTO THE REAR YARD SETBACK AND TWO FEET INTO THE SIDE YARD SETBACK, LOCATED AT 2601 PROVIDENCE BLVD., DELTONA; PROVIDING FOR SEVERABILITY, AND AN EFFECTIVE DATE.

WHEREAS, the City of Deltona, Florida, adopted Section 110-307 of the Deltona Code of Ordinances, and

WHEREAS, a zoning variance application has been received by the City of Deltona, meeting the basic requirements and supporting documentation and need for a zoning variance from the setback requirements set forth in Section 110-307(e) of the City of Deltona Code of Ordinances for the property located at 2601 Providence Blvd. described as Lot 6, Block 1415 Deltona Lakes Unit 53, Map Book 28, Pages 32-42 to allow a 12'X20', 240 square foot shed situated at the northeast corner of the property to encroach seven feet into the rear yard setback and two feet into the side yard setback; and

WHEREAS the City Commission consistent with Section 110-1001 of the City of Deltona Code of Ordinances found a literal enforcement of the provision of Chapter 110, Zoning Ordinance, would result in unnecessary and undue hardship on the applicant that is not self-imposed.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF DELTONA, FLORIDA:

Section 1. In accordance with City of Deltona Code of Ordinances, Section No. 110-1103, as amended, the Deltona City Commission hereby grants the Variance to allow a 12'X20', 240 square foot shed situated at the northeast corner of the property to encroach seven feet into the rear yard setback and two feet into the side yard setback; at 2601 Providence Blvd., Deltona, Florida (File # VR16-005).

Section 2. **Severability.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, the invalidity shall not affect other provisions or

applications of the Resolution, which can be given effect without the invalid provision or application, and to this end the provisions of this Resolution, are declared severable.

Section 3. Effective Date. This resolution shall take effect immediately upon its final adoption by the City Commission.

PASSED AND ADOPTED BY THE CITY COMMISSION OF THE CITY OF DELTONA, FLORIDA, THIS _____ DAY OF _____, 2017.

_____
JOHN C. MASIARCZYK, SR., Mayor

ATTEST:

_____
JOYCE RAFTERY, CMC, MMC, City Clerk

Approved as to form and legality for use
and reliance of the City of Deltona, Florida:

_____
GRETCHEN R. H. VOSE, City Attorney

December 9, 2016

RE: Pacitti request for variance

To Whom It May Concern,

We are looking to replace an old shed with a new sturdier shed from Superior Sheds. The shed size that we are looking to install is a 12x20. To install the shed we would need to use the easement, as our property grading in our back yard would cause the shed to be approximately 25 inches off the ground using the current easement restrictions. The grading slope drops 32 inches from the foundation's ground level to the property line. Allowing us to use the easement would enable us to put the shed at ground level.

Placing the shed at the current requirements of 10-foot easement would place the shed only 7 feet from the house, this would have a negative effect on our property grading causing issues when it rains, possibly causing soil erosion.

I would like to thank you in advance for your time and consideration in this matter. I look forward to hearing from you.

Sincerely,

Alice Pacitti

Alice Pacitti

2601 Providence Blvd

orange flag

10 feet from property line

3 feet from property line

CR 4155 (PROVIDENCE BLVD)
JOYNER DR
AERIAL PHOTO
Legend
Subject Parcels
City Boundary
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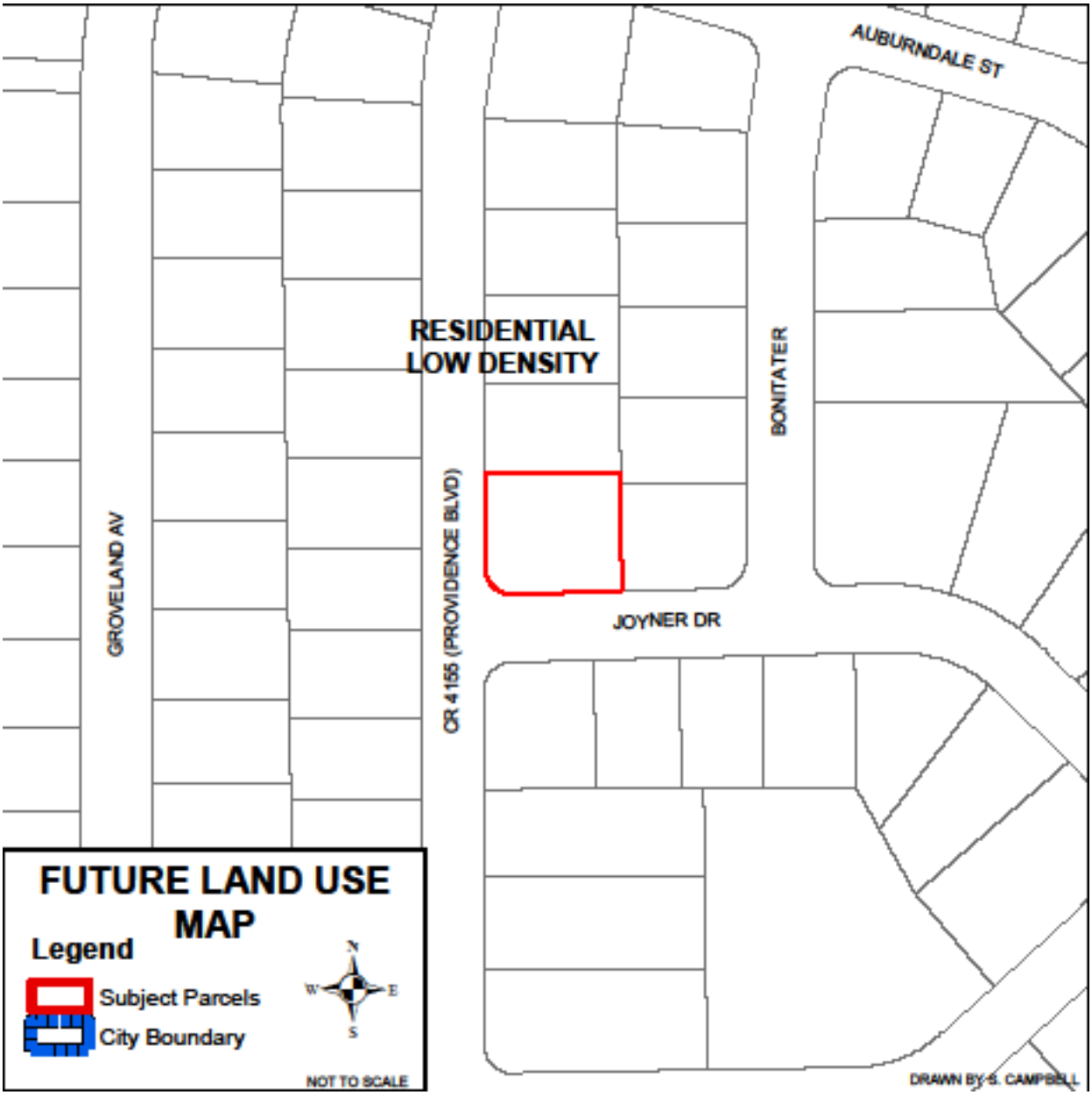
NOT TO SCALE
DRAWN BY S. CAMPBELL


AUBURNDALE ST
RESIDENTIAL
LOW DENSITY
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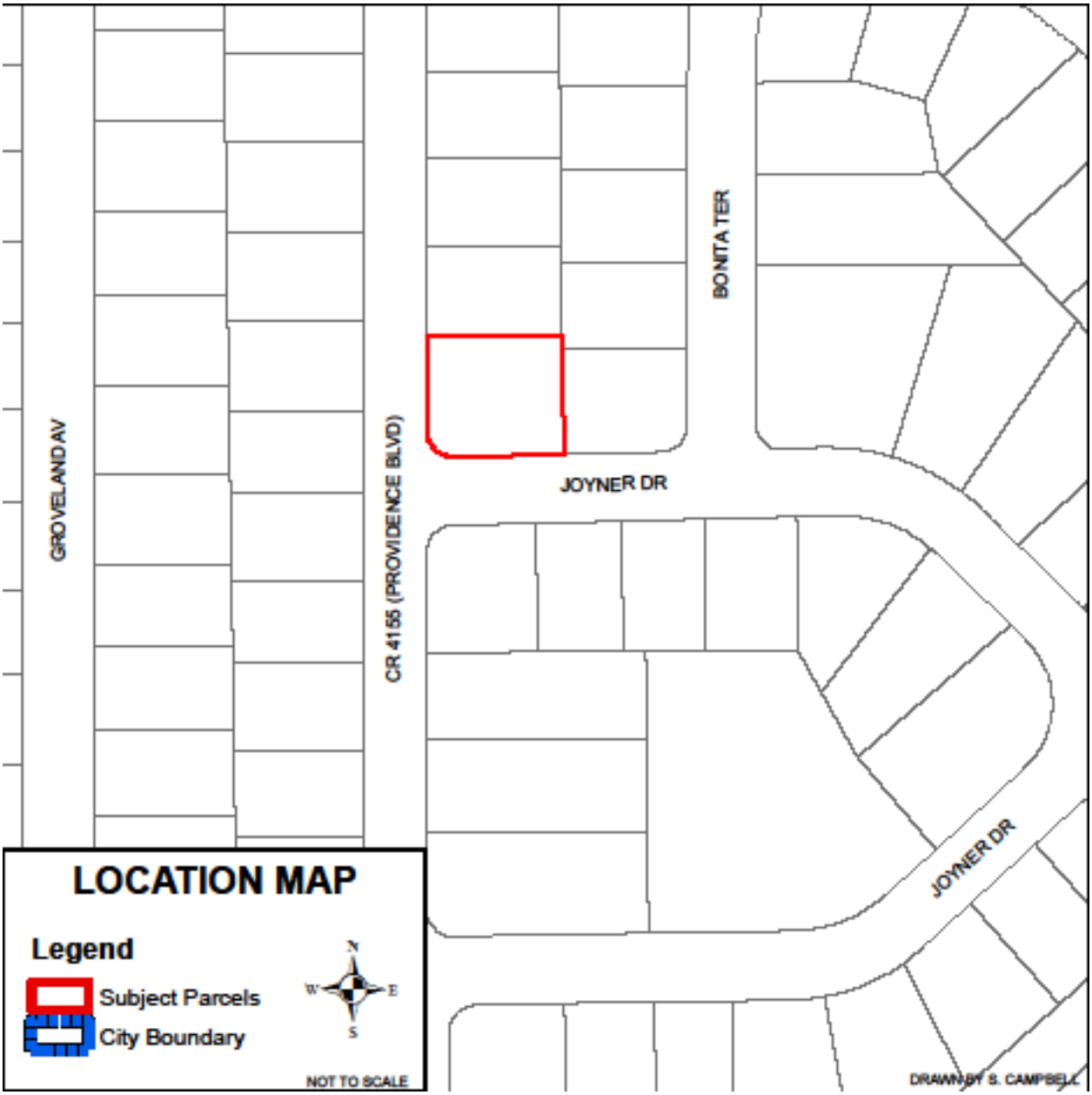
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CR 4155 (PROVIDENCE BLVD)
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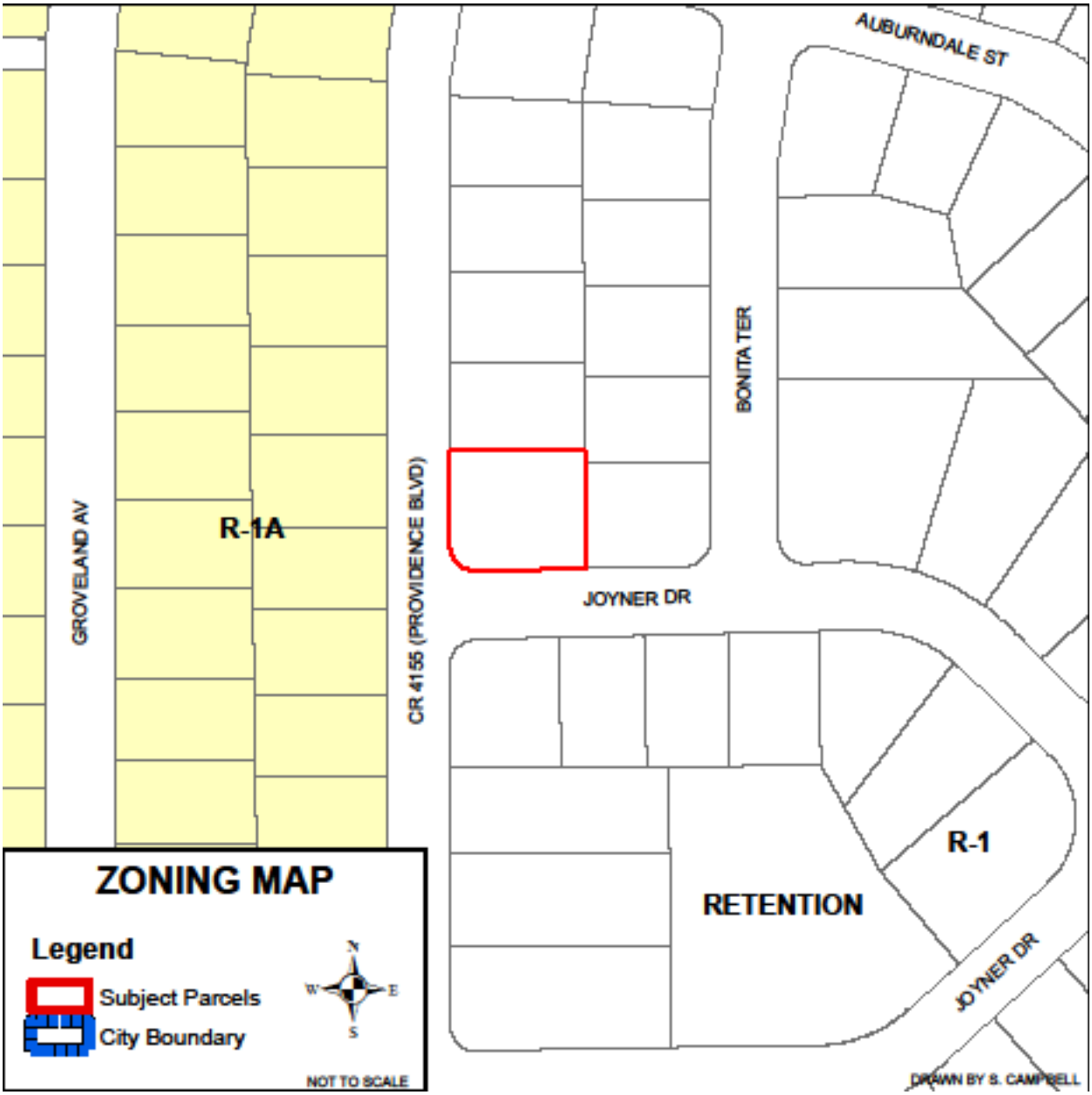
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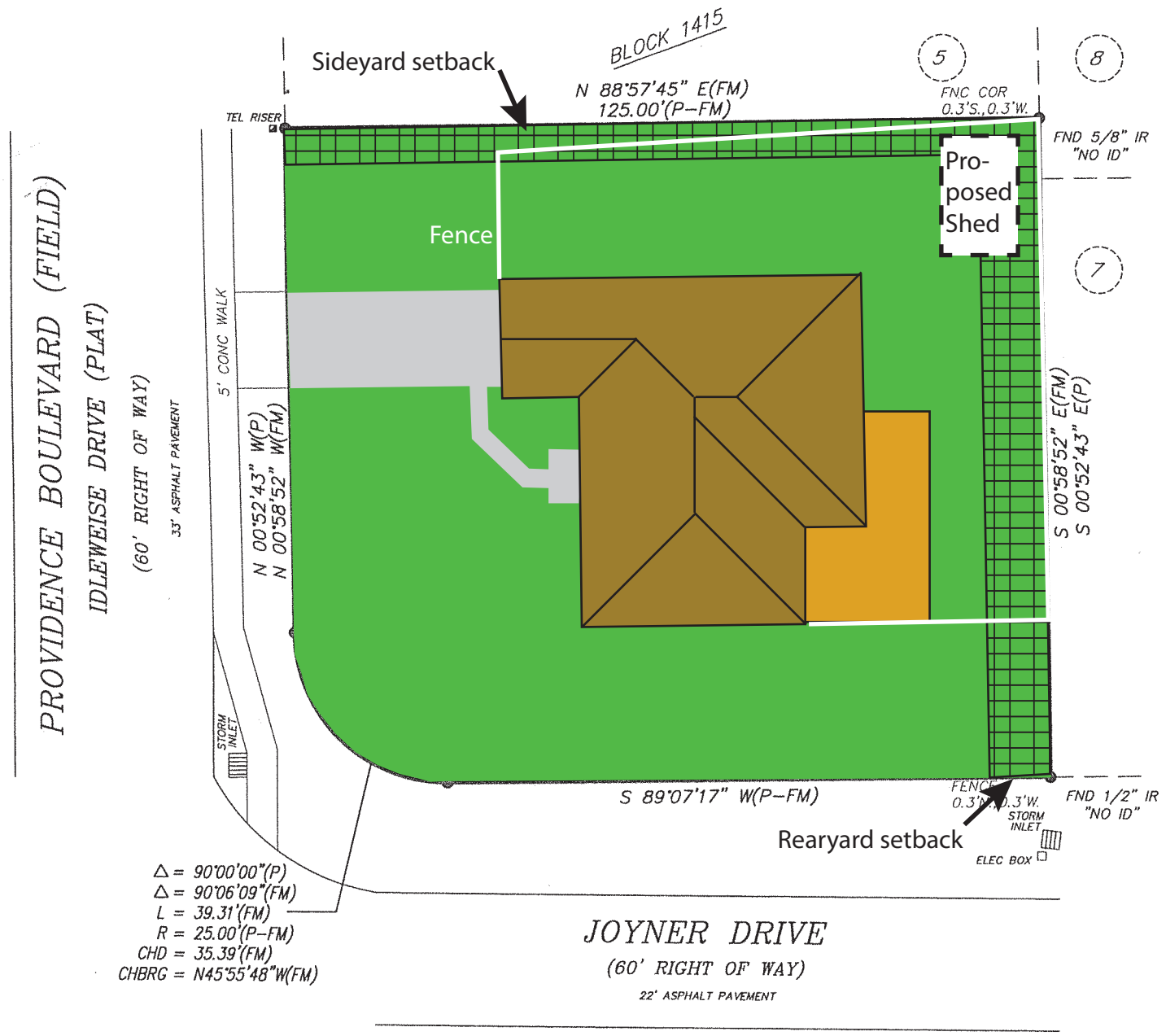
CR 4155 (PROVIDENCE BLVD)
JOYNER DR
BONITA TER
AUBURNDALE ST
RETENTION
R-1
JOYNER DR
DRAWN BY S. CAMPBELL

LEGAL DESCRIPTION: (OR 6911 PG 2499)

LOT 6, BLOCK 1415, DELTONA LAKES UNIT FIFTY-THREE, ACCORDING TO THE PLAT THEREOF, AS RECORDED IN MAP BOOK 28, PAGES 32 THROUGH 42, INCLUSIVE, OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.

Applicant Proposed Shed Location

SCALE: 1"=20'



NOTES:

BEARINGS SHOWN BASED ON THE NORTH RIGHT-OF-WAY LINE OF JOYNER DRIVE AS BEING A BEARING OF S. 89°07'17" W. (PLAT).

THE FLOODPLAIN BOUNDARY, IF SHOWN HEREON, WAS SCALED FROM A LARGE SCALE FEMA FLOOD INSURANCE MAP AND AS SUCH HAS AN INHERENT ERROR OF 10% OF THE FEMA MAP SCALE.

UNDERGROUND UTILITIES AND FOUNDATION MAY EXIST AND HAVE NOT BEEN LOCATED, EXCEPT AS SHOWN.

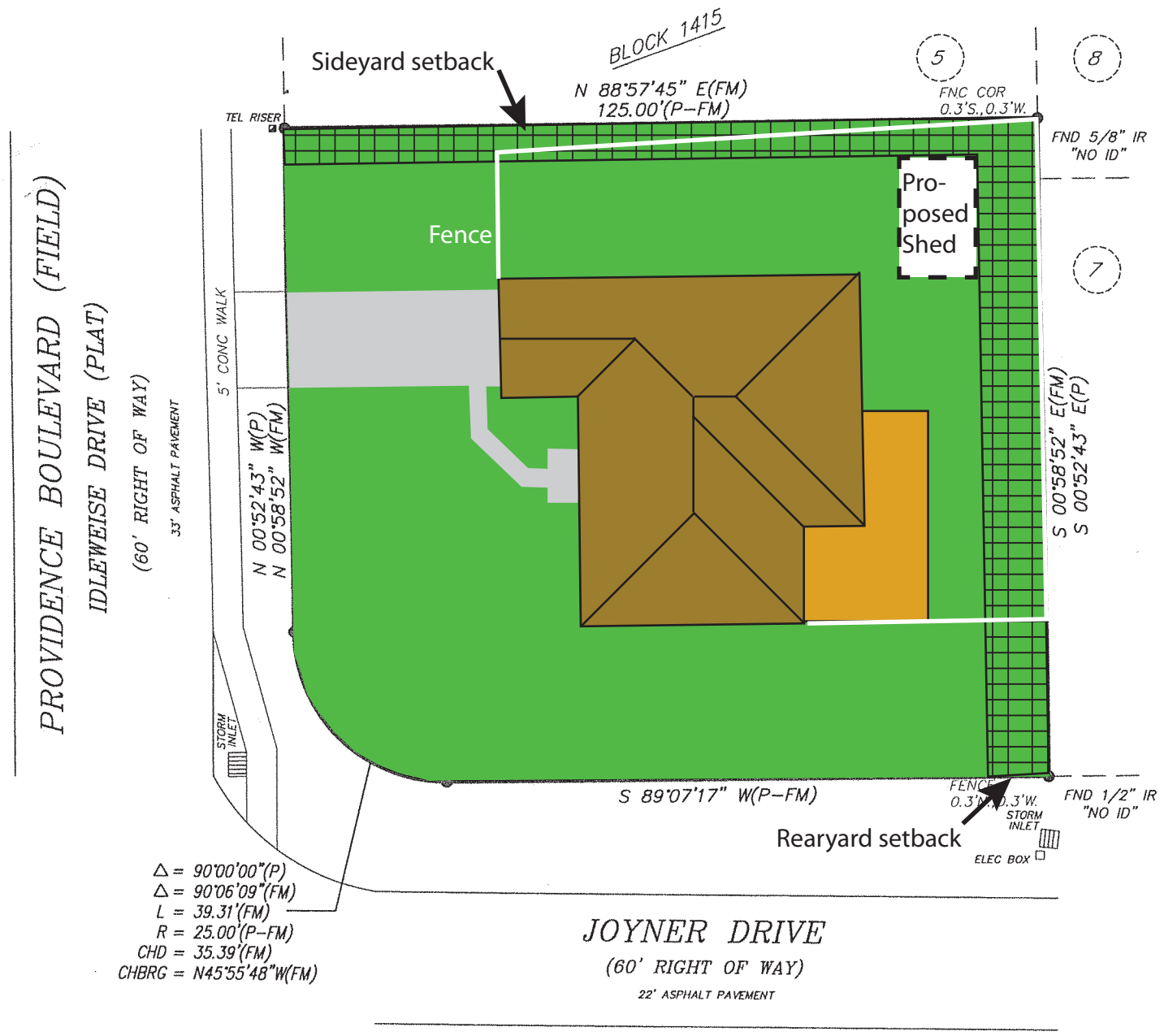
FLOOD CERTIFICATION:
(Per map dated February 19, 2014)
This is to certify that I have consulted the Federal Insurance Flood Hazard Boundary Map and found the ABOVE named Property IS NOT located in a special flood hazard area, according to Community Panel Map No. 12127C-0640-J Map, Panel 640 of 930, Zone "X".

LEGAL DESCRIPTION: (OR 6911 PG 2499)

LOT 6, BLOCK 1415, DELTONA LAKES UNIT FIFTY-THREE, ACCORDING TO THE PLAT THEREOF, AS RECORDED IN MAP BOOK 28, PAGES 32 THROUGH 42, INCLUSIVE, OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.

SCALE: 1"=20'

Option 1



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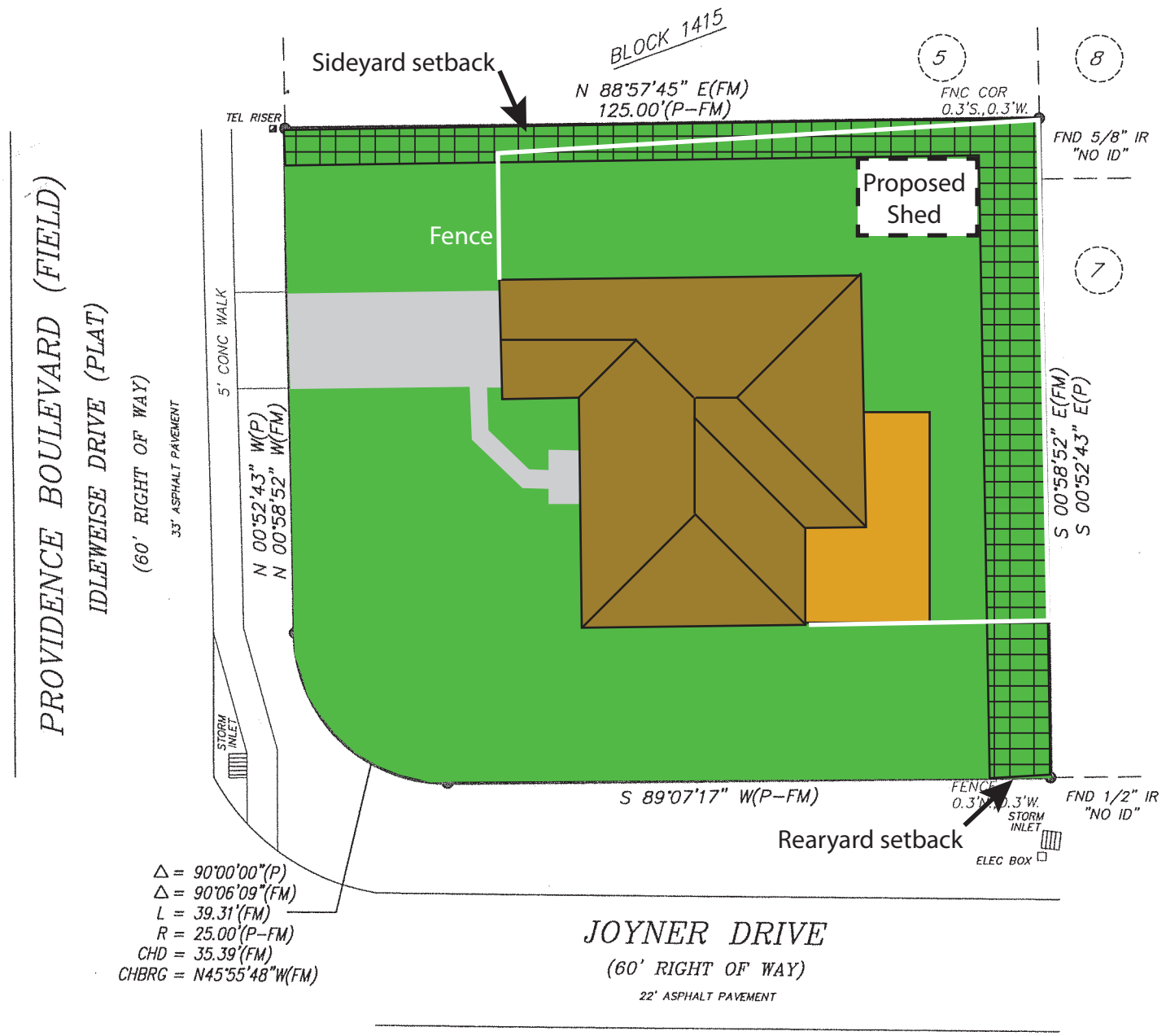
SCALE: 1"=20'

Option 2



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Memorandum

To: **Planning and Zoning Board**

From: **Joseph Ruiz, Planner II**

Date: **January 4, 2017**

Re: **Ordinance No. 35-2016, S/E Corner of Normandy Blvd. and Saxon Blvd., CP16-001; Changing the Future Land Use Map from Low Density Residential to Commercial**

I. SUMMARY OF APPLICATION

APPLICANT: Deltona Lakes Investors, LLC
Paul F. Holub, Jr., Managing Member
PO Box 730086
Ormond Beach, FL 32173

Request: The City of Deltona has received an application to amend the City's Future Land Use Map by changing ±2.5 acres of land located at the southeast corner of the intersection of Normandy Blvd. and Saxon Blvd. from Low Density Residential (LDR) to Commercial (C).

A. SITE INFORMATION:

1. **Tax Parcel No.**: 8130-03-25-0230, 8130-03-25-0240, 8130-03-25-0250, 8130-03-25-0390, 8130-03-25-0400, 8130-03-25-0410, 8130-03-25-0420, 8130-03-25-0430, 8130-03-25-0440
2. **Property Addresses:** 1878 Saxon Boulevard
3. **Property Acreage:** ±2.5 acres
4. **Property Location:** SE corner of the intersection of Normandy Blvd. and Saxon Blvd.
5. **Property Legal Description:**

   LOTS 23, 24, 25, 39, 40, 41, 42, 43 & 44,

BLOCK 86, DELTONA LAKES, UNIT THREE, ACCORDING TO THE MAP OR PLAT BOOK 25, PAGES 105-120, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.

B. Existing Land Uses

1. **Subject Property:** Seven single-family residential houses and two vacant single-family lots which were originally platted as part of Unit Three of the Deltona Lakes Subdivision.

2. **Existing Land Use Adjacent to Subject Property:**
Adjacent uses located generally to the north, south, east, and west are single-family dwellings on individual lots. However, a Walgreens drug store is located catty corner from the property across the Saxon Blvd. and Normandy Blvd. intersection.

C. Future Land Use Designation

Subject Property:
Existing: Low Density Residential (LDR). The LDR designation is an urban land use category that allows residential uses, typically at a suburban scale, such as dwellings on individual lots. The LDR has a density range of 0 to 6 units per acre.

Requested: Commercial (C). The Commercial category allows a wide range of retail and service oriented commercial uses including big box, mall, shopping center, restaurant, and other self-contained or clustered business uses. Heavy commercial type uses, such as storage and major repair activities may be allowed if compatible with the surrounding area. The Commercial designation allows up to a 0.55 Floor Area Ratio (FAR).

D. Zoning:

1. **Subject Property:**
Existing: Single Family Residential (R-1)
Requested: Retail Commercial District (C-1). The applicant has applied for a rezoning of the property to C-1 from R-1.

2. **Zoning on Adjacent Properties:**
The adjacent zonings are Residential (R-1), Office Residential (OR), and General Commercial (C-2)

II. Authority and Procedure

The authority for City staff making recommendations to the City Commission regarding applications and proposals for Comprehensive Plan Amendments is set forth in Section 110 1202 of the Deltona Code of Ordinances. The relevant procedure involves submittal of a complete application by the property owner, or his authorized agent, review of the application by staff, preparation of a written staff report with recommendations, one public hearing held by the Planning & Zoning Board with resulting recommendations to the City Commission, and a minimum of two (2) public hearings held by the City Commission.

Comprehensive Plan Amendments are enacted by adoption of an ordinance by the City Commission. In addition, Comprehensive Plan Amendments need to be certified by the Volusia Growth Management Commission (VGMC) before final adoption by the City.

III. Review Criteria

The Planning & Zoning Board must consider the criteria specified in Future Land Use Element Goals, Objectives, and Policies of the Comprehensive Plan when making a determination on the application and may accept, reject, modify, return, or seek additional information.

IV. Amendment Analysis

The Comprehensive Plan establishes parameters with regard to the review of Future Land Use Map Amendments. The subject parameters are established in Future Land Use Element Policy FLU1-7.17, and the proposed Future Land Use Amendment will be reviewed with regard to each parameter.

Policy FLU1-7.17 of the City of Deltona Comprehensive Plan, Future Land Use Element
"**Applicants requesting amendments to the Future Land Use Map shall be evaluated with respect to consistency with the Goals, Objectives and Policies of all elements, other timely issues and in particular the extent to which the proposal, if approved, would:"**

a. Satisfy a deficiency in the plan map to accommodate projected population or economic growth of the City;

The amendment is to change residential land to a non-residential, higher intensity commercial oriented Future Land Use designation – Commercial (C). The allocation of Future Land Use entitlements within the City is driven by population projections with the intent of providing an appropriate balance of interdependent land use types and comport with City economic development oriented objectives. Comprehensive Plan Policy FLU1-7.23 provides detailed guidance with regard to ideal commercial (and industrial) allocations to promote a healthy balance of residential and non-residential land uses. The policy states the following:

Policy FLU1-7.23
The City shall seek to ensure that its Future Land Use Plan Map provides for a minimum of six acres of commercial lands and four acres of industrial lands per 1,000 residents, with a goal of providing 10 or more acres of commercial lands and six or more acres of industrial lands per 1,000 residents by 2025.

The City currently has over ten (10) acres of commercial land per 1,000 residents designated on the Future Land Use Map – well above the six (6) acre minimum standard articulated by the policy. However, it is important to note that the City Comprehensive Plan is a 20 year plan and based on the 20 year planning window the policy establishes a ratio of "at least" ten (10) acres or more of commercial land per 1,000 residents by 2025. To accomplish the commercial ratio by 2025, the City will need 990 acres of commercial land (projected population of almost 99,000 people by the year 2025 per the Florida Housing Data Clearinghouse). The City currently has 1,075 acres of planned commercial land. As per Policy FLU1-7.23, the ratio of 10 acres of commercial per 1,000 residents is expressed as a minimum standard. The policy does not preclude and encourages the City exceeding the ratio of 10 acres per 1,000 residents. Therefore, the proposed amendment will serve to further the goal of affording ten (10) or more acres of commercial land by the year 2025.

b. <u>Maintain and/or improve of the City's ratio of non-residential lands to residential lands available for economic use;</u>

The expansion of commercial land use designations and zoning categories help further the City's goal of a more balanced commercial/residential ratio (See above discussion pertaining to Policy FLU1-7.23.). While the City may presently be planned for a range of residential to non-residential uses which would meet the needs of the City's growing population, actual commercial development within the City is inadequate. As developed, the City is at a ratio of about eight (8) acres of commercial land per 1,000 residents. Currently, the City remains underserved by commercial uses and residents must leave the City to fulfill needs for goods and services. Therefore, changing the land use on the amendment area from the residential designation of Low Density Residential to Commercial would be an appropriate method of which to address the commercial to residential land use imbalance by providing an ability to expand existing commercial nodes.

c. <u>Support efforts to increase the provision of a viable mixture of land uses in a compact, walkable area that is accessible to the full range of feasible non-motorized and motorized transportation modes;</u>

The amendment area is located in an urban context associated with existing development including residential and commercial land uses. The promotion of compact urban development is a basic tenet of the City Comprehensive Plan. The amendment to Commercial represents an expansion of a non-residential node at the very strategic Normandy/Saxon intersection, already established by the Walgreens development. The result of this node will provide an opportunity for more business to establish around a major City intersection, as well as providing commercial services to the adjacent residences within a walkable area. The result will be a development pattern that maximizes land resources within an existing urban area.

The intersection of major transportation thoroughfares are often targeted for non-residential development because of advantageous automotive access. However, the proposed amendment area is also juxtaposed to existing residential areas in a manner that would promote multi-model transportation opportunities. The network of local streets and existing and planned sidewalks provides access to residential areas and is conducive to bike and pedestrian transportation modes. This synergy between land uses provides for the community to remain local, decreasing the need to travel elsewhere for neighborhood services. The proposed site allocates a use within a walkable distance. The current proposal complies with the **Policy FLU1-2.4** which states the following:

Policy FLU1-2.4
The City shall expand commercial, industrial, and mixed-use developments in appropriate locations in order to discourage sprawl and to promote energy efficient development patterns.

Being that a commercial site will be abutting a residential district, City safeguards allow for compatibility within these parameters. Substantial buffer requirements aid in the transition of uses, providing for distance and screening separation. An appropriate buffer as designated in the City's Land Development Code will be required along the east and south property lines abutting the residential community. This complies with **Policy FLU1-7.8**, which states:

Policy FLU1-7.8
Appropriate buffers and transition areas shall be utilized to ensure compatibility between residential areas and commercial and industrial developments in a manner that balances neighborhood protection and economic development goals.

In no way will the proximity of a commercial use be haphazard to the existing residential community. Other commercial sites along this section of the Saxon Corridor have successfully promoted the viability of the surrounding neighborhood and the staff suggests the proposal will provide more of the same. Through land development guidelines and thorough site plan review, the proposal will benefit the community by

providing for safe vehicular and pedestrian access and roadway buffers for aesthetic and safety purposes. The proposal will comply with **Policy FLU1-7.3** as follows:

Policy FLU1-7.3
The City of Deltona shall maintain the viability of existing and proposed residential neighborhoods by maintaining guidelines and regulations for: vehicular and pedestrian access, roadway buffers, landscaping, fences and walls, and the maintenance and use of common open space areas.

VOTRAN currently provides service to the area. VOTRAN Route 23 utilizes Saxon and a portion of Normandy Boulevards and provides access to the amendment area. Various areas of interest in the City can be accessed along these routes. There is not a stop located at the intersection; however, the route currently does have a stop located on the north side of Saxon Blvd. just west of the Walgreens heading westbound. Also, this route facilitates, through transfer, access to other areas of southwest Volusia County. Headway on the route is one hour and is more convenient than the other routes with two hour headways. Inferentially headway times will be reduced as there is more demand for transit because there will be more synergy along transit routes, such as goods, services and employment. The City anticipates that with the growing commercial uses at this intersection, a stop will be available to serve both inbound and outbound commuters. It is the City's goal that strategic intersections with commercial nodes be served by mass transportation services such as VOTRAN as part of the City's vision in **Policy FLU1-1.7** which states:

Policy FLU1-1.7
Non-residential centers should be served, when available, by mass transportation routes and designed to accommodate mass transit riders, vehicles and amenities.

The City of Deltona is a suburban institution. Part of the suburban paradigm is automotive reliance. Automotive dependency is inculcated into the American culture and that expectation will be part of the American experience for the foreseeable future. The cultural expectations of automotive dependency may be part of a way of life, especially in suburbia, but it is possible to mitigate the impact of automotive dependency. The method to mitigate automotive dependency is to reduce Vehicle Miles Travelled (VMT). VMT is a yardstick to determine the amount of automotive dependency associated with a community and Deltona VMT rates are very high. According to Census data, Deltona commuters spend an average of 31.7 minutes commuting. By way of comparison, the State average is 25.7 minutes. The high commute times are undoubtedly because of greater Deltona VMT and more traffic. Also, the fact the City is underserved by both commercial development and employment opportunities in close proximity indicates Deltona VMT is greater as people have to drive out of the community for goods, services and jobs. The amendment

would facilitate more opportunity for goods, services, and jobs closer to residential areas. The result would be a lower VMT.

d. <u>Enhance or impede provision of services at adopted Levels of Service Standards;</u>

Transportation

The property proposed to be changed from a residential land use entailment to a commercial allocation is located at the intersection of two major City thoroughfares – Saxon Blvd. and Normandy Blvd. The intersection is essentially a transportation gateway to Interstate 4 and is associated with extensive movements and relatively heavy volumes of traffic. The fact the intersection carries so many trips is one reason the property in question has been targeted for commercial uses.

Based on the location of the property and the traffic volumes associated with several business uses allowed within the requested C-1 zoning, a traffic impact analysis (TIA) was required to be part of the application. A TIA generated by Traffic Planning and Design (TPD) was submitted and is predicated on a land use assumption the site would be developed as a ±5,943 SF convenience store with 16 fueling stations. The TPD TIA is attached. While the assumed land use is not the most significant traffic generator when compared to other uses allowed in the C-1 zoning, the convenience store with gas sales is a very plausible land use scenario for the property. The property size, location, traffic pattern and market radius characteristic are conducive to such a use. Other assumptions include a conceptual sketch plan depicting two points of access. One access off of Normandy Blvd. would be restricted to a right-in and right-out movement. The other access located off of Saxon Blvd. is planned to be a full movement.

According to the TIA, the use would attract over 8,600 daily trips. However, the total new trips would be reduced to 3,082 trips because of a high "pass by" trip factor indicative of convenience store uses. A "pass by" trip refers to a trip already on the City network but accesses the facility on the way to another/other destination(s). Turning movements are also quantified. There is projected to be 570 peak daily turning movements - 265 in the morning and 305 in the evening peak hours. Traffic volumes and turning movements are very important elements with regard to determining site land use appropriateness (type/intensity/density) site design and access management. Access management refers to access minimization, location, movement and design onto the public road network. Lack of appropriate access management can exacerbate congestion associated with trip intensive land uses and create traffic safety problems. Therefore, since the proposed commercial use of the property is going to change traffic patterns in the area, traffic and related access management are important factors. Much of traffic design associated with developments is technically specific and is addressed during the City site plan review process. However, the full movement planned for Saxon Blvd. will be a

future site plan concern. The full movement so close to a major intersection could be unsafe and further cause undue traffic congestion. The result will be a left turn restricted design associated with the Saxon Blvd. access point. A right in and right out with a raised concrete median will be suggested for any access off of Saxon Blvd. Also, the throat of Normandy Blvd. at the southern approach to the Saxon Blvd. and Normandy Blvd. intersection will eventually need to be upgraded to facilitate enhanced traffic flow. This intersection improvement will probably be undertaken by the public in the future, perhaps utilizing Community Redevelopment Area funds.

The existing land use condition in the field today includes seven existing dwelling units. Six of the seven dwelling units feature an individual driveway cut onto a City thoroughfare road, either Saxon Blvd. or Normandy Blvd. According to the 9th Addition of the Institute of Traffic Engineers Trip Generation Manual, a single family dwelling unit generates 9.52 trips per day. Therefore, currently there is the potential for 57 turning movements at six individual driveway cuts. The proposed project does represent a significant increase in traffic activity compared to the existing land uses. However, the driveway cuts will be limited beyond what currently is in the field today.

The TIA conclusions indicated the project will have no significant impact on any roadway segments or intersections in the vicinity of the project. In addition, the TIA indicates the existing center lane of Saxon Blvd. designed to accommodate left turn lanes will also be used by Saxon Blvd. east bound traffic to access the property (However, staff will not recommend a full access on to Saxon Blvd. as part of the site plan review process.).

The TIA did not take into account improvements to Saxon Blvd. planned by FDOT. The FDOT is planning to widen Saxon Blvd. to six lanes from I-4 to Normandy Blvd. as part of the I-4 Beyond the Ultimate project. The intent is to more efficiently move traffic off of I-4 so cars are not queued in the interstate travel lanes. Just east of the Saxon Blvd./Normandy Blvd. intersection, FDOT is planning a 900 foot transition to taper the six lanes to the existing four lane configuration. As part of the transition, a raised median is planned for a distance of approximately 300 feet east of the intersection of Saxon Blvd. and Normandy Blvd. This raised median and related FDOT Saxon Blvd. improvements were not analyzed as part of the TIA. However, the improvements – six lanes and related median operations will result in greater capacity and enhanced safety along the Saxon Blvd. corridor in the vicinity of the subject property.

The City did hire a traffic engineer to provide peer review services. The firm VHB reviewed the TPD TIA and determined the findings, in general, were technically

sound. VHB did express concerns about the proposed full access from Saxon Blvd. For more information please feel free to see the attached comments from VHB traffic engineer Mr. Kok Wan Mah. Also attached are responses from Traffic Planning and Design (TPD) to the VHB comments.

Water

The amendment area will be served by the Deltona Water Utilities central water system. The City utility system has a permitted capacity of 13.957 million gallons per day, and the City currently uses an average of 5.946 million gallons per day. Therefore, the City has about eight (8) million gallons a day of permitted capacity to support future development. The Comprehensive Plan has articulated an Equivalent Residential Unit (ERU) level of service of 300 gallons per day (GPD). If all lots associated with the amendment area were developed, there could be up to nine (9) dwelling units developed under the existing LDR category. At a 300 GPD consumption rate per unit, the nine (9) dwelling units would create a demand of 2,700 gallons of water per day. To determine water use rates for non-residential development, the water use matrix from the City Water and Wastewater Utility Rate Ordinance was utilized as per the Comprehensive Plan. Existing and proposed water use is illustrated in the table below.

SCENARIO	LAND USE TYPE	ALLOWABLE DEVELOPMENT	ERU & MULTIPLIER	GALLONS PER DAY
Adopted LDR	Residential	9	300 GPD x 1	2,700
Proposed C	Convenience Store w/ 16 fuel stations	5,943	5,943/100 square feet x 0.038 x 300 GPD	678

Total water use from the proposed amendment would amount to 678 gallons per day. The amendment would result in less water use than the nine (9) dwelling units recognized by the LDR Land Use category and plat.

Wastewater

The project will need to be served by the City sanitary sewer system that extends along the Normandy Blvd. corridor but terminates approximately 1,200 feet or 0.23 mile south of Saxon Blvd. The Normandy Blvd. sewer line is a force main and none of the homes that are part of the amendment area are connected to the sewer line. The homes are served by individual septic systems. Central sewer is typically needed to facilitate viable commercial development in an urban area. On small sized lots, locating required landscaping, parking, and stormwater management facilities needed to accommodate a business use is land intensive and most often does not leave enough room for a septic tank and drain field. In addition, septic systems require maintenance and can be

unreliable when used for commercial activities. Therefore, site selectors for business uses typically eschew sites that not are served by central sewer. The City has over 1.4 million gallons of permitted wastewater treatment capacity per day and the majority of the capacity is already allocated. However, the City currently has about 500,000 gallons per day of extra wastewater treatment capacity. While the City sewer capacity is limited, the City and will be able to provide wastewater treatment for the amendment area.

Stormwater
Commercial development within the amendment area will be required to design stormwater retention systems consistent with the standards of the City of Deltona Land Development Code, Section 98-79.

Schools
This amendment will not increase residential dwelling potential and will not have a negative effect on school capacity.

e. <u>Be compatible with abutting and nearby land uses;</u>

The amendment is located on major City thoroughfares, with one being a four-lane road (Saxon Blvd.). Residential uses are common along major City roads and that development pattern will persist into the foreseeable future. While the residential development pattern within the City is well established, even along major roads, there are residential areas that are appropriate for a transition from residential to non-residential uses. Those residential areas that can be suitable for a transition to non-residential uses are associated with existing nodes of commercial activity and/or are clustered around the intersections of major roads. The nodal approach to business land use allocation is diametric to a linear, highway flanking strip commercial development pattern that radiates for long distances along major roads. Strip commercial development patterns are rife with traffic, driveway cuts, safety challenges, and generally poor aesthetic characteristics.

The amendment area is located at a strategic commercial intersection on the southeast corner of Saxon Blvd. /Normandy Blvd. The Saxon Blvd. /Normandy Blvd. intersection carries a high volume of traffic which is preferred by most retail site selectors. The Saxon Boulevard Corridor between Interstate 4 and Normandy Blvd. has been gradually growing into a commercial corridor. A recent example is the RaceTrac development located at the northeast corner of the intersection of Saxon Blvd. and W Finland Dr. The existing commercial nodes have been compatible with the existing adjacent neighborhoods and this land use change will only enhance the commercial/residential dynamic along Saxon Blvd. In addition, the market radius is well developed with a ready customer base as evidenced by extensive single family development in the area. The

location for this type of use is compatible to the existing theme along the Saxon Corridor and will be reviewed during plan review for consistency with Policy FLU1-5.13, which states:

Policy FLU1-5.13
In implementing the Future Land Use Element, the City shall develop and adopt regulations to ensure to the maximum extent feasible, compatibility of use of areas and properties, including but not limited to such factors as traffic circulation, air quality and odor control, noise control, lighting and aesthetics.

Safeguards such as setbacks, landscape buffers, traffic circulation standards, and architectural development standards will integrate a commercial land use into the area with limited impact. The application of the C category, with aesthetic and compatibility safeguards (buffers, setbacks, landscaping, etc.) represents a logical transition of prime intersection fronting land from residential to commercial – redevelopment.

The subject site is also within the Southwest Deltona Community Redevelopment Area (CRA). Being within the CRA signifies the subject site is in an area that has been assessed with a need for redevelopment. Additionally, City workshops have been performed to receive valuable input from the community to develop a Community Redevelopment Plan. This project will advance the CRA's mission and vision to redevelop blighted areas while at the same time establishing strategically located commercial/mixed-use areas designed in the plan. This application ensures that the following Southwest Deltona CRA Primary Objectives are being promoted:

Primary Objective 4: *Ensure regulatory measures are in place to promote the redevelopment of attractive, safe, viable, and sustainable commercial nodes along Deltona/Normandy/Saxon Boulevards. These strategies will correct the blighted conditions of defective or unsafe conditions (Pgs. 23-25 of the Finding of Necessity Report); and deterioration of site or other improvements (Pgs. 16-20 of the Finding of Necessity Report).*

Primary Objective 5: *Create attractive, safe, viable, and sustainable commercial corridors along Deltona/Normandy/Saxon Boulevards. These strategies will correct the blighted conditions of faulty lot layout (Pgs. 18, 23, and 24 of the Finding of Necessity Report); unsafe conditions (Pgs. 23 – 25 of the Finding of Necessity Report); and deterioration of site or other improvements (Pgs. 16, 17 and 24 of the Finding of Necessity Report).*

Primary Objective 8: *Encourage parcel assembly to facilitate redevelopment of the redevelopment area within commercial nodes along the Saxon/Normandy/Deltona Corridors. The below strategies will correct the blighted conditions of faulty lot layout*

in relation to size, adequacy, accessibility, or usefulness (Pgs. 18, 19, 23 and 24 of the Finding of Necessity Report).

The site will enhance commercial services for the community and surrounding neighborhoods along a prominent intersection within the City. Staff finds that the change from Low Density Residential to Commercial will have no negative effects on the public health, welfare, safety or morals of the City.

f. <u>Enhance or degrade environmental resources;</u>

The area contains single-family dwellings on single lots and two (2) vacant lots with heavily forested vegetation. Soils associated with the amendment area are predominantly well drained. The soil associated with the amendment area (Paola Fine Sand) is suitable to support community development. Soils are mapped on a graphic as part of the attached map series.

The amendment has ±0.16 acre located within the 100 year floodplain, as depicted on the flood zone map. Though the site is within the 100 year floodplain, Policy FLU1-5.8 allows a provision for structures developed within the 100 flood as it reads:

Policy FLU1-5.8
If structures are allowed in the 100-year flood plain, development within areas prone to 100 year flooding shall compensate for the full amount of flood storage displacement within the 100 year floodplain and shall not increase expected flood levels for adjacent properties or reduce receiving surface water quality below established levels.

Staff through plan review and the application of *Chapter 90 Floodplain Management* shall assure that the site compensate for the full amount of flood storage displacement.

The site does not contain any wetlands. The site does contain an elevation change of about 20 feet from approximately 35 feet to 55 feet throughout the site as can be seen on the Contour Map.

The amendment area has been developed residentially. In addition, the site is located in a developed, urban context. Therefore, the amendment area does not provide suitable habitat for significant wildlife including listed species.

g. <u>Based on the ability to provide adequate potable water resources:</u>

The amendment area will be served by the Deltona Water central water system. The City has about four million gallons a day of permitted capacity which is more

than ample to support development of this site. For more information on potable water see the potable water LOS discussion under subsection "d."

V. Special Conditions

There are no special conditions associated with the amendment area.

VI. Conclusion/Recommendation

The City is underserved by business development and this deficiency along with the need for jobs is discussed frequently in the community. To help address this deficiency, the City has established policy through the Comprehensive Plan Future Land Use Element which recommends that there be more commercial opportunity available in the form of more land for business development as the City grows. The amendment is consistent with and implements the Comprehensive Plan Policy; the amendment also comports with another long standing City objective: diversifying/expanding the tax base to become less reliant on residential tax revenue. In addition, along with addressing core City goals, the application of the C category, with requisite aesthetic and compatibility safeguards, represents a logical transition of land use intensity between a strategic commercial intersection and residential neighborhoods. Finally, the amendment area will serve existing residential areas and reduce the need for residents to leave the City for goods and services, while upgrading a blighted state of a strategic City intersection along one of the City's strategic intersections. Therefore, the Planning & Development Services staff recommends approval of the Future Land Use Amendment from Low Density Residential to Commercial for the properties covered by this application.

ORDINANCE NO. 35-2016

AN ORDINANCE OF THE CITY OF DELTONA, FLORIDA, PERTAINING TO THE COMPREHENSIVE PLAN; PROVIDING FOR A SMALL SCALE FUTURE LAND USE MAP AMENDMENT FOR NINE (9) PARCELS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF SAXON AND NORMANDY BOULEVARDS TO CHANGE THE FUTURE LAND USE DESIGNATION ON SAID PARCELS TO COMMERCIAL (C) FROM LOW DENSITY RESIDENTIAL (LDR); PROVIDING FOR CONFLICTS; SEVERABILITY; AND AN EFFECTIVE DATE.

WHEREAS, the City Comprehensive Plan has been adopted and has been found in compliance pursuant to Chapter 163, Florida Statutes; and

WHEREAS, the City of Deltona desires to increase the acreage available for business uses in appropriate areas;

WHEREAS, the City of Deltona finds the request to change the Future Land Use Map designation on the subject nine parcels from Low Density Residential to Commercial to be consistent with the Comprehensive Plan.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COMMISSION OF THE CITY OF DELTONA, FLORIDA, as follows:

Section 1. Comprehensive Plan Amendment. The Future Land Use Map of the City of Deltona, as shown within the City of Deltona Comprehensive Plan, is hereby amended by re-designating the following parcels, which were heretofore part of the City of Deltona Comprehensive Plan from Low Density Residential to Commercial. The parcels to be re-designated are more particularly described as:

Lots 23, 24, 25, 39, 40, 41, 42, 43, & 44, Block 86, Deltona Lakes, Unit Three
MB 25, Pages 105 - 120

Section 2. Conflicts. Any and all Ordinances or parts of Ordinances in conflict herewith are hereby repealed.

Section 3. Severability. If any provision of this ordinance or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect any other provision or application of this ordinance which can be given effect without the invalid provision or application.

Section 4. Effective Date. This ordinance shall take effect immediately upon its final adoption by the City Commission.

PASSED AND ADOPTED BY THE CITY COMMISSION OF THE CITY OF DELTONA, FLORIDA THIS _____ DAY OF _____, 2017.

First Reading: _____

Advertised: _____

Second Reading: _____

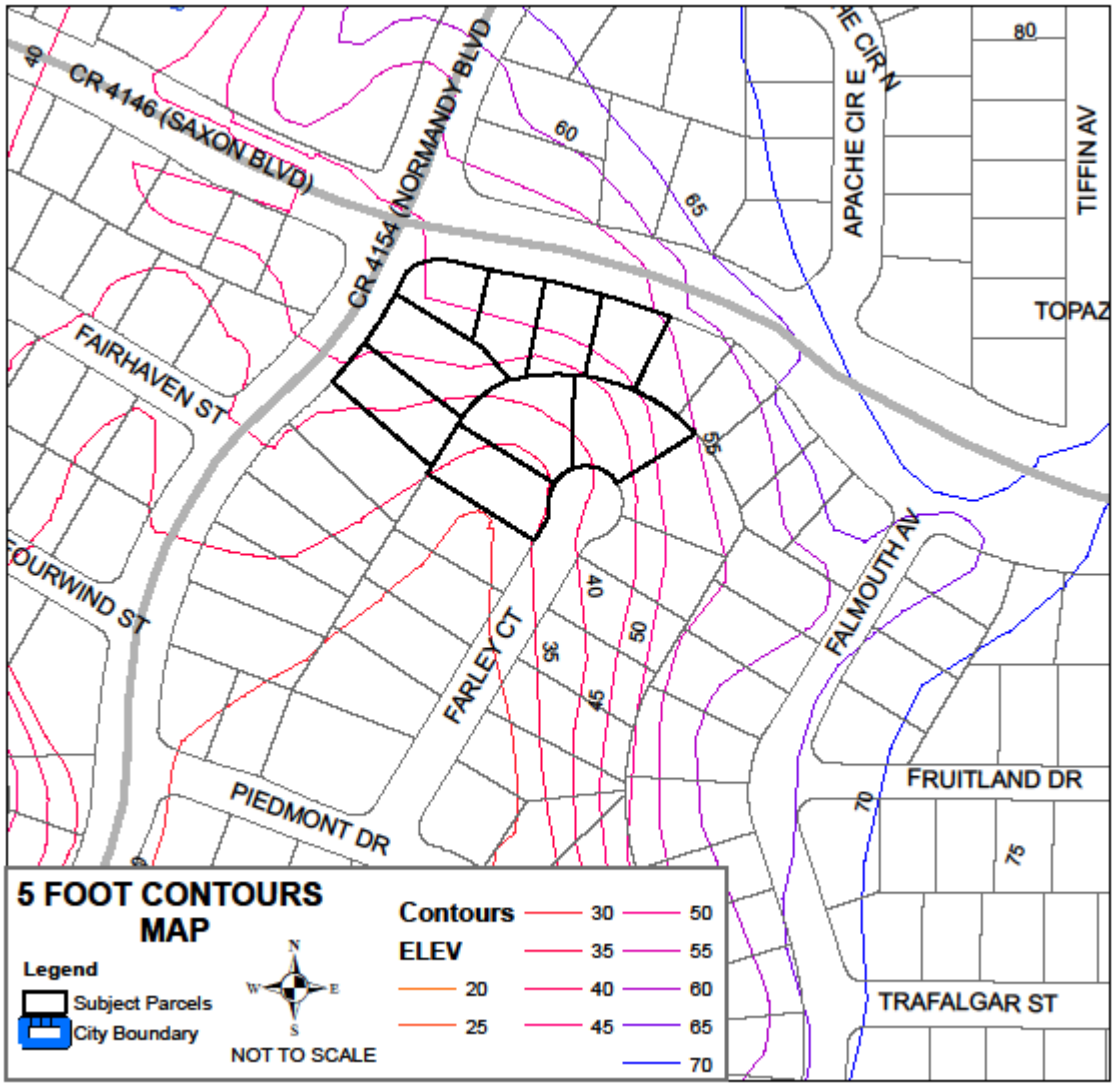
BY: _____
JOHN C. MASIARCZYK, SR., Mayor

ATTEST:

_____
JOYCE RAFTERY, CMC, MMC, City Clerk

Approved as to form and legality
for use and reliance of the City of
Deltona, Florida

_____
GRETCHEN R. H. VOSE, City Attorney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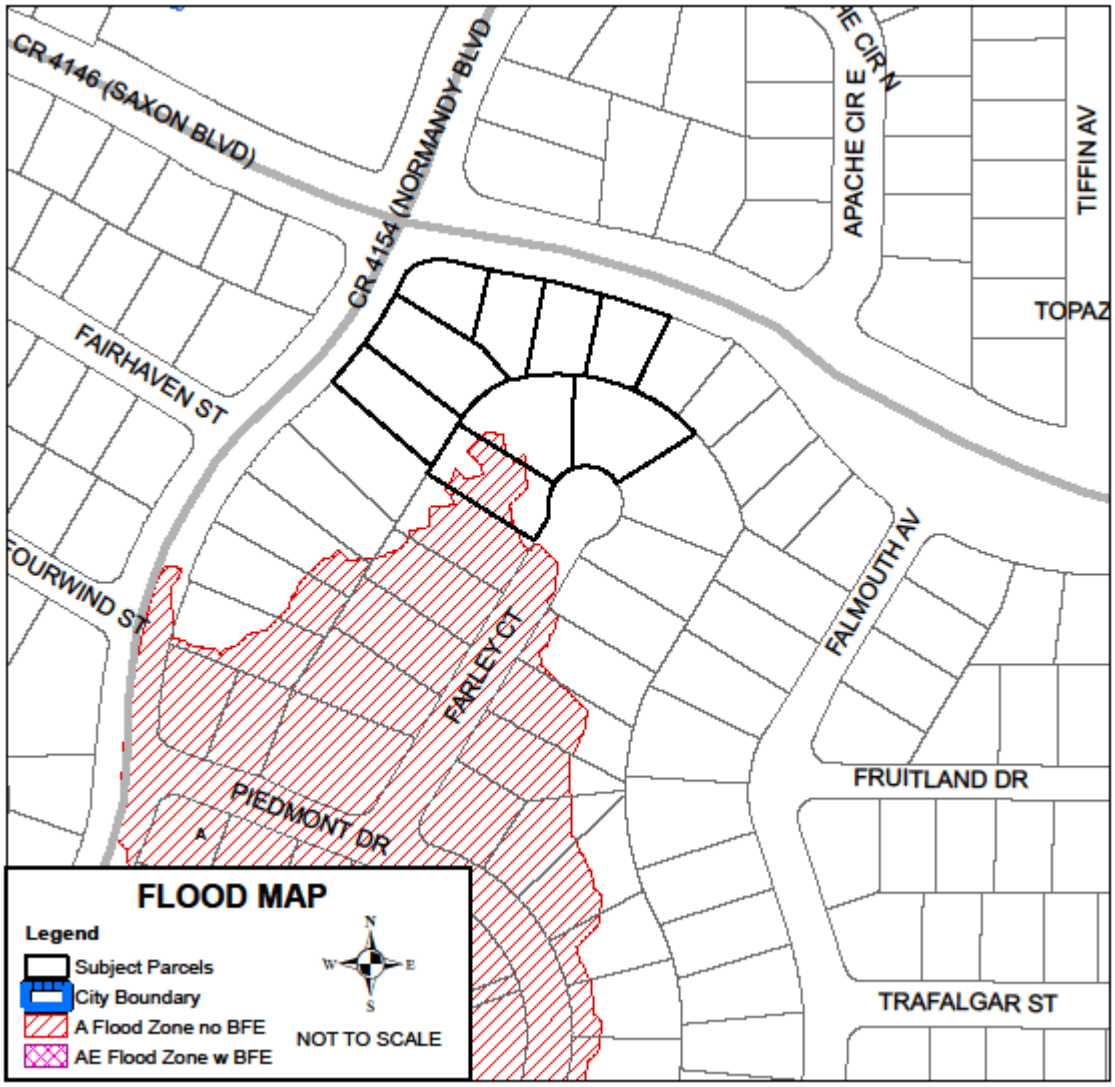
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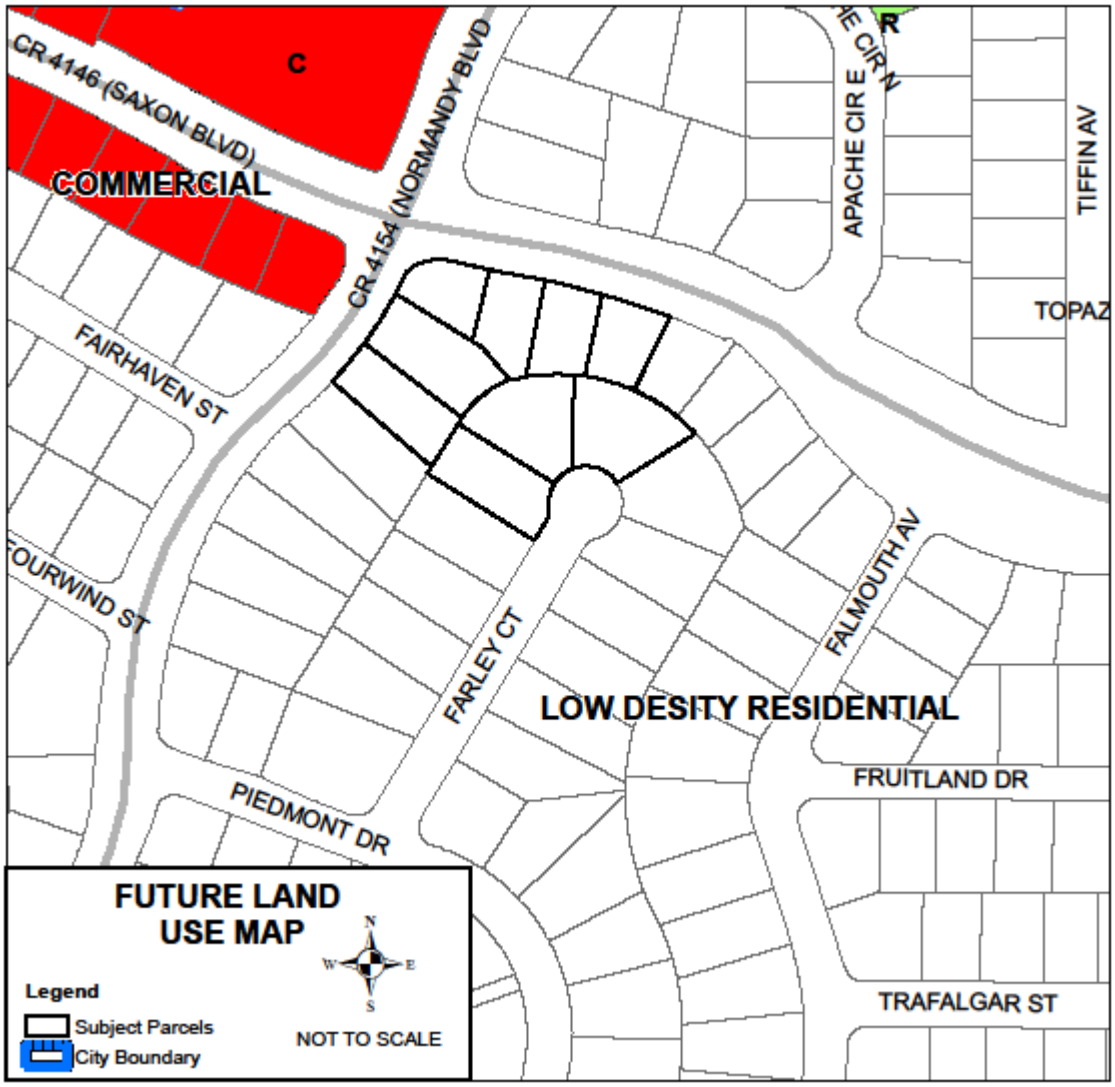
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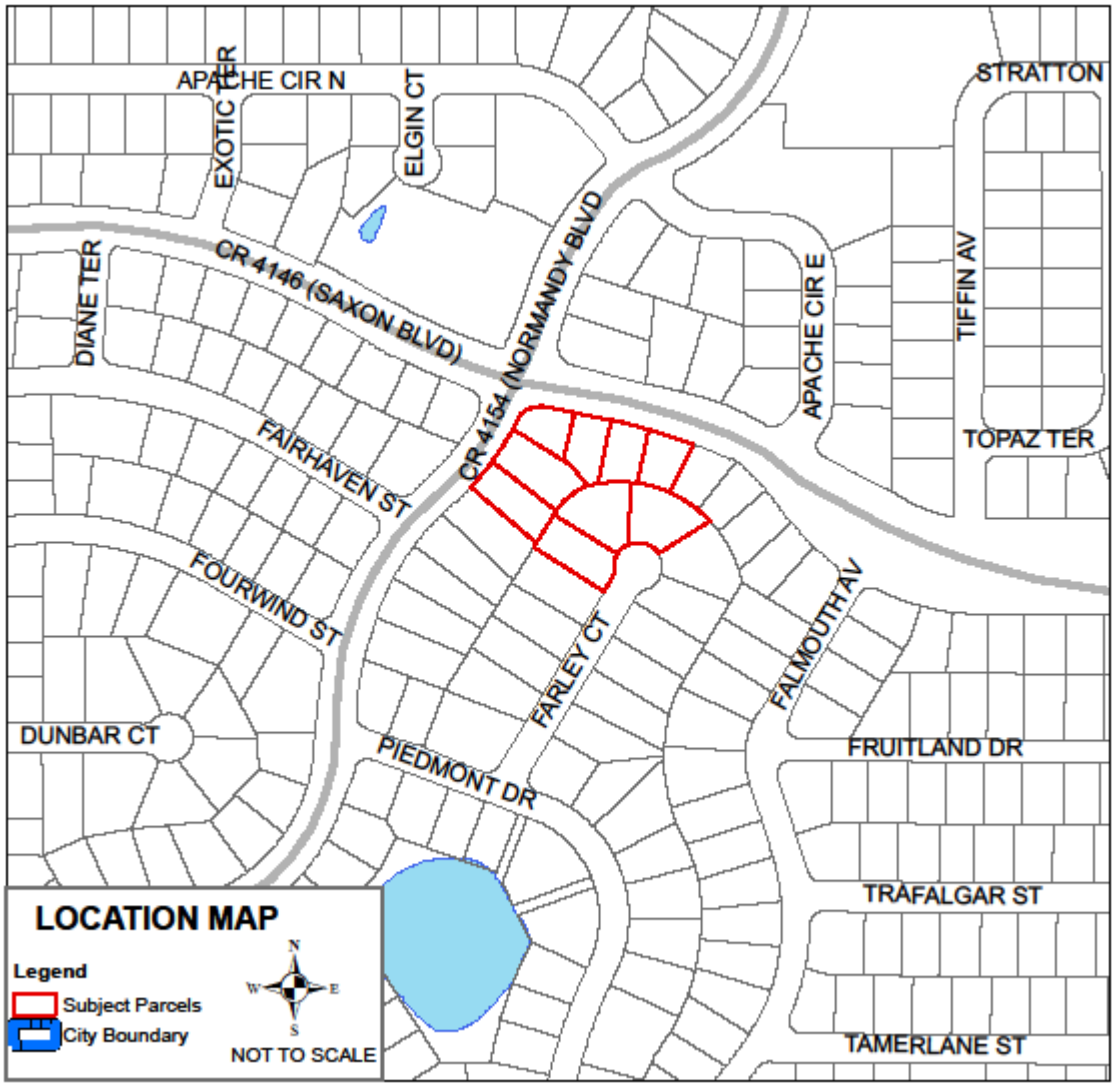
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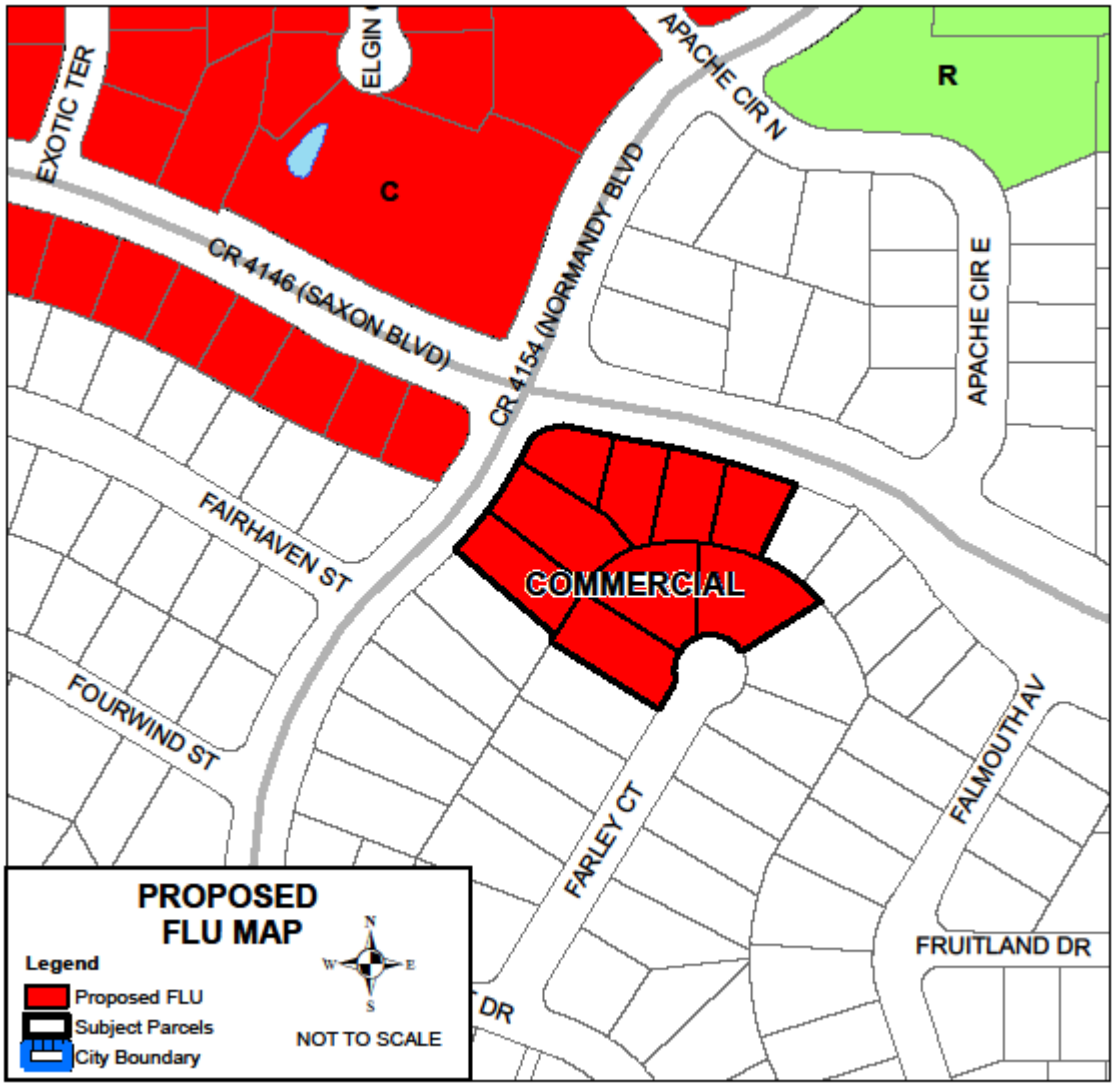
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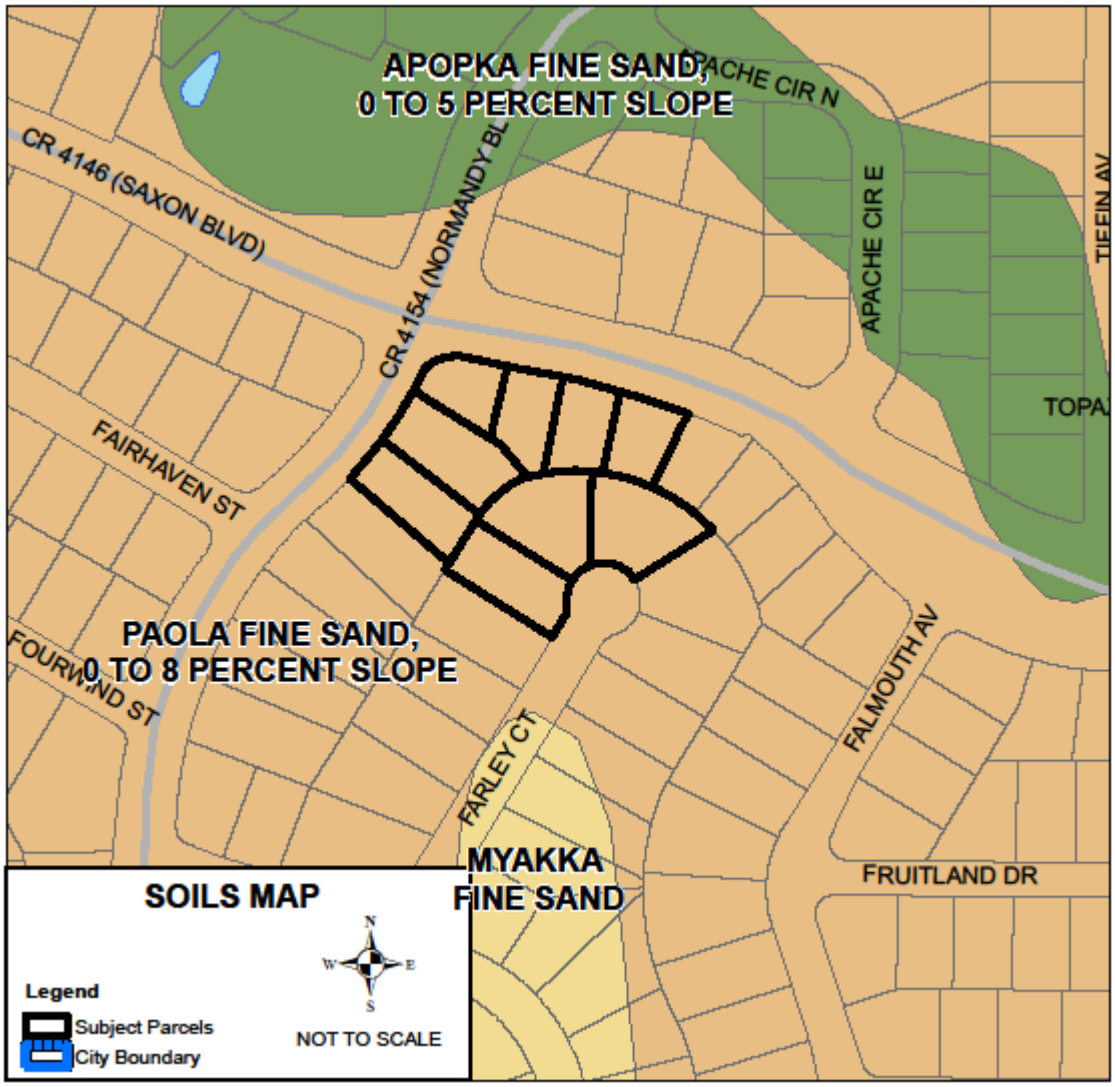
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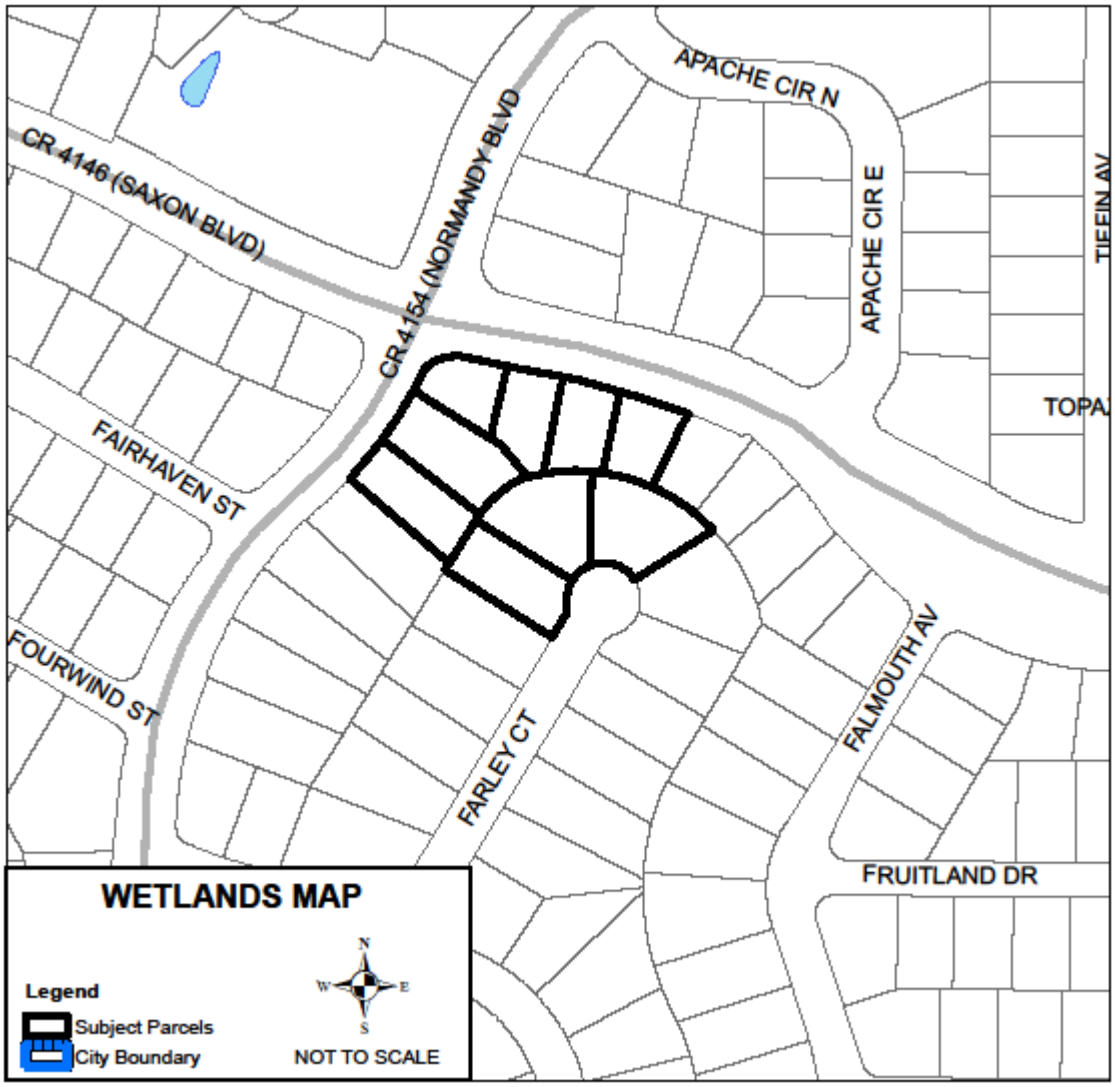
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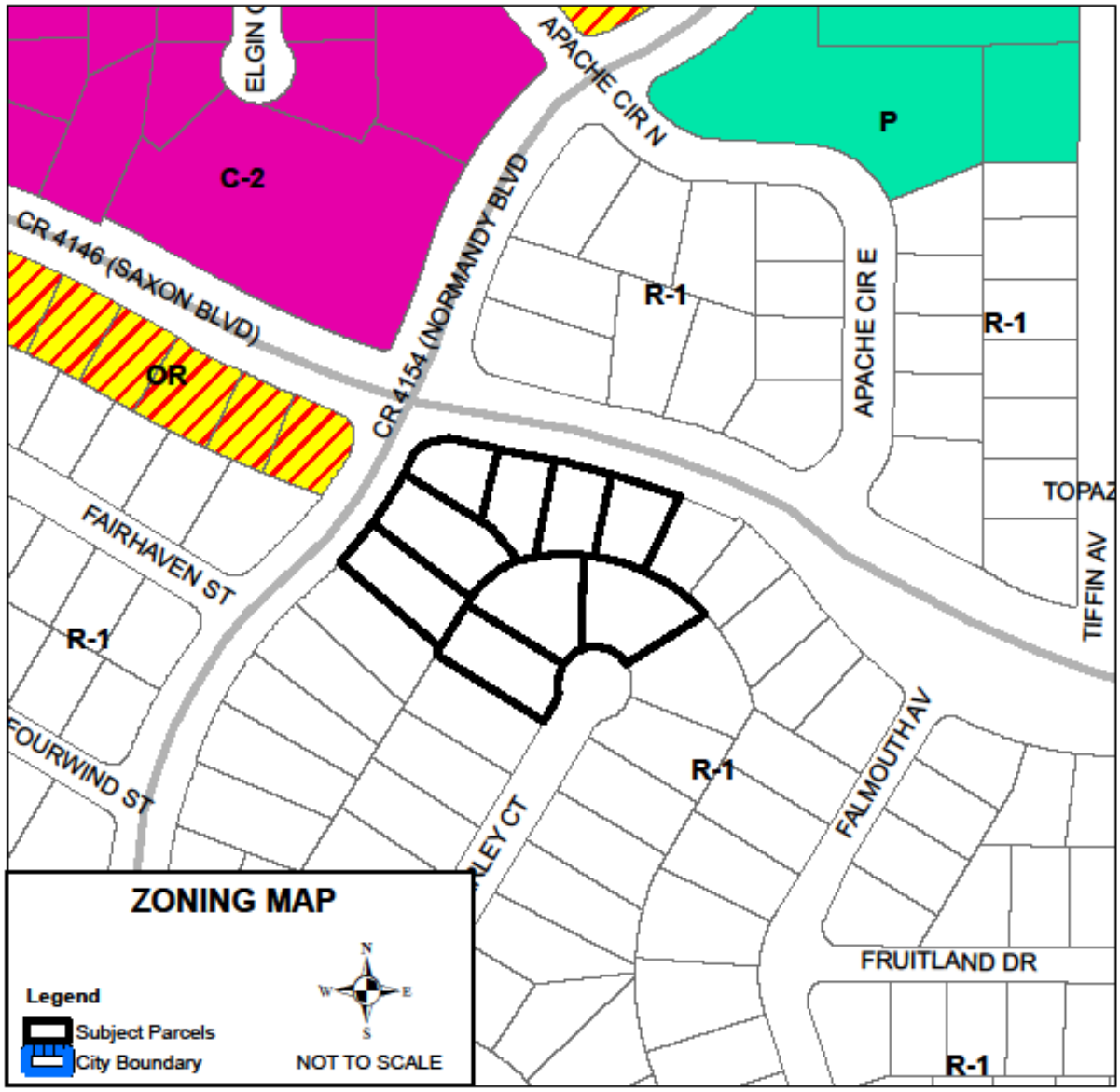
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CR 4154 (NORMANDY BLVD
FAIRHAVEN ST
FOURWIND ST
TOPAZ
TIFFIN AV
FALMOUTH AV
FRUITLAND DR

TRAFFIC IMPACT STUDY

CONVENIENCE MARKET
WITH GASOLINE PUMPS
CITY OF DELTONA, FLORIDA

Prepared for:

Holub Development Company
Post Office Box 730086
Ormond Beach, Florida 32173

Prepared by:

Traffic Planning and Design, Inc.
535 Versailles Drive
Maitland, Florida 32751
407-628-9955

Revised
January 2017

TPD № 4755

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: Convenience Market with Gasoline Pumps

LOCATION: Deltona, Florida

CLIENT: Holub Development Company

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.

NAME: Turgut Dervish, P.E.

P.E. No.: 20400

DATE: January 3, 2017

SIGNATURE: _____

TURGUT DERVISH
LICENSE
No. 20400
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

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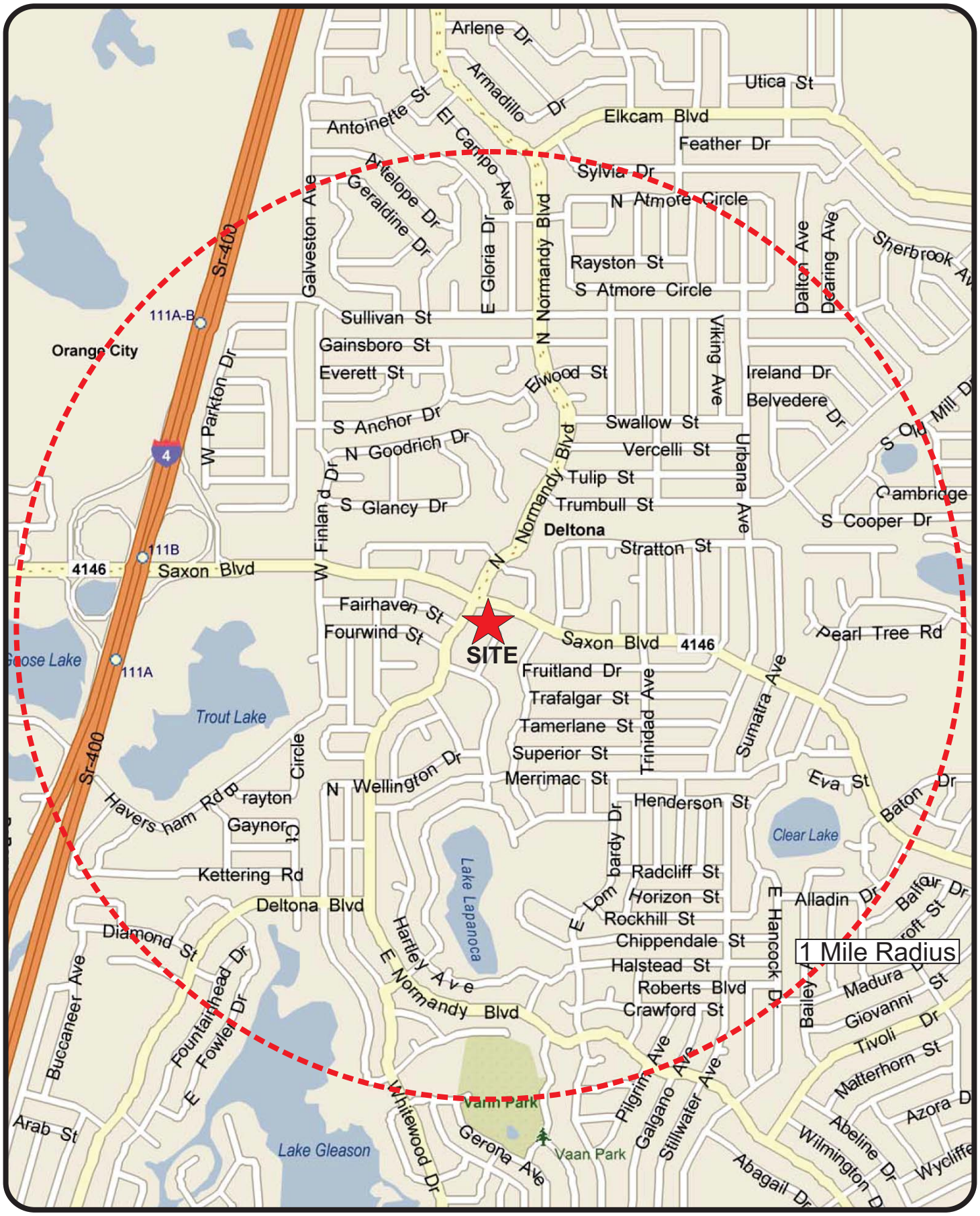
INTRODUCTION

This analysis was undertaken in order to assess the traffic impact of a proposed convenience market with gasoline pumps in Deltona, Florida. Located in the southeast corner of Saxon Boulevard and Normandy Boulevard, the development will consist of a 5,943 square foot building with 16 fueling positions. Access to the site will be provided via driveways on Saxon Boulevard and Normandy Boulevard. Saxon Boulevard is a four-lane arterial with an east-west orientation. Normandy Boulevard is a north-south major collector which has four lanes north of Saxon Boulevard and two lanes south of Saxon Boulevard. **Figure 1** depicts the site location.

The traffic analysis was performed in accordance with the River to Sea Transportation Planning Organization (R2C TPO) guidelines as documented in a study methodology submitted to the City as well as the County. This study methodology and related correspondence are included in **Appendix A**. Data used in the analysis consisted of site plan/development information provided by Project Engineers, roadway segment data obtained from the Volusia County 2014 Average Annual Daily Traffic and Historical Counts spreadsheets. Additionally Traffic Planning and Design, Inc. (TPD) personnel conducted a field survey of the area roadways and collected A.M./P.M. peak hour counts at study intersections.



Convenience Market with Gasoline Pumps
Project № 47554
Figure 1

Site Location

N
NTS

EXISTING CONDITIONS ANALYSIS

Existing conditions were analyzed within an area where the proposed development trips significantly impact roadways as per R2C TPO Guidelines utilizing a 3% significance. Based upon the significance test conducted in the study methodology, the proposed development will not significantly impact any roadway segment in the area. Therefore, the following roadway segments to which the site has access connections were included in the analysis:

- Saxon Boulevard, Normandy Boulevard to Tivoli Drive
- Normandy Boulevard, Saxon Boulevard to Deltona Boulevard

The following intersections were identified in consultation with the City and County for inclusion in the study:

- Saxon Boulevard and Finland Drive
- Saxon Boulevard and Normandy Boulevard
- Saxon Boulevard and Sterling Silver Boulevard
- Saxon Boulevard and Tivoli Drive
- Normandy Boulevard and Deltona Boulevard

Capacity analyses were performed for the study roadway segments and intersections for the existing traffic to establish their current operating conditions in terms of Levels of Service.

Roadway Segment Analysis

The roadway segments were analyzed by comparing the existing P.M. peak hour volumes of the segments with the corresponding capacities at the adopted LOS standard. The existing P.M. peak hour segment volumes were determined from the P.M. peak hour counts made at the study intersections. The peak hour roadway capacities were obtained from Volusia County's 2015 Average Annual Daily Traffic and Historical Counts. A summary of the peak hour roadway capacity analysis is presented in **Table 1**. The existing conditions analysis reveals that the study roadway segments currently operate at a satisfactory Levels of Service.

Table 1
Existing Peak Hour Roadway Capacity Analysis

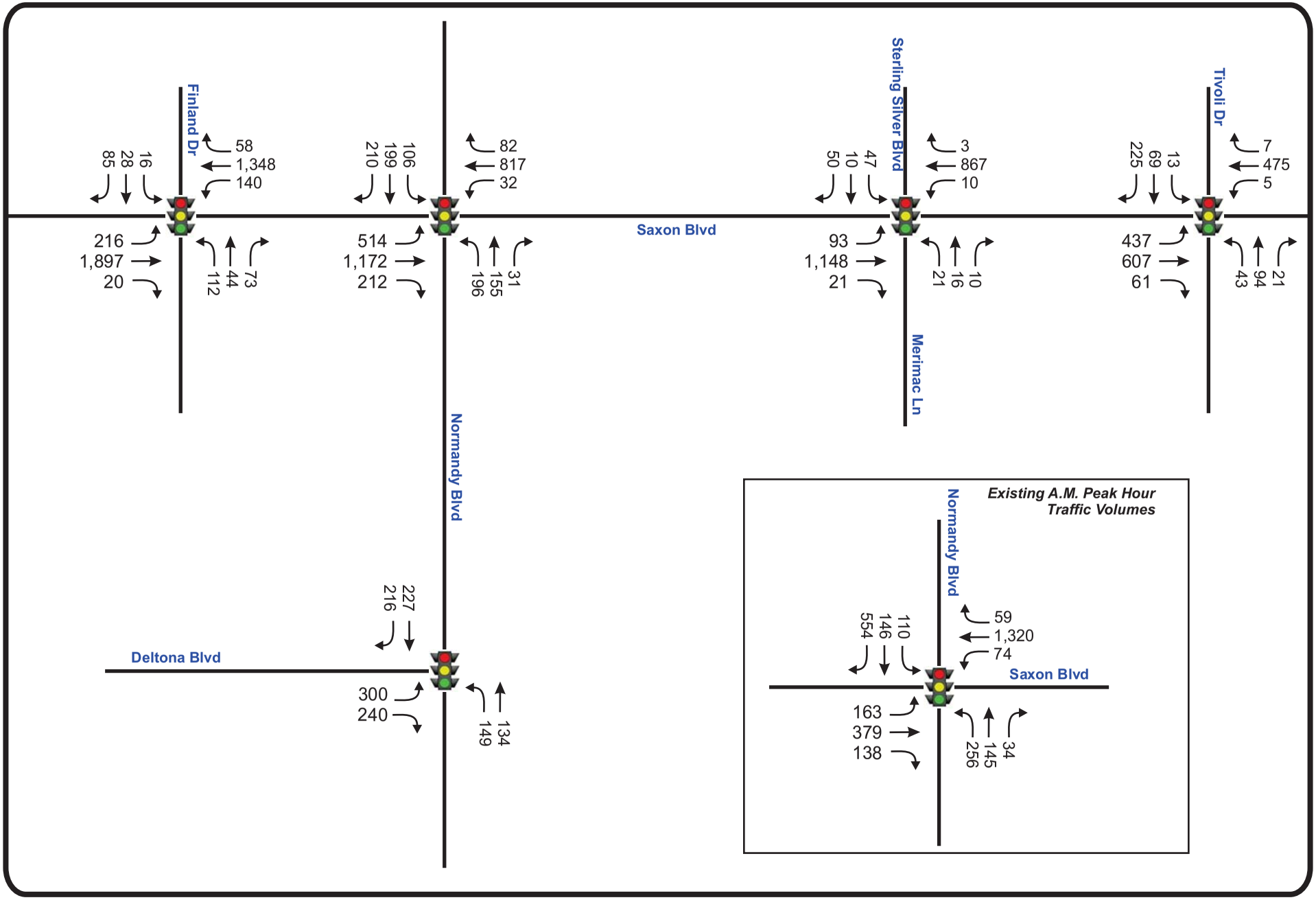
Roadway Segment	# of Lns	Area Type	LOS Standard*	Peak Hour Two-Way Capacity**	Existing Two-Way Peak Hour Volume***	V/C Ratio	Existing LOS
Saxon Boulevard							
Normandy Boulevard to Tivoli Drive	4	U	E	3,410	2,240	0.66	C
Normandy Boulevard							
Saxon Boulevard to Deltona Boulevard	2	U	E	1,015	877	0.86	D

* Obtained from the City of Deltona Transportation Element
** Obtained from Volusia County 2015 AADT & Historical Counts
*** Obtained from P.M. Peak Hour Intersection Counts

Intersection Analysis

A capacity analysis was conducted for each intersection using the latest version of the *Highway Capacity Software (HCS)* in accordance with the procedures of the 2010 *Highway Capacity Manual (HCM)*. The capacity analysis was performed using the existing intersection geometry, peak hour traffic volumes and signal timing data. The intersection of Saxon Road/Normandy Boulevard was analyzed for both the A.M. and P.M. peak hours. The other intersections were analyzed for the P.M. peak hour. The A.M./P.M. peak hour traffic volumes were determined from turning movement counts made at the study intersections during the 7-9 A.M. and 4:30-7:00 P.M. time periods. These counts are included in **Appendix B** along with signal timing data provided by Volusia County Traffic Engineering. The intersection peak hour volumes are displayed in **Figure 2.**

The intersection capacity analysis results are summarized in **Table 2** and detailed HCS worksheets are provided in **Appendix C.** This analysis indicates that the study intersections currently operate at overall satisfactory Levels of Service. At the Saxon Boulevard/Normandy Boulevard the southbound approach experiences delays in the A.M. peak hour due to the relatively heavy right turning movements.



Convenience Market with Gasoline Pumps
Project № 4755
Figure 2

Existing P.M. Peak Hour Traffic Volumes

Table 2
Existing Intersection Capacity Analysis

Intersection	Control	Period	EB		WB		NB		SB		Overall	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Saxon Boulevard & Finland Drive	Signal	P.M	65.1	E	48.8	D	55.5	E	48.1	D	57.8	E
Saxon Boulevard & Normandy Boulevard	Signal	A.M. P.M.	38.1 41.0	D D	61.5 62.6	E E	61.9 57.3	E E	104.4 61.4	F E	66.6 50.8	E D
Saxon Boulevard & Sterling Silver Boulevard	Signal	P.M	12.4	B	14.6	B	28.7	C	22.1	C	14.1	B
Saxon Boulevard & Tivoli Drive	Signal	P.M	20.9	C	34.3	C	26.2	C	28.7	C	25.6	C
Normandy Boulevard & Deltona Boulevard	Signal	P.M	17.2	B	--	--	9.0	A	17.5	B	15.5	B

TRIP GENERATION AND PROPOSED DEVELOPMENT

The proposed development consists of a 5,943 square foot convenience market with gasoline pumps. **Figure 3** depicts the site plan, building layout and access configuration. The development is envisioned to be completed within two years or by 2018. To determine the impact of this development in the area, an analysis of its trip generation characteristics was made. This included the determination of the trips to be generated and the distribution/assignment of these trips to the area roadways.

Trip Generation

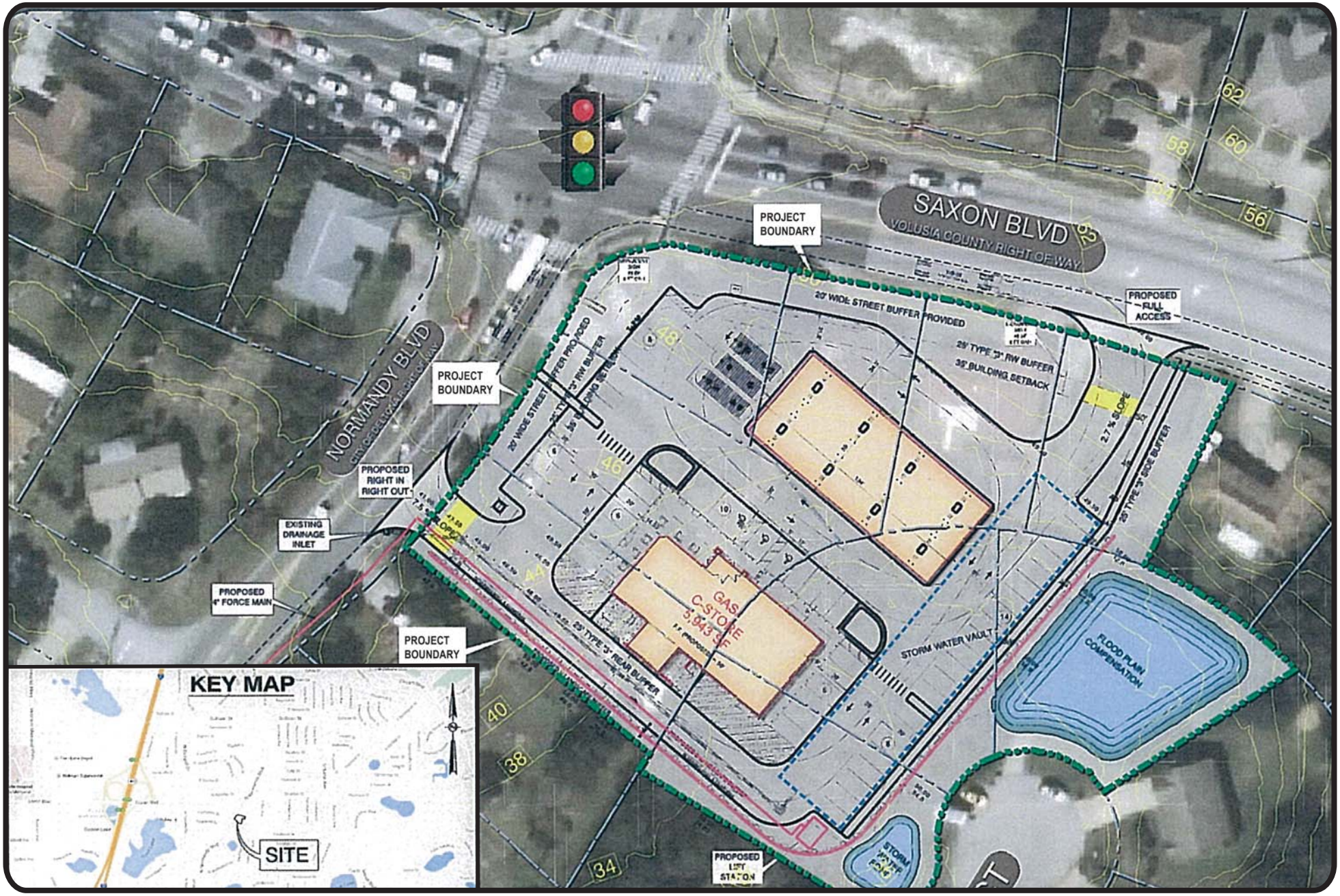
The trip generation of the proposed development was calculated with the use of data obtained from the *9th Edition* of the *Institute of Transportation Engineers* (ITE) *Trip Generation Manual.* This calculation is summarized in **Table 3** which shows the project's daily and A.M./P.M. peak hour generation. At the request of Volusia County, vehicle fueling positions (instead of square feet) were used in the trip generation calculation. Interestingly, the use of square feet instead of fueling positions would result in the same P.M. peak hour trips. The pass-by trip capture percentages shown in the table were obtained from the *3rd Edition of the ITE Trip Generation Handbook.* Subtracting the pass-by trips results in new net trips to be added to the area roadways. Reference pages from the Trip Generation Manual and Trip Generation Handbook are included in in the study methodology.

Table 3
Trip Generation Summary

Land Use	ITE Code	Quantity (VFP)*	Daily		A.M. Peak Hour				P.M. Peak Hour			
			Rate	Trips	Rate	Enter	Exit	Total	Rate	Enter	Exit	Total
Convenience Market w/Gasoline Pumps	853	16	542.60	8,682	16.57	132	133	265	19.07	152	153	305
Total Trips				**8,683**	**-----**	**132**	**133**	**265**	**-----**	**152**	**153**	**305**
Pass-by Trips (63% A.M./66% P.M.)				5,601	-----	83	84	167	-----	100	101	201
Net New Trips				**3,082**	**-----**	**49**	**49**	**98**	**-----**	**52**	**52**	**104**

* VFP = Vehicle Fueling Positions

The proposed development is estimated to generate 3,082 net new daily trips, of which 98 will occur in the A.M. peak hour and 104 in the P.M. peak hour. Background traffic on the adjacent roadways was checked to insure that the pass-by trips did not exceed the 14% threshold as per the R2C TIA Guidelines.



Convenience Market with Gasoline Pumps
Project № 4755
Figure 3

Site Plan and Access Configuration

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Trip Distribution/Trip Assignment

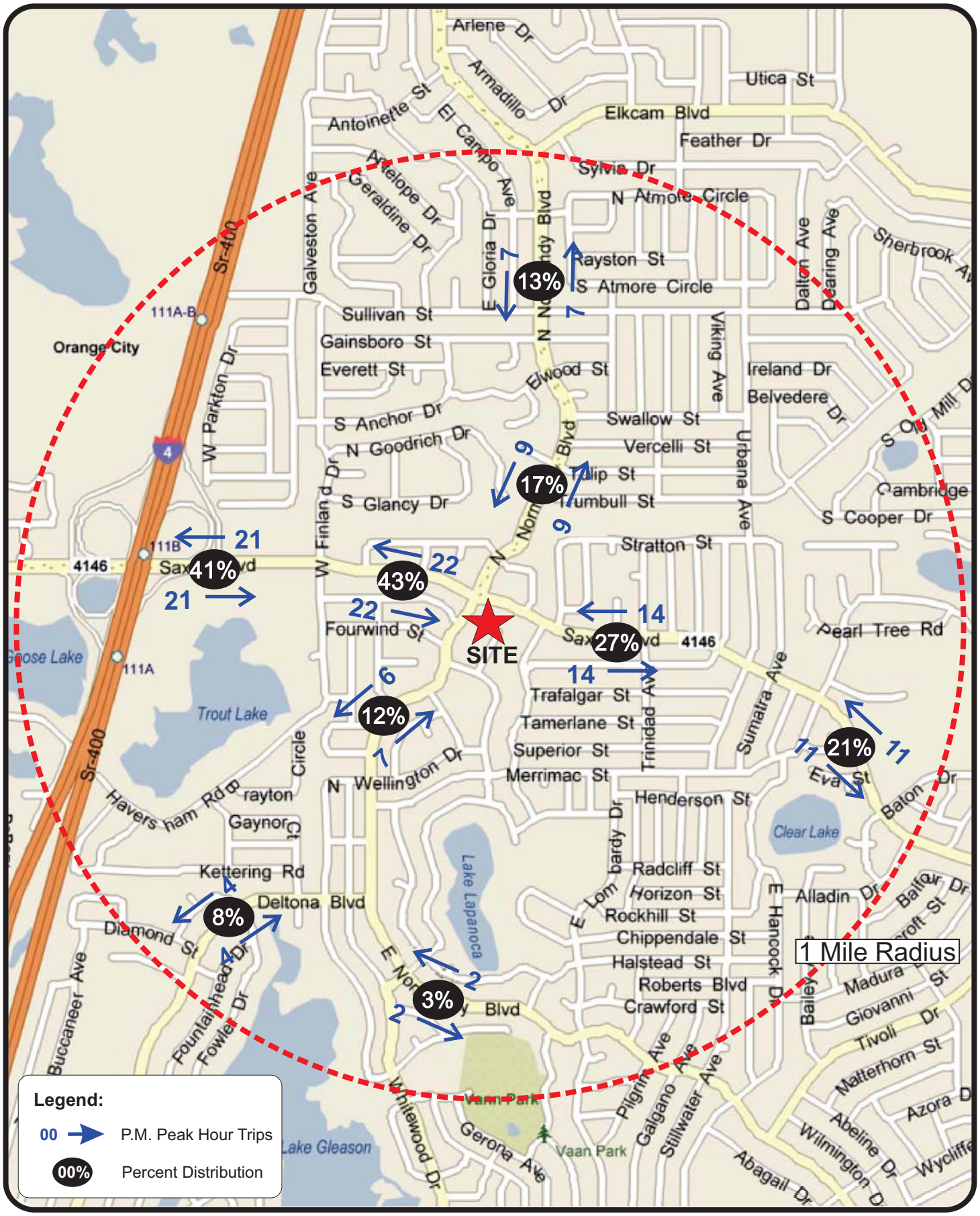
The distribution of the development's new trips was estimated with the use of the CFRPM model. Prior to the use of this model, a minor modification was made to add a traffic analysis zone representing the project. Subsequently, the model was run with a select zone analysis to obtain a distribution pattern for the project's new trips. The trip distribution pattern in the project vicinity is graphically shown in **Figure 4** and the model distribution plot is included in the study methodology. This distribution pattern was used to assign the project's new trips to the area roadways also shown in Figure 4. The project's pass-by trips will be assigned to the project entrances based upon the directional distribution of existing traffic on the adjacent roadways.

Critical/Near-Critical Segment Analysis

Based upon the information provided by Volusia County, there are several critical/near-critical roadway segments within a one-mile radius of the site. A map provided by Volusia County is included in the study methodology. The project's impact on the critical/near-critical segments is quantified in **Table 4**. This table shows that the project will have a de minimis or no significant impact on these roadway segments.

Table 4
Critical/Near-Critical Segment Analysis

Roadway Segment	2-way Peak Hour		V/C Ratio	Project Trips			Impact
	Capacity	Volume		Distribution	Volume	As % of Capacity	
Critical Roadways							
I-4							
Dirksen Drive to Saxon Boulevard	10,060	8,982	0.89	16%	17	0.17%	De minimis
Near-Critical Roadways							
I-4							
Saxon Boulevard to SR 472	10,060	8,055	0.80	12%	13	0.13%	De minimis
Saxon Boulevard							
I-4 to Finland Drive.	3,410	3,678	1.08	41%	43	1.26%	Not Significant
Finland Drive to Normandy Boulevard	3,410	3,532	1.04	43%	45	1.32%	Not Significant
Normandy Boulevard							
Saxon Boulevard to Deltona Boulevard	960	877	0.91	12%	13	1.35%	Not Significant
Deltona Boulevard to Tivoli Drive	960	750	0.78	4%	4	0.42%	Not Significant



Convenience Market with Gasoline Pumps
Project № 4755
Figure 4

Project Trip Distribution and Assignment

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PROJECTED TRAFFIC CONDITIONS

Projected traffic conditions for the project buildout in 2018 were analyzed using peak hour traffic volumes for the study roadway segments and intersections. The analysis was conducted for the projected background traffic volumes plus vested trips and project trips. Background traffic was determined by applying a growth factor to existing traffic. A trends analysis of historical AADT data obtained from Volusia County on Saxon Boulevard revealed a negative growth trend in the area. The trends analysis charts are included in **Appendix D**. Therefore, a minimum of 2% annual growth was used in the background traffic estimation. Background traffic volumes were then combined with vested trips from the RaceTrac located at Finland Drive and Saxon Boulevard (currently under construction) plus project trips to obtain total traffic volumes. The Saxon Sterling Silver office/retail development and the Halifax Medical Center identified for inclusion in the background traffic have already been constructed and their trips are included in the counts made at the study intersections.

Roadway Segment Analysis

A roadway segment analysis was performed for the study segments by comparing the projected P.M. peak hour volumes of the segment with the corresponding capacities at the adopted LOS standard. The analysis is summarized in **Table 5**. The results of the analysis show that the study roadway segments will continue to operate at a satisfactory Levels of Service in the projected conditions.

Table 5
Projected P.M. Peak Hour Roadway Capacity Analysis

Roadway Segment	# of Lanes	Area Type	LOS Capacity	2-way Pk Hr Capacity*	Two-Way Peak Hour Volumes				V/C Ratio	Projected LOS
					Back-ground**	Vested***	Project	Total		
Saxon Boulevard										
Normandy Boulevard to Tivoli Drive	4	U	E	3,410	2,330	54	41	2,428	0.71	C
Normandy Boulevard										
Saxon Boulevard to Deltona Boulevard	2	U	E	1,015	912	13	18	943	0.93	D

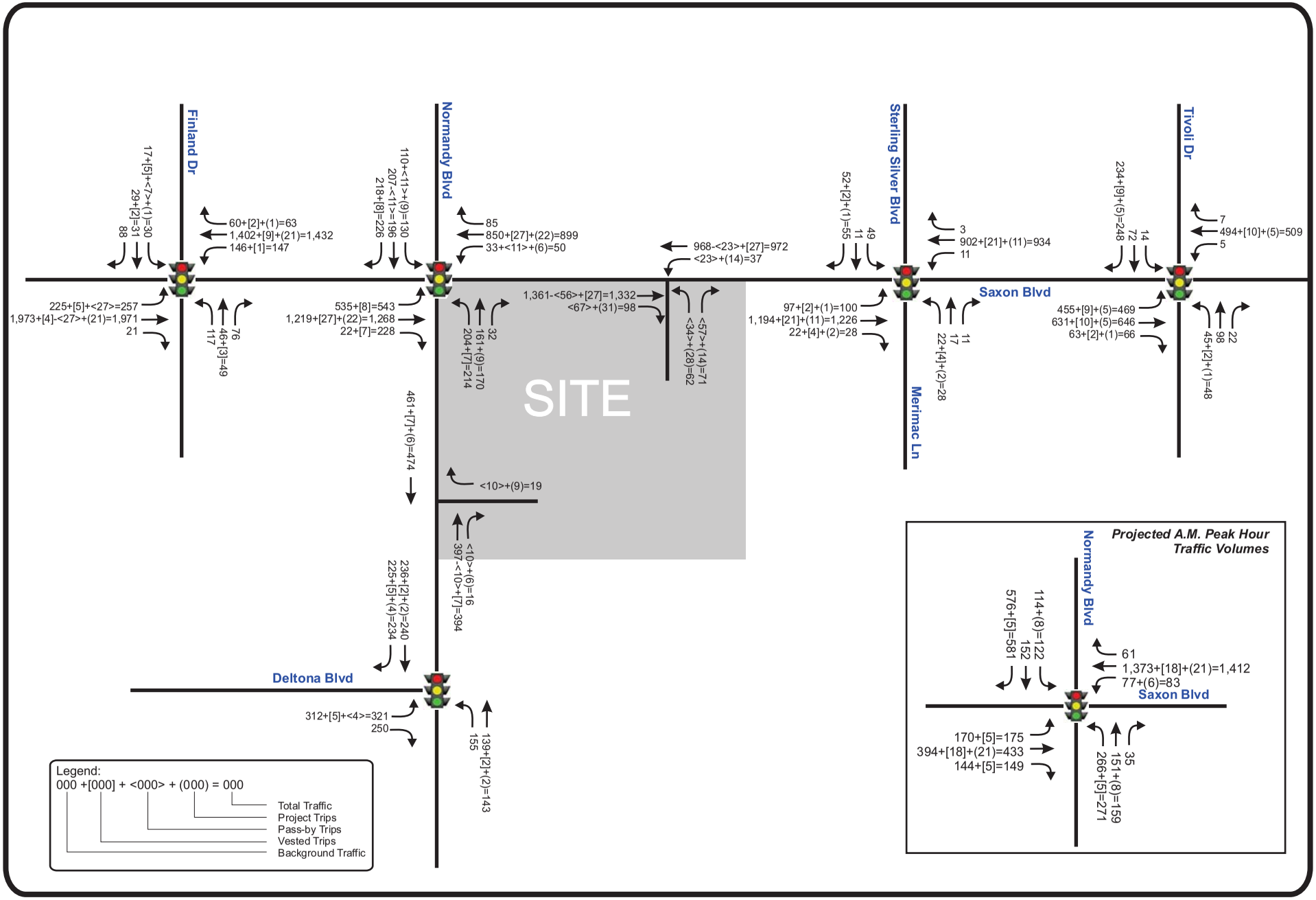
* Obtained from Volusia County 2015 AADT & Historical Counts
** Existing Traffic Volume X 1.04
*** Obtained from the Traffic Impact Study for the RaceTrac Gas Station @ Saxon Boulevard and Finland Drive

Intersection Analysis

To assess the projected operating conditions at the study intersections, intersection capacity analyses were conducted using projected A.M./P.M. peak hour traffic volumes. The analysis was conducted similar to the existing conditions analysis utilizing the procedures of the *Highway Capacity Manual (HCM)* and HCS software. **Figure 5** shows the projected A.M./P.M. peak hour turning movements for the study intersections/site access driveways consisting of background traffic, vested trips and project trips. Background traffic shown in the figure was determined by applying an annual growth rate as discussed previously. The projected Levels of Service are summarized in **Table 6** which shows that the study intersections will continue to operate at overall satisfactory Levels of Services in the projected conditions. As was the case with existing conditions, the southbound approach at Saxon Boulevard/Normandy Boulevard intersection will experience delays in the A.M. peak hour due to the heavy right turning movements. The project is not adding trips to this movement. The site access driveways proposed at locations on Saxon Boulevard and Normandy Boulevard will also operate at satisfactory Levels of Service. The criteria for the design and construction of the driveways will be further discussed/reviewed by the City. The HCS analysis worksheets are included in **Appendix E**.

Table 6
Projected Intersection Capacity Analysis

Intersection	Control	EB		WB		NB		SB		Overall	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Saxon Boulevard & Finland Drive	Signal	76.2	E	67.3	E	69.3	E	51.0	D	71.5	E
Saxon Boulevard & Normandy Boulevard (AM)	Signal	46.0	D	78.0	E	71.4	E	118.4	F	79.5	E
Saxon Boulevard & Normandy Boulevard (PM)	Signal	51.8	D	75.6	E	63.7	E	61.4	E	60.4	E
Saxon Boulevard & Sterling Silver Boulevard	Signal	12.7	B	14.8	B	30.7	C	23.7	C	14.5	B
Saxon Boulevard & Tivoli Dive	Signal	37.3	D	41.1	D	27.9	C	30.8	C	36.5	D
Normandy Boulevard & Deltona Boulevard	Signal	17.9	B	-	-	9.3	A	18.2	B	16.1	B
Site Access @ Normandy Boulevard	STOP	-	-	10.9	B	-	-	0.6	A	-	-
Site Access @ Saxon Boulevard	STOP	-	-	0.5	A	38.0	E	-	-	-	-



Retail Commercial @ Saxon and Normandy
Project № 4755

Figure 5

Projected P.M. Peak Hour Traffic Volumes

Alternative Mode Analysis

An alternative mode analysis was conducted to ensure alternative modes of transportation were adequately considered as part of the project. In the existing condition, alternative modes of transportation in the area include both pedestrian and transit facilities. There are paved sidewalks along both sides of Saxon Boulevard adjacent to the proposed development. Also, there are sidewalks on both sides of Normandy Boulevard north of Saxon Boulevard. At the signalized intersection of Saxon Boulevard and Normandy Boulevard there are protected crosswalks on all four approaches of the intersection. In addition, Volusia County's public transit system, VOTRAN, operates one bus route, with one-hour headways, along Saxon Boulevard and Normandy Boulevard north of Saxon Boulevard. A map depicting the bus route is included in **Appendix F**. There are benches located on Saxon Boulevard and Normandy Boulevard in the vicinity of the project. The site plan will be designed with pedestrian features and connectivity to the adjacent sidewalks and benches.

STUDY CONCLUSIONS

This analysis was undertaken in order to assess the traffic impact of a proposed convenience market with gasoline pumps in Deltona, Florida. Located in the southeast corner of Saxon Boulevard and Normandy Boulevard, the development will consist of a 5,943 square foot building with 16 fueling positions. The results of the study as documented herein are summarized below:

- The proposed development is estimated to generate 3,082 net new daily trips, of which 98 will occur in the A.M. peak hour and 104 will occur in the P.M. peak hour

- Based on the significance test, no roadway segments will be significantly impacted by the proposed development. Therefore, the adjacent roadway segments to which the site has access connections were included in the analysis along with five intersections identified in consultation with the City and County. The roadway segments are currently operating at a satisfactory Level of Service and will continue to do so at project buildout in 2018.

- The study intersections along the significantly impacted roadway segment are currently operating at overall LOS E or better traffic conditions and will continue to operate similarly at project buildout. At the intersection of Saxon Boulevard/Normandy Boulevard, the southbound approach experiences delays during the A.M. peak hour and will continue to do so at project buildout in 2018. The project is adding zero traffic to this movement.

- Access to the project site will be provided by two access connections, one on Saxon Boulevard and the other on Normandy Boulevard. At the Saxon Boulevard access connection the existing two-way left turn lane will serve the project trips arriving from the east. The Applicant will further consult with the City regarding the criteria in the design and construction of the site driveways.

APPENDICES

APPENDIX A

Study Methodology and Correspondence

Turgut Dervish

From: Melissa Winsett <mwinsett@volusia.org>
Sent: Friday, April 08, 2016 8:37 AM
To: Turgut Dervish
Subject: Fwd: Convenience Store Normandy/Saxon TIA methodology comments
Attachments: VCTE comments TIA Meth April 2016.pdf

>>> Melissa Winsett 4/8/2016 8:35 AM >>>
Hello, Turgut-

The city reviewed our comments and requested that we send them to you. Please see the attached.

Melissa K. Winsett
Transportation Planner III
Transportation Planning, Engineering Studies, Development Review

Volusia County Traffic Engineering
123 W. Indiana Ave., Room 400
DeLand, FL 32720-4262

mwinsett@volusia.org
386-736-5968 x12322 (DeLand Area)
386-257-6000 x12322 (Daytona Area)
386-423-3300 x12322 (New Smyrna Area)

Fax 386-740-5242

>>> Melissa Winsett 4/6/2016 4:06 PM >>>
Ron and Chris,

Please see the attached TIA methodology comments. Please forward them to the applicants if you have no questions or concerns.

Thank you.

Melissa K. Winsett
Transportation Planner III
Transportation Planning, Engineering Studies, Development Review

Volusia County Traffic Engineering
123 W. Indiana Ave., Room 400
DeLand, FL 32720-4262

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386-257-6000 x12322 (Daytona Area)
386-423-3300 x12322 (New Smyrna Area)

Fax 386-740-5242

TIA METHODOLGY SUBMISSION CHECKLIST

Project Name: Convenience Market with Gas Pumps

Location: Saxon Blvd/Normandy Blvd, Deltona

TRANSPORTATION IMPACT ANALYSIS METHODOLOGY	DESCRIPTION	INFORMATION INCLUDED			
		YES	NO	N/A	Remarks[1]
	Type of TIA Methodology ☐ COMP PLAN ☐ REZONING ☐ SITE PLAN		x		Please provide information
	Description of proposed land uses		x		# of Gas Pumps?
	Proposed Build-out schedule		x		Please provide
	Conceptual Site Plan	x			
	Site Location relative to surrounding roadway network (map)	x			
	Analysis Period(s): ☐ AM ☐ Mid-Day x PM ☐ Weekend	x			See Comment
	Traffic Volume Counts (Day & Time)	x			
	Vested Trip Information (verify with nearby local government(s))		x		See Comment
	Proposed development trip generation x Daily x 2-Way Peak Hour ☐ Internal Capture x Pass By Capture (<14% Adjacent Road)	x			
	Proposed development trip distribution and assignment (map) x CFRPM ☐ by Engineering Judgment	x			
	ROADWAY SIGNIFICANCE TEST TABLE – (includes all roadway segments within test area, number of lanes, adopted LOS capacity (cite source), project distribution percentages, project trips, project trips/adopted capacity ratio, significance test check) ALONG WITH all Critical and Near-Critical map road segments within the appropriate radius (5-mile radius for all uses except Parks/Recreation uses (1.5 mile radius) and Convenience Stores (1-mile radius)	x			
	ANALYSIS MAP – 5-mile study area boundary including all Critical and Near-Critical road segments and intersections within the appropriate radius	x			1-mile radius
	Proposed roadway segments to be analyzed (list)	x			
	Proposed intersections segments to be analyzed (list)		x		Refer to additional intersections
	Proposed Critical and Near-Critical segments to be analyzed - list	x			
	Background Traffic ☐ CFRPM x Historical Growth Rate (state and justify proposed minimum)	x			Add vested trips (specifically RaceTrac & Saxon Sterling Silver)
	Segment Analysis ☐ Signalized Corridor Analysis Required if part of signal system				N/A
	Intersection Analysis x HCS ☐ Syncro ☐ Other	x			
	List scheduled improvements within first three years ☐ FDOT Work Program ☐ County CIP ☐ City CIP		x		Required in TIA
	Proposed Alternative Modes Study (commit to studying project's alternative mode needs associated with transit connection, pedestrian & bicycle facilities, school student access needs, etc. ☐Study to include TPO's Transit Development Design Guidelines		x		Required in TIA
	Transportation Improvements			x	N/A
	Concurrency mitigation strategy			x	N/A
	2nd Submission: Response to Previous Comments			x	N/A

1 – Remarks: Justify "NO" and "N/A"

Reviewed By: Jon Cheney, Melissa Winsett Date: 4-6-16

Volusia County FLORIDA

Volusia County
Traffic Engineering

Project Name: **Convenience Market with Gasoline Pumps**
Subject: **TIA methodology comments**
Date: **4-6-16**

Comments

1) Page 1: Please provide the buildout year and the type of development application (site plan, rezoning, etc.).

2) Trip Generation: Please provide the number of gasoline pumps that are proposed. If 8 are proposed, using the ITE #853 trip rate is acceptable using the square footage of the convenience store. However, if the number of fueling positions is 16, please use the number of Vehicle Fueling Positions to generate traffic.

3) Site Plan: In the TIA, please provide a more detailed site plan that depicts access. For distances between a signalized intersection and Intermediate or Major Driveway, please refer to Table V of the Volusia County Land Development Code. Please understand that Volusia County reserves the right to restrict access onto Saxon Blvd depending on driveway location distance to the signalized intersection at Saxon Blvd/Normandy Blvd.

4) Study Intersections: Please add:
    a. Saxon Blvd/Sterling Silver Blvd
    b. Saxon Blvd/Finland Drive
    c. Saxon Blvd/Normandy Blvd
        i. AM analysis is required due to citizens' concerns about heavy congestion, especially northbound left turns vs. southbound right turns.
        ii. Northbound left turn signal warrant required.

5) Traffic Impact Assessment/background traffic: Growth growth rates and vested trips need to be addressed and agreed upon *during the methodology phase* prior to moving into the TIA phase. The Racetrac at Saxon Blvd/Finland Drive is required to be analyzed as vested trips. Please contact the city to determine if any other developments should be considered (developments that have traffic volume that is not reflected in the county's 2014 AADTs) such as Saxon Sterling Silver.

6) TIA is required to include the list of scheduled improvements within the next three years.

7) Please include a Multimodal analysis that shows/describes how bicycles, pedestrian and transit users will access in and around the site.

TO: Chris Bowley, AICP
Melissa Winsett

FROM: Turgut Dervish, P.E.

DATE: March 29, 2016

RE: Convenience Market with Gasoline Pumps
Saxon Boulevard and Normandy Boulevard
City of Deltona
TPD № 4755

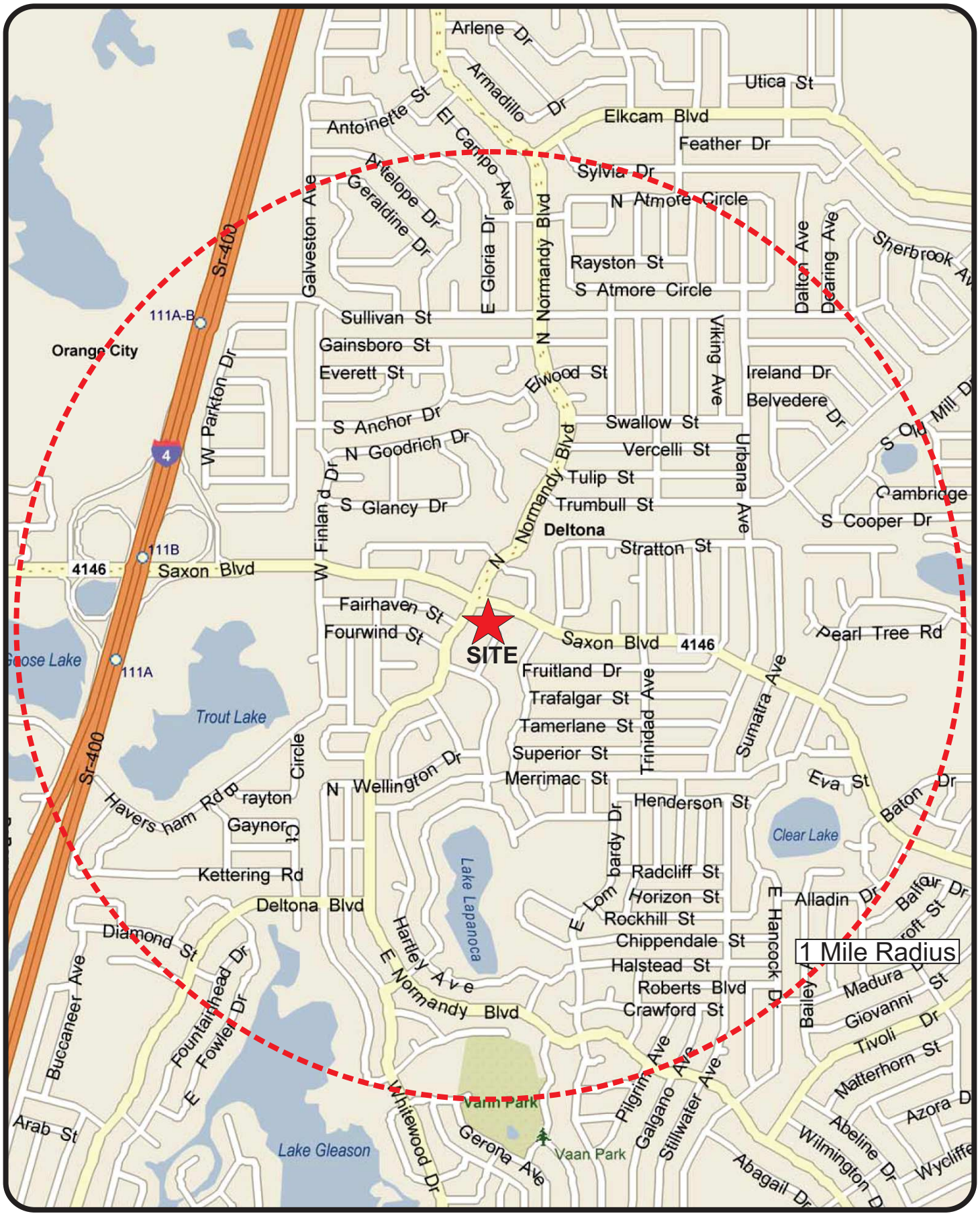
The following is our proposed traffic study methodology for the Traffic Impact Analysis (TIA) for the above-referenced convenience market. Its site is located on the southeast corner of the intersection of Saxon Boulevard and Normandy Boulevard. **Figure 1** depicts this site location and the area roadways within one-mile from the site. The City of Deltona requested that the analysis be conducted as per the River to Sea Transportation Planning Organization (R2C TPO) Transportation Impact Analysis (TIA) guidelines. In accordance with these guidelines, this letter outlines the proposed methodology by which the analysis will be conducted.

Proposed Development

The proposed development is for 5,943 square feet of convenience market with gasoline pumps. **Figure 2** depicts the conceptual site plan and its access configuration.

Trip Generation

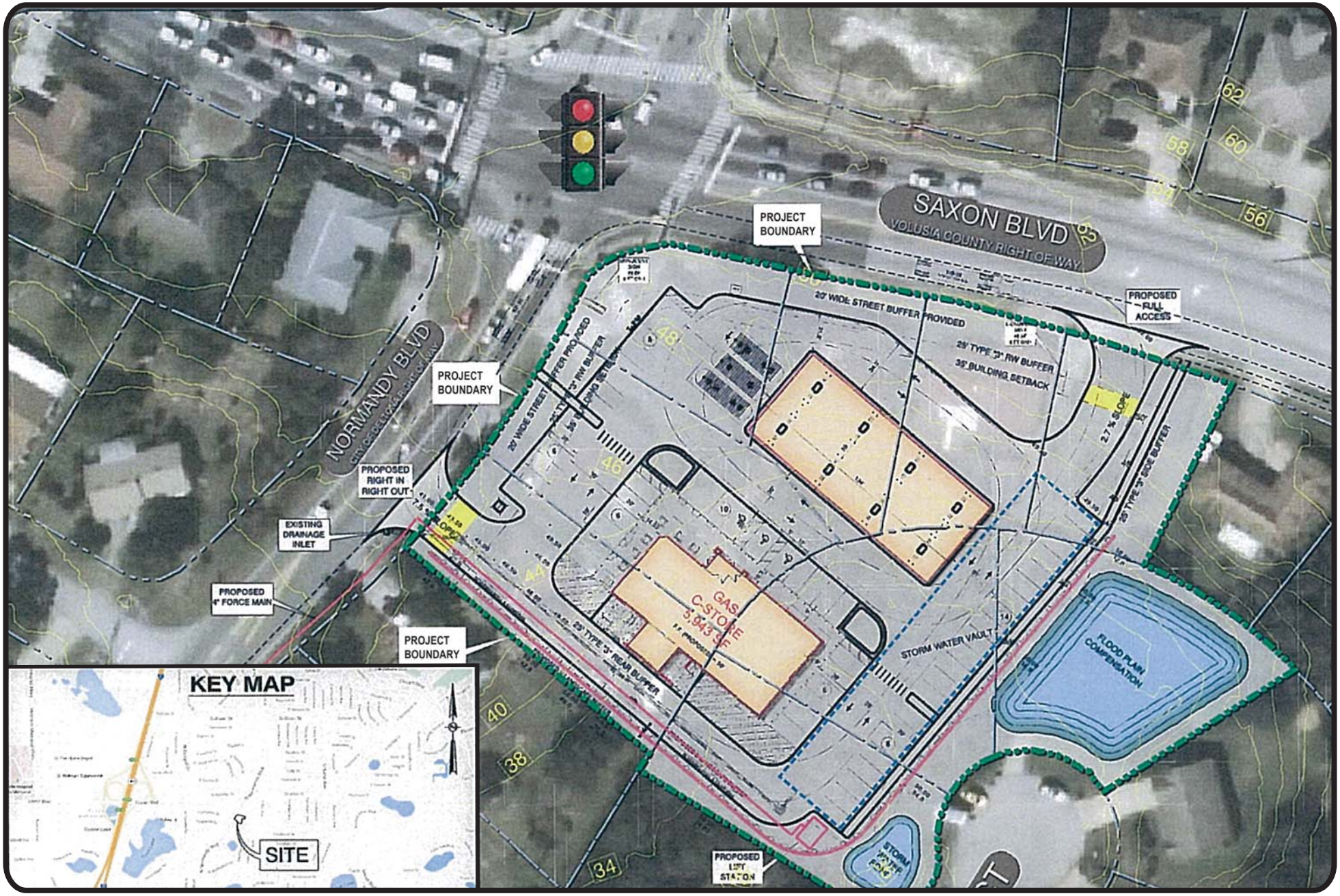
The trip generation of the proposed development will be calculated with the trip generation rates from the *9th Edition of the ITE Trip Generation Manual.* This calculation is summarized in **Table 1** which includes estimations of pass-by trips based upon *ITE's Trip Generation Handbook, 3rd Edition*. As shown in the table, the proposed development is estimated to generate 1,708 new net daily trips, of which 103 will occur in the P.M. peak hour. The pass-by trips will be limited to 14% of the background traffic on the adjacent roadways as per the R2C TPO Guidelines. The ITE trip generation sheets are included in **Attachment A**.



Convenience Market with Gasoline Pumps
Project № 4755
Figure 1

Site Location

N
NTS



Convenience Market with Gasoline Pumps
Project № 4755
Figure 2

Site Plan and Access Configuration

N
NTS

TABLE 1
Trip Generation Calculation Summary

Land Use	ITE Code	Quantity (SF)	Daily		PM Peak Hour			
			Rate	Trips	Rate	Enter	Exit	Total
Convenience Market w/Gasoline Pumps	853	5,943	845.60	5,025	50.92	151	152	303
Total Trips				**5,025**	**-----**	**151**	**152**	**303**
Pass-by Trips (66%)				3,317	-----	100	100	200
New Net Trips				**1,708**	**-----**	**51**	**52**	**103**

Trip Distribution

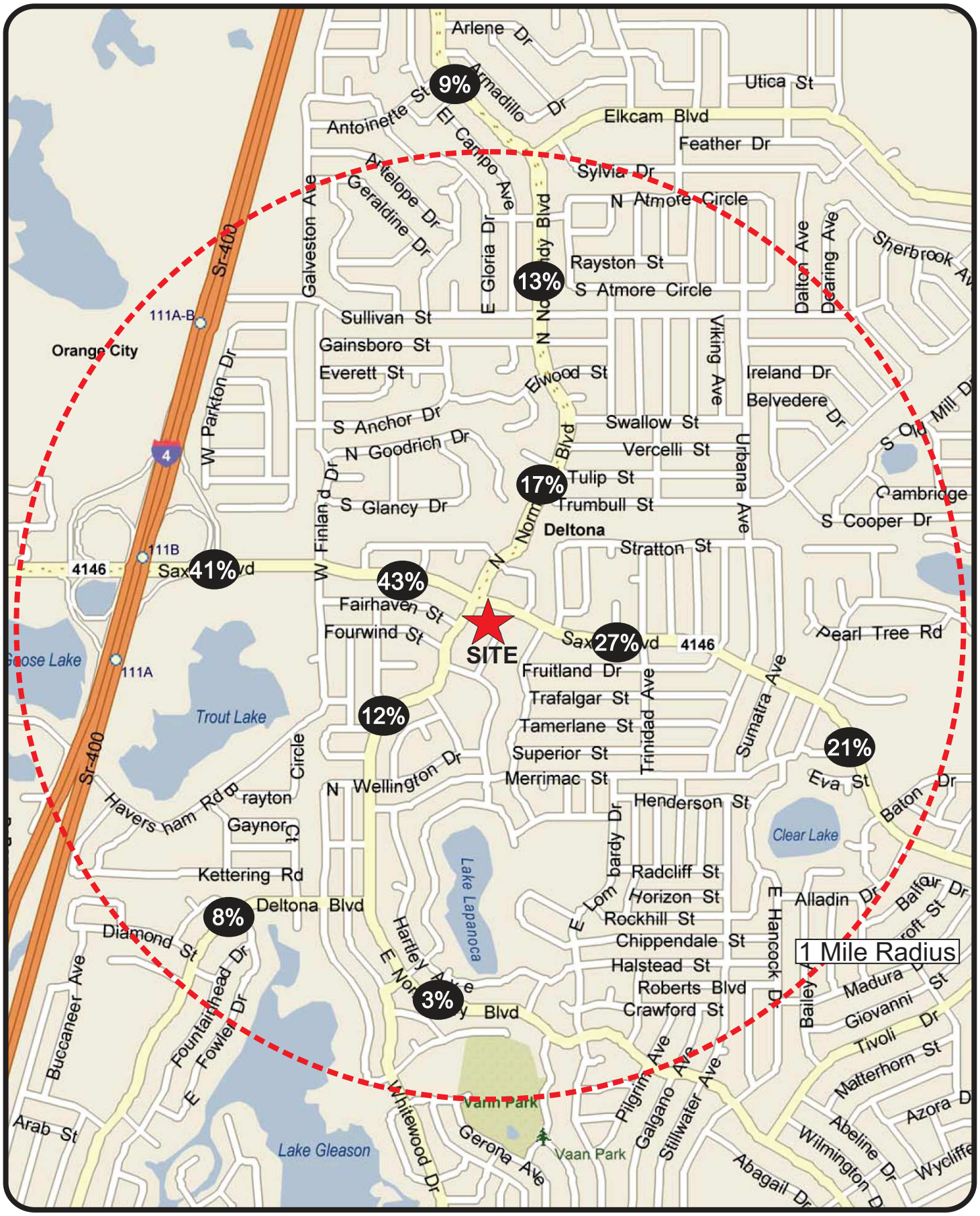
The estimation of the distribution of the project's new net trips in the area will be based upon the latest version of the Central Florida Regional Planning Model (CFRPM). **Figure 3** illustrates the obtained trip distribution plot. This distribution will be used to assign the project trips to the area roadways and intersections. The model trip distribution plots are included in Attachment A with trip generation data.

Traffic Impact Area

For projects generating between 100 to no more than 300 or more two-way peak hour external trips, the R2C TPO guidelines require that all road segments where the project consumes three percent (3%) or more of the roadway's two-way peak hour service volume based upon the adopted LOS be included in the analysis. To determine the traffic impact area for this project, a significance test was conducted as summarized in **Table 2**. Based upon the significance test, none of the area roadways will be significantly impacted by the proposed development. Therefore, the following roadway segments to which the site has access connections will be included in the analysis:

- Saxon Boulevard
    - Normandy Boulevard to Tivoli Drive
- Normandy Boulevard
    - Saxon Boulevard to Deltona Boulevard

The roadway segments will be analyzed for existing and buildout conditions for the P.M. peak hour as per the R2C TIA guidelines.



Convenience Market with Gasoline Pumps
Project № 4755
Figure 3

Project Trip Distribution

TABLE 2
Significance Analysis

Roadway Segment	Area	Functional Class	# of Lanes	Peak Hour Two-Way Capacity*	LOS Standard	Project Distribution**	Project Trips	Significance
Saxon Boulevard								
I-4 to Finland Dr	U	Minor Arterial	4	3,410	E	41%	42	1.2%
Finland Dr to Normandy Blvd	U	Minor Arterial	4	3,410	E	43%	44	1.3%
Normandy Blvd to Tivoli Dr	U	Minor Arterial	4	3,410	E	27%	28	0.82%
Tivoli Dr to Providence Blvd	U	Minor Arterial	2	1,020	E	21%	22	2.1%
Normandy Boulevard								
Rhode Island Ave to Elkcam Blvd	U	Major Collector	4	2,630	D	9%	9	0.3%
Elkham Blvd to Saxon Blvd	U	Major Collector	4	2,630	D	17%	18	0.68%
Saxon Blvd to Deltona Blvd	U	Major Collector	2	960	D	12%	12	1.25%
Deltona Blvd to Tivoli Dr	U	Major Collector	3	960	D	4%	4	0.42%
Deltona Boulevard								
Normandy Blvd to Cloverleaf Blvd	U	Major Collector	4	2,630	D	8%	8	0.3%

* Obtained from 2014 Volusia County AADT & Historical Counts

** Highest % distribution on the segment

Study Intersections

The following intersections that are part of the study roadway segments will be included in the traffic analysis:

- Saxon Boulevard and Normandy Boulevard
- Saxon Boulevard and Tivoli Drive
- Normandy Boulevard and Deltona Boulevard
- Site Entrances

The intersections will be analyzed utilizing weekday P.M. peak hour counts. The counts will be obtained during the 4-6 P.M. time period by 15-minute intervals at each intersection.

The intersections will be analyzed for existing and projected conditions with the use of the latest version of the Highway Capacity Study (HCS) software, in accordance with the procedures of the *2010 Highway Capacity Manual.* Existing traffic counts at the intersections will be expanded to the project's buildout year using annual growth factors determined from a trends analysis of available historical daily traffic volumes.

Traffic Impact Assessment

To assess the impact of the project traffic on the study roadways/intersections, the following steps will be followed in the analysis of the study roadways and intersections:

Roadways

- Determine background traffic volumes on impacted roadways based upon historical growth trend of daily volumes on the area roadways.
- Combine project traffic with background traffic to obtain total traffic flows.
- Perform traffic analysis utilizing FDOT Level of Service Standards/Guidelines consistent with the City's comprehensive plan.

Intersections

- Conduct intersection counts during the P.M. peak period at the study intersections.
- Expand existing traffic counts to the project's buildout year using growth factors based upon historical traffic volume data.
- Combine project traffic with background traffic to obtain total traffic.
- Perform intersection capacity analysis utilizing the latest HCM/HCS operational analysis procedures for the P.M. peak hour.

Critical and Near-Critical Roadways

To determine whether the development will impact critical and near-critical roadways, an impact area map of one-mile radius was obtained from Volusia County (**Attachment B**). The following roadways segments will be added to the analysis as per section 3a and b of the R2C TPO TIA guidelines:

- Saxon Boulevard
  FDOT Park & Ride to Normandy Boulevard

- I-4
  Segments north and south of Saxon Boulevard

- Normandy Boulevard
  Saxon Boulevard to Tivoli Drive

Traffic Report

A traffic report will be prepared documenting the study procedures, analysis and calculations/ recommendations.

Improvements

If warranted, appropriate roadway and intersection improvements will be identified.

Attachment A

Trip Generation Sheets/Distribution Plots

Convenience Market with Gasoline Pumps
(853)

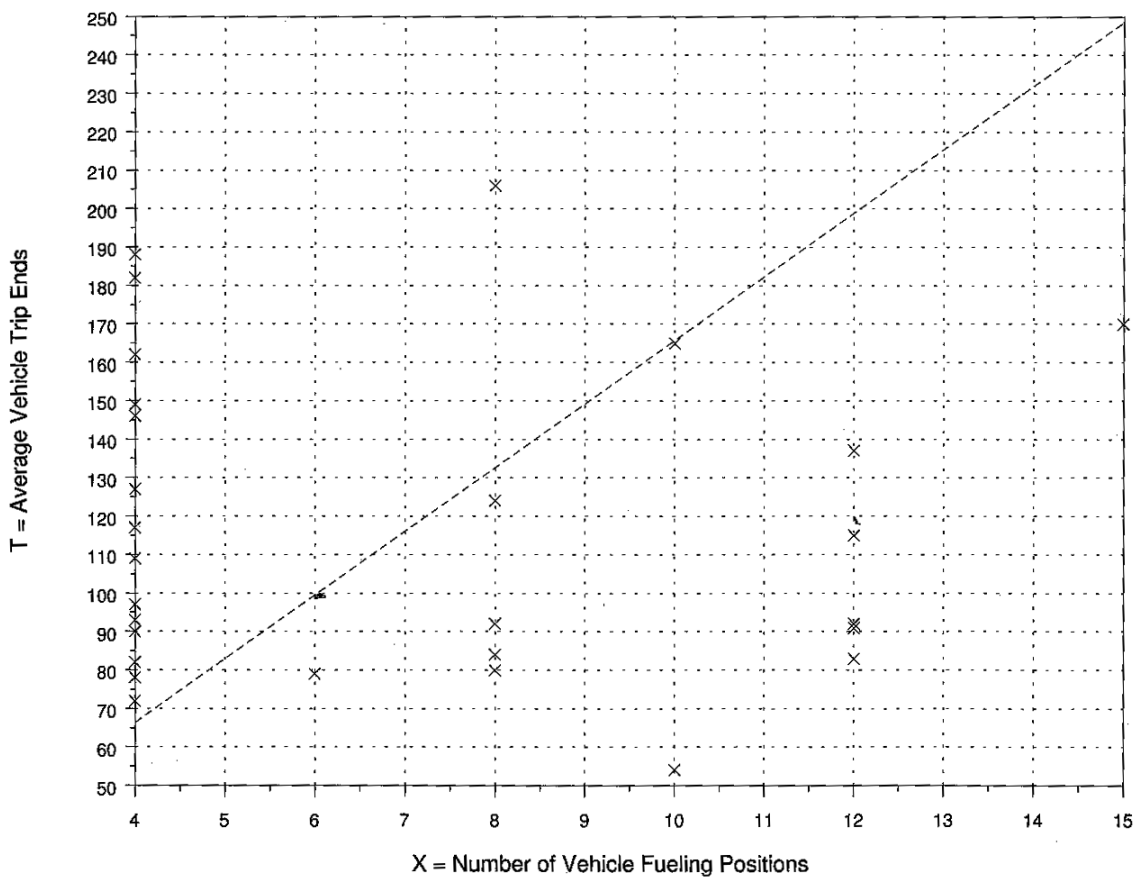
Average Vehicle Trip Ends vs: Vehicle Fueling Positions
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 28
Average Vehicle Fueling Positions: 7
Directional Distribution: 50% entering, 50% exiting

Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
16.57	5.40 - 47.00	11.34

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

Convenience Market with Gasoline Pumps
(853)

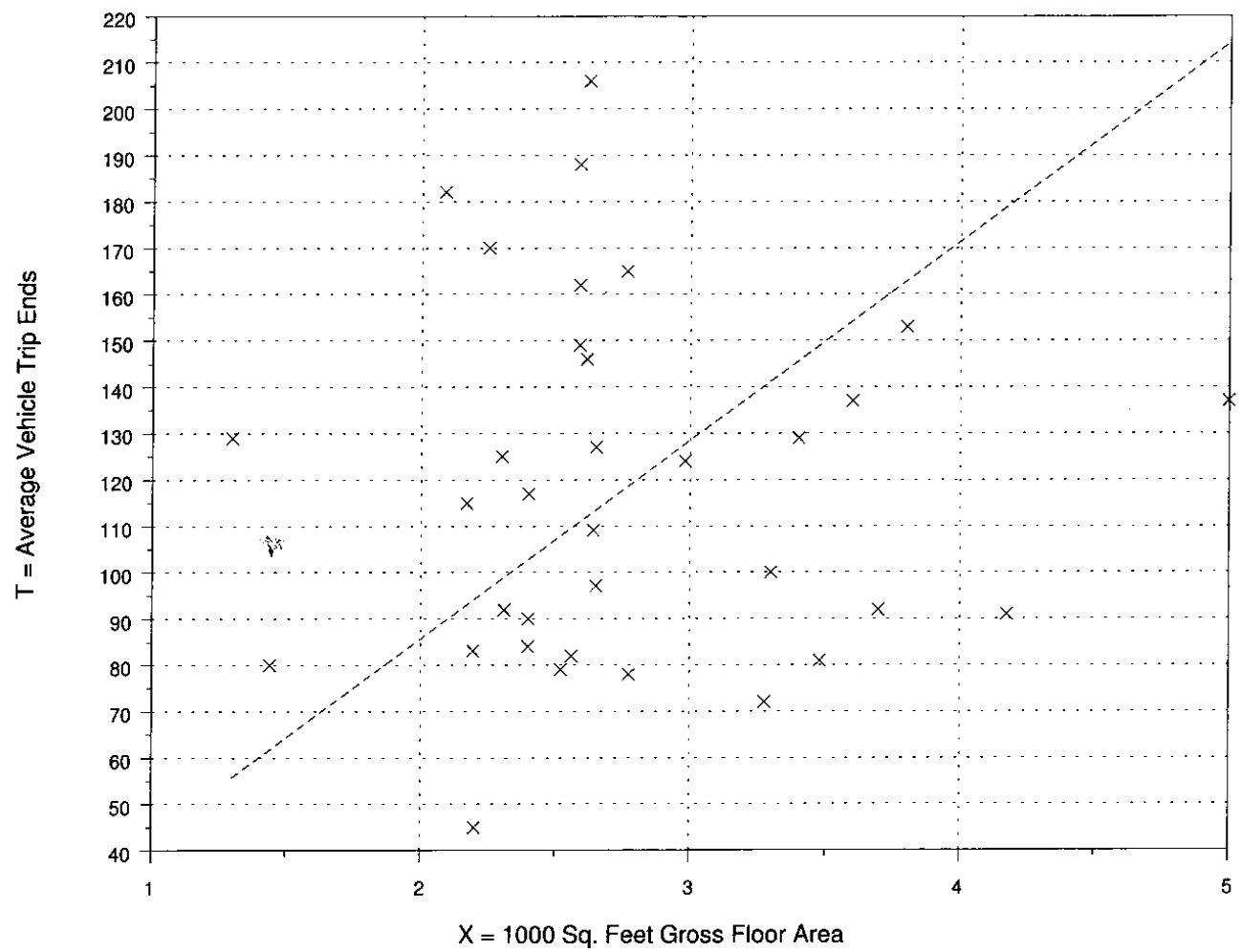
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
A.M. Peak Hour of Generator

Number of Studies: 34
Average 1000 Sq. Feet GFA: 3
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
42.86	20.45 - 99.23	18.85

Data Plot and Equation



× **Actual Data Points**

------ **Average Rate**

Fitted Curve Equation: Not given

R^2 = ****

Convenience Market with Gasoline Pumps
(853)

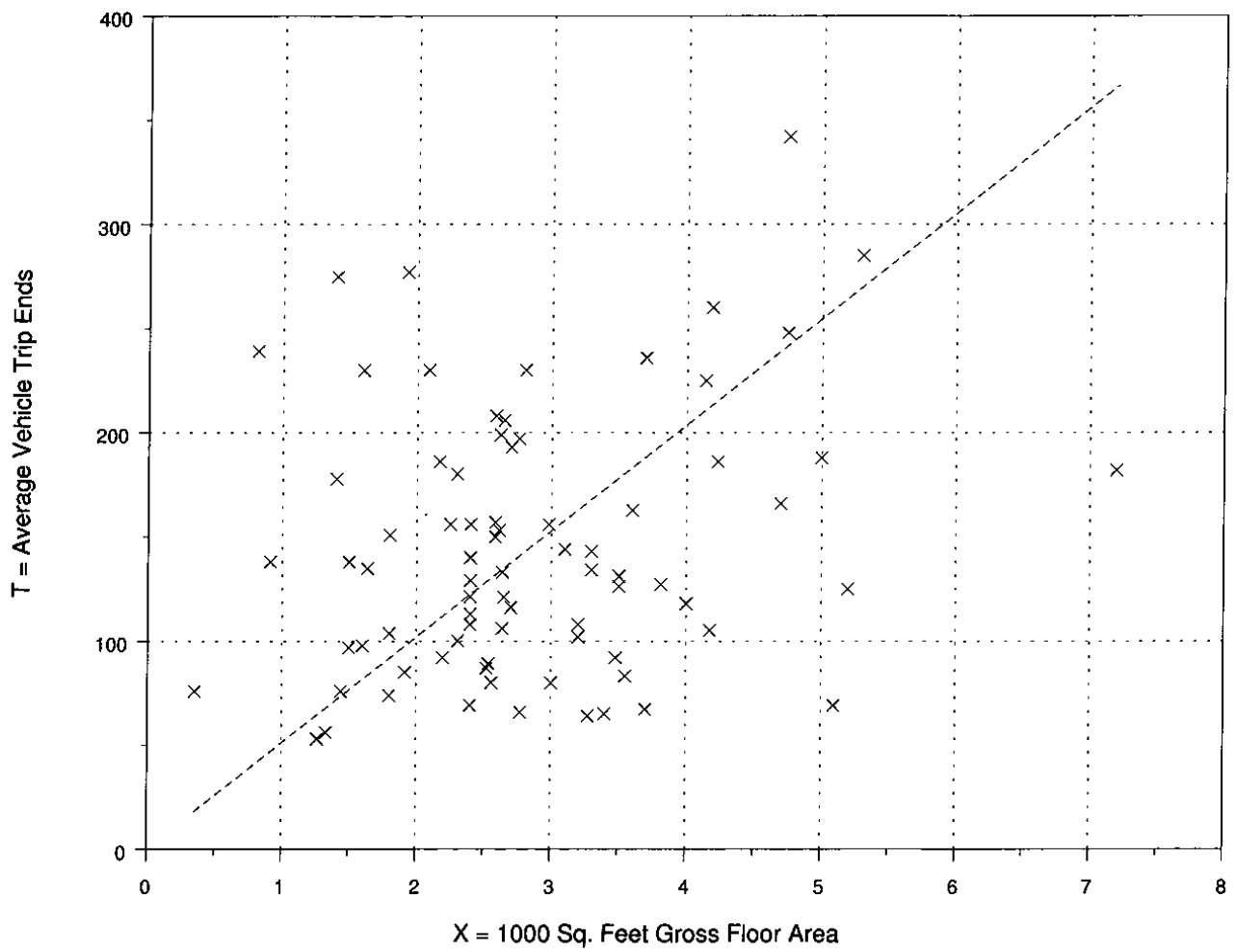
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 78
Average 1000 Sq. Feet GFA: 3
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
50.92	13.53 - 292.89	32.15

Data Plot and Equation



× Actual Data Points

------ Average Rate

Fitted Curve Equation: Not given

R^2 = ****

Table F.15 Pass-By and Non-Pass-By Trips Weekday, AM Peak Period
Land Use Code 853—Convenience Market with Gasoline Pumps

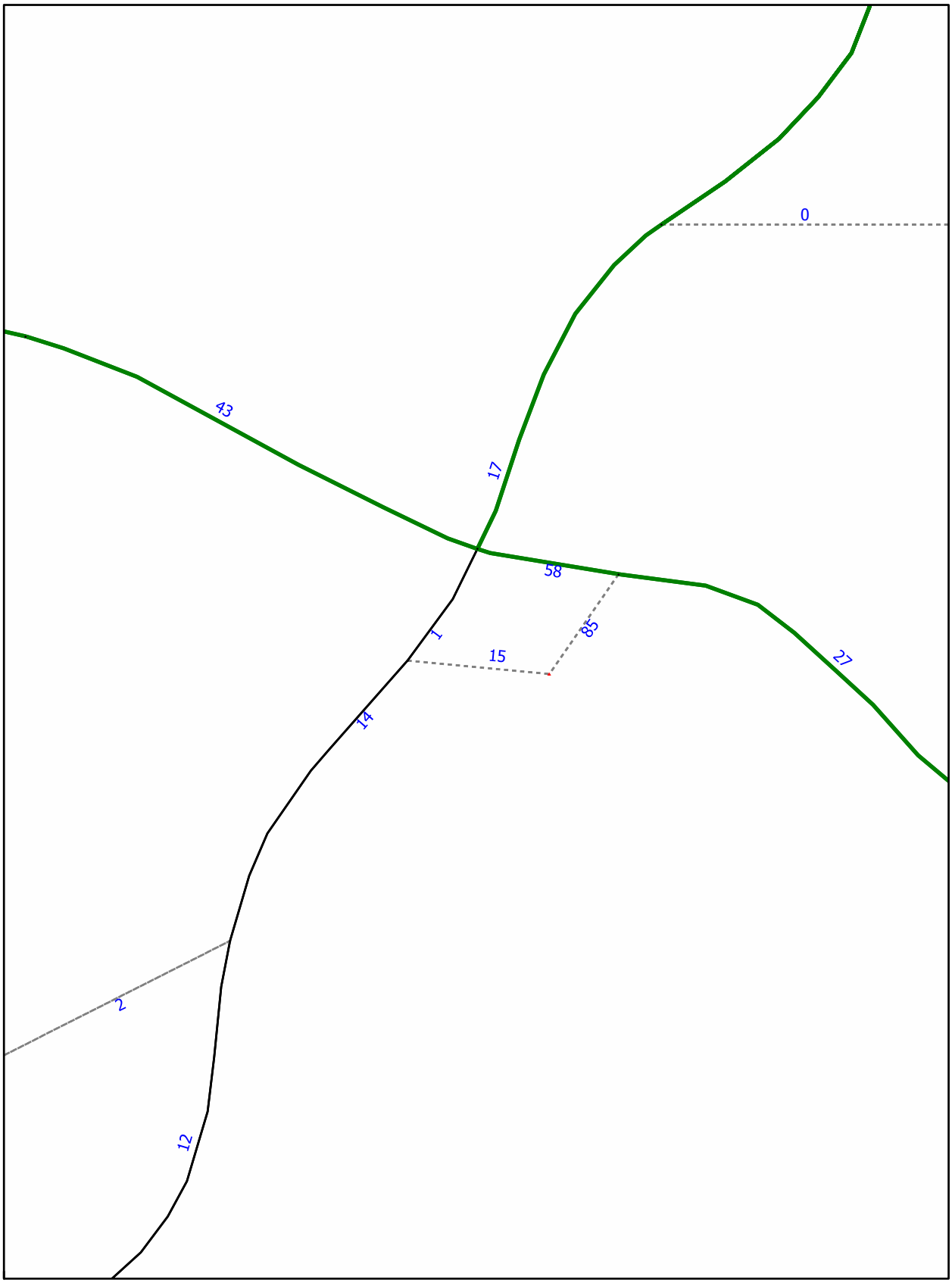
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]
						PRIMARY	DIVERTED	TOTAL		
2.8	Louisville area, KY	1993	—	7:00–9:00 a.m.	54	11	35	46	1,240	Barton-Aschman Assoc.
2.4	Louisville area, KY	1993	—	7:00–9:00 a.m.	48	17	35	52	1,210	Barton-Aschman Assoc.
4.2	Louisville area, KY	1993	47	7:00–9:00 a.m.	62	19	19	38	1,705	Barton-Aschman Assoc.
2.6	Crestwood, KY	1993	—	7:00–9:00 a.m.	72	15	13	28	940	Barton-Aschman Assoc.
3.7	Louisville area, KY	1993	49	7:00–9:00 a.m.	66	16	18	34	990	Barton-Aschman Assoc.
3.0	New Albany, IN	1993	62	7:00–9:00 a.m.	74	10	16	26	790	Barton-Aschman Assoc.
2.3	Louisville, KY	1993	58	7:00–9:00 a.m.	64	5	31	36	1,255	Barton-Aschman Assoc.
2.2	New Albany, IN	1993	79	7:00–9:00 a.m.	56	6	38	44	635	Barton-Aschman Assoc.
3.6	Louisville area, KY	1993	49	7:00–9:00 a.m.	67	4	29	33	1,985	Barton-Aschman Assoc.

Average Pass-By Trip Percentage: 63
"—" means no data were provided

Table F.16 Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 853—Convenience Market with Gasoline Pumps

						PRIMARY	DIVERTED	TOTAL		
2.8	Louisville area, KY	1993	—	4:00–6:00 p.m.	62	11	27	38	2,875	Barton-Aschman Assoc.
2.4	Louisville area, KY	1993	—	4:00–6:00 p.m.	58	13	29	42	2,655	Barton-Aschman Assoc.
4.2	Louisville area, KY	1993	61	4:00–6:00 p.m.	58	26	16	42	2,300	Barton-Aschman Assoc.
2.6	Crestwood, KY	1993	68	4:00–6:00 p.m.	67	15	18	33	950	Barton-Aschman Assoc.
3.7	Louisville area, KY	1993	70	4:00–6:00 p.m.	61	16	23	39	2,175	Barton-Aschman Assoc.
3.0	New Albany, IN	1993	80	4:00–6:00 p.m.	65	15	20	35	1,165	Barton-Aschman Assoc.
2.3	Louisville, KY	1993	67	4:00–6:00 p.m.	57	16	27	43	1,954	Barton-Aschman Assoc.
2.2	New Albany, IN	1993	115	4:00–6:00 p.m.	48	16	36	52	820	Barton-Aschman Assoc.
3.6	Louisville area, KY	1993	60	4:00–6:00 p.m.	56	17	27	44	2,505	Barton-Aschman Assoc.
2.6	Seminole Co., FL	1989	82	4:00–6:00 p.m.	73	20	7	27	—	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	98	4:00–6:00 p.m.	81	15	4	19	—	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	115	4:00–6:00 p.m.	69	16	15	31	—	Tipton Associates Inc.
2.6	Volusia Co., FL	1989	98	4:00–6:00 p.m.	74	15	11	26	—	Tipton Associates Inc.
2.4	Volusia Co., FL	1989	38	4:00–6:00 p.m.	74	24	2	26	—	Tipton Associates Inc.
2.7	Volusia Co., FL	1989	82	4:00–6:00 p.m.	87	8	5	13	—	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	99	2:00–4:00 p.m.	64	28	8	36	—	Tipton Associates Inc.
2.4	Volusia Co., FL	1989	38	2:00–4:00 p.m.	88	21	11	32	—	Tipton Associates Inc.

Average Pass-By Trip Percentage: 66
"—" means no data were provided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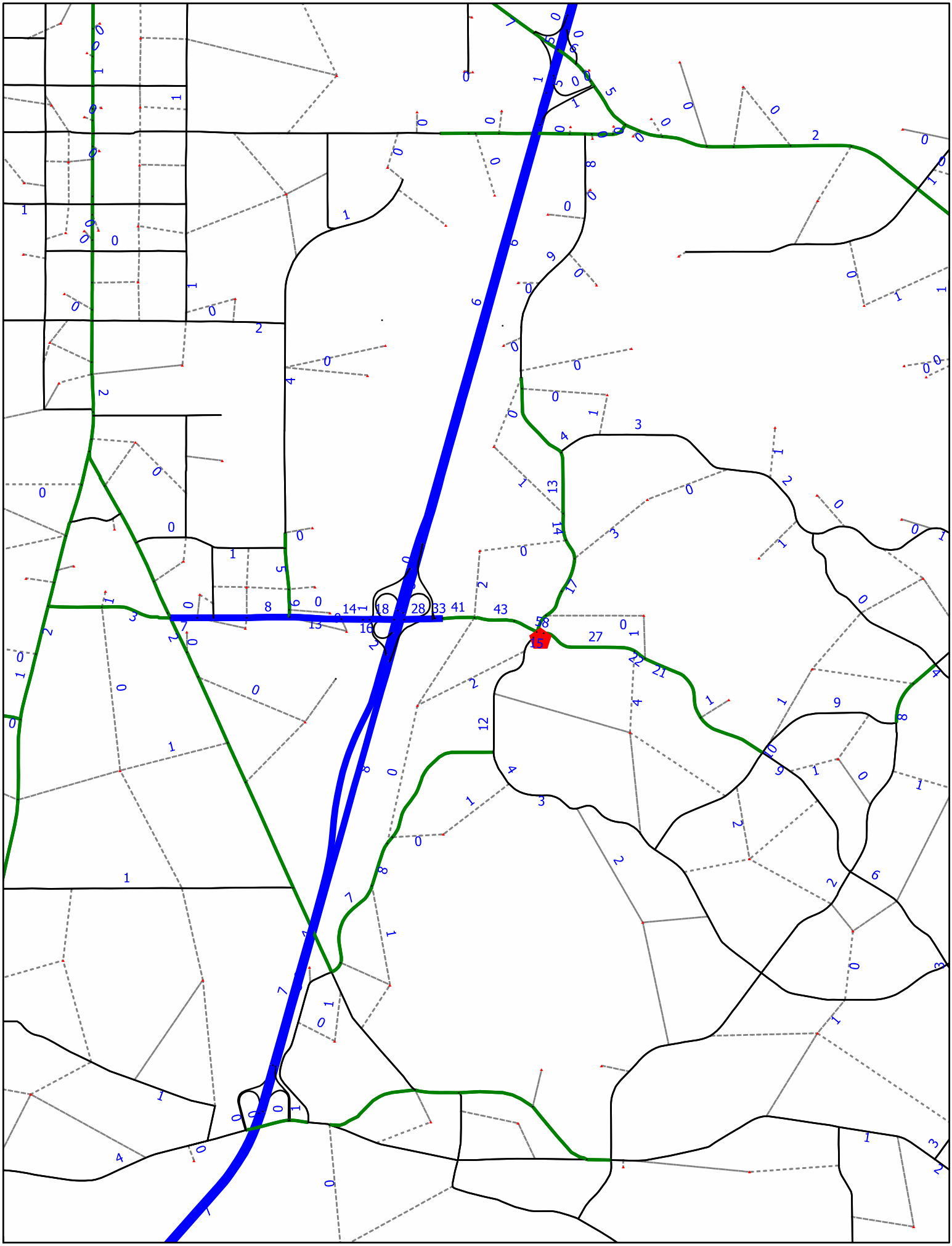
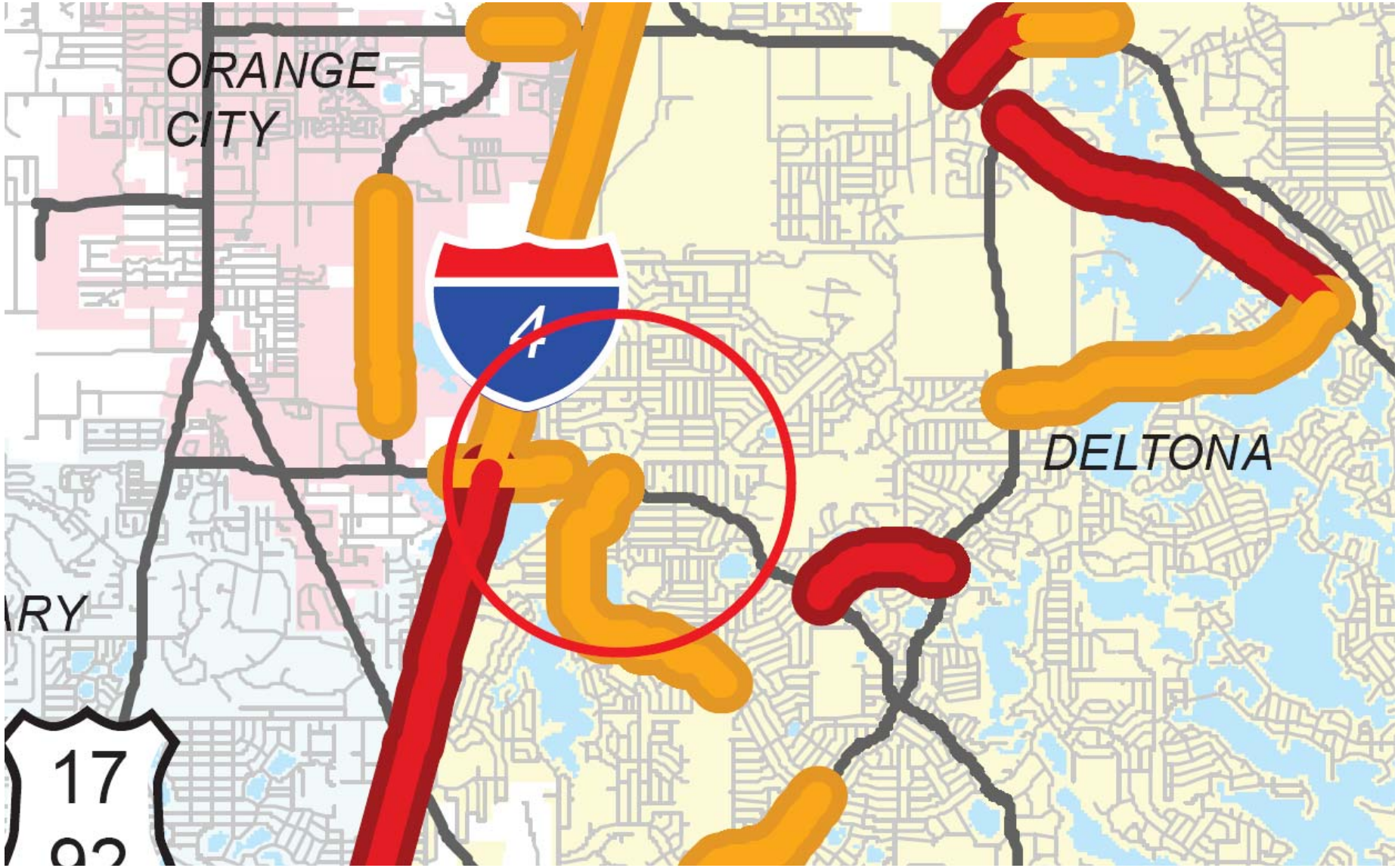


Attachment B

Critical/Near Critical Roadway Map

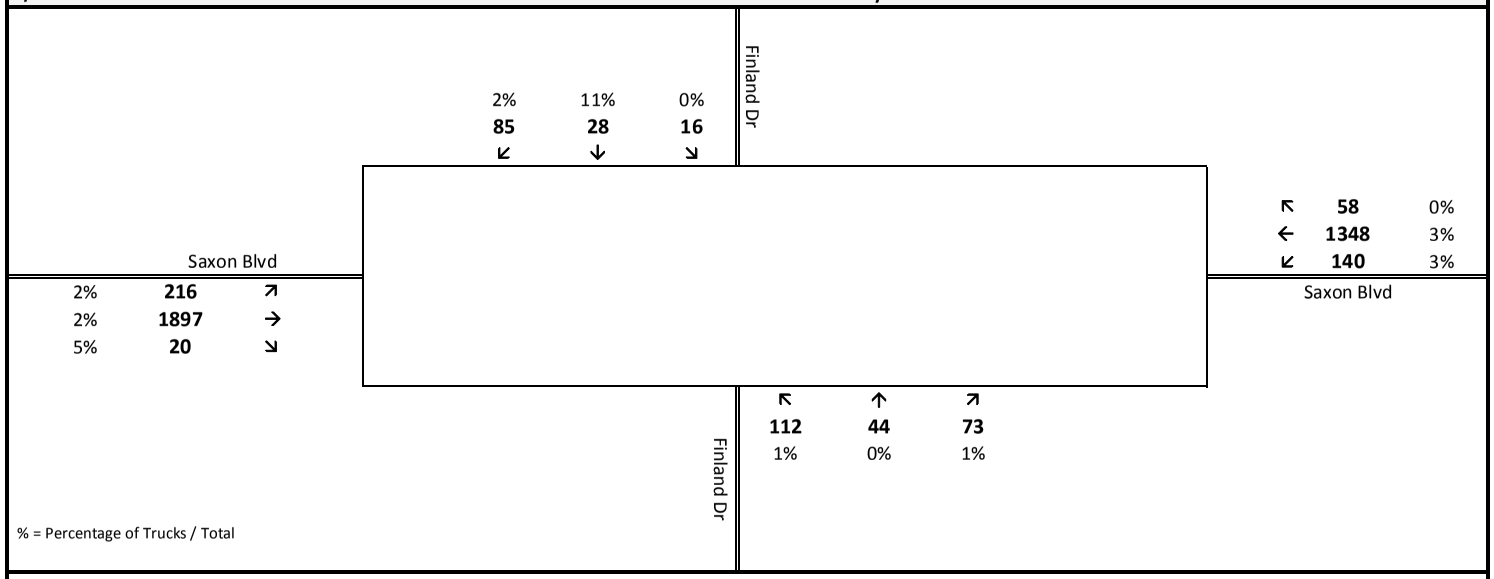
Level of Service 2014
Critical / Near Critical* State and County Roadways



APPENDIX B

Traffic Counts and
Signal Timing Data

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Finland Dr	**Study Period:**	PM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	16	25	83	136	1301	58	111	44	72	211	1863	19	3939
Trucks	0	3	2	4	47	0	1	0	1	5	34	1	98
Total	**16**	**28**	**85**	**140**	**1348**	**58**	**112**	**44**	**73**	**216**	**1897**	**20**	**4037**
Peak Hour Factor	**0.913**												
Peak Hour	**05:45 PM to to 06:45 PM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	2	8	30	12	199	4	31	6	10	39	399	15	755
5:00:00 PM	5	4	19	21	252	9	35	9	19	50	460	6	889
5:15:00 PM	3	13	34	11	304	7	36	11	9	60	481	6	975
5:30:00 PM	3	2	8	23	302	5	32	15	10	23	449	4	876
5:45:00 PM	4	1	20	36	300	11	29	19	12	49	457	5	943
6:00:00 PM	8	8	37	33	385	17	35	9	17	61	495	1	1,106
6:15:00 PM	3	15	15	41	355	12	26	8	23	65	461	10	1,034
6:30:00 PM	1	4	13	30	308	18	22	8	21	41	484	4	954
6:45:00 PM	2	9	17	47	296	11	26	9	14	41	414	7	893

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Finland Dr	**Study Period:**	PM

Total Vehicle Traffic

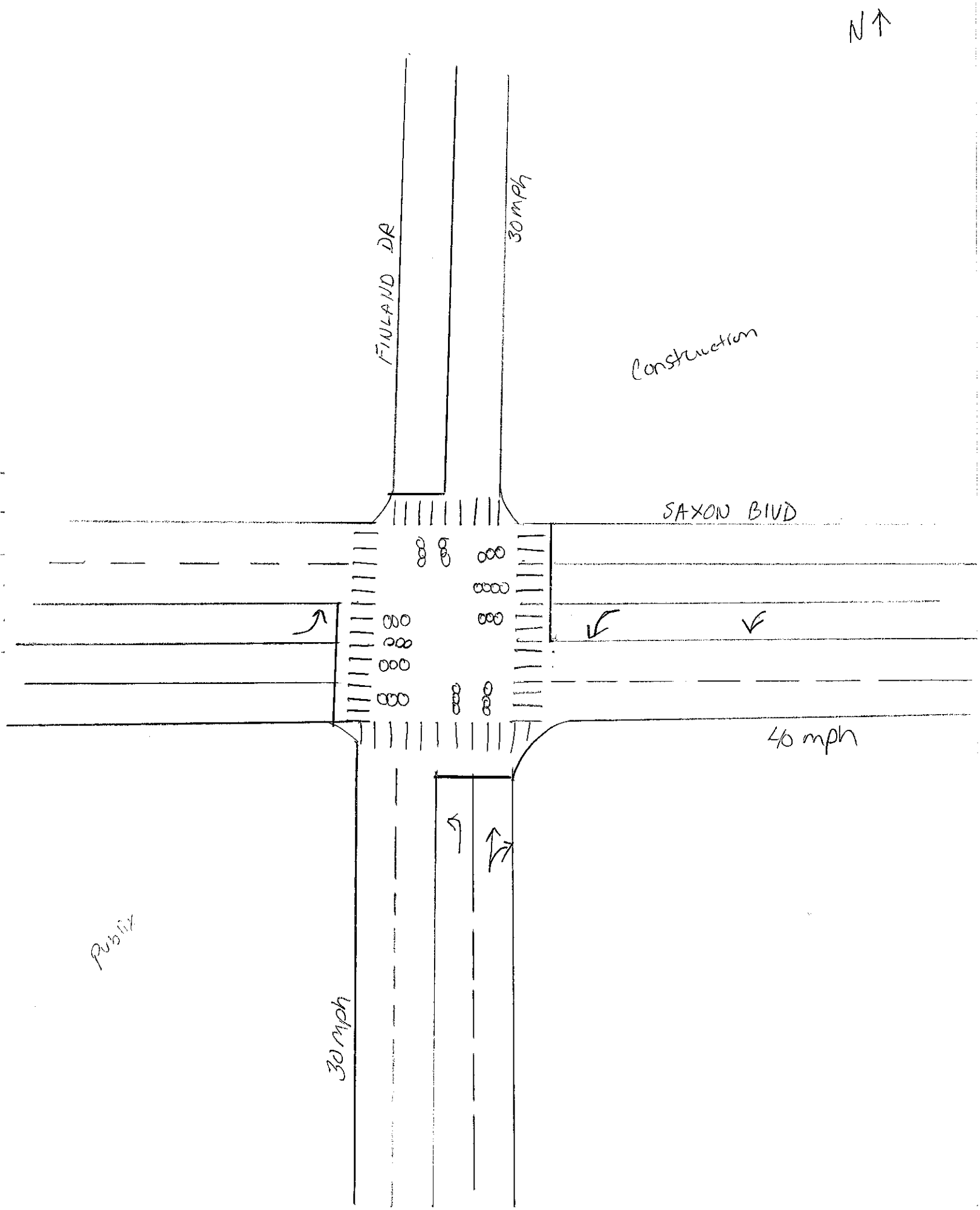
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	2	8	30	12	199	4	31	6	10	39	399	15	755
5:00:00 PM	5	4	19	21	252	9	35	9	19	50	460	6	889
5:15:00 PM	3	13	34	11	304	7	36	11	9	60	481	6	975
5:30:00 PM	3	2	8	23	302	5	32	15	10	23	449	4	876
5:45:00 PM	4	1	20	36	300	11	29	19	12	49	457	5	943
6:00:00 PM	8	8	37	33	385	17	35	9	17	61	495	1	1,106
6:15:00 PM	3	15	15	41	355	12	26	8	23	65	461	10	1,034
6:30:00 PM	1	4	13	30	308	18	22	8	21	41	484	4	954
6:45:00 PM	2	9	17	47	296	11	26	9	14	41	414	7	893

Car Traffic

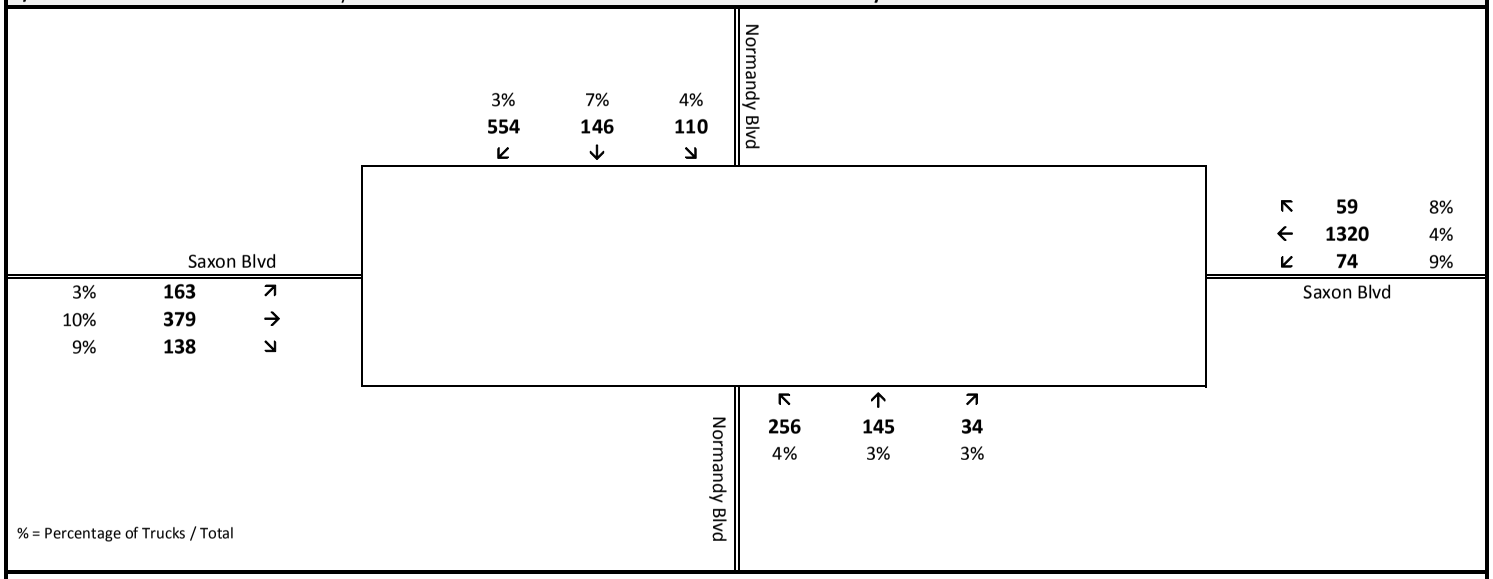
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	2	8	28	11	185	4	31	6	10	37	397	15	734
5:00:00 PM	5	4	18	21	247	9	35	9	19	48	458	6	879
5:15:00 PM	3	11	33	9	294	7	36	11	9	60	479	6	958
5:30:00 PM	3	2	8	23	299	5	32	15	9	23	443	4	866
5:45:00 PM	4	1	20	36	293	11	28	19	12	48	449	5	926
6:00:00 PM	8	8	36	31	365	17	35	9	17	61	486	1	1074
6:15:00 PM	3	12	15	40	343	12	26	8	22	63	454	10	1008
6:30:00 PM	1	4	12	29	300	18	22	8	21	39	474	3	931
6:45:00 PM	2	9	15	46	280	11	26	9	14	39	402	7	860

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	0	2	1	14	0	0	0	0	2	2	0	21
5:00:00 PM	0	0	1	0	5	0	0	0	0	2	2	0	10
5:15:00 PM	0	2	1	2	10	0	0	0	0	0	2	0	17
5:30:00 PM	0	0	0	0	3	0	0	0	1	0	6	0	10
5:45:00 PM	0	0	0	0	7	0	1	0	0	1	8	0	17
6:00:00 PM	0	0	1	2	20	0	0	0	0	0	9	0	32
6:15:00 PM	0	3	0	1	12	0	0	0	1	2	7	0	26
6:30:00 PM	0	0	1	1	8	0	0	0	0	2	10	1	23
6:45:00 PM	0	0	2	1	16	0	0	0	0	2	12	0	33


N
FINLAND DR
30 mph
Construction
SAXON BLVD
40 mph
Publix
30 mph

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	AM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	106	136	536	67	1272	54	246	141	33	158	341	125	3215
Trucks	4	10	18	7	48	5	10	4	1	5	38	13	163
Total	**110**	**146**	**554**	**74**	**1320**	**59**	**256**	**145**	**34**	**163**	**379**	**138**	**3378**
Peak Hour Factor	**0.970**												
Peak Hour	**07:30 AM to to 08:30 AM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00:00 AM	19	20	105	9	220	14	50	34	3	18	72	19	583
7:15:00 AM	24	25	129	15	260	16	59	35	6	20	102	20	711
7:30:00 AM	39	44	144	21	327	18	59	41	10	35	89	36	863
7:45:00 AM	38	20	133	21	334	13	66	42	6	53	94	38	858
8:00:00 AM	23	39	158	18	332	15	76	31	8	41	102	28	871
8:15:00 AM	10	43	119	14	327	13	55	31	10	34	94	36	786
8:30:00 AM	7	62	106	13	328	11	51	25	3	41	116	36	799
8:45:00 AM	11	30	175	12	350	9	35	21	3	55	65	18	784

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	AM

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00:00 AM	19	20	105	9	220	14	50	34	3	18	72	19	583
7:15:00 AM	24	25	129	15	260	16	59	35	6	20	102	20	711
7:30:00 AM	39	44	144	21	327	18	59	41	10	35	89	36	863
7:45:00 AM	38	20	133	21	334	13	66	42	6	53	94	38	858
8:00:00 AM	23	39	158	18	332	15	76	31	8	41	102	28	871
8:15:00 AM	10	43	119	14	327	13	55	31	10	34	94	36	786
8:30:00 AM	7	62	106	13	328	11	51	25	3	41	116	36	799
8:45:00 AM	11	30	175	12	350	9	35	21	3	55	65	18	784

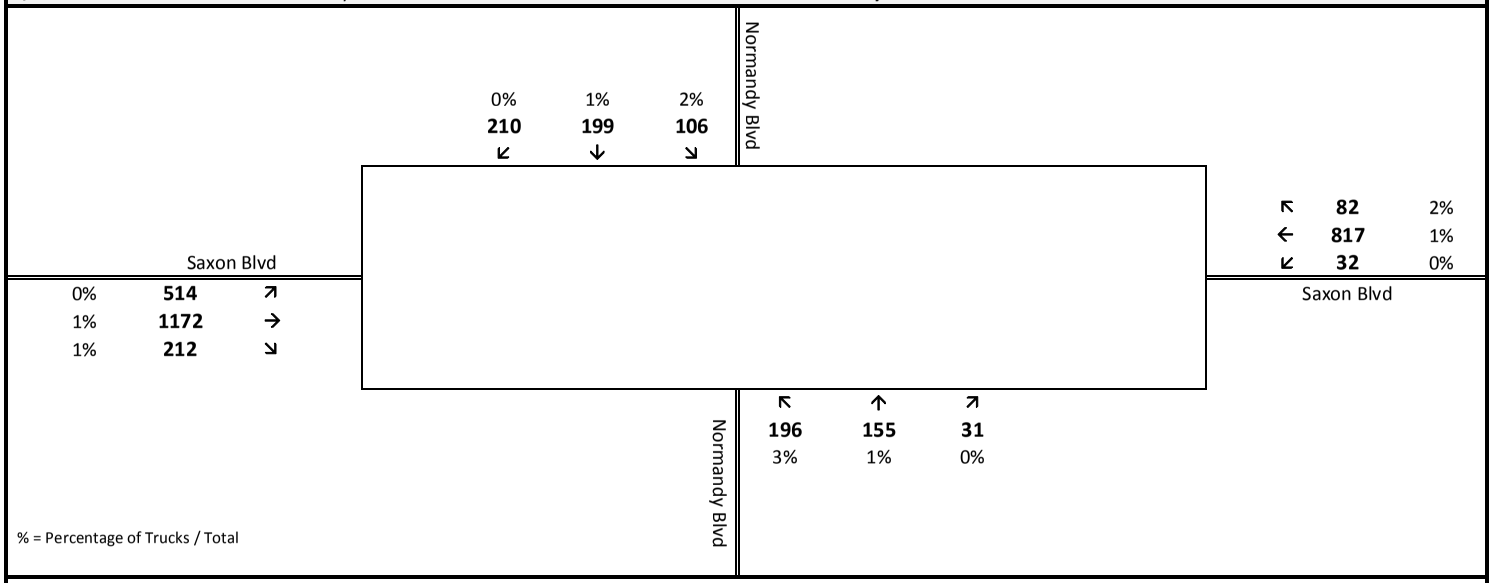
Car Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00:00 AM	19	20	104	8	215	13	45	31	2	18	69	17	561
7:15:00 AM	24	25	127	13	251	16	52	31	5	20	97	18	679
7:30:00 AM	38	40	140	20	313	17	53	37	10	35	81	33	817
7:45:00 AM	37	20	126	19	324	13	65	42	5	51	83	36	821
8:00:00 AM	21	38	154	15	321	13	74	31	8	40	90	24	829
8:15:00 AM	10	38	116	13	314	11	54	31	10	32	87	32	748
8:30:00 AM	7	58	105	13	323	11	50	18	3	39	108	33	768
8:45:00 AM	11	30	173	12	342	8	32	18	2	53	58	18	757

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00:00 AM	0	0	1	1	5	1	5	3	1	0	3	2	22
7:15:00 AM	0	0	2	2	9	0	7	4	1	0	5	2	32
7:30:00 AM	1	4	4	1	14	1	6	4	0	0	8	3	46
7:45:00 AM	1	0	7	2	10	0	1	0	1	2	11	2	37
8:00:00 AM	2	1	4	3	11	2	2	0	0	1	12	4	42
8:15:00 AM	0	5	3	1	13	2	1	0	0	2	7	4	38
8:30:00 AM	0	4	1	0	5	0	1	7	0	2	8	3	31
8:45:00 AM	0	0	2	0	8	1	3	3	1	2	7	0	27
													0

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	PM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	104	197	209	32	811	80	191	154	31	513	1160	210	3692
Trucks	2	2	1	0	6	2	5	1	0	1	12	2	34
Total	**106**	**199**	**210**	**32**	**817**	**82**	**196**	**155**	**31**	**514**	**1172**	**212**	**3726**
Peak Hour Factor	**0.968**												
Peak Hour	**05:00 PM to to 06:00 PM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	22	38	46	4	203	13	56	40	5	92	289	53	861
5:00:00 PM	26	48	44	10	210	17	45	44	9	137	297	54	941
5:15:00 PM	34	49	53	8	230	21	51	32	7	125	304	48	962
5:30:00 PM	30	53	59	10	176	34	52	37	4	118	285	42	900
5:45:00 PM	16	49	54	4	201	10	48	42	11	134	286	68	923
6:00:00 PM	19	46	70	9	204	14	52	32	7	148	280	46	927
6:15:00 PM	16	48	71	6	180	11	51	40	8	122	285	53	891
6:30:00 PM	24	44	62	11	184	11	43	35	10	128	278	53	883
6:45:00 PM	25	49	57	5	222	6	38	25	8	135	232	44	846

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	PM

Total Vehicle Traffic

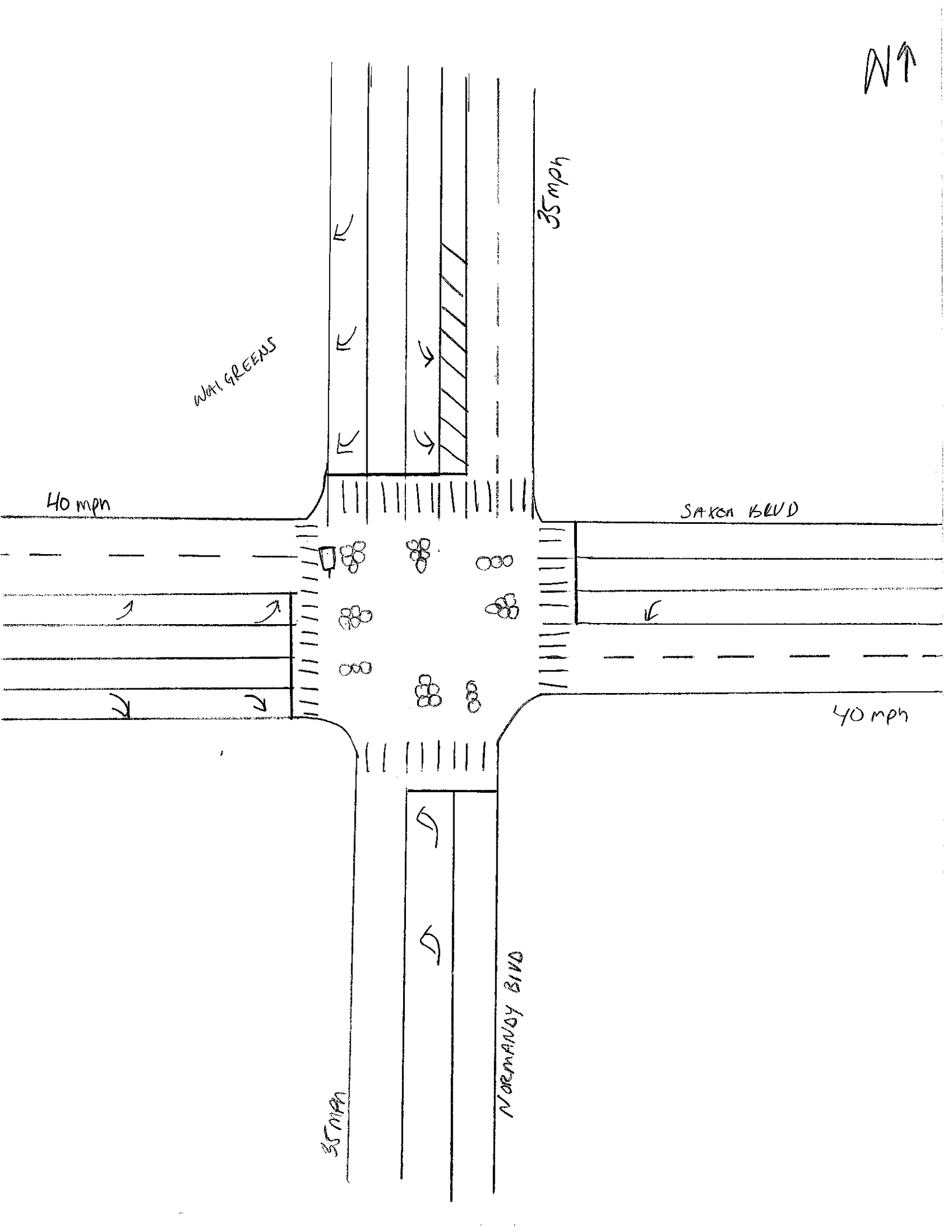
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	22	38	46	4	203	13	56	40	5	92	289	53	861
5:00:00 PM	26	48	44	10	210	17	45	44	9	137	297	54	941
5:15:00 PM	34	49	53	8	230	21	51	32	7	125	304	48	962
5:30:00 PM	30	53	59	10	176	34	52	37	4	118	285	42	900
5:45:00 PM	16	49	54	4	201	10	48	42	11	134	286	68	923
6:00:00 PM	19	46	70	9	204	14	52	32	7	148	280	46	927
6:15:00 PM	16	48	71	6	180	11	51	40	8	122	285	53	891
6:30:00 PM	24	44	62	11	184	11	43	35	10	128	278	53	883
6:45:00 PM	25	49	57	5	222	6	38	25	8	135	232	44	846

Car Traffic

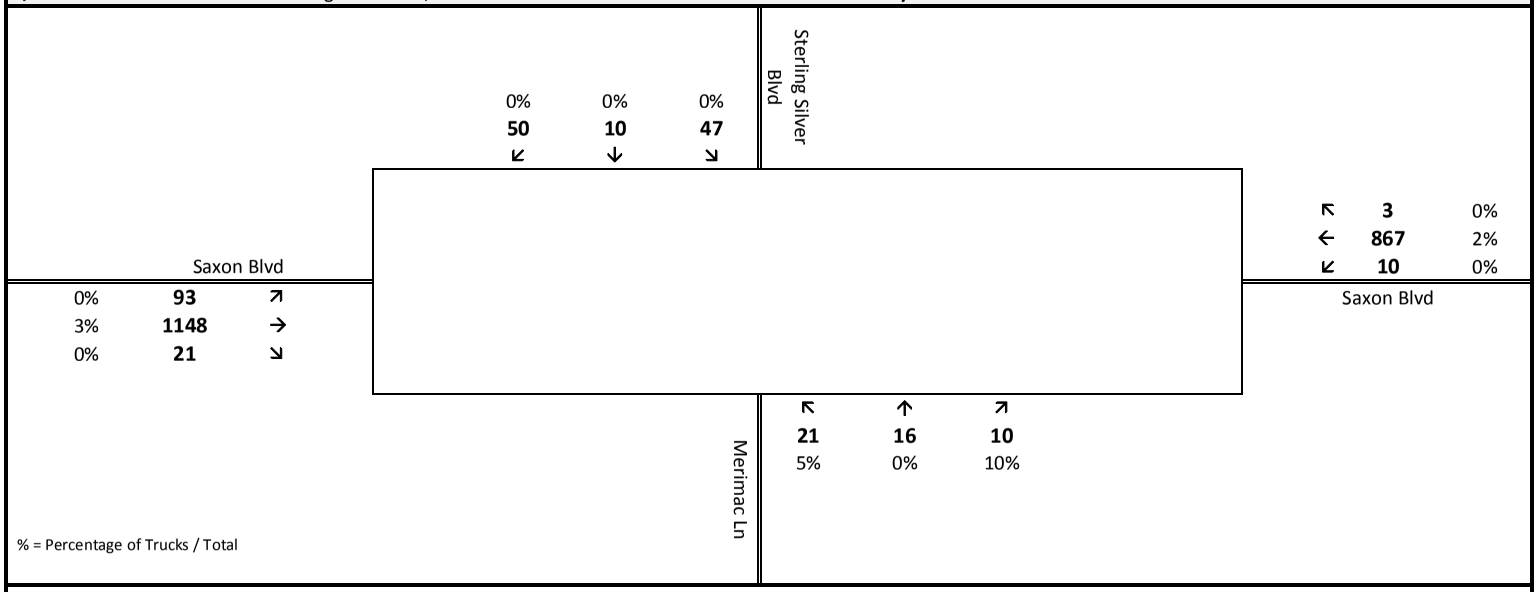
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	22	38	46	4	200	13	56	40	5	91	288	53	856
5:00:00 PM	25	47	44	10	208	17	44	43	9	137	294	54	932
5:15:00 PM	34	49	52	8	228	19	49	32	7	124	302	47	951
5:30:00 PM	29	53	59	10	175	34	52	37	4	118	282	42	895
5:45:00 PM	16	48	54	4	200	10	46	42	11	134	282	67	914
6:00:00 PM	19	46	69	9	202	14	52	32	7	147	278	46	921
6:15:00 PM	16	47	71	6	179	11	50	40	8	122	284	52	886
6:30:00 PM	24	44	61	11	183	11	43	34	10	127	277	53	878
6:45:00 PM	25	49	57	5	219	6	38	25	8	135	231	42	840

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	0	0	0	3	0	0	0	0	1	1	0	5
5:00:00 PM	1	1	0	0	2	0	1	1	0	0	3	0	9
5:15:00 PM	0	0	1	0	2	2	2	0	0	1	2	1	11
5:30:00 PM	1	0	0	0	1	0	0	0	0	0	3	0	5
5:45:00 PM	0	1	0	0	1	0	2	0	0	0	4	1	9
6:00:00 PM	0	0	1	0	2	0	0	0	0	1	2	0	6
6:15:00 PM	0	1	0	0	1	0	1	0	0	0	1	1	5
6:30:00 PM	0	0	1	0	1	0	0	1	0	1	1	0	5
6:45:00 PM	0	0	0	0	3	0	0	0	0	0	1	2	6


N
35mph
WALGREENS
40 mph
SAXON BLVD
40 mph
NORMANDY BLVD
35MPH

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Sterling Silver Blvd/Merimac Ln	**Study Period:**	PM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	47	10	50	10	851	3	20	16	9	93	1112	21	2242
Trucks	0	0	0	0	16	0	1	0	1	0	36	0	54
Total	**47**	**10**	**50**	**10**	**867**	**3**	**21**	**16**	**10**	**93**	**1148**	**21**	**2296**
Peak Hour Factor	**0.966**												
Peak Hour	**05:00 PM to to 06:00 PM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	9	4	6	2	169	1	4	2	2	30	239	5	473
5:00:00 PM	5	2	20	5	210	2	1	4	3	28	292	4	576
5:15:00 PM	8	2	8	3	222	1	10	6	3	23	301	7	594
5:30:00 PM	13	4	10	2	234	0	4	2	1	22	276	6	574
5:45:00 PM	21	2	12	0	201	0	6	4	3	20	279	4	552
6:00:00 PM	13	2	12	3	200	3	5	3	0	32	263	4	540
6:15:00 PM	11	5	24	3	171	1	6	6	2	25	261	5	520
6:30:00 PM	5	3	15	0	170	2	5	1	3	18	252	7	481

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Sterling Silver Blvd/Merimac Ln	**Study Period:**	PM

Total Vehicle Traffic

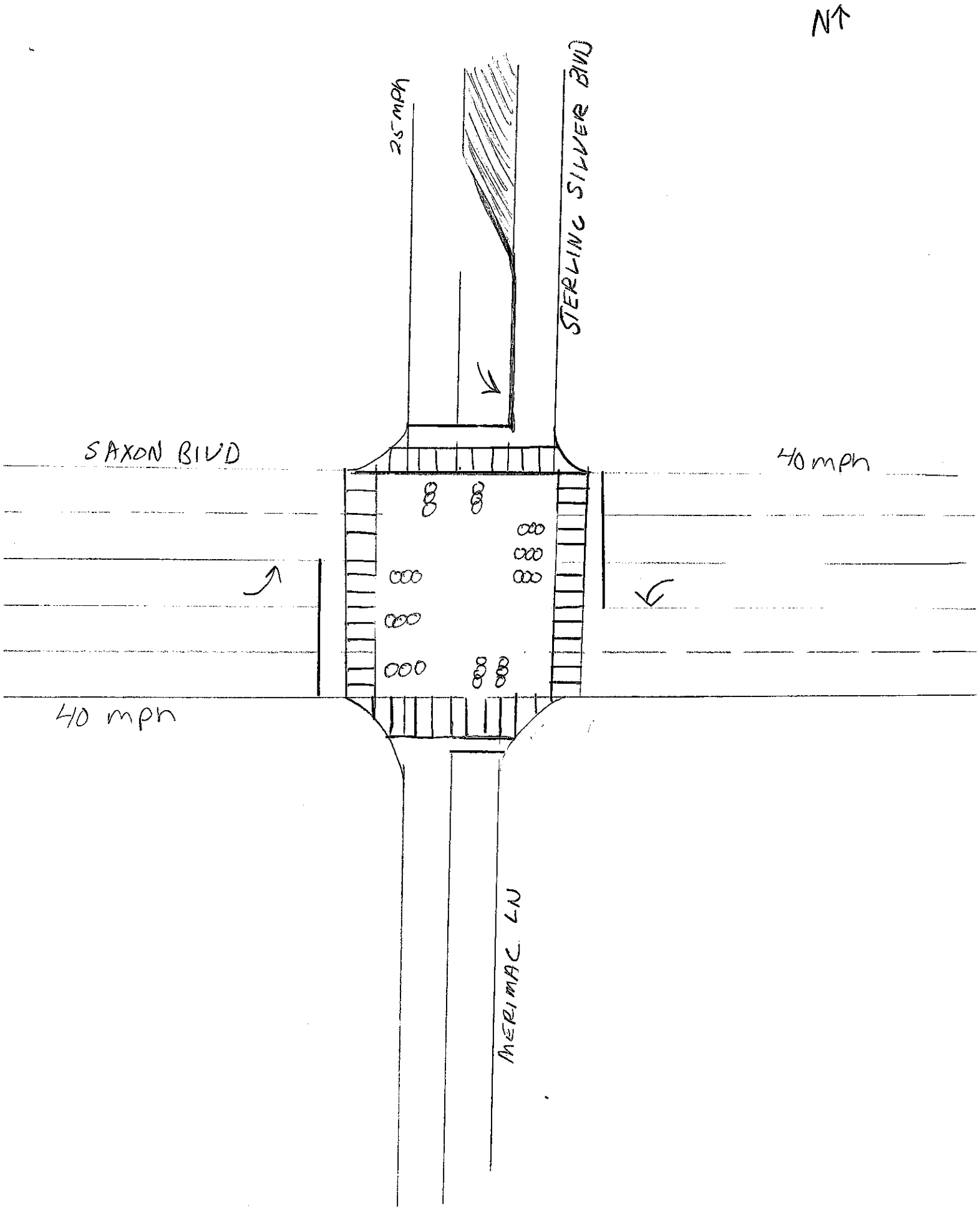
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	9	4	6	2	169	1	4	2	2	30	239	5	473
5:00:00 PM	5	2	20	5	210	2	1	4	3	28	292	4	576
5:15:00 PM	8	2	8	3	222	1	10	6	3	23	301	7	594
5:30:00 PM	13	4	10	2	234	0	4	2	1	22	276	6	574
5:45:00 PM	21	2	12	0	201	0	6	4	3	20	279	4	552
6:00:00 PM	13	2	12	3	200	3	5	3	0	32	263	4	540
6:15:00 PM	11	5	24	3	171	1	6	6	2	25	261	5	520
6:30:00 PM	5	3	15	0	170	2	5	1	3	18	252	7	481
6:45:00 PM	3	3	10	4	159	2	9	8	6	21	235	3	463

Car Traffic

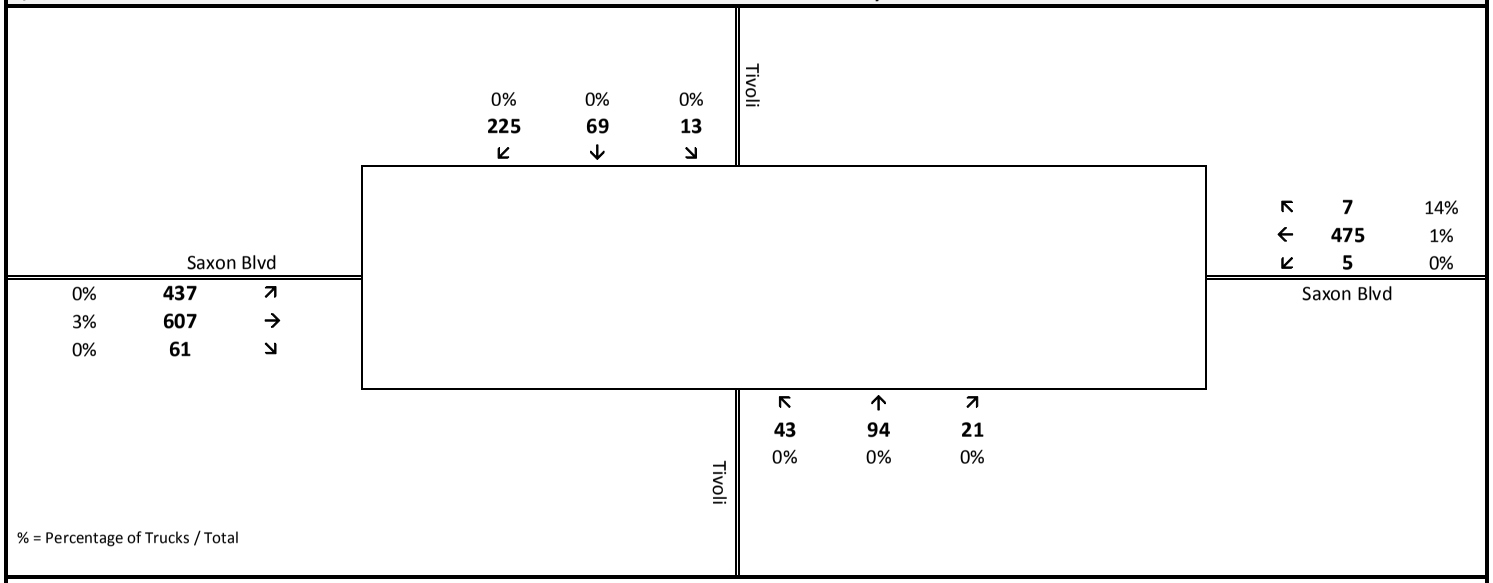
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	9	4	6	2	165	0	4	2	2	30	233	5	462
5:00:00 PM	5	2	20	5	207	2	1	4	3	28	282	4	563
5:15:00 PM	8	2	8	3	217	1	9	6	3	23	291	7	578
5:30:00 PM	13	4	10	2	227	0	4	2	1	22	269	6	560
5:45:00 PM	21	2	12	0	200	0	6	4	2	20	270	4	541
6:00:00 PM	13	2	12	3	199	3	5	3	0	31	256	4	531
6:15:00 PM	11	5	24	3	167	1	6	6	2	25	252	5	507
6:30:00 PM	5	3	15	0	168	2	5	1	3	18	242	7	469
6:45:00 PM	3	3	10	4	156	2	9	8	6	21	228	3	453

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	0	0	0	4	1	0	0	0	0	6	0	11
5:00:00 PM	0	0	0	0	3	0	0	0	0	0	10	0	13
5:15:00 PM	0	0	0	0	5	0	1	0	0	0	10	0	16
5:30:00 PM	0	0	0	0	7	0	0	0	0	0	7	0	14
5:45:00 PM	0	0	0	0	1	0	0	0	1	0	9	0	11
6:00:00 PM	0	0	0	0	1	0	0	0	0	1	7	0	9
6:15:00 PM	0	0	0	0	4	0	0	0	0	0	9	0	13
6:30:00 PM	0	0	0	0	2	0	0	0	0	0	10	0	12
6:45:00 PM	0	0	0	0	3	0	0	0	0	0	7	0	10


N
25 mph
STERLING SILVER BLVD
SAXON BLVD
40 mph
40 mph
MERIMAC LN

Date:	27-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Tivoli	**Study Period:**	PM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	13	69	224	5	472	6	43	94	21	435	588	61	2031
Trucks	0	0	1	0	3	1	0	0	0	2	19	0	26
Total	**13**	**69**	**225**	**5**	**475**	**7**	**43**	**94**	**21**	**437**	**607**	**61**	**2057**
Peak Hour Factor	**0.978**												
Peak Hour	**05:15 PM to to 06:15 PM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	9	51	4	72	2	10	20	4	92	124	15	403
5:00:00 PM	1	8	55	3	99	3	9	26	4	104	148	22	482
5:15:00 PM	2	17	68	0	110	2	7	24	4	110	158	23	525
5:30:00 PM	3	15	46	1	129	3	10	19	6	111	147	10	500
5:45:00 PM	6	19	57	0	119	2	14	23	6	99	164	17	526
6:00:00 PM	2	18	54	4	117	0	12	28	5	117	138	11	506
6:15:00 PM	3	21	59	2	115	5	15	16	2	130	131	20	519
6:30:00 PM	1	33	51	3	108	8	18	22	0	104	140	15	503
6:45:00 PM	3	17	47	2	116	0	21	35	5	99	113	15	473

Date:	27-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Tivoli	**Study Period:**	PM

Total Vehicle Traffic

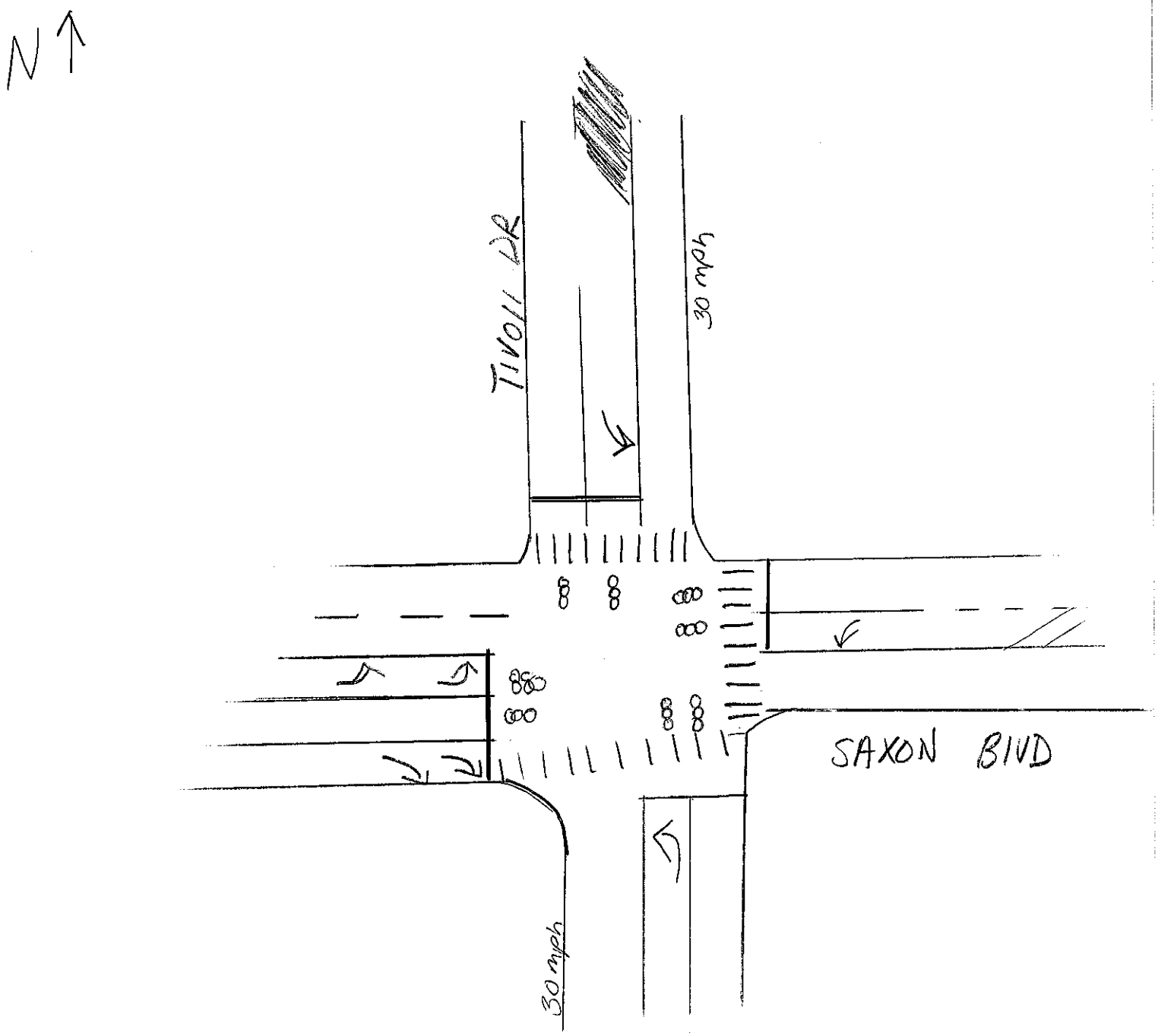
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	9	51	4	72	2	10	20	4	92	124	15	403
5:00:00 PM	1	8	55	3	99	3	9	26	4	104	148	22	482
5:15:00 PM	2	17	68	0	110	2	7	24	4	110	158	23	525
5:30:00 PM	3	15	46	1	129	3	10	19	6	111	147	10	500
5:45:00 PM	6	19	57	0	119	2	14	23	6	99	164	17	526
6:00:00 PM	2	18	54	4	117	0	12	28	5	117	138	11	506
6:15:00 PM	3	21	59	2	115	5	15	16	2	130	131	20	519
6:30:00 PM	1	33	51	3	108	8	18	22	0	104	140	15	503
6:45:00 PM	3	17	47	2	116	0	21	35	5	99	113	15	473

Car Traffic

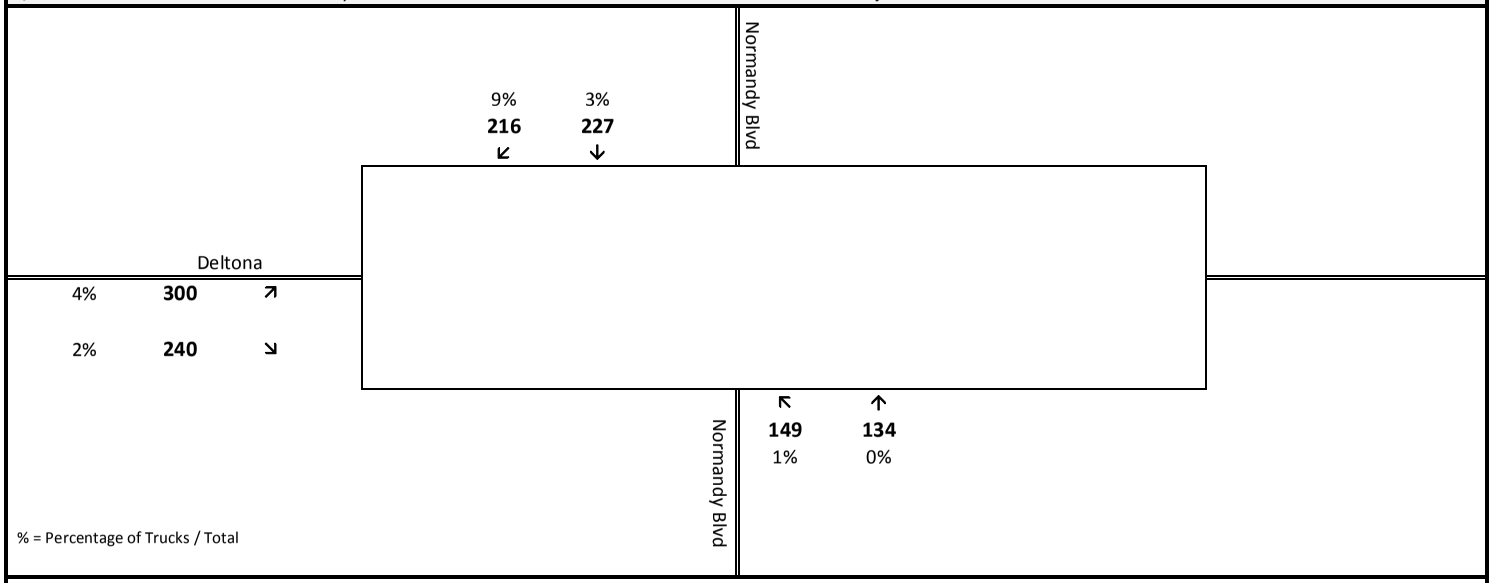
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	9	50	4	69	2	10	20	4	92	119	15	394
5:00:00 PM	1	8	54	3	98	2	9	23	4	102	140	22	466
5:15:00 PM	2	17	67	0	109	2	7	24	4	110	151	23	516
5:30:00 PM	3	15	46	1	128	2	10	19	6	111	146	10	497
5:45:00 PM	6	19	57	0	119	2	14	23	6	99	157	17	519
6:00:00 PM	2	18	54	4	116	0	12	28	5	115	134	11	499
6:15:00 PM	3	21	59	2	112	5	15	15	2	130	125	20	509
6:30:00 PM	1	33	51	3	107	8	18	22	0	104	137	15	499
6:45:00 PM	3	17	47	2	116	0	21	34	5	98	112	14	469

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	0	1	0	3	0	0	0	0	0	5	0	9
5:00:00 PM	0	0	1	0	1	1	0	3	0	2	8	0	16
5:15:00 PM	0	0	1	0	1	0	0	0	0	0	7	0	9
5:30:00 PM	0	0	0	0	1	1	0	0	0	0	1	0	3
5:45:00 PM	0	0	0	0	0	0	0	0	0	0	7	0	7
6:00:00 PM	0	0	0	0	1	0	0	0	0	2	4	0	7
6:15:00 PM	0	0	0	0	3	0	0	1	0	0	6	0	10
6:30:00 PM	0	0	0	0	1	0	0	0	0	0	3	0	4
6:45:00 PM	0	0	0	0	0	0	0	1	0	1	1	1	4


N
TIVOLI DR
30 mph
SAXON BLVD
30 mph

Date:	9-May-16	**City:**	Deland
E/W Street Name:	Deltona	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	PM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	0	221	197	0	0	0	147	134	0	289	0	236	1224
Trucks	0	6	19	0	0	0	2	0	0	11	0	4	42
Total	**0**	**227**	**216**	**0**	**0**	**0**	**149**	**134**	**0**	**300**	**0**	**240**	**1266**
Peak Hour Factor	**0.912**												
Peak Hour	**05:00 PM to to 06:00 PM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	46	48	0	0	0	38	30	0	58	0	56	276
5:00:00 PM	0	47	64	0	0	0	40	25	0	69	0	61	306
5:15:00 PM	0	59	52	0	0	0	44	36	0	81	0	75	347
5:30:00 PM	0	65	44	0	0	0	31	34	0	76	0	54	304
5:45:00 PM	0	56	56	0	0	0	34	39	0	74	0	50	309
6:00:00 PM	0	67	44	0	0	0	28	42	0	58	0	48	287
6:15:00 PM	0	53	62	0	0	0	26	38	0	82	0	28	289
6:30:00 PM	0	45	56	0	0	0	36	27	0	54	0	40	258
6:45:00 PM	0	41	40	0	0	0	28	30	0	42	0	33	214

Date:	9-May-16	**City:**	Deland
E/W Street Name:	Deltona	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	PM

Total Vehicle Traffic

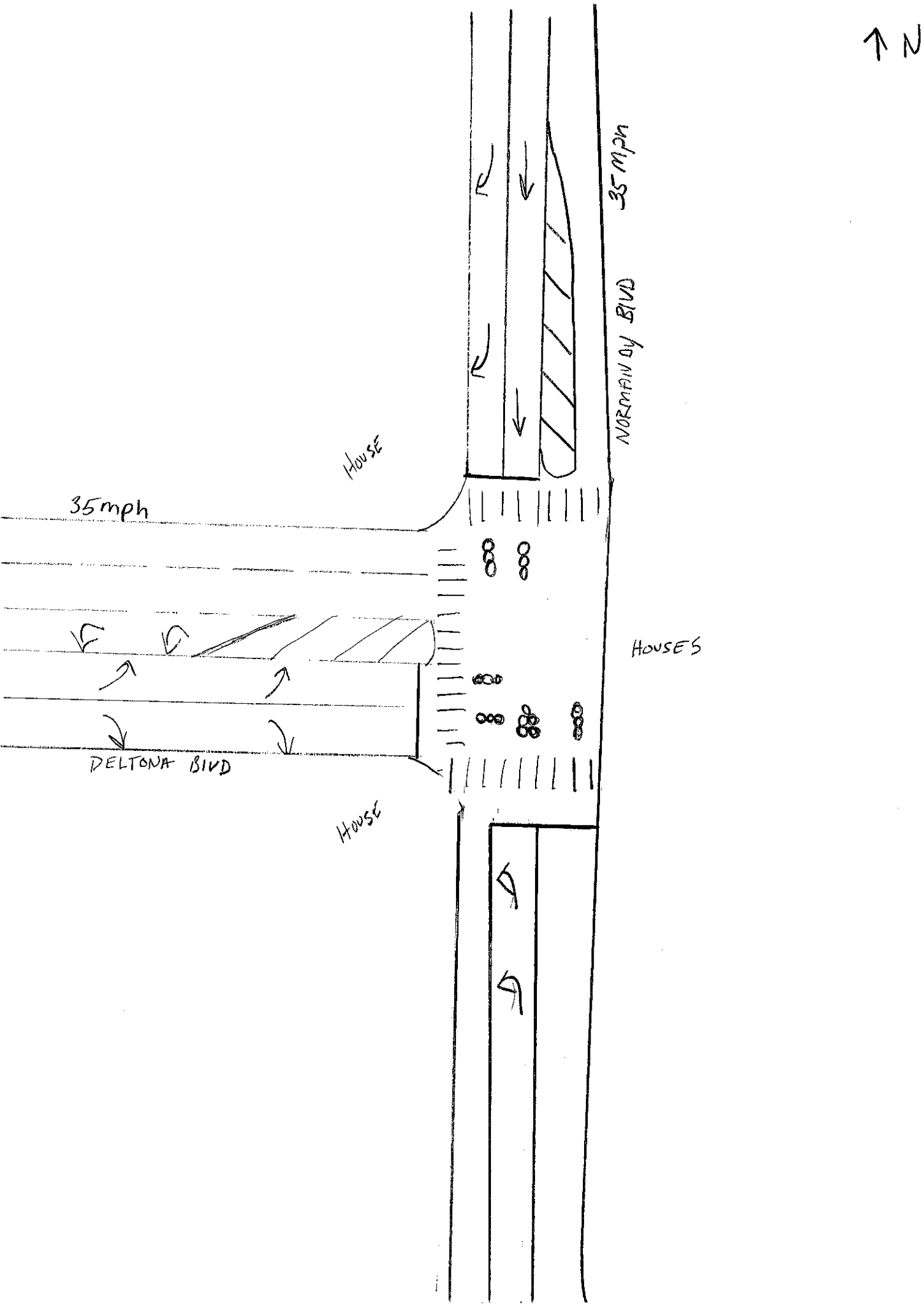
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	46	48	0	0	0	38	30	0	58	0	56	276
5:00:00 PM	0	47	64	0	0	0	40	25	0	69	0	61	306
5:15:00 PM	0	59	52	0	0	0	44	36	0	81	0	75	347
5:30:00 PM	0	65	44	0	0	0	31	34	0	76	0	54	304
5:45:00 PM	0	56	56	0	0	0	34	39	0	74	0	50	309
6:00:00 PM	0	67	44	0	0	0	28	42	0	58	0	48	287
6:15:00 PM	0	53	62	0	0	0	26	38	0	82	0	28	289
6:30:00 PM	0	45	56	0	0	0	36	27	0	54	0	40	258
6:45:00 PM	0	41	40	0	0	0	28	30	0	42	0	33	214

Car Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	45	46	0	0	0	37	30	0	54	0	53	265
5:00:00 PM	0	46	59	0	0	0	38	25	0	69	0	60	297
5:15:00 PM	0	57	47	0	0	0	44	36	0	78	0	74	336
5:30:00 PM	0	63	39	0	0	0	31	34	0	72	0	52	291
5:45:00 PM	0	55	52	0	0	0	34	39	0	70	0	50	300
6:00:00 PM	0	64	40	0	0	0	26	42	0	56	0	48	276
6:15:00 PM	0	51	59	0	0	0	26	38	0	77	0	28	279
6:30:00 PM	0	44	51	0	0	0	36	27	0	53	0	40	251
6:45:00 PM	0	41	40	0	0	0	28	30	0	42	0	33	214

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	1	2	0	0	0	1	0	0	4	0	3	11
5:00:00 PM	0	1	5	0	0	0	2	0	0	0	0	1	9
5:15:00 PM	0	2	5	0	0	0	0	0	0	3	0	1	11
5:30:00 PM	0	2	5	0	0	0	0	0	0	4	0	2	13
5:45:00 PM	0	1	4	0	0	0	0	0	0	4	0	0	9
6:00:00 PM	0	3	4	0	0	0	2	0	0	2	0	0	11
6:15:00 PM	0	2	3	0	0	0	0	0	0	5	0	0	10
6:30:00 PM	0	1	5	0	0	0	0	0	0	1	0	0	7
6:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0


N
35 mph
NORMANDY BLVD
HOUSE
35mph
HOUSES
DELTONA BLVD
HOUSE

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: Saxon Boulevard & Finland Drive
Deltona

ISOLATED:

DATE: 2/20/2015

SIGNAL #: 321

CO-ORD: X

Design By: M. Tobin

System #: 18

Controller Timing Chart

PHASE	1	2	3	4	5	6	7	8
DIRECTION	WBL	EB	-	SB	EBL	WB	-	NB
TURN TYPE	PROT	-	-	-	PROT	-	-	-
MIN GREEN	5	11		6	5	11		6
EXTENSION	3	4		4	3	4		4
CLEARANCE	4.5	4.5		4.0	4.5	4.5		4.0
ALL RED	3.0	3.0		3.0	3.0	3.0		3.0
WALK	-	7		7	-	7		7
FDW	-	22		24	-	22		24
MAX 1	20	60		25	20	60		25
MAX 2								
MAX 3	-	85		-	-	85		-
ADJUST	-	10		-	-	10		-
RECALL	-	MIN		-	-	MIN		-
DETECTOR	NON-LOCK	LOCK		NON-LOCK	NON-LOCK	LOCK		NON-LOCK
FLASH	RED	YELLOW		RED	RED	YELLOW		RED
SET	-	2		-	-	2		-
CLEAR	-	2		-	-	2		-

BASE DAY		1	2	3	4	5	6	7
MON #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
TUES#1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
WED #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
THU #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
FRI #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
SAT #2	TIME	00:01-00:00						
	PLAN	FREE						
SUN #3	TIME	00:01-00:00						
	PLAN	FREE						

Crosswalk Length
P2
75 Feet
P4
81 Feet
P6
64 Feet
P8
74 Feet

CONTROLLER TYPE		CONDITION OF OVERHEAD	OK	PROM NUMBER	
3000E		OVERHEAD STREET NAMES	NO		SIGNAL OWNER
PHASES:	8Φ	ILLUMINATED STREET NAMES	YES	8216A 3.7.3	County
CABINET TYPE	V	PRE-EMPTION	NO	IP ADDRESS	LED YES
CABINET DATE	06/1994	PRE-EMPTION TYPE	N/A	10.77.8.38	

REMARKS:

1	2	4
5	6	8

VOLUSIA COUNTY TRAFFIC ENGINEERING
SYSTEM INVENTORY

Switch IP.# 10.77.8.6
Controller IP.# 10.77.8.38
Camera IP # -

DATE: 2/20/2015 DESIGNED BY: M. Tobin

LOCATION: Saxon Boulevard & Finland Drive
CITY: Deltona ID NO: 321 SYSTEM ID: 18

CONTROLLER TIME CHART

MVMNT	MIN	EXT	CLR	A.R.	WALK	FDW	MAX1	MAX2	MAX3	ADJST	REC	DET	FL	SET	CLR
1	5	3	4.5	3	-	-	20	-	-	-	-	NL	R	-	-
2	11	4	4.5	3	7	22	60	-	85	10	MIN	L	Y	2	2
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	6	4	4	3	7	24	25	-	-	-	-	NL	R	-	-
5	5	3	4.5	3	-	-	20	-	-	-	-	NL	R	-	-
6	11	4	4.5	3	7	22	60	-	85	10	MIN	L	Y	2	2
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	6	4	4	3	7	24	25	-	-	-	-	NL	R	-	-

TP# 1

CO-ORDINATION

PLAN	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
CYCLE	120	130						
OFF 1	55	77						
OFF 2								
OFF 3								
OFF 4								
OFF 5								
PERM	10%	10%	10%	10%	10%	10%	10%	10%

PHASE SPLITS (seconds)

CY/SP		C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
15.5	PH 1	20	21	-	-	-	-		
22.5	PH 2	64	79	-	-	-	-		
0	PH 3	-	-	-	-	-	-		
17	PH 4	36	30	-	-	-	-		
15.5	PH 5	20	25	-	-	-	-		
22.5	PH 6	64	75	-	-	-	-		
0	PH 7	-	-	-	-	-	-		
17	PH 8	36	30	-	-	-	-		

1	2	4
5	6	8

BASE DAY		1	2	3	4	5	6	7	8	9	10	11	
MON #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
TUES#1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
WED #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
THU #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
FRI #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
SAT	TIME	00:01-00:00											
	PLAN	FREE											
SUN	TIME	00:01-00:00											
	PLAN	FREE											

TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: Saxon Blvd & N. Normandy Blvd
Deltona

ISOLATED:

DATE: 1/9/2015

SIGNAL #: 157

CO-ORD: X

Design By: M. Tobin

System #: 18

Controller Timing Chart

PHASE	1	2	3	4	5	6	7	8
DIRECTION	EBL	WB	SBL	NB	WBL	EB	NBL	SB
TURN TYPE	PERM/PROT	-	PERM/PROT	-	PERM/PROT	-	PERM/PROT	-
MIN GREEN	5	11	5	6	5	11	5	6
EXTENSION	3	4	3	4	3	4	3	4
CLEARANCE	4.5	4.5	4.5	4.0	4.5	4.5	4.0	4.5
ALL RED	4.0	4.0	4.0	3.5	4.0	4.0	3.5	4.0
WALK	-	7	-	7	-	7	-	7
FDW	-	29	-	23	-	18	-	23
MAX 1	20	45	20	40	20	45	20	40
MAX 2	-	-	-	-	-	-	-	-
MAX 3	40	60	-	-	-	60	-	-
ADJUST	5	5	-	-	-	5	-	-
RECALL	-	MIN	-	-	-	MIN	-	-
DETECTOR	NON-LOCK	LOCK	NON-LOCK	NON-LOCK	NON-LOCK	LOCK	NON-LOCK	NON-LOCK
FLASH	-	YELLOW	-	RED	-	YELLOW	-	RED
SET	2	2	-	-	-	2	-	-
CLEAR	2	2	-	-	-	2	-	-

BASE DAY		1	2	3	4	5	6	7
MON #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
TUES#1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
WED #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
THU #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
FRI #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
SAT #2	TIME	00:01-00:00						
	PLAN	FREE						
SUN #3	TIME	00:01-00:00						
	PLAN	FREE						

Crosswalk Length
P2
100 Feet
P4
75 Feet
P6
60 Feet
P8
80 Feet

CONTROLLER TYPE		CONDITION OF OVERHEAD	Ok	PROM NUMBER	
3000E		OVERHEAD STREET NAMES	NO		
PHASES:	8Φ	ILLUMINATED STREET NAMES	NO	8216A 3.7.3	SIGNAL OWNER
CABINET TYPE	V	PRE-EMPTION	NO	IP ADDRESS	County
CABINET DATE	06/1992	PRE-EMPTION TYPE	N/A	10.77.8.37	LED YES

REMARKS:

1	2	3	4
5	6	7	8

VOLUSIA COUNTY TRAFFIC ENGINEERING
SYSTEM INVENTORY

Switch IP.# 10.77.8.5
Controller IP.# 10.77.8.37
Camera IP # 10.77.8.67

DATE: 1/9/2015 DESIGNED BY: M. Tobin

LOCATION: Saxon Blvd & N. Normandy Blvd
CITY: Deltona SIGNAL ID NO: 157 SYSTEM ID: 18

CONTROLLER TIME CHART

MVMNT	MIN	EXT	CLR	A.R.	WALK	FDW	MAX1	MAX2	MAX3	ADJST	REC	DET	FL	SET	CLR
1	5	3	4.5	4	-	-	20	-	40	5	-	NL	-	2	2
2	11	4	4.5	4	7	29	45	-	60	5	MIN	L	Y	2	2
3	5	3	4.5	4	-	-	20	-	-	-	-	NL	-	-	-
4	6	4	4	3.5	7	23	40	-	-	-	-	NL	R	-	-
5	5	3	4.5	4	-	-	20	-	-	-	-	NL	-	-	-
6	11	4	4.5	4	7	18	45	-	60	5	MIN	L	Y	2	2
7	5	3	4	3.5	-	-	20	-	-	-	-	NL	-	-	-
8	6	4	4.5	4	7	23	40	-	-	-	-	NL	R	-	-

TP# 1

CO-ORDINATION

PLAN	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
CYCLE	120	130						
OFF 1	20	92						
OFF 2								
OFF 3								
OFF 4								
OFF 5								
PERM	10%	10%	10%	10%	10%	10%	10%	10%

PHASE SPLITS (seconds)

	CY/SP	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
16.5	PH 1	18	42	-	-	-	-		
23.5	PH 2	56	42	-	-	-	-		
16.5	PH 3	18	16	-	-	-	-		
17.5	PH 4	28	30	-	-	-	-		
16.5	PH 5	18	20	-	-	-	-		
23.5	PH 6	56	64	-	-	-	-		
15.5	PH 7	24	23	-	-	-	-		
18.5	PH 8	22	23	-	-	-	-		

1	2	3	4
5	6	7	8

BASE DAY		1	2	3	4	5	6	7	8	9	10	11	
	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
MON #1	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
TUES#1	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
WED #1	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
THU #1	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
FRI #1	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
	TIME	00:01-00:00											
SAT	PLAN	FREE											
	TIME	00:01-00:00											
SUN	PLAN	FREE											

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: Saxon Blvd & Sterling Silver Blvd
Deltona

FREE: X

DATE: 8/18/2015

SIGNAL #: 447

CO-ORD:

Design By: M. Tobin

NETWORK #: ???

Controller Timing Chart

PHASE	1	2	3	4	5	6	7	8	
DIRECTION	EBL	WB	SBL	NB	WBL	EB	-	SB	
TURN TYPE	PERM/PROT	-	PERM/PROT	-	PERM/PROT	-	-	-	
MIN GREEN	7	11	5	6	5	11		6	
WALK	-	5	-	7	-	5	-	7	
PED CLR	-	11	-	11	-	11	-	11	
YELLOW	4.5	4.5	3.5	3.5	4.5	4.5		3.5	
RED CLR	2.0	2.0	2.0	2.0	2.0	2.0		2.0	
EXTENSION	3	3	3	3	3	3		3	
MAX 1	20	65	20	20	20	65		35	
MAX 2	-	-	-	-	-	-	-	-	
MAX 3	-	-	-	-	-	-	-	-	
DYM MAX	-	-	-	-	-	-	-	-	
DYM STP	-	-	-	-	-	-	-	-	
RECALL	-	MIN	-	-	-	MIN	-	-	
DETECTOR	LOCK	LOCK	NON-LOCK	NON-LOCK	LOCK	LOCK		NON-LOCK	
FLASH	RED	YELLOW	-	RED	RED	YELLOW	-	RED	

COORDINATION TIMINGS

PATTERN	1	2	3	4	5	6	7	8	
CYCLE						-	-	-	
OFFSET						-	-	-	

PHASE	1	2	3	4	5	6	7	8	
PATTERN 1									
PATTERN 2									
PATTERN 3									
PATTERN 4									
PATTERN 5									
PATTERN 6	-	-	-	-	-	-	-	-	
PATTERN 7	-	-	-	-	-	-	-	-	

Controller IP		Switch IP		Camera IP	
Controller Gateway		Switch Gateway		Camera Gateway	

REMARKS:

1	2	3	4
5	6	7	8

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: Saxon Blvd & Sterling Silver Blvd
Deltona

FREE: X

DATE: 8/18/2015

SIGNAL #: 447

CO-ORD:

Design By: M. Tobin

NETWORK #: ???

TIME OF DAY SCHEDULE

BASE DAY		1	2	3	4	5	6	7
MON	TIME	00:00-07:00	07:00-09:30	09:30-11:30	11:30-16:00	16:00-18:00	18:00-20:00	20:00-00:00
	PATTERN	FREE	PATTERN 1	PATTERN 2	PATTERN 3	PATTERN 4	PATTERN 2	FREE
TUES	TIME	00:00-07:00	07:00-09:30	09:30-11:30	11:30-16:00	16:00-18:00	18:00-20:00	20:00-00:00
	PATTERN	FREE	PATTERN 1	PATTERN 2	PATTERN 3	PATTERN 4	PATTERN 2	FREE
WED	TIME	00:00-07:00	07:00-09:30	09:30-11:30	11:30-16:00	16:00-18:00	18:00-20:00	20:00-00:00
	PATTERN	FREE	PATTERN 1	PATTERN 2	PATTERN 3	PATTERN 4	PATTERN 2	FREE
THU	TIME	00:00-07:00	07:00-09:30	09:30-11:30	11:30-16:00	16:00-18:00	18:00-20:00	20:00-00:00
	PATTERN	FREE	PATTERN 1	PATTERN 2	PATTERN 3	PATTERN 4	PATTERN 2	FREE
FRI	TIME	00:00-07:00	07:00-09:30	09:30-11:30	11:30-16:00	16:00-18:00	18:00-20:00	20:00-00:00
	PATTERN	FREE	PATTERN 1	PATTERN 2	PATTERN 3	PATTERN 4	PATTERN 2	FREE
SAT	TIME	00:00-08:00	08:00-20:00	20:00-00:00				
	PATTERN	FREE	PATTERN 5	FREE				
SUN	TIME	00:00-09:30	09:30-20:00	20:00-00:00				
	PATTERN	FREE	PATTERN 5	FREE				

Crosswalk Length
P2
? Feet
P4
? Feet
P6
? Feet
P8
? Feet

CONTROLLER TYPE		CONDITION OF OVERHEAD	NEW	PROGRAM NUMBER	
Econolite ASC/3		OVERHEAD STREET NAMES	NO		SIGNAL OWNER
PHASES:	8Φ	ILLUMINATED STREET NAMES	YES	V1.12.05	City
CABINET TYPE	V	PRE-EMPTION	NO	Controller IP Address	LED YES
CABINET DATE	6/2015	PRE-EMPTION TYPE	N/A	0	

REMARKS:

1	2	3	4
5	6	7	8

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: Saxon Blvd & Tivoli Drive
Deltona

ISOLATED: X

DATE: 1/13/2015

SIGNAL #: 232

CO-ORD:

Design By: M. Tobin

System #: -

Controller Timing Chart

PHASE	1	2	3	4	5	6	7	8	
DIRECTION	-	EB	-	NB/SB	EBL	WB	-	-	
TURN TYPE	-	-	-	-	PERM/PROT	-	-	-	
MIN GREEN		11		5	5	11			
EXTENSION		4		3	3	4			
CLEARANCE		4.0		4.0	4.5	4.0			
ALL RED		2.5		2.5	2.5	2.5			
WALK		7		7	-	7			
FDW		16		20	-	16			
MAX 1		30		30	15	30			
MAX 2		-		-	-	-			
MAX 3		-		40	30	-			
ADJUST		-		5	5	-			
RECALL		MIN		-	-	MIN			
DETECTOR		LOCK		NON-LOCK	NON-LOCK	LOCK			
FLASH		YELLOW		RED	-	YELLOW			
SET		-		2	2	-			
CLEAR		-		2	2	-			

BASE DAY		1	2	3	4	5	6	7
MON #1	TIME	00:01-00:00						
	PLAN	FREE						
TUES#1	TIME	00:01-00:00						
	PLAN	FREE						
WED #1	TIME	00:01-00:00						
	PLAN	FREE						
THU #1	TIME	00:01-00:00						
	PLAN	FREE						
FRI #1	TIME	00:01-00:00						
	PLAN	FREE						
SAT #2	TIME	00:01-00:00						
	PLAN	FREE						
SUN #3	TIME	00:01-00:00						
	PLAN	FREE						

Crosswalk Length
P2
55 Feet
P4
52 Feet
P6
53 Feet
P8
69 Feet

CONTROLLER TYPE		CONDITION OF OVERHEAD	OK	PROM NUMBER		
1880 EL		OVERHEAD STREET NAMES	NO			
PHASES:	8Φ	ILLUMINATED STREET NAMES	YES	92R09	SIGNAL OWNER	
CABINET TYPE	V	PRE-EMPTION	NO	IP ADDRESS	County	
CABINET DATE	10/2003	PRE-EMPTION TYPE	N/A	-	LED	-

REMARKS:

2 4
5 6

VOLUSIA COUNTY TRAFFIC ENGINEERING
SYSTEM INVENTORY

Switch IP.# _____
Controller IP.# -
Camera IP # _____

DATE: 1/13/2015 DESIGNED BY: M. Tobin

LOCATION: Saxon Blvd & Tivoli Drive
CITY: Deltona SIGNAL ID NO: 232 SYSTEM ID: -

CONTROLLER TIME CHART

MVMNT	MIN	EXT	CLR	A.R.	WALK	FDW	MAX1	MAX2	MAX3	ADJST	REC	DET	FL	SET	CLR
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	11	4	4	2.5	7	16	30	-	-	-	MIN	L	Y	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	5	3	4	2.5	7	20	30	-	40	5	-	NL	R	2	2
5	5	3	4.5	2.5	-	-	15	-	30	5	-	NL	-	2	2
6	11	4	4	2.5	7	16	30	-	-	-	MIN	L	Y	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TP# xx

CO-ORDINATION

PLAN	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1	
CYCLE							
OFF 1							
OFF 2							
OFF 3							
OFF 4							
OFF 5							
PERM	10%	10%	10%	10%	10%	10%	10%

PHASE SPLITS (seconds)

CY/SP	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
PH 1	-	-	-	-	-	-		
PH 2	-	-	-	-	-	-		
PH 3	-	-	-	-	-	-		
PH 4	-	-	-	-	-	-		
PH 5	-	-	-	-	-	-		
PH 6	-	-	-	-	-	-		
PH 7	-	-	-	-	-	-		
PH 8	-	-	-	-	-	-		

	2	4
5	6	

BASE DAY		1	2	3	4	5	6	7	8	9	10	11
MON #1	TIME	00:01-00:00										
	PLAN	FREE										
TUES#1	TIME	00:01-00:00										
	PLAN	FREE										
WED #1	TIME	00:01-00:00										
	PLAN	FREE										
THU #1	TIME	00:01-00:00										
	PLAN	FREE										
FRI #1	TIME	00:01-00:00										
	PLAN	FREE										
SAT	TIME	00:01-00:00										
	PLAN	FREE										
SUN	TIME	00:01-00:00										
	PLAN	FREE										

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: N. Normandy Blvd & Deltona Blvd
Deltona

FREE: X

DATE: 2/9/2015

SIGNAL #: 283

CO-ORD:

Design By: M. Tobin

System #: -

Controller Timing Chart

PHASE	1	2	3	4	5	6	7	8
DIRECTION	-	NB	-	EB	NBL	SB	-	-
TURN TYPE	-	-	-	-	PERM/PROT	-	-	-
MIN GREEN		10		4	3	10		
EXTENSION		3		2.5	2.5	3		
CLEARANCE		4.0		4.0	4.0	4.5		
ALL RED		2.5		2.0	2.5	2.5		
WALK		-		7	-	7		
FDW		-		18	-	21		
MAX 1		25		20	15	25		
MAX 2		-		-	-	-		
MAX 3		-		-	-	-		
ADJUST		-		-	-	-		
RECALL		MIN		-	-	MIN		
DETECTOR		LOCK		NON-LOCK	NON-LOCK	LOCK		
FLASH		YELLOW		RED	-	YELLOW		
SET		-		-	-	-		
CLEAR		-		-	-	-		

BASE DAY		1	2	3	4	5	6	7
MON #1	TIME	00:00-00:00						
	PLAN	FREE						
TUES#1	TIME	00:00-00:00						
	PLAN	FREE						
WED #1	TIME	00:00-00:00						
	PLAN	FREE						
THU #1	TIME	00:00-00:00						
	PLAN	FREE						
FRI #1	TIME	00:00-00:00						
	PLAN	FREE						
SAT #2	TIME	00:00-00:00						
	PLAN	FREE						
SUN #3	TIME	00:00-00:00						
	PLAN	FREE						

Crosswalk Length
P2
-
P4
63 Feet
P6
73 Feet
P8
-

CONTROLLER TYPE		CONDITION OF OVERHEAD		PROM NUMBER	
3000E		OVERHEAD STREET NAMES	YES		SIGNAL OWNER
PHASES:	8Φ	ILLUMINATED STREET NAMES	NO	8216A 3.6.4	
CABINET TYPE	V	PRE-EMPTION	NO	IP ADDRESS	Deltona
CABINET DATE	-	PRE-EMPTION TYPE	N/A	-	LED YES

REMARKS:

2 4
5 6

CITY: Deltona

SIGNAL ID NO: 283

SYSTEM ID: -

CONTROLLER TIME CHART

TP# XX

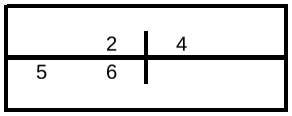
MVMNT	MIN	EXT	CLR	A.R.	WALK	FDW	MAX1	MAX2	MAX3	ADJST	REC	DET	FL	SET	CLR
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	10	3	4	2.5	-	-	25	-	-	-	MIN	L	Y	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	4	2.5	4	2	7	18	20	-	-	-	-	NL	R	-	-
5	3	2.5	4	2.5	-	-	15	-	-	-	-	NL	-	-	-
6	10	3	4.5	2.5	7	21	25	-	-	-	MIN	L	Y	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CO-ORDINATION

PLAN	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
CYCLE								
OFF 1								
OFF 2								
OFF 3								
OFF 4								
OFF 5								
PERM	10%	10%	10%	10%	10%	10%	10%	10%

PHASE SPLITS (seconds)

CY/SP	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
PH 1	-	-	-	-	-	-		
PH 2	-	-	-	-	-	-		
PH 3	-	-	-	-	-	-		
PH 4	-	-	-	-	-	-		
PH 5	-	-	-	-	-	-		
PH 6	-	-	-	-	-	-		
PH 7	-	-	-	-	-	-		
PH 8	-	-	-	-	-	-		



BASE DAY		1	2	3	4	5	6	7	8	9	10	11	
MON #1	TIME	00:00-00:00											
	PLAN	FREE											
TUES#1	TIME	00:00-00:00											
	PLAN	FREE											
WED #1	TIME	00:00-00:00											
	PLAN	FREE											
THU #1	TIME	00:00-00:00											
	PLAN	FREE											
FRI #1	TIME	00:00-00:00											
	PLAN	FREE											
SAT #2	TIME	00:00-00:00											
	PLAN	FREE											
SUN #3	TIME	00:00-00:00											
	PLAN	FREE											

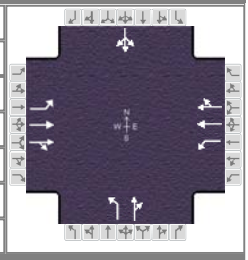
TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		

APPENDIX C

Existing HCS Capacity Analysis Worksheets

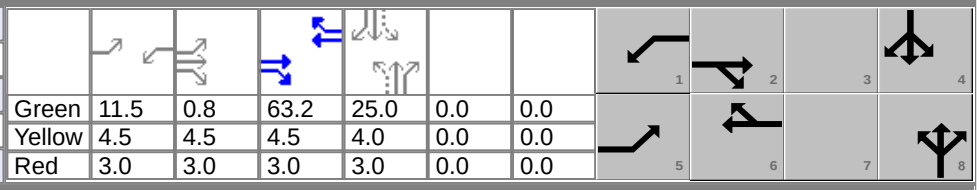
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	MJA	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.91
Urban Street	Saxon Blvd	Analysis Year	2016	Analysis Period	1> 17:45
Intersection	Saxon Blvd & Finland Dr…	File Name	Saxon Blvd & Finland Dr Existing PM Peak OPT.xus		
Project Description	PM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	216	1897	20	140	1348	58	112	44	73	16	28	85

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	11.5	0.8	63.2	25.0	0.0	0.0
Yellow	4.5	4.5	4.5	4.0	0.0	0.0
Red	3.0	3.0	3.0	3.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	2.0	4.0	2.0	4.0		6.0		8.0
Phase Duration, s	27.3	79.0	19.0	70.7		32.0		32.0
Change Period, ($Y+R_c$), s	7.5	7.5	7.5	7.5		7.0		7.0
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0		5.4		5.4
Queue Clearance Time (g_s), s	19.0		13.4			25.1		12.7
Green Extension Time (g_e), s	0.8	0.0	0.0	0.0		0.0		1.8
Phase Call Probability	1.00		1.00			1.00		0.99
Max Out Probability	0.00		1.00			1.00		0.12

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	237	1053	1053	154	776	769	123	129			142	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1863	1856	1757	1845	1818	1274	1708			1487	
Queue Service Time (g_s), s	17.0	71.5	71.5	11.4	48.6	49.0	12.4	8.5			0.0	
Cycle Queue Clearance Time (g_c), s	17.0	71.5	71.5	11.4	48.6	49.0	23.1	8.5			10.7	
Green Ratio (*g/C*)	0.15	0.55	0.55	0.09	0.49	0.49	0.19	0.19			0.19	
Capacity (*c*), veh/h	271	1024	1021	155	896	883	195	328			317	
Volume-to-Capacity Ratio (*X*)	0.877	1.028	1.032	0.990	0.866	0.870	0.630	0.391			0.447	
Back of Queue (*Q*), ft/ln (95 th percentile)	325.3	1296.7	1286.4	319.7	787.9	775	198.6	169			193.1	
Back of Queue (*Q*), veh/ln (95 th percentile)	12.8	51.0	51.5	12.6	31.0	31.0	7.8	6.8			7.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	
Uniform Delay (d_1), s/veh	53.9	29.3	29.3	59.2	29.7	29.8	57.0	45.9			46.7	
Incremental Delay (d_2), s/veh	8.9	35.5	36.7	69.0	11.0	11.4	7.3	1.1			1.4	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Control Delay (*d*), s/veh	62.8	64.8	66.0	128.1	40.6	41.2	64.4	46.9			48.1	
Level of Service (LOS)	E	F	F	F	D	D	E	D			D	
Approach Delay, s/veh / LOS	65.1	E		48.8	D		55.5	E		48.1	D	
Intersection Delay, s/veh / LOS	57.8						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.1	B	2.9	C	2.9	C
Bicycle LOS Score / LOS	2.4	B	1.9	A	0.9	A	0.7	A

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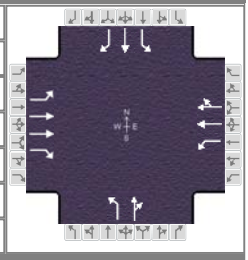
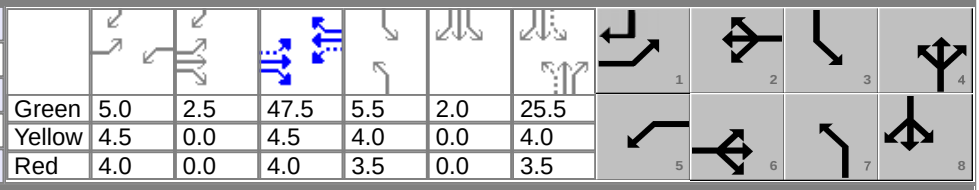
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	MJA	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	AM Peak	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2016	Analysis Period	1> 7:30
Intersection	Saxon Blvd & Normandy…	File Name	Saxon Blvd & Normandy Blvd Existing AM Peak…		
Project Description	AM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	163	379	138	74	1320	59	256	145	34	110	146	554

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.0	2.5	47.5	5.5	2.0	25.5
Yellow	4.5	0.0	4.5	4.0	0.0	4.0
Red	4.0	0.0	4.0	3.5	0.0	3.5

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	3.0	1.1	4.0	1.1	4.0	1.1	3.0
Phase Duration, s	16.0	58.5	13.5	56.0	13.0	33.0	15.0	35.0
Change Period, ($Y+R_c$), s	8.5	8.5	8.5	8.5	7.5	8.5	8.5	8.5
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0	4.1	5.3	4.1	5.3
Queue Clearance Time (g_s), s	8.9		5.2		7.5	13.4	8.1	28.5
Green Extension Time (g_e), s	0.0	0.0	0.2	0.0	0.0	4.0	0.0	0.0
Phase Call Probability	1.00		0.92		1.00	1.00	0.98	1.00
Max Out Probability	1.00		0.00		1.00	0.44	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	168	391	128	76	712	704	264	181		113	151	514
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1690	1505	1675	1845	1819	1691	1705		1774	1845	1563
Queue Service Time (g_s), s	6.9	9.1	6.5	3.2	45.5	45.7	5.5	11.4		6.1	8.3	26.5
Cycle Queue Clearance Time (g_c), s	6.9	9.1	6.5	3.2	45.5	45.7	5.5	11.4		6.1	8.3	26.5
Green Ratio (*g/C*)	0.46	0.42	0.42	0.44	0.40	0.40	0.25	0.20		0.26	0.22	0.28
Capacity (*c*), veh/h	176	1408	627	432	730	720	296	348		287	407	443
Volume-to-Capacity Ratio (*X*)	0.953	0.277	0.204	0.176	0.975	0.977	0.892	0.521		0.395	0.369	1.161
Back of Queue (*Q*), ft/ln (95 th percentile)	232.6	173.5	112.9	57.2	878.4	874.9	307.8	226.5		122.8	182.3	935.1
Back of Queue (*Q*), veh/ln (95 th percentile)	9.2	6.6	4.3	2.3	33.3	33.1	12.1	8.6		4.8	6.9	35.4
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh	29.2	23.1	22.3	20.2	35.7	35.7	47.1	42.5		35.9	39.7	43.0
Incremental Delay (d_2), s/veh	53.9	0.5	0.7	0.2	27.7	28.5	26.8	1.9		0.9	0.8	95.0
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	83.1	23.6	23.1	20.4	63.3	64.2	74.0	44.4		36.7	40.5	138.0
Level of Service (LOS)	F	C	C	C	E	E	E	D		D	D	F
Approach Delay, s/veh / LOS	38.1	D		61.5	E		61.9	E		104.4	F	
Intersection Delay, s/veh / LOS	66.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.9	C	3.0	C
Bicycle LOS Score / LOS	1.1	A	1.7	A	1.2	A	1.8	A

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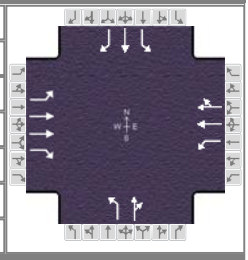
HCS 2010 Signalized Intersection Results Summary

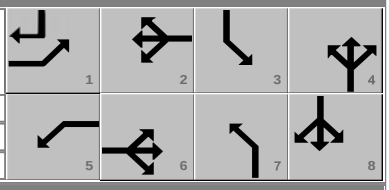
General Information				Intersection Information	
Agency	TPD, Inc.			Duration, h	0.25
Analyst	MJA	Analysis Date	May 10, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2016	Analysis Period	1> 17:00
Intersection	Saxon Blvd & Normandy…	File Name	Saxon Blvd & Normandy Blvd Existing PM Peak…		
Project Description	PM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	514	1172	212	32	817	82	196	155	31	106	199	210

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	3.5	19.5	36.5	5.5	7.0	15.5
Yellow	4.5	4.5	4.5	4.5	0.0	4.5
Red	4.0	4.0	4.0	4.0	0.0	4.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	3.0	1.1	4.0	1.1	4.0	1.1	3.0
Phase Duration, s	40.0	73.0	12.0	45.0	21.0	31.0	14.0	24.0
Change Period, ($Y+R_c$), s	8.5	8.5	8.5	8.5	7.5	8.5	8.5	8.5
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0	4.1	5.2	4.1	5.2
Queue Clearance Time (g_s), s	33.5		3.7		14.9	14.4	7.5	16.0
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0
Phase Call Probability	1.00		0.70		1.00	1.00	0.98	1.00
Max Out Probability	1.00		0.00		1.00	0.50	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	530	1208	195	33	466	452	202	189		109	205	193
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1791	1594	1810	1881	1826	1757	1831		1774	1881	1610
Queue Service Time (g_s), s	31.5	33.3	9.1	1.7	30.7	30.7	12.9	12.4		5.5	14.0	11.3
Cycle Queue Clearance Time (g_c), s	31.5	33.3	9.1	1.7	30.7	30.7	12.9	12.4		5.5	14.0	11.3
Green Ratio (*g/C*)	0.54	0.50	0.50	0.31	0.28	0.28	0.23	0.17		0.16	0.12	0.36
Capacity (*c*), veh/h	521	1778	791	209	528	513	251	317		205	224	582
Volume-to-Capacity Ratio (*X*)	1.017	0.680	0.246	0.158	0.881	0.881	0.805	0.595		0.533	0.915	0.331
Back of Queue (*Q*), ft/ln (95 th percentile)	771.1	509.4	156.9	33.6	591	578.6	276.5	250.4		38.9	350.1	199
Back of Queue (*Q*), veh/ln (95 th percentile)	30.8	20.2	6.2	1.3	23.5	23.0	11.1	9.9		1.6	13.9	7.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh	37.1	24.9	18.8	32.0	44.7	44.7	44.1	49.6		50.6	56.6	30.1
Incremental Delay (d_2), s/veh	43.7	2.1	0.7	0.3	18.7	19.2	17.2	3.6		2.6	38.1	0.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	80.7	27.0	19.5	32.3	63.4	63.9	61.2	53.2		53.2	94.7	30.6
Level of Service (LOS)	F	C	B	C	E	E	E	D		D	F	C
Approach Delay, s/veh / LOS	41.0	D		62.6	E		57.3	E		61.4	E	
Intersection Delay, s/veh / LOS	50.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.1	B	1.3	A	1.1	A	1.3	A

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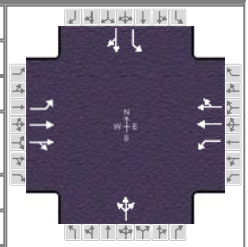
HCS 2010 Signalized Intersection Results Summary

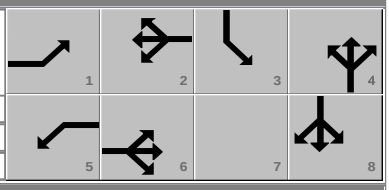
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	DWF	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak (Existing)	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2016	Analysis Period	1> 17:00
Intersection	Saxon Blvd & Sterling Si…	File Name	Saxon Blvd & Sterling-Merrimac Existing PM Pea…		
Project Description	PM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	93	1148	21	10	867	3	21	16	10	47	10	50

Signal Information			
Cycle, s	60.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	0.8	4.8	24.7	2.8	3.3	0.0
Yellow	4.5	0.0	4.5	3.5	3.5	0.0
Red	2.0	0.0	2.0	2.0	2.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4	3	8
Case Number	1.1	4.0	1.1	4.0		8.3	1.0	4.0
Phase Duration, s	12.1	36.0	7.3	31.2		8.8	8.3	17.1
Change Period, ($Y+R_c$), s	6.5	6.5	6.5	6.5		5.5	5.5	5.5
Max Allow Headway (*MAH*), s	4.1	4.0	4.1	4.0		4.4	4.3	4.4
Queue Clearance Time (g_s), s	3.7	17.1	2.2	13.3		3.8	3.4	3.9
Green Extension Time (g_e), s	0.2	11.2	0.0	11.3		0.3	0.1	0.4
Phase Call Probability	0.80	1.00	0.16	1.00		0.56	0.56	0.65
Max Out Probability	0.00	0.07	0.00	0.05		0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	96	604	601	10	449	448		48		48	62	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1845	1833	1810	1863	1860		1574		1810	1652	
Queue Service Time (g_s), s	1.7	15.1	15.1	0.2	11.3	11.3		1.7		1.4	1.9	
Cycle Queue Clearance Time (g_c), s	1.7	15.1	15.1	0.2	11.3	11.3		1.8		1.4	1.9	
Green Ratio (*g/C*)	0.51	0.49	0.49	0.42	0.41	0.41		0.06		0.13	0.19	
Capacity (*c*), veh/h	427	900	894	240	761	760		173		239	318	
Volume-to-Capacity Ratio (*X*)	0.225	0.671	0.672	0.043	0.590	0.590		0.279		0.203	0.194	
Back of Queue (*Q*), ft/ln (95 th percentile)	23.8	219.7	213.6	3.2	186.3	181.8		31.5		27.7	32.6	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.0	8.6	8.5	0.1	7.3	7.3		1.3		1.1	1.3	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	9.1	11.8	11.8	11.4	13.9	13.9		27.8		23.4	20.5	
Incremental Delay (d_2), s/veh	0.3	0.9	0.9	0.1	0.7	0.7		0.9		0.4	0.3	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (*d*), s/veh	9.4	12.7	12.7	11.5	14.7	14.7		28.7		23.8	20.8	
Level of Service (LOS)	A	B	B	B	B	B		C		C	C	
Approach Delay, s/veh / LOS	12.4	B		14.6	B		28.7	C		22.1	C	
Intersection Delay, s/veh / LOS	14.1						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.6	A	1.2	A	0.6	A	0.7	A

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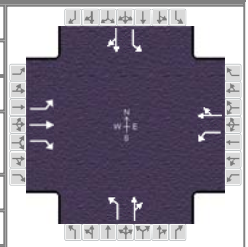
HCS 2010 Signalized Intersection Results Summary

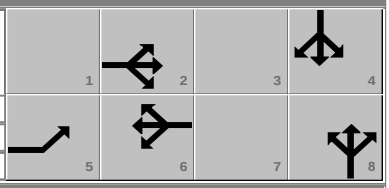
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	DWF	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak (Existing)	PHF	0.98
Urban Street	Saxon Blvd	Analysis Year	2016	Analysis Period	1> 17:15
Intersection	Saxon Blvd & Tivoli Dr	File Name	Saxon Blvd & Tivoli Dr Existing PM Peak.xus		
Project Description	PM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	437	607	61	5	475	7	43	94	21	13	69	225

Signal Information			
Cycle, s	75.2	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	14.2	22.7	18.3	0.0	0.0	0.0
Yellow	4.5	4.0	4.0	0.0	0.0	0.0
Red	2.5	2.5	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		4
Case Number	1.0	3.0		6.3		6.0		6.0
Phase Duration, s	21.2	50.4		29.2		24.8		24.8
Change Period, ($Y+R_c$), s	7.0	6.5		6.5		6.5		6.5
Max Allow Headway (*MAH*), s	4.1	5.1		5.1		4.3		4.3
Queue Clearance Time (g_s), s	14.0	17.8		20.7		17.4		14.5
Green Extension Time (g_e), s	0.2	5.7		2.0		1.6		1.7
Phase Call Probability	1.00	1.00		1.00		0.97		1.00
Max Out Probability	1.00	0.52		0.68		0.05		0.02

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	446	619	62	5	492		44	117		13	300	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1845	1610	817	1876		1096	1840		1295	1670	
Queue Service Time (g_s), s	12.0	15.8	1.3	0.3	18.7		2.9	3.9		0.6	12.5	
Cycle Queue Clearance Time (g_c), s	12.0	15.8	1.3	0.3	18.7		15.4	3.9		4.5	12.5	
Green Ratio (*g/C*)	0.52	0.58	0.58	0.30	0.30		0.24	0.24		0.24	0.24	
Capacity (*c*), veh/h	487	1077	940	342	566		181	448		345	407	
Volume-to-Capacity Ratio (*X*)	0.916	0.575	0.066	0.015	0.869		0.242	0.262		0.038	0.737	
Back of Queue (*Q*), ft/ln (95 th percentile)	285	239.5	16.8	2.8	353.3		35.3	74.6		8.7	217.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	11.4	9.4	0.7	0.1	14.1		1.4	3.0		0.3	8.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	15.7	9.8	6.8	18.5	24.9		33.3	23.0		24.8	26.3	
Incremental Delay (d_2), s/veh	21.2	0.9	0.0	0.0	9.5		0.7	0.3		0.0	2.6	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	36.8	10.7	6.8	18.5	34.4		34.0	23.3		24.9	28.9	
Level of Service (LOS)	D	B	A	B	C		C	C		C	C	
Approach Delay, s/veh / LOS	20.9	C		34.3	C		26.2	C		28.7	C	
Intersection Delay, s/veh / LOS	25.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	2.3	B	2.4	B
Bicycle LOS Score / LOS	2.3	B	1.3	A	0.8	A	1.0	A

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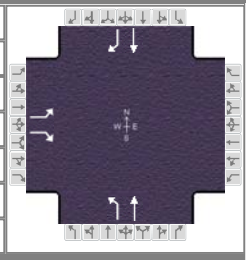
HCS 2010 Signalized Intersection Results Summary

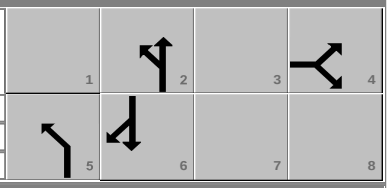
General Information				Intersection Information	
Agency	TPD, Inc.			Duration, h	0.25
Analyst	MJA	Analysis Date	May 10, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.91
Urban Street	Normandy Blvd	Analysis Year	2016	Analysis Period	1> 17:00
Intersection	Normandy Blvd & Delto…	File Name	Normandy Blvd & Deltona Blvd Existing PM Peak.…		
Project Description	PM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	300		240				149	134			227	216

Signal Information			
Cycle, s	46.1	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.5	10.9	11.2	0.0	0.0	0.0
Yellow	4.0	4.5	4.0	0.0	0.0	0.0
Red	2.5	2.5	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			5	2		6
Case Number		9.0			1.0	4.0		7.3
Phase Duration, s		17.2			11.0	29.0		17.9
Change Period, ($Y+R_c$), s		6.0			6.5	7.0		7.0
Max Allow Headway (*MAH*), s		3.2			3.6	4.2		4.2
Queue Clearance Time (g_s), s		10.2			4.9	4.0		8.7
Green Extension Time (g_e), s		1.0			0.3	2.3		2.2
Phase Call Probability		1.00			0.88	1.00		1.00
Max Out Probability		0.04			0.00	0.00		0.02

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14				5	2			6	16
Adjusted Flow Rate (*v*), veh/h	330		264				164	147			249	237
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1740		1579				1792	1900			1845	1477
Queue Service Time (g_s), s	8.2		7.0				2.9	2.0			5.5	6.7
Cycle Queue Clearance Time (g_c), s	8.2		7.0				2.9	2.0			5.5	6.7
Green Ratio (*g/C*)	0.24		0.24				0.38	0.48			0.24	0.24
Capacity (*c*), veh/h	422		383				466	904			437	350
Volume-to-Capacity Ratio (*X*)	0.780		0.688				0.352	0.163			0.571	0.679
Back of Queue (*Q*), ft/ln (95 th percentile)	131.2		99.1				42.4	27.1			93.1	96.8
Back of Queue (*Q*), veh/ln (95 th percentile)	5.1		3.9				1.6	1.1			3.7	3.8
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00				0.00	0.00			0.00	0.00
Uniform Delay (d_1), s/veh	16.3		15.9				10.5	6.9			15.6	16.0
Incremental Delay (d_2), s/veh	1.2		0.8				0.3	0.1			1.2	2.3
Initial Queue Delay (d_3), s/veh	0.0		0.0				0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh	17.5		16.7				10.9	7.0			16.7	18.3
Level of Service (LOS)	B		B				B	A			B	B
Approach Delay, s/veh / LOS	17.2	B		0.0			9.0	A		17.5	B	
Intersection Delay, s/veh / LOS	15.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	0.7	A	2.3	B
Bicycle LOS Score / LOS		F			1.0	A	1.3	A

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APPENDIX D

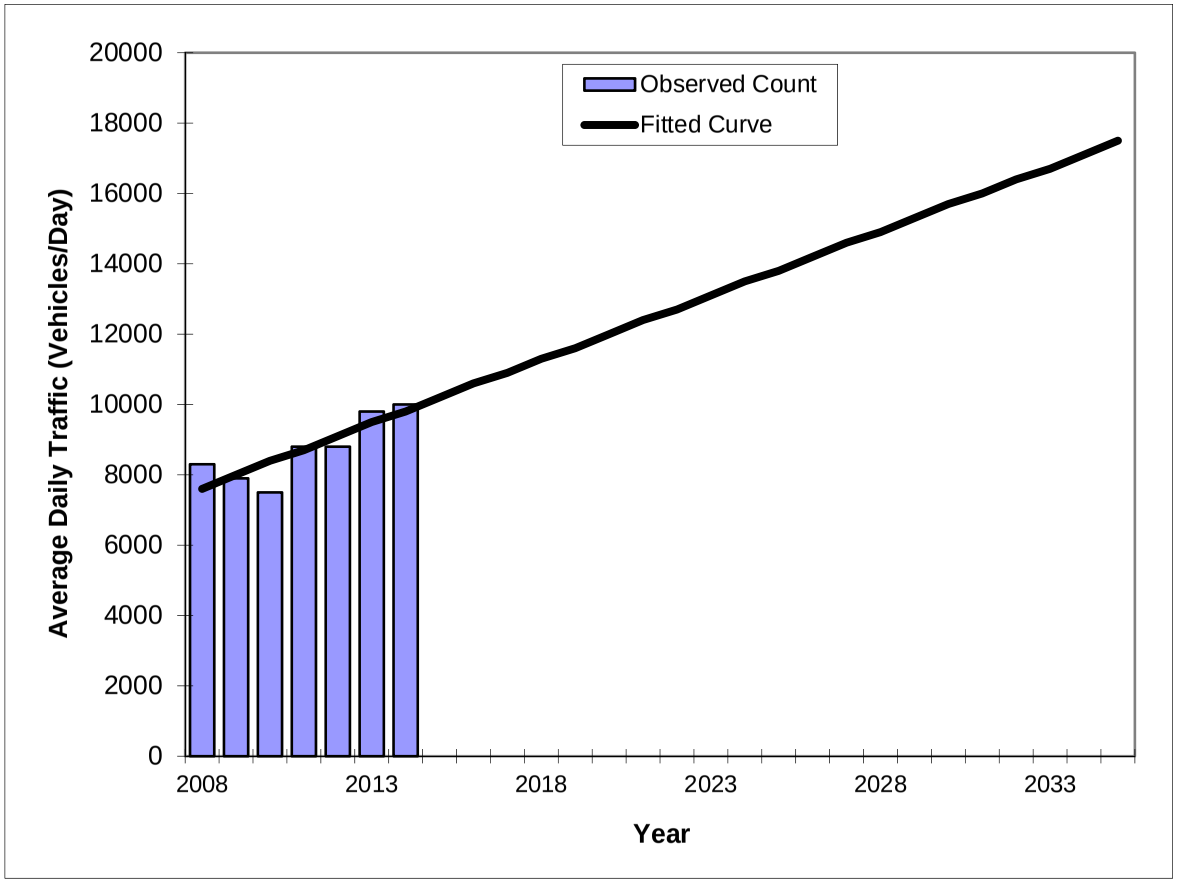
Trends Analysis Charts

Traffic Trends - V3.0

NORMANDY BLVD -- Elkcam to Ft Smith

FIN#	1234
Location	1

County:	Volusia (79)
Station #:	0
Highway:	NORMANDY BLVD



Year	Traffic (ADT/AADT) Count*	Trend**
2008	8300	7600
2009	7900	8000
2010	7500	8400
2011	8800	8700
2012	8800	9100
2013	9800	9500
2014	10000	9800
2018 Opening Year Trend		
2018	N/A	11300
2020 Mid-Year Trend		
2020	N/A	12000
2025 Design Year Trend		
2025	N/A	13800
TRANPLAN Forecasts/Trends		

*Axle-Adjusted

** Annual Trend Increase:	364
Trend R-squared:	72.09%
Trend Annual Historic Growth Rate:	4.82%
Trend Growth Rate (2014 to Design Year):	3.71%
Printed:	3-May-16

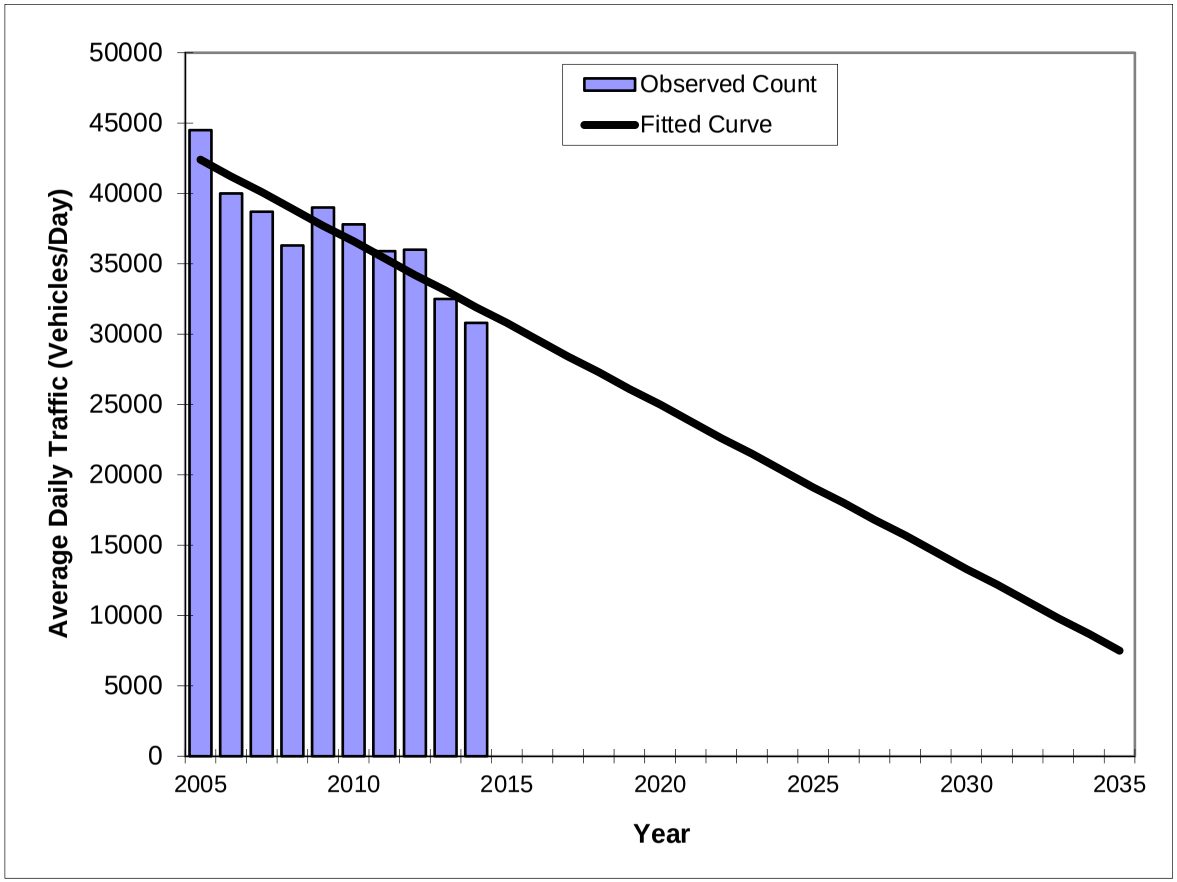
Straight Line Growth Option

Traffic Trends - V3.0

SAXON BLVD -- Finland to Normandy

FIN#	1234
Location	1

County:	Volusia (79)
Station #:	0
Highway:	SAXON BLVD



Year	Traffic (ADT/AADT) Count*	Trend**
2005	44500	42400
2006	40000	41200
2007	38700	40100
2008	36300	38900
2009	39000	37700
2010	37800	36600
2011	35900	35400
2012	36000	34200
2013	32500	33100
2014	30800	31900
2018 Opening Year Trend		
2018	N/A	27300
2020 Mid-Year Trend		
2020	N/A	25000
2025 Design Year Trend		
2025	N/A	19100
TRANPLAN Forecasts/Trends		

** Annual Trend Increase:	-1,162
Trend R-squared:	83.14%
Trend Annual Historic Growth Rate:	-2.75%
Trend Growth Rate (2014 to Design Year):	-3.65%
Printed:	3-May-16
Straight Line Growth Option	

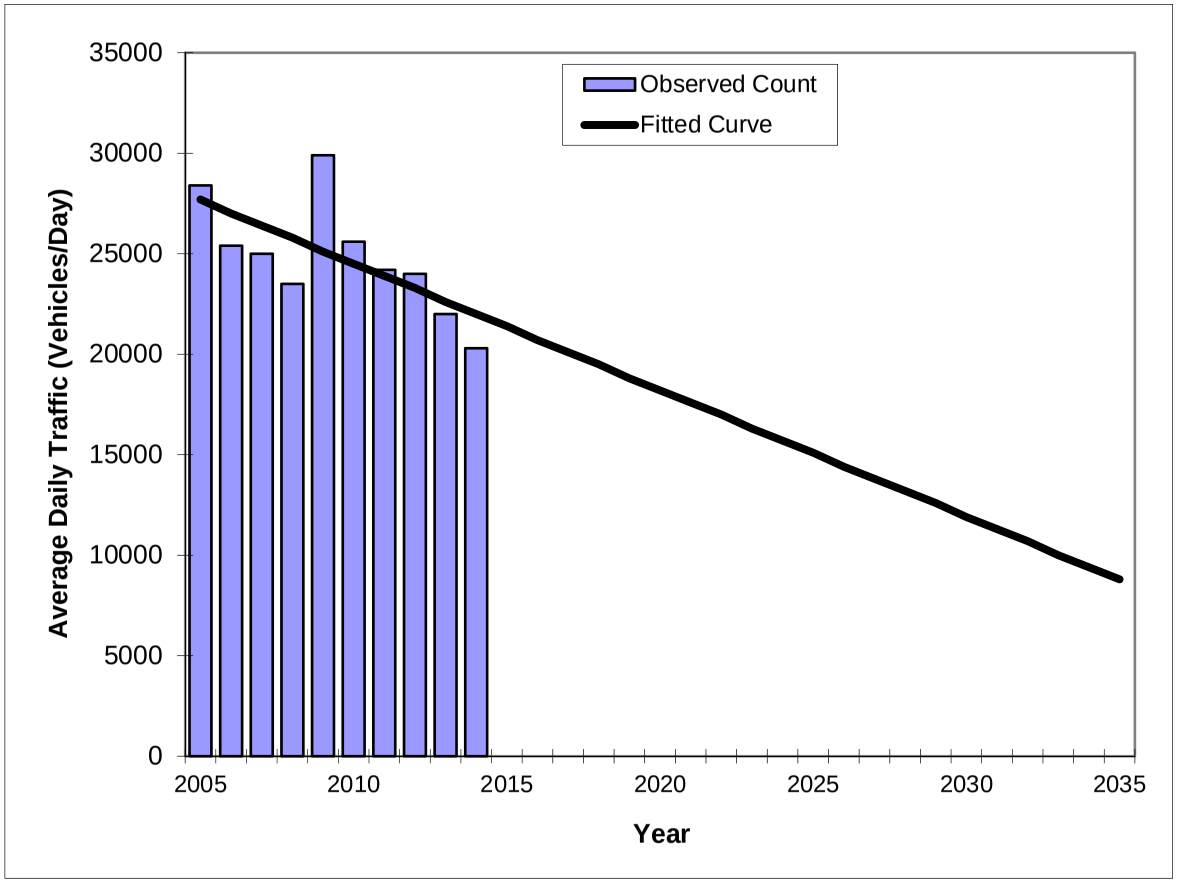
*Axle-Adjusted

Traffic Trends - V3.0

SAXON BLVD -- Normandy to Tivoli

FIN#	1234
Location	1

County:	Volusia (79)
Station #:	0
Highway:	SAXON BLVD



Year	Traffic (ADT/AADT) Count*	Trend**
2005	28400	27700
2006	25400	27000
2007	25000	26400
2008	23500	25800
2009	29900	25100
2010	25600	24500
2011	24200	23900
2012	24000	23300
2013	22000	22600
2014	20300	22000
2018 Opening Year Trend		
2018	N/A	19500
2020 Mid-Year Trend		
2020	N/A	18200
2025 Design Year Trend		
2025	N/A	15100
TRANPLAN Forecasts/Trends		

*Axle-Adjusted

** Annual Trend Increase:	-630
Trend R-squared:	46.22%
Trend Annual Historic Growth Rate:	-2.29%
Trend Growth Rate (2014 to Design Year):	-2.85%
Printed:	3-May-16

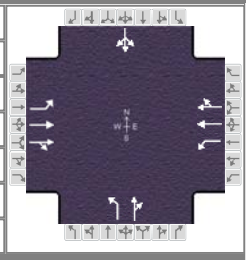
Straight Line Growth Option

APPENDIX E

Projected HCS Capacity Analysis Worksheets

HCS 2010 Signalized Intersection Results Summary

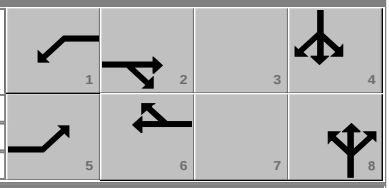
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	MJA	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.91
Urban Street	Saxon Blvd	Analysis Year	2018	Analysis Period	1> 17:45
Intersection	Saxon Blvd & Finland Dr…	File Name	Saxon Blvd & Finland Dr Projected PM Peak OPT…		
Project Description	PM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	257	1971	21	147	1432	63	117	49	76	30	31	88

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	11.5	4.2	59.8	25.0	0.0	0.0
Yellow	4.5	4.5	4.5	4.0	0.0	0.0
Red	3.0	3.0	3.0	3.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	2.0	4.0	2.0	4.0		6.0		8.0
Phase Duration, s	30.7	79.0	19.0	67.3		32.0		32.0
Change Period, ($Y+R_c$), s	7.5	7.5	7.5	7.5		7.0		7.0
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		5.4		5.4
Queue Clearance Time (g_s), s	22.2		13.5			27.0		16.9
Green Extension Time (g_e), s	1.0	0.0	0.0	0.0		0.0		1.6
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		1.00			1.00		0.45

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	282	1095	1095	162	825	818	129	137			164	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1863	1856	1757	1845	1817	1267	1713			1361	
Queue Service Time (g_s), s	20.2	71.5	71.5	11.5	56.8	57.5	10.1	9.2			5.7	
Cycle Queue Clearance Time (g_c), s	20.2	71.5	71.5	11.5	56.8	57.5	25.0	9.2			14.9	
Green Ratio (g/C)	0.18	0.55	0.55	0.09	0.46	0.46	0.19	0.19			0.19	
Capacity (c), veh/h	317	1025	1021	155	849	836	154	329			295	
Volume-to-Capacity Ratio (X)	0.892	1.068	1.072	1.039	0.972	0.979	0.834	0.417			0.555	
Back of Queue (Q), ft/ln (95 th percentile)	373.2	1446.6	1435.4	346.3	988.3	979.5	241.7	181.4			225.1	
Back of Queue (Q), veh/ln (95 th percentile)	14.7	57.0	57.4	13.6	38.9	39.2	9.5	7.3			8.9	
Queue Storage Ratio (RQ) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	
Uniform Delay (d_1), s/veh	52.2	29.3	29.3	59.3	34.3	34.5	61.1	46.1			48.1	
Incremental Delay (d_2), s/veh	8.6	48.2	49.7	83.0	24.8	26.4	31.6	1.2			2.9	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Control Delay (d), s/veh	60.8	77.5	78.9	142.3	59.0	60.9	92.7	47.3			51.0	
Level of Service (LOS)	E	F	F	F	E	E	F	D			D	
Approach Delay, s/veh / LOS	76.2	E		67.3	E		69.3	E		51.0	D	
Intersection Delay, s/veh / LOS	71.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.1	B	2.9	C	2.9	C
Bicycle LOS Score / LOS	2.5	B	2.0	A	0.9	A	0.8	A

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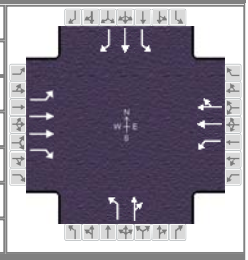
HCS 2010 Signalized Intersection Results Summary

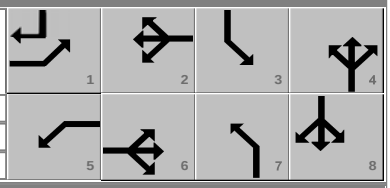
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	MJA	Analysis Date	May 12, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	AM Peak	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2018	Analysis Period	1> 7:30
Intersection	Saxon Blvd & Normandy…	File Name	Saxon Blvd & Normandy Blvd Projected AM Peak…		
Project Description	AM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	175	433	149	83	1412	61	271	159	35	122	152	581

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.5	2.0	47.5	5.5	2.0	25.5
Yellow	4.5	0.0	4.5	4.0	0.0	4.0
Red	4.0	0.0	4.0	3.5	0.0	3.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	3.0	1.1	4.0	1.1	4.0	1.1	3.0
Phase Duration, s	16.0	58.0	14.0	56.0	13.0	33.0	15.0	35.0
Change Period, ($Y+R_c$), s	8.5	8.5	8.5	8.5	7.5	8.5	8.5	8.5
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0	4.1	5.3	4.1	5.3
Queue Clearance Time (g_s), s	9.5		5.6		7.5	14.4	8.5	28.5
Green Extension Time (g_e), s	0.0	0.0	0.3	0.0	0.0	4.0	0.0	0.0
Phase Call Probability	1.00		0.94		1.00	1.00	0.98	1.00
Max Out Probability	1.00		0.00		1.00	0.53	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	180	446	138	86	760	753	279	196		126	157	539
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1690	1505	1675	1845	1820	1691	1709		1774	1845	1563
Queue Service Time (g_s), s	7.5	10.7	7.1	3.6	47.5	47.5	5.5	12.4		6.5	8.7	26.5
Cycle Queue Clearance Time (g_c), s	7.5	10.7	7.1	3.6	47.5	47.5	5.5	12.4		6.5	8.7	26.5
Green Ratio (*g/C*)	0.46	0.41	0.41	0.44	0.40	0.40	0.25	0.20		0.26	0.22	0.28
Capacity (*c*), veh/h	171	1394	620	409	730	720	291	349		276	407	443
Volume-to-Capacity Ratio (*X*)	1.056	0.320	0.223	0.209	1.040	1.045	0.959	0.561		0.456	0.385	1.217
Back of Queue (*Q*), ft/ln (95 th percentile)	285.5	203.4	124.2	64	1037.3	1036.9	360.5	244.2		137.7	190.5	1048
Back of Queue (*Q*), veh/ln (95 th percentile)	11.2	7.7	4.7	2.5	39.3	39.3	14.2	9.2		5.4	7.2	39.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh	32.1	23.9	22.8	20.2	36.3	36.3	48.1	42.9		36.7	39.8	43.0
Incremental Delay (d_2), s/veh	84.4	0.6	0.8	0.3	44.3	45.8	41.5	2.6		1.2	0.8	116.8
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	116.5	24.5	23.7	20.5	80.5	82.0	89.5	45.5		37.9	40.7	159.8
Level of Service (LOS)	F	C	C	C	F	F	F	D		D	D	F
Approach Delay, s/veh / LOS	46.0	D		78.0	E		71.4	E		118.4	F	
Intersection Delay, s/veh / LOS	79.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.9	C	3.0	C
Bicycle LOS Score / LOS	1.1	A	1.8	A	1.3	A	1.8	A

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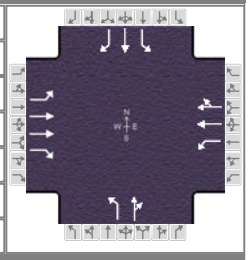
HCS 2010 Signalized Intersection Results Summary

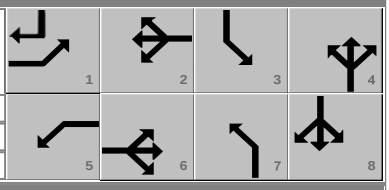
General Information				Intersection Information	
Agency	TPD, Inc.			Duration, h	0.25
Analyst	MJA	Analysis Date	May 12, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2018	Analysis Period	1> 17:00
Intersection	Saxon Blvd & Normandy…	File Name	Saxon Blvd & Normandy Blvd Projected PM Peak…		
Project Description	PM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	543	1268	228	50	899	85	214	170	32	130	196	226

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.2	18.8	36.5	5.5	7.0	15.5
Yellow	4.5	4.5	4.5	4.5	0.0	4.5
Red	4.0	4.0	4.0	4.0	0.0	4.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	3.0	1.1	4.0	1.1	4.0	1.1	3.0
Phase Duration, s	40.0	72.3	12.7	45.0	21.0	31.0	14.0	24.0
Change Period, ($Y+R_c$), s	8.5	8.5	8.5	8.5	7.5	8.5	8.5	8.5
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0	4.1	5.2	4.1	5.2
Queue Clearance Time (g_s), s	33.5		4.6		15.5	15.5	7.5	15.8
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
Phase Call Probability	1.00		0.84		1.00	1.00	0.99	1.00
Max Out Probability	1.00		0.03		1.00	0.68	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	560	1307	211	52	510	496	221	205		134	202	209
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1791	1594	1810	1881	1829	1757	1833		1774	1881	1610
Queue Service Time (g_s), s	31.5	38.1	10.1	2.6	34.7	34.7	13.5	13.5		5.5	13.8	12.4
Cycle Queue Clearance Time (g_c), s	31.5	38.1	10.1	2.6	34.7	34.7	13.5	13.5		5.5	13.8	12.4
Green Ratio (*g/C*)	0.54	0.49	0.49	0.31	0.28	0.28	0.23	0.17		0.16	0.12	0.36
Capacity (*c*), veh/h	502	1757	782	192	528	514	253	317		193	224	582
Volume-to-Capacity Ratio (*X*)	1.116	0.744	0.270	0.268	0.965	0.965	0.871	0.647		0.694	0.901	0.359
Back of Queue (*Q*), ft/ln (95 th percentile)	769.7	575.5	174.6	52.9	701.2	686.2	317	273.5		98.6	340.7	214.3
Back of Queue (*Q*), veh/ln (95 th percentile)	30.8	22.8	6.9	2.1	27.8	27.2	12.7	10.9		3.9	13.5	8.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh	39.7	26.6	19.4	32.3	46.1	46.1	45.3	50.0		53.2	56.5	30.5
Incremental Delay (d_2), s/veh	76.0	2.9	0.8	0.7	31.4	31.9	26.4	5.1		10.2	35.2	0.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	115.7	29.5	20.3	33.0	77.5	78.0	71.7	55.2		63.4	91.7	31.0
Level of Service (LOS)	F	C	C	C	E	E	E	E		E	F	C
Approach Delay, s/veh / LOS	51.8	D		75.6	E		63.7	E		61.4	E	
Intersection Delay, s/veh / LOS	60.4						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.2	B	1.4	A	1.2	A	1.4	A

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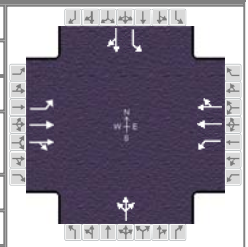
HCS 2010 Signalized Intersection Results Summary

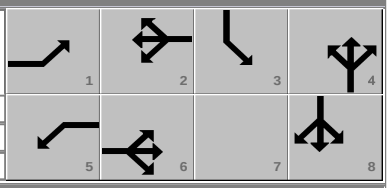
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	DWF	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak (Projected)	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2018	Analysis Period	1> 17:00
Intersection	Saxon Blvd & Sterling Si…	File Name	Saxon Blvd & Sterling-Merrimac Projected PM Pe…		
Project Description	PM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	100	1226	28	11	934	3	28	17	11	49	11	55

Signal Information			
Cycle, s	64.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	0.9	5.0	27.8	3.0	3.9	0.0
Yellow	4.5	0.0	4.5	3.5	3.5	0.0
Red	2.0	0.0	2.0	2.0	2.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4	3	8
Case Number	1.1	4.0	1.1	4.0		8.3	1.0	4.0
Phase Duration, s	12.4	39.3	7.4	34.3		9.4	8.5	17.9
Change Period, ($Y+R_c$), s	6.5	6.5	6.5	6.5		5.5	5.5	5.5
Max Allow Headway (*MAH*), s	4.1	4.0	4.1	4.0		4.4	4.3	4.4
Queue Clearance Time (g_s), s	3.8	19.3	2.2	14.9		4.3	3.6	4.2
Green Extension Time (g_e), s	0.2	12.7	0.0	12.9		0.3	0.1	0.5
Phase Call Probability	0.84	1.00	0.18	1.00		0.65	0.60	0.71
Max Out Probability	0.00	0.12	0.00	0.09		0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	103	649	644	11	483	483		58		51	68	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1845	1830	1810	1863	1861		1551		1810	1652	
Queue Service Time (g_s), s	1.8	17.3	17.3	0.2	12.9	12.9		2.1		1.6	2.2	
Cycle Queue Clearance Time (g_c), s	1.8	17.3	17.3	0.2	12.9	12.9		2.3		1.6	2.2	
Green Ratio (*g/C*)	0.53	0.51	0.51	0.45	0.43	0.43		0.06		0.14	0.19	
Capacity (*c*), veh/h	414	937	930	229	803	802		177		229	316	
Volume-to-Capacity Ratio (*X*)	0.249	0.692	0.693	0.050	0.602	0.602		0.327		0.221	0.215	
Back of Queue (*Q*), ft/ln (95 th percentile)	26.6	247.4	240.9	3.6	209	203.9		40.7		31.3	39.2	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.1	9.7	9.6	0.1	8.2	8.2		1.6		1.3	1.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	9.2	12.1	12.1	11.6	14.1	14.1		29.6		24.9	22.0	
Incremental Delay (d_2), s/veh	0.3	0.9	0.9	0.1	0.7	0.7		1.1		0.5	0.3	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (*d*), s/veh	9.5	13.0	13.0	11.7	14.9	14.9		30.7		25.4	22.4	
Level of Service (LOS)	A	B	B	B	B	B		C		C	C	
Approach Delay, s/veh / LOS	12.7	B		14.8	B		30.7	C		23.7	C	
Intersection Delay, s/veh / LOS	14.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.6	A	1.3	A	0.6	A	0.7	A

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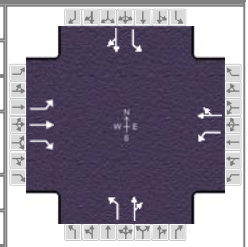
HCS 2010 Signalized Intersection Results Summary

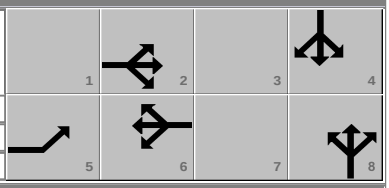
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	DWF	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak (Projected)	PHF	0.98
Urban Street	Saxon Blvd	Analysis Year	2018	Analysis Period	1> 17:15
Intersection	Saxon Blvd & Tivoli Dr	File Name	Saxon Blvd & Tivoli Dr Projected PM Peak (existi…		
Project Description	PM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	469	646	66	5	509	7	48	98	22	14	72	248

Signal Information			
Cycle, s	82.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	15.0	25.5	21.4	0.0	0.0	0.0
Yellow	4.5	4.0	4.0	0.0	0.0	0.0
Red	2.5	2.5	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		4
Case Number	1.0	3.0		6.3		6.0		6.0
Phase Duration, s	22.0	54.0		32.0		27.9		27.9
Change Period, ($Y+R_c$), s	7.0	6.5		6.5		6.5		6.5
Max Allow Headway (*MAH*), s	4.1	5.1		5.1		4.4		4.4
Queue Clearance Time (g_s), s	17.0	21.2		24.0		20.3		16.7
Green Extension Time (g_e), s	0.0	4.9		1.5		1.5		1.8
Phase Call Probability	1.00	1.00		1.00		0.98		1.00
Max Out Probability	1.00	0.74		0.93		0.16		0.05

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	479	659	67	5	527		49	122		14	327	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1845	1610	787	1877		1070	1839		1289	1667	
Queue Service Time (g_s), s	15.0	19.2	1.5	0.4	22.0		3.6	4.3		0.7	14.7	
Cycle Queue Clearance Time (g_c), s	15.0	19.2	1.5	0.4	22.0		18.3	4.3		5.0	14.7	
Green Ratio (*g/C*)	0.52	0.58	0.58	0.31	0.31		0.26	0.26		0.26	0.26	
Capacity (*c*), veh/h	457	1070	934	333	585		176	481		357	436	
Volume-to-Capacity Ratio (*X*)	1.047	0.616	0.072	0.015	0.901		0.279	0.254		0.040	0.748	
Back of Queue (*Q*), ft/ln (95 th percentile)	472.7	290.4	21	3	427.3		43.5	83.9		10	252.2	
Back of Queue (*Q*), veh/ln (95 th percentile)	18.9	11.3	0.8	0.1	17.1		1.7	3.4		0.4	10.1	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	20.4	11.3	7.6	19.6	27.0		36.2	23.9		25.9	27.8	
Incremental Delay (d_2), s/veh	55.1	1.3	0.0	0.0	14.3		0.9	0.3		0.0	3.2	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	75.5	12.5	7.6	19.6	41.3		37.1	24.2		26.0	31.0	
Level of Service (LOS)	F	B	A	B	D		D	C		C	C	
Approach Delay, s/veh / LOS	37.3	D		41.1	D		27.9	C		30.8	C	
Intersection Delay, s/veh / LOS	36.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	2.3	B	2.4	B
Bicycle LOS Score / LOS	2.5	B	1.4	A	0.8	A	1.0	A

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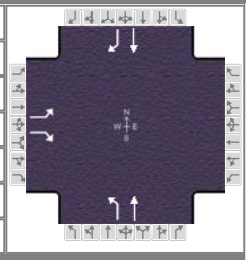
HCS 2010 Signalized Intersection Results Summary

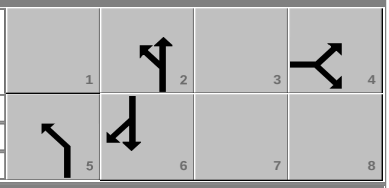
General Information				Intersection Information	
Agency	TPD, Inc.			Duration, h	0.25
Analyst	MJA	Analysis Date	May 10, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.91
Urban Street	Normandy Blvd	Analysis Year	2018	Analysis Period	1> 17:00
Intersection	Normandy Blvd & Delto…	File Name	Normandy Blvd & Deltona Blvd Projected PM Pea…		
Project Description	PM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	321		250				155	143			240	234

Signal Information			
Cycle, s	48.7	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.9	12.0	12.3	0.0	0.0	0.0
Yellow	4.0	4.5	4.0	0.0	0.0	0.0
Red	2.5	2.5	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			5	2		6
Case Number		9.0			1.0	4.0		7.3
Phase Duration, s		18.3			11.4	30.4		19.0
Change Period, ($Y+R_c$), s		6.0			6.5	7.0		7.0
Max Allow Headway (*MAH*), s		3.2			3.6	4.2		4.2
Queue Clearance Time (g_s), s		11.3			5.1	4.3		9.7
Green Extension Time (g_e), s		1.0			0.3	2.5		2.3
Phase Call Probability		1.00			0.90	1.00		1.00
Max Out Probability		0.07			0.00	0.01		0.04

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14				5	2			6	16
Adjusted Flow Rate (*v*), veh/h	353		275				170	157			264	257
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1740		1579				1792	1900			1845	1477
Queue Service Time (g_s), s	9.3		7.7				3.1	2.3			6.1	7.7
Cycle Queue Clearance Time (g_c), s	9.3		7.7				3.1	2.3			6.1	7.7
Green Ratio (*g/C*)	0.25		0.25				0.39	0.48			0.25	0.25
Capacity (*c*), veh/h	440		399				464	913			456	365
Volume-to-Capacity Ratio (*X*)	0.802		0.689				0.367	0.172			0.578	0.704
Back of Queue (*Q*), ft/ln (95 th percentile)	151.7		110.4				47	31.3			104.9	112.4
Back of Queue (*Q*), veh/ln (95 th percentile)	5.9		4.3				1.8	1.3			4.2	4.4
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00				0.00	0.00			0.00	0.00
Uniform Delay (d_1), s/veh	17.1		16.5				10.9	7.2			16.1	16.7
Incremental Delay (d_2), s/veh	1.3		0.8				0.4	0.1			1.2	2.5
Initial Queue Delay (d_3), s/veh	0.0		0.0				0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh	18.4		17.3				11.2	7.3			17.3	19.2
Level of Service (LOS)	B		B				B	A			B	B
Approach Delay, s/veh / LOS	17.9	B		0.0			9.3	A		18.2	B	
Intersection Delay, s/veh / LOS	16.1						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	0.7	A	2.3	B
Bicycle LOS Score / LOS		F			1.0	A	1.3	A

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HCS 2010 Two-Way Stop Control Summary Report

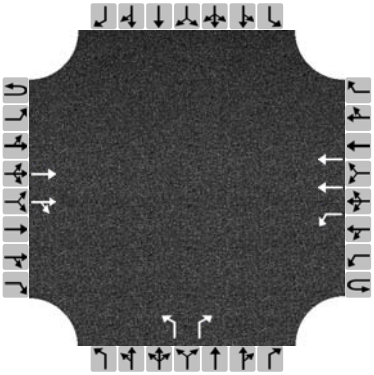
General Information

Analyst	MJA
Agency/Co.	TPD
Date Performed	5/12/2016
Analysis Year	2018
Time Analyzed	PM Peak (Projected)
Intersection Orientation	East-West
Project Description	4755

Site Information

Intersection	Saxon Blvd & Site Access
Jurisdiction	Volusia
East/West Street	Saxon Blvd
North/South Street	Site Access
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			1332	98		37	972			62		71				
Percent Heavy Vehicles						3				3		3				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						39				65		75				
Capacity						436				125		351				
v/c Ratio						0.09				0.52		0.21				
95% Queue Length						0.3				2.4		0.8				
Control Delay (s/veh)						14.1				61.1		18.0				
Level of Service (LOS)						B				F		C				
Approach Delay (s/veh)					0.5				38.0							
Approach LOS									E							

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HCS 2010 Two-Way Stop Control Summary Report

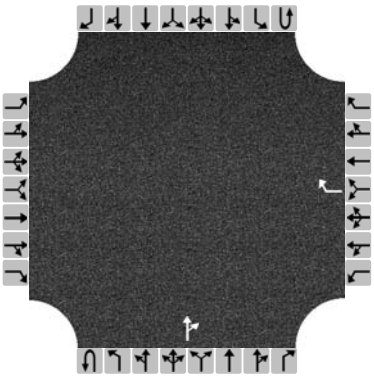
General Information

Analyst	MJA
Agency/Co.	TPD
Date Performed	5/12/2016
Analysis Year	2016
Time Analyzed	PM Peak (Projected)
Intersection Orientation	North-South
Project Description	4755

Site Information

Intersection	Normandy Blvd & Site Acce
Jurisdiction	Volusia
East/West Street	Site Access
North/South Street	Normandy Blvd
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	1	0	0	1	0	0	0	0	0
Configuration								R				TR				
Volume (veh/h)								19			394	16				
Percent Heavy Vehicles								3								
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)								20								
Capacity								628								
v/c Ratio								0.03								
95% Queue Length								0.1								
Control Delay (s/veh)								10.9								
Level of Service (LOS)								B								
Approach Delay (s/veh)					10.9											
Approach LOS					B											

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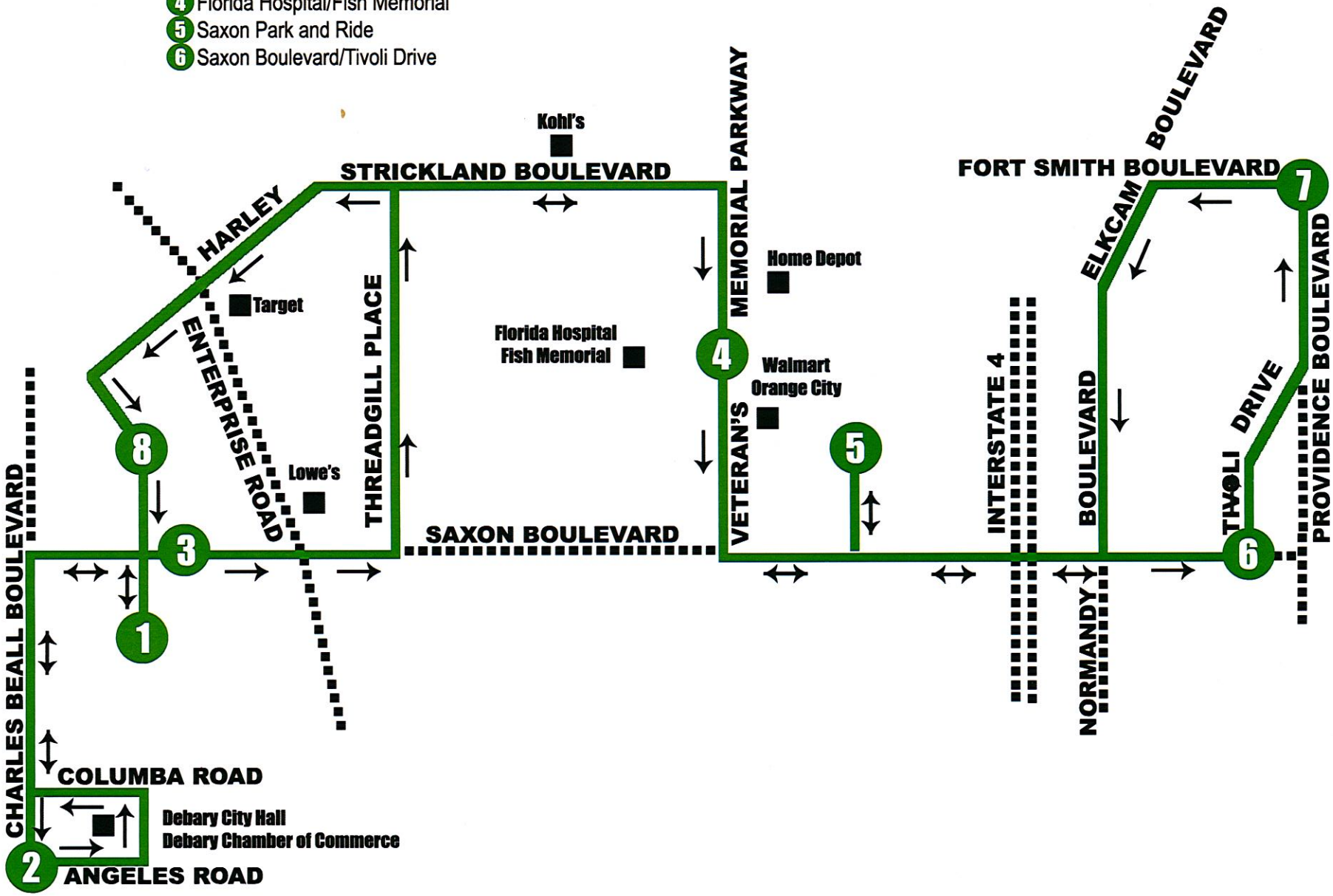
APPENDIX F

Bus Route Map

ROUTE 23 - ORANGE CITY

Serving:

1. Market Place Shopping Plaza
2. Charles Bealle Boulevard. Angeles Road
3. Saxon Market Place
4. Florida Hospital/Fish Memorial
5. Saxon Park and Ride
6. Saxon Boulevard/Tivoli Drive
7. Providence Boulevard/Fort Smith Boulevard
8. Crowne Center



Memorandum

To: Ron Paradise
Assistant Director
City of Deltona
Planning & Development Services

Date: December 23, 2016

Project #: 62354.03

From: Kok Wan Mah, P.E., PTOE
Senior Transportation Engineer

Re: Review of Traffic Impact Study for Convenience Store with Gas Pumps
Continuing Professional Services Contract – Daytona Beach, Florida
Contract No. RZ16-004, RFQ #14012

CC: Chris Bowley, AICP
Joseph Ruiz
Jorge Tolosa, P.E.

The following summary of comments are associated with the traffic impact analysis methodology for the proposed Convenience Store with Gas Pumps in Deltona, Florida. The subject study was prepared by Traffic Planning and Design, Inc. and is dated May 2016. This review examined the requirements needed to conduct a traffic impact study, following the R2CTPO TIA Guidelines. The comments are as follows:

Comment #1 – Trip Generation

The number of daily trips in the last paragraph on page 7 does not match the net daily trips in Table 3. This correction does not change the results of the analysis.

Comment #2 – Intersection Volumes

It is unclear how the attenuation of pass-by trips is accounted for. On Figure 3, at the intersection of Saxon and Normandy, a total of 485 vehicles turn south (50+207+228), of which, 22 pass-by trips are identified. At the site access a total of 474 vehicles pass the driveway, which appear to lose 11 of the pass-by trips. Please clarify.

Comment #3 – Alternative Mode Analysis

Please verify if a minimum of 4-foot wide sidewalks as required by City of Deltona Code of Ordinances, Section 96-41 (a) will be maintained adjacent to the project property after the development of the site.

Comment #4 – Alternative Mode Analysis

It should be noted that the nearest eastbound transit stop is located approximately 0.25 miles from the project site. The nearest westbound transit stop is located approximately 560 feet from the project site.

225 E. Robinson Street, Suite 300
Landmark Center Two
Orlando, FL 32801-4326
P 407.839.4006

Both of these are in front of residential homes. With the redevelopment of this site, it is suggested that the City and the Applicant engage in a discussion with VOTRAN to determine if these stops should be relocated adjacent to the proposed project, which would provide for a better opportunity for a transit stop.

Comment #5 – HCS Analyses

Please check the timing and phasings used in the analyses. The green times used in the HCS analyses are not consistent with the minimum greens on the signal timing sheets. Please verify if any data analysis conclusions change as a result.

Comment #6 – HCS Analyses

Review of certain inputs used in the HCS analyses, such as truck percentages and peak hour factors for each lane group cannot be verified with the HCS printouts. Electronic files are requested.

Comment #7 – Site Access Drives

Please consult with City of Deltona Code Section 96-37(a)(10)b for criteria required in the design and construction of the site access driveways. The driveway shall conform to Major Driveway entrance (based on daily trip ends).

LDC Section 96-37(a)(10)c.1.(iii), states that "the minimum acceptable spacing between intermediate or major driveways and an intersection shall be similar to the criteria for intersections of local streets with a thoroughfare. Refer to subsection 96-37(3)a.2". According to Section 96-37(3)a.2, the minimum distance between a local street intersection and any other intersection of the thoroughfare shall be a 660 feet. However, as described in page 7 of the TIA, the proposed full access driveway entrance (a T-type intersection) along Saxon Boulevard is located approximately 300 feet east of the signal at Saxon Blvd and Normandy Blvd. However, the driveway, as depicted in the preliminary site plan, is designed as far away as possible on the parcel.

Comment #8 – Queues

The 95% queues on the westbound approach of Saxon Blvd and Normandy Blvd are shown to extend beyond the full access driveway on Saxon Blvd. This will present issues for the single-lane approach of the driveway, as left turns will not be able to exit without considerable delays. Please confirm and provide an explanation of how the project driveway will provide for safe and efficient ingress and egress for the site.

Comment #9 – Level of Service Standard

Per Policy T1-4.3 of the City of Deltona Transportation Element, the acceptable level of service standard for arterials and collectors is "E".

Comment #10 – Service Volumes

Please verify the two-way peak-hour volumes shown for Normandy Drive in Table 4.

Based on the peer review relating to the TIA supporting the proposed convenience store with 16 fueling stations on the southeast corner of Saxon Boulevard and Normandy Boulevard, VHB recommends that the City of Deltona transmits these comments to the Applicant and that a revised TIA be provided addressing these comments. The revised TIA should identify if any study roadway segments or intersections are anticipated to be adversely impacted by the development based on any changes resulting from the included comments. In addition, the revised TIA should provide convincing analysis and documentation to demonstrate that the proposed full driveway access at Saxon Blvd meets the requirements set forth in the City of Deltona LDC. We appreciate the opportunity to provide this service to the City of Deltona. If you have any questions, please do not hesitate to contact us.

Sincerely,

Kok Wan Mah, P.E., PTOE
Senior Transportation Engineer
VHB
kmah@vhb.com
407.641.0690

Response to Traffic Study Review Comments
Convenience Market with Gasoline Pumps
City of Deltona, Florida

This is in response to the traffic-related comments for the "Convenience Market with Gasoline Pumps" traffic study dated May 2016. Each of the comments is listed first in **bold** followed by our response.

Comment # 1 – Trip Generation

The number of daily trips in the last paragraph on page 7 does not match the net daily trips in Table 3. This correction does not change the results of the analysis.

Response:
The paragraph was changed to reflect the correct new net daily trips. It should be pointed out that the correct new net trips as shown in the table were used in the analysis.

Comment # 2 – Intersection Volumes

It is unclear how the attenuation of pass-by trips is accounted for. On figure 3, at the intersection of Saxon and Normandy, a total of 485 vehicles turn south (50+207+228), of which 22 pass-by trips are identified. At the site access, a total of 474 vehicles pass the driveway, which appear to lose 11 of the pass-by trips. Please clarify.

Response:
In Figure 3, the (+) and (-) signs for the southbound pass-by trips were erroneously switched (a graphical error) but the totals are correct. In the revised report, the southbound through movement was corrected to (207-<11>=196) and the southbound left turn movement to (110+<11>+(9)=130).

TPD No. 4755
January 03, 2017

Comment # 3 – Alternative Mode Analysis

Please verify if a minimum of 4-foot wide sidewalks as required by City of Deltona Code of Ordinances, Section 96-41 (a) will be maintained adjacent to the project property after the development of the site.

Response:
A minimum of 4-foot sidewalks will be maintained adjacent to the project property after the development of the site.

Comment # 4 – Alternative Mode Analysis

It should be noted that the nearest eastbound transit stop is located approximately 0.25 miles from the project site. The nearest westbound transit stop is located approximately 560 feet from the project site.
Both of these are in front of the residential homes. With the redevelopment of this site, it is suggested that the City and the Applicant engage in a discussion with VOTRAN to determine if these stops should be relocated adjacent to the proposed project, which would provide for a better opportunity for a transit stop.

Response:
The Applicant is willing to engage in a discussion with the City and VOTRAN to determine if these bus stops should be relocated adjacent to the proposed project.

Comment # 5 – HCS Analysis

Please check the timing and phasing used in the analyses. The green times used in the HCS analyses are not consistent with the minimum greens on the signal timing sheets. Please verify if any data analysis conclusions change as a result.

Response:
The HCS analyses are consistent with the minimum greens on the signal timing sheets. However, the signals at the intersections of Saxon Blvd/Finland Ave and Saxon Blvd/Normandy Blvd are coordinated with a cycle length of 120 seconds during the A.M. peak hour and 130 seconds during the P.M. peak hour. The splits were optimized in the HCS analyses for these two intersection while preserving the same cycle length and coordination. Electronic files are submitted separately for clarification.

Comment # 6 – HCS Analysis

Review if certain inputs used in the HCS analyses, such as truck percentages and peak hour factors for each lane group cannot be verified with the HCS printouts, Electronic files are requested.

Response:
Inputs used in the analyses were reviewed and verified. Electronic files will be provided separately.

Comment # 7 – Site Access Drives

Please consult with City of Deltona Code Section 96-37(a)(10)b for criteria required in the design and construction of the site access driveways. The driveway shall conform to Major Driveway entrance (based on daily trip ends).
LDC Section 96-37(a)(10)c.1.(iii), states that "the minimum acceptable spacing between intermediate or major driveways and an intersection shall be similar to the criteria for intersections of local streets with a thoroughfare. Refer to subsection 96-37(3)a.2". According to Section 96-37(3)a.2, the minimum distance between a local street intersection and any other intersection of the thoroughfare shall be 660 feet. However, as described in page 7 of the TIA, the proposed full access driveway entrance (a T-type intersection) along Saxon Boulevard is located approximately 300 feet east of the signal at Saxon Blvd and Normandy Blvd. However, the driveway, as depicted in the preliminary site plan, is designed as far away as possible on the parcel.

Response:
We will consult with the City regarding the criteria in the design and construction of the site driveways. The site's major driveway on Saxon Boulevard is proposed to be located as far away as possible from Normandy Boulevard. However, this location will not meet the 660 feet minimum distance from Normandy Boulevard. It is interesting to note that there are sixteen (16) local streets which intersect Saxon Boulevard between Finland Drive and Sterling Silver Boulevard (a distance of one mile). These local streets create sixteen spacings none of which meet the 660 feet standard measured edge-to-edge of street. Measured center-to-center, only two spacings out of sixteen meet the 660 feet standard.

Comment # 8 – Queues

The 95% queues on the westbound approach of Saxon Blvd and Normandy Blvd are shown to extend beyond the full access driveway on Saxon Blvd. This will present issues for the single-lane approach of the driveway, as left turns will not be able to exit without considerable delays. Please confirm and provide an explanation of how the project driveway will provide for safe and efficient ingress and egress for the site.

Response:
We agree that there will be instances where queues on the westbound approach will extend beyond the site access driveway on Saxon Boulevard. This situation will only inconvenience the proposed development traffic and not the traffic on Saxon Boulevard. A two-lane approach is envisioned for this driveway so that the right turns will not be impacted by the queues. Based upon the HCS analysis, the exiting left turns will experience 60 second delays with a v/c ratio of 0.52 at this driveway. Furthermore, the exiting vehicles from the site can use the Normandy Boulevard access and take advantage of the signal at Saxon Boulevard.

Comment # 9 – Level of Service Standard

Per Policy T1-4.3 of the City of Deltona Transportation Element, the acceptable level of service standard for arterials and collectors is "E".

Response:
The acceptable level of service standards were taken from the Volusia County 2015 Average Annual Daily Traffic & Historical Counts as documented in the traffic study methodology included as Appendix A in the traffic study. The traffic study methodology was submitted to and reviewed by the City and County prior to the conduct of the study. Table 1 and Table 5 were changed in the revised report to reflect the correct Level of Service standard.

Comment # 10 – Service Volumes

Please verify the two-way peak-hour volumes shown for Normandy Drive in Table 4.

Response:
The two-way peak-hour volumes for Normandy Road were reviewed and corrected accordingly in the revised report.

Memorandum

To: Ron Paradise
Assistant Director
City of Deltona
Planning & Development Services

Date: January 5, 2017

Project #: 62354.03

From: Kok Wan Mah, P.E., PTOE
Senior Transportation Engineer

Re: Additional Comments for Convenience Store with Gas Pumps
Continuing Professional Services Contract – Daytona Beach, Florida
Contract No. RZ16-004, RFQ #14012

CC: Chris Bowley, AICP
Joseph Ruiz
Jorge Tolosa, P.E.

The following summary of comments are associated with the traffic impact analysis methodology for the proposed Convenience Store with Gas Pumps in Deltona, Florida. The subject study was prepared by Traffic Planning and Design, Inc. and is dated May 2016. This review examined the requirements needed to conduct a traffic impact study, following the R2CTPO TIA Guidelines. The comments are as follows:

Comment # 1 – Trip Generation

The number of daily trips in the last paragraph on page 7 does not match the net daily trips in Table 3. This correction does not change the results of the analysis.

Response:
The paragraph was changed to reflect the correct new net daily trips. It should be pointed out that the correct new net trips as shown in the table were used in the analysis.

VHB Response: Corrected. No further action.

Comment # 2 – Intersection Volumes

It is unclear how the attenuation of pass-by trips is accounted for. On figure 3, at the intersection of Saxon and Normandy, a total of 485 vehicles turn south (50+207+228), of which 22 pass-by trips are identified. At the site access, a total of 474 vehicles pass the driveway, which appear to lose 11 of the pass-by trips. Please clarify.

225 E. Robinson Street, Suite 300
Landmark Center Two
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P 407.839.4006

Response:
In Figure 3, the (+) and (-) signs for the southbound pass-by trips were erroneously switched (a graphical error) but the totals are correct. In the revised report, the southbound through movement was corrected to (207-<11>=196) and the southbound left turn movement to (110+<11>+(9)=130).

VHB Response: Corrected. No further action.

Comment # 3 – Alternative Mode Analysis
Please verify if a minimum of 4-foot wide sidewalks as required by City of Deltona Code of Ordinances, Section 96-41 (a) will be maintained adjacent to the project property after the development of the site.

Response:
A minimum of 4-foot sidewalks will be maintained adjacent to the project property after the development of the site.

VHB Response: Acknowledged. No further action.

Comment # 4 – Alternative Mode Analysis

It should be noted that the nearest eastbound transit stop is located approximately 0.25 miles from the project site. The nearest westbound transit stop is located approximately 560 feet from the project site. Both of these are in front of the residential homes. With the redevelopment of this site, it is suggested that the City and the Applicant engage in a discussion with VOTRAN to determine if these stops should be relocated adjacent to the proposed project, which would provide for a better opportunity for a transit stop.

Response:
The Applicant is willing to engage in a discussion with the City and VOTRAN to determine if these bus stops should be relocated adjacent to the proposed project.

VHB Response: No further comment.

Comment # 5 – HCS Analysis

Please check the timing and phasing used in the analyses. The green times used in the HCS analyses are not consistent with the minimum greens on the signal timing sheets. Please verify if any data analysis conclusions change as a result.

Response:
The HCS analyses are consistent with the minimum greens on the signal timing sheets. However, the signals at the intersections of Saxon Blvd/Finland Ave and Saxon Blvd/Normandy Blvd are coordinated with a cycle length of 120 seconds during the A.M. peak hour and 130 seconds during the P.M. peak hour. The splits were optimized in the HCS analyses for these two intersection while preserving the same cycle length and coordination. Electronic files are submitted separately for clarification.

VHB Response: Verified. No further action.

Comment # 6 – HCS Analysis

Review if certain inputs used in the HCS analyses, such as truck percentages and peak hour factors for each lane group cannot be verified with the HCS printouts, Electronic files are requested.
Response:
Inputs used in the analyses were reviewed and verified. Electronic files will be provided separately.

VHB Response: Verified. No further action.

Comment # 7 – Site Access Drives

Please consult with City of Deltona Code Section 96-37(a)(10)b for criteria required in the design and construction of the site access driveways. The driveway shall conform to Major Driveway entrance (based on daily trip ends).
LDC Section 96-37(a)(10)c.1.(iii), states that "the minimum acceptable spacing between intermediate or major driveways and an intersection shall be similar to the criteria for intersections of local streets with a thoroughfare. Refer to subsection 96-37(3)a.2". According to Section 96-37(3)a.2, the minimum distance between a local street intersection and any other intersection of the thoroughfare shall be 660 feet. However, as described in page 7 of the TIA, the proposed full access driveway entrance (a T-type intersection) along Saxon Boulevard is located approximately 300 feet east of the signal at Saxon Blvd and Normandy Blvd. However, the driveway, as depicted in the preliminary site plan, is designed as far away as possible on the parcel.

Response:
We will consult with the City regarding the criteria in the design and construction of the site driveways. The site's major driveway on Saxon Boulevard is proposed to be located as far away as possible from Normandy Boulevard. However, this location will not meet the 660 feet minimum distance from Normandy Boulevard. It is interesting to note that there are sixteen (16) local streets which intersect Saxon Boulevard between Finland Drive and Sterling

Silver Boulevard (a distance of one mile). These local streets create sixteen spacings none of which meet the 660 feet standard measured edge-to-edge of street. Measured center-to-center, only two spacings out of sixteen meet the 660 feet standard.

VHB Response: In their response to Comment # 8, the applicant states that "A two-lane approach is envisioned for this driveway (at Saxon Blvd) so that the right turns will not be impacted by the queues." As such, it is recommended, that the site plan of the driveway on Saxon Blvd be revised to show a two-lane egress approach, which is also a requirement per the City of Deltona Land Development Code, to provide efficient operations for vehicles exiting the project site. Furthermore, the City reserves the right in the future to restrict outbound left turns in the case that operational and/or safety concerns are observed for the project traffic at the Saxon Blvd driveway.

Comment # 8 – Queues

The 95% queues on the westbound approach of Saxon Blvd and Normandy Blvd are shown to extend beyond the full access driveway on Saxon Blvd. This will present issues for the single-lane approach of the driveway, as left turns will not be able to exit without considerable delays. Please confirm and provide an explanation of how the project driveway will provide for safe and efficient ingress and egress for the site.

Response:
We agree that there will be instances where queues on the westbound approach will extend beyond the site access driveway on Saxon Boulevard. This situation will only inconvenience the proposed development traffic and not the traffic on Saxon Boulevard. A two-lane approach is envisioned for this driveway so that the right turns will not be impacted by the queues. Based upon the HCS analysis, the exiting left turns will experience 60 second delays with a v/c ratio of 0.52 at this driveway. Furthermore, the exiting vehicles from the site can use the Normandy Boulevard access and take advantage of the signal at Saxon Boulevard.
See VHB Response to Comment #7.

Comment # 9 – Level of Service Standard

Per Policy T1-4.3 of the City of Deltona Transportation Element, the acceptable level of service standard for arterials and collectors is "E".

Response:
The acceptable level of service standards were taken from the Volusia County 2015 Average Annual Daily Traffic & Historical Counts as documented in the traffic study methodology included as Appendix A in the traffic study.

The traffic study methodology was submitted to and reviewed by the City and County prior to the conduct of the study. Table 1 and Table 5 were changed in the revised report to reflect the correct Level of Service standard.

VHB Response: Corrected. No further action.

Comment # 10 – Service Volumes

Please verify the two-way peak-hour volumes shown for Normandy Drive in Table 4.

Response:

The two-way peak-hour volumes for Normandy Road were reviewed and corrected accordingly in the revised report.

VHB Response: Corrected. No further action.

Based on the peer review relating to the TIA and responses to comments supporting the proposed convenience store with 16 fueling stations on the southeast corner of Saxon Boulevard and Normandy Boulevard, VHB recommends that the City of Deltona reviews these comments and responses, and if satisfactory, draft development order conditions that would be presented to the Applicant as part of the development entitlements.

Sincerely,

Kok Wan Mah, P.E., PTOE
Senior Transportation Engineer
VHB
kmah@vhb.com
407.641.0690

Staff Report

To: **Planning and Zoning Board**

From: **Joseph Ruiz, Planner II**

Date: **January 4, 2017**

Re: **Ordinance No. 36-2016, S/E Corner of Normandy Blvd. and Saxon Blvd., RZ16-004; Changing the zoning from R-1 to C-1**

A. Summary of Application:

Applicant: Deltona Lakes Investors, LLC
Paul F. Holub, Jr., Managing Member
PO Box 730086
Ormond Beach, FL 32173

Request: The City has received an application to rezone ±2.5acres located at the southeast corner of the intersection of Normandy Blvd. and Saxon Blvd. from Single-Family Residential (R-1) to Retail Commercial District (C-1).

Tax Parcel Nos.: 8130-03-25-0230, 8130-03-25-0240, 8130-03-25-0250, 8130-03-25-0390, 8130-03-25-0400, 8130-03-25-0410, 8130-03-25-0420, 8130-03-25-0430, 8130-03-25-0440

Property Acreage: ±2.5acres

Property Location: 1878 Saxon Boulevard

Legal Description:

LOTS 23, 24, 25, 39, 40, 41, 42, 43 & 44,
BLOCK 86, DELTONA LAKES, UNIT THREE, ACCORDING TO THE MAP OR PLAT BOOK 25, PAGES 105-120, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.

B. Existing Zoning: Single Family (R-1**)**

C. Background: The City has received an application to rezone ±2.5 acres, comprising of nine (9) parcels acres located at the southeast corner of the intersection of Normandy Boulevard and Saxon Boulevard. The subject properties are currently zoned R-1. Seven of the lots are developed with single family dwellings. The remaining two lots are vacant. The Applicant is seeking the C-1 zoning to allow for the construction of a convenience store with 16 fuel stations.

D. Support Information

Public Facilities:

a. Potable Water: to be supplied by Deltona Water
b. Sanitary Sewer: to be supplied by Deltona Water
c. Fire Protection: Deltona Fire Station 62
d. Law Enforcement: Volusia County Sheriff's Office (VCSO)
e. Electricity: Duke Energy

E. Matters for Consideration:

Section 110-1101, Code of City Ordinances, states that the City shall consider the following matters when reviewing applications for amendments to the Official Zoning Map:

1. Whether it is consistent with all adopted elements of the Comprehensive Plan.

The Future Land Use Category for the property is Low Density Residential (LDR). The Applicant is concurrently proposing a Small Scale Comprehensive Plan Future Land Use Map Amendment to convert the Future Land Use Designation to Commercial, which according to the Land Use/Zoning Matrix (Table 110-16), the proposed C-1 zoning is a preferred and compatible zoning classification that could be applied to land designated with the Commercial Land Use category. If the Future Land Use Map amendment request is not approved, the City cannot approve the rezoning request. In addition, the Future Land Use Map amendment will need to be certified by the Volusia Growth Management Commission and approved by the Florida Department of Economic Opportunity before the City can take final action on this rezoning request.

OBJECTIVE FLU1-7

The City of Deltona shall appropriately allocate land uses to adequately meet the current and future population needs while maximizing land use compatibility. The City shall promote a variety of land uses including residential, commercial, industrial, pedestrian oriented mixed-use, recreational, conservation, and public facilities. 9J-5.006(3)(b)(1)

The allocation of Future Land Use entitlements within the City is driven by population projections with the intent of providing appropriate balance of interdependent land use types and compart with City economic development oriented objectives. Comprehensive

Plan Policy FLU1-7.23 provides detailed guidance with regard to ideal commercial (and industrial) allocations to promote a healthy balance of residential and non-residential land uses. The policy states the following:

Policy FLU1-7.23
The City shall seek to ensure that its Future Land Use Plan Map provides for a minimum of six acres of commercial lands and four acres of industrial lands per 1,000 residents, with a goal of providing 10 or more acres of commercial lands and six or more acres of industrial lands per 1,000 residents by 2025.

The City currently has over ten (10) acres of commercial land per 1,000 residents designated on the Future Land Use Map – well above the six (6) acre minimum standard articulated by the policy. However, it is important to note that the City Comprehensive Plan is a 20 year plan and based on the 20 year planning window the policy establishes a ratio of "at least" ten (10) acres or more of commercial land per 1,000 residents by 2025. To accomplish the commercial ratio by 2025, the City will need 990 acres of commercial land (projected population of almost 99,000 people by the year 2025 per the Florida Housing Data Clearinghouse). The City currently has 1,075 acres of planned commercial land. As per Policy FLU1-7.23, the ratio of 10 acres of commercial per 1,000 residents is expressed as a minimum standard. The policy does not preclude and encourages the City exceeding the ratio of 10 acres per 1,000 residents. Therefore, the proposed amendment will serve to further the goal of affording ten (10) or more acres of commercial land by the year 2025.

The current state of the structures on these parcels is dilapidated and blighted. Amending the zoning of the subject properties facilitates the ability to meet market demand for commercial space while meeting the current needs of the population with new and improved construction.

2. Its impact upon the environment or natural resources.

The area is developed with single-family dwellings on seven (7) of the nine (9) lots, and the remaining two (2) vacant lots are heavily forested. Soils associated with the amendment area are predominantly well drained. The soil associated with the amendment area (Paola Fine Sand) is suitable to support community development. Soils are mapped on a graphic as part of the attached map series.

The property has ±0.16 acre located within the 100 year floodplain, as depicted on the flood zone map. While the City does discourage development activity within floodplain areas, there are recognized engineering techniques, such as compensating storage,

appropriate to protect floodplain function. The following provision in the Comprehensive Plan states:

Policy FLU1-5.8
If structures are allowed in the 100-year flood plain, development within areas prone to 100 year flooding shall compensate for the full amount of flood storage displacement within the 100 year floodplain and shall not increase expected flood levels for adjacent properties or reduce receiving surface water quality below established levels

The site does not contain any wetlands. The site is associated with an elevation change of about 20 foot grading from approximately 35 feet to 55 feet throughout the site from north to south. See the contour map.

The amendment area has been developed residentially. In addition, the site is located in a developed, urban context. Therefore, the amendment area does not provide suitable habitat for significant wildlife including listed species.

3. Its impact upon the economy of any affected area.

The proposed zoning will be changing the subject site's zoning designation from Single-Family Residential (R-1) to Retail Commercial District (C-1). If the property is redeveloped at a commercial capacity, the rezoning to C-1 has the potential to significantly increase the taxable value of the properties. The 2016 property tax roll for the nine (9) single-family residential parcels indicates a total of $11,085.68 in ad valorem taxes were collected as portrayed in the chart below:

Parcel	Millage Rate	Property Taxes
8130-03-25-0230	23.7605	1,534.73
8130-03-25-0240	23.7605	237.92
8130-03-25-0250	23.7605	256.18
8130-03-25-0390	23.7605	819.47
8130-03-25-0400	23.7605	1,874.92
8130-03-25-0410	23.7605	1,677.96
8130-03-25-0420	23.7605	1,334
8130-03-25-0430	23.7605	2,034.60
8130-03-25-0440	23.7605	1,315.90
Total		11,085.68

An analysis was performed by taking another site with a comparable use within the City to ascertain how potentially significant and beneficial the rezoning of blighted

residences to commercial may be. The City through the Volusia County Property Appraiser's Website, researched the recently developed RaceTrac site located on the northeast corner of the intersection of Saxon Blvd. and W Finland Dr. which currently has a convenience store and fuel station use. The RaceTrac property was also comprised of single-family homes which were redeveloped to a commercial use. This property currently has a 2016 property tax amount of $38,686.90. The difference in property tax values between the nine (9) residential parcels and the comparable RaceTrac commercial parcel within the City is at a $17,000 dollar difference that may be assessed to this property. Such a change would be substantially beneficial to the City, and the City Community Redevelopment Re-development Area tax increment financing as well (The property is located within the newly approved Southwest Deltona CRA.).

4. **Notwithstanding the provisions of Article XIV of the Land Development Code, Ordinance No. 92-25 [Chapter 86, Code of Ordinances] as it may be amended from time to time, its impact upon necessary governmental services, such as schools, sewage disposal, potable water, drainage, fire and police protection, solid waste or transportation systems.**

   a. **Schools:** The zoning amendment will not have a negative impact on the local schools or school district

      Sewage Disposal: The proposed development will be required to connect to City sewers, and ample capacity is available. The Comprehensive Plan requires all uses within a ¼ mile be required to connect to City sewers as follows:

      Policy CIE1-3.14
      Connection to central sewer is required for all uses with a 1/4 mile of sewer main as required by the Florida Administrative Code, Chapter 10 D-6. Lines should only be extended if the absence of such facilities would result in a threat to the overall environmental and water quality, and public health or safety and be funded by those property owners receiving benefits along with an agreement that describes the method and timing of when these services would be provided. All uses except single family residential shall be required to connect to the City's central sewer system

   b. **Potable Water:** The proposed development will connect to City water. Ample capacity is available.

   c. **Drainage:** Stormwater will be managed in accordance with the City Land Development Code and the St. Johns River Water Management District.

d. **Transportation Systems:**

The property proposed to be changed from a residential land use entailment to a commercial allocation is located at the intersection of two major City thoroughfares – Saxon Blvd. and Normandy Blvd. The intersection is essentially a transportation gateway to Interstate 4 and is associated with extensive movements and relatively heavy volumes of traffic. The fact the intersection carries so many trips is one reason the property in question has been targeted for commercial uses. Based on the location of the property and the traffic volumes associated with several business uses allowed within the requested C-1 zoning, a traffic impact analysis (TIA) was required to be part of the application. A TIA generated by Traffic Planning and Design (TPD) was submitted and is predicated on a land use assumption the site would be developed as a ±5,943 square foot convenience store with 16 fueling stations. The TPD TIA is attached. While the assumed land use is not the most significant traffic generator when compared to other uses allowed in the C-1 zoning, the convenience store with gas sales is a very plausible land use scenario for the property. The property size, location, traffic pattern and market radius characteristic are conducive to such a use. Other assumptions include a conceptual sketch plan depicting two points of access. One access off of Normandy Blvd. would be restricted to a right-in and right-out movement. The other access located off of Saxon Blvd. is planned to be a full movement.

According to the TIA, the use would attract over 8,600 daily trips. However, the total new trips would be reduced to 3,082 trips because of a high "pass by" trip factor indicative of convenience store uses. A "pass by" trip refers to a trip already on the City network but accesses the facility on the way to another/other destination(s). Turning movements are also quantified. There is projected to be 570 peak daily turning movements - 265 in the morning and 305 in the evening peak hours. Traffic volumes and turning movements are very important elements with regard to determining site land use appropriateness (type/intensity/density) site design and access management. Access management refers to access minimization, location, movement and design onto the public road network. Lack of appropriate access management can exacerbate congestion associated with trip intensive land uses and create traffic safety problems. Therefore, since the proposed commercial use of the property is going to change traffic patterns in the area, traffic and related access management are important factors. However, much of traffic design associated with developments is technically specific and will be addressed during the City site plan review process. However, the full movement planned for Saxon Blvd. will be a future site plan concern. The full movement so close to a major intersection could be unsafe and further cause undue traffic congestion. The result will be a left turn restricted design associated with the Saxon Blvd. access point. A right in and right out with a raised concrete median

will be suggested for any access off of Saxon Blvd. Also, the throat of Normandy Blvd. at the southern approach to the Saxon Blvd. and Normandy Blvd. intersection will eventually need to be upgraded to facilitate enhanced traffic flow. This intersection improvement will probably be undertaken by the public in the future, perhaps utilizing Community Redevelopment Area funds.

The existing land use condition in the field today includes seven existing dwelling units. Six of the seven dwelling units feature an individual driveway cut onto a City thoroughfare road, either Saxon Blvd. or Normandy Blvd. According to the 9th Addition of the Institute of Traffic Engineers Trip Generation Manual, a single family dwelling unit generates 9.52 trips per day. Therefore, currently there is the potential for 57 turning movements at six individual driveway cuts. The proposed project does represent a significant increase in traffic activity compared to the existing land uses. However, the driveway cuts will be limited beyond what currently is in the field today.

The TIA conclusions indicated the project will have no significant impact on any roadway segments or intersections in the vicinity of the project. In addition, the TIA indicates the existing center lane of Saxon Blvd. designed to accommodate left turn lanes will also be used by Saxon Blvd. east bound traffic to access the property (However, staff will not recommend a full access on to Saxon Blvd. as part of the site plan review process.).

The TIA did not take into account improvements to Saxon Blvd. planned by FDOT. The FDOT is planning to widen Saxon Blvd. to six lanes from I-4 to Normandy Blvd. as part of the I-4 Beyond the Ultimate project. The intent is to more efficiently move traffic off of I-4 so cars are not queued in the interstate travel lanes. Just east of the Saxon Blvd./Normandy Blvd. intersection, FDOT is planning a 900 foot transition to taper the six lanes to the existing four lane configuration. As part of the transition, a raised median is planned for a distance of approximately 300 feet east of the intersection of Saxon Blvd. and Normandy Blvd. This raised median and related FDOT Saxon Blvd. improvements were not analyzed as part of the TIA. However, the improvements – six lanes and related median operations will result in greater capacity and enhanced safety along the Saxon Blvd. corridor in the vicinity of the subject property.

The City did hire a traffic engineer to provide peer review services. The firm VHB reviewed the TPD TIA and determined the findings, in general, were technically sound. VHB did express concerns about the proposed full access form Saxon Blvd. For more information please feel free to see the attached information from VHB traffic engineer Mr. Kok Wan Mah. Also attached are responses from Traffic Planning Design (TPD) to the VHB comments.

5. **Any changes in circumstances or conditions affecting the area.**

   Within the last 20 years the Saxon Boulevard Corridor between Interstate 4 and Normandy Boulevard have seen an increase in commercial development and redevelopment from residential to commercial as well as the approval of the Southwest Deltona CRA. Most of the developments have fallen into the C-1 and C-2 zoning categories; therefore, the proposed C-1 zoning request is appropriate.

6. **Any mistakes in the original classification.**

   No known mistakes.

7. **Its effect upon the public health, welfare, safety, or morals.**

   The amendment is located on major City thoroughfares, with one being a four lane road (Saxon Blvd.). Residential uses are common along major City roads and that development pattern will persist into the foreseeable future. While the residential development pattern within the City is well established, even along major roads, there are residential areas that are appropriate for a transition from residential to non-residential uses. Those residential areas that can be suitable for a transition to non-residential uses are associated with existing nodes of commercial activity clustered around the intersections of major roads. The nodal approach to business land use allocation is diametric to a linear, highway flanking strip commercial development pattern that radiates for long distances along major roads. Strip commercial development patterns are rife with traffic, driveway cuts, safety challenges, and generally poor aesthetic characteristics.

   The amendment area is located in the vicinity of an existing strategic commercial intersection on the southeast corner of Saxon Blvd./Normandy Blvd. The Saxon Boulevard corridor between Interstate 4 and Normandy Blvd. has been gradually growing into a commercial corridor. A recent example is the RaceTrac development located at the northeast corner of the intersection of Saxon Blvd. and W. Finland Dr. However, compatibility with the existing adjacent neighborhoods is important. Therefore, any commercial development will be reviewed during the site plan approval process for consistency with **Policy FLU1-5.13** which states:

   Policy FLU1-5.13
   In implementing the Future Land Use Element, the City shall develop and adopt regulations to ensure to the maximum extent feasible, compatibility of use of areas and properties, including but not limited to such factors as traffic circulation, air quality and odor control, noise control, lighting and aesthetics.

Safeguards such as setbacks, landscape buffers, traffic circulation standards, and architectural development standards mentioned in the above policy, will help integrate a commercial use into the area will minimal impact. Therefore, any redevelopment activity associated with this rezoning request will be subject to requirements intended to ensure compatibility with the adjacent neighborhood.

As it has been stated, the subject site is also within the Southwest Deltona Community Redevelopment Area (CRA). Being within the CRA signifies the subject site is in an area that has been assessed with a need for redevelopment. Additionally, City workshops have been performed to receive valuable input from the community to develop a Community Redevelopment Plan. This project will advance the CRA's mission and vision to redevelop blighted areas. This application ensures that the following Southwest Deltona CRA Primary Objectives are being promoted:

Primary Objective 4: *Ensure regulatory measures are in place to promote the redevelopment of attractive, safe, viable, and sustainable commercial nodes along Deltona/Normandy/Saxon Boulevards. These strategies will correct the blighted conditions of defective or unsafe conditions (Pgs. 23-25 of the Finding of Necessity Report); and deterioration of site or other improvements (Pgs. 16-20 of the Finding of Necessity Report).*

Primary Objective 5: *Create attractive, safe, viable, and sustainable commercial corridors along Deltona/Normandy/Saxon Boulevards. These strategies will correct the blighted conditions of faulty lot layout (Pgs. 18, 23, and 24 of the Finding of Necessity Report); unsafe conditions (Pgs. 23 – 25 of the Finding of Necessity Report); and deterioration of site or other improvements (Pgs. 16, 17 and 24 of the Finding of Necessity Report).*

Primary Objective 8: *Encourage parcel assembly to facilitate redevelopment of the redevelopment area within commercial nodes along the Saxon/Normandy/Deltona Corridors. The below strategies will correct the blighted conditions of faulty lot layout in relation to size, adequacy, accessibility, or usefulness (Pgs. 18, 19, 23 and 24 of the Finding of Necessity Report).*

The site will enhance commercial services for the community and surrounding neighborhoods along a prominent intersection within the City. Staff finds that the change from R-1 to C-1 will have no negative effects on the public health, welfare, safety or morals of the City.

CONCLUSION/STAFF RECOMMENDATION:

The City remains underserved by commercial uses, and the proposed C-1 rezoning application will foster greater commercial opportunity within the City. Greater commercial opportunity will also help address the City's over reliance on a tax base dominated by residential uses. Promoting more commercial development and tax base diversification are long standing City goals. However, in the case of this rezoning application, these goals will not be furthered at the expense of land use compatibility. The requested C-1 zoning is neighborhood oriented and the C-1 is intended to serve and be compatible with residential areas. The proposed rezoning is consistent with the Comprehensive Plan and can be served by existing public infrastructure (roads, central water and sewer). Finally, the amendment area will serve existing residential areas and reduce the need for residents to leave the City for goods and services, while upgrading from the blighted state of the existing structures along one of the City's strategic intersections. The Planning and Development Services Staff recommends the City Commission approve this rezoning application from R-1 to C-1.

ORDINANCE NO. 36-2016

AN ORDINANCE OF THE CITY OF DELTONA, FLORIDA, AMENDING THE OFFICIAL ZONING MAP PURSUANT TO CHAPTER 110, SECTION 1101, OF THE CITY CODE OF ORDINANCES NINE (9) PARCELS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF SAXON AND NORMANDY BOULEVARDS FROM SINGLE-FAMILY RESIDENTIAL (R-1) TO RETAIL COMMERCIAL (C-1); PROVIDING FOR CONFLICTS, SEVERABILITY, AND EFFECTIVE DATE.

WHEREAS, the City of Deltona has received an application to amend the zoning for the property located at 1878 Saxon Boulevard, legally described as follows:

WHEREAS, Section 50-28 of Chapter 50 has become inapplicable to current City operations and City staff has determined that revisions to Section 50-28 of Chapter 50 are warranted; and

WHEREAS, the City of Deltona, Florida and its Land Planning Agency have complied with the requirements of the Municipal Home Rule Powers Act, sections 166.011 et. seq., Florida Statutes, in considering the proposed rezoning from Single Family Residential (R1) to Retail Commercial (C-1); and

WHEREAS, after said public hearing, the City Commission of the City of Deltona, Florida, has determined that the C-1 zoning is consistent with the Comprehensive Plan of the City of Deltona, Florida.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COMMISSION OF THE CITY OF DELTONA, FLORIDA, as follows:

Section 1. Located in the City of Deltona, Florida, the zoning for the following property is hereby amended to C-1 as described as:

LOTS 23, 24, 25, 39, 40, 41, 42, 43 & 44, BLOCK 86, DELTONA LAKES, UNIT THREE, ACCORDING TO THE MAP OR PLAT BOOK 25, PAGE 105-120, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.

Section 2. This Ordinance is adopted in conformity with and pursuant to the Comprehensive Plan of the City of Deltona, the Local Planning and Land Development Act, Sections 163.161 et. seq., Florida Statues, and the Municipal Home Rule Powers Act et. seq., Florida Statues.

Section 3. Conflicts. Any and all Ordinances or parts of Ordinances in conflict herewith are hereby repealed.

Section 4. Severability. If any provision of this ordinance or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect any other provision or application of this ordinance which can be given effect without the invalid provision or application.

Section 5. Effective Date. This Ordinance shall take effect immediately upon its final adoption by the City Commission.

PASSED AND ADOPTED BY THE CITY COMMISSION OF THE CITY OF DELTONA, FLORIDA THIS _____ DAY OF _____, 2017.

First Reading: _____

Advertised: _____

Second Reading: _____

BY: _____
JOHN C. MASIARCZYK, SR., Mayor

ATTEST:

_____
JOYCE RAFTERY, CMC, MMC, City Clerk

Approved as to form and legality
for use and reliance of the City of
Deltona, Florida

_____
GRETCHEN R. H. VOSE, ESQ., City Attorney

CR 4154 (NORMANDY BLVD)
CR 4146 (SAXON BLVD)
FARLEY CT
AERIAL PHOTO
Legend
Subject Parcels
City Boundary
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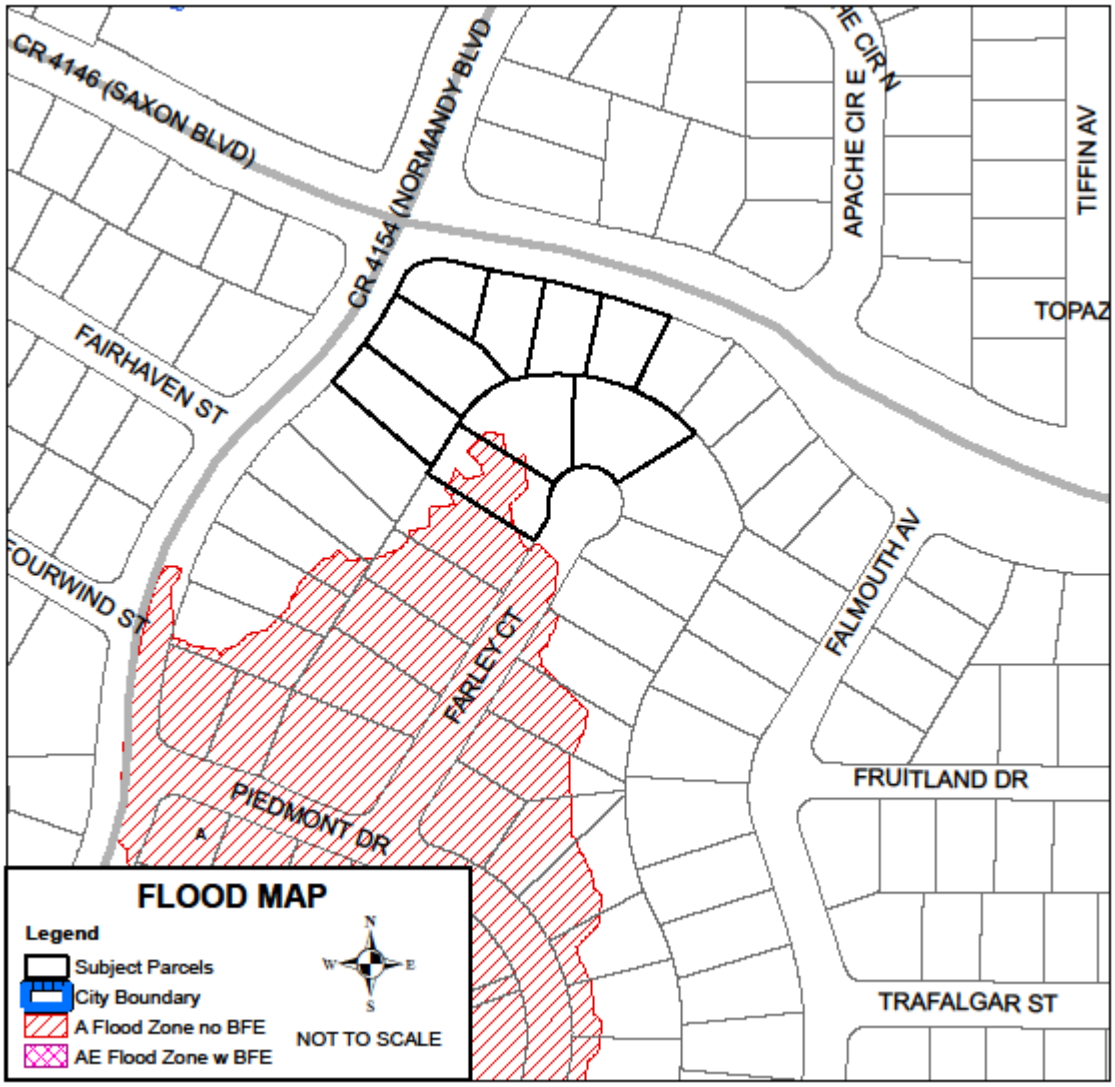
NOT TO SCALE


CR 4146 (SAXON BLVD)
CR 4154 (NORMANDY BLVD)
APACHE CIR E
TIFFIN AV
TOPAZ
FAIRHAVEN ST
FOURWIND ST
FARLEY CT
FALMOUTH AV
FRUITLAND DR
PIEDMONT DR
TRAFALGAR ST
FLOOD MAP
Legend
Subject Parcels
City Boundary
A Flood Zone no BFE
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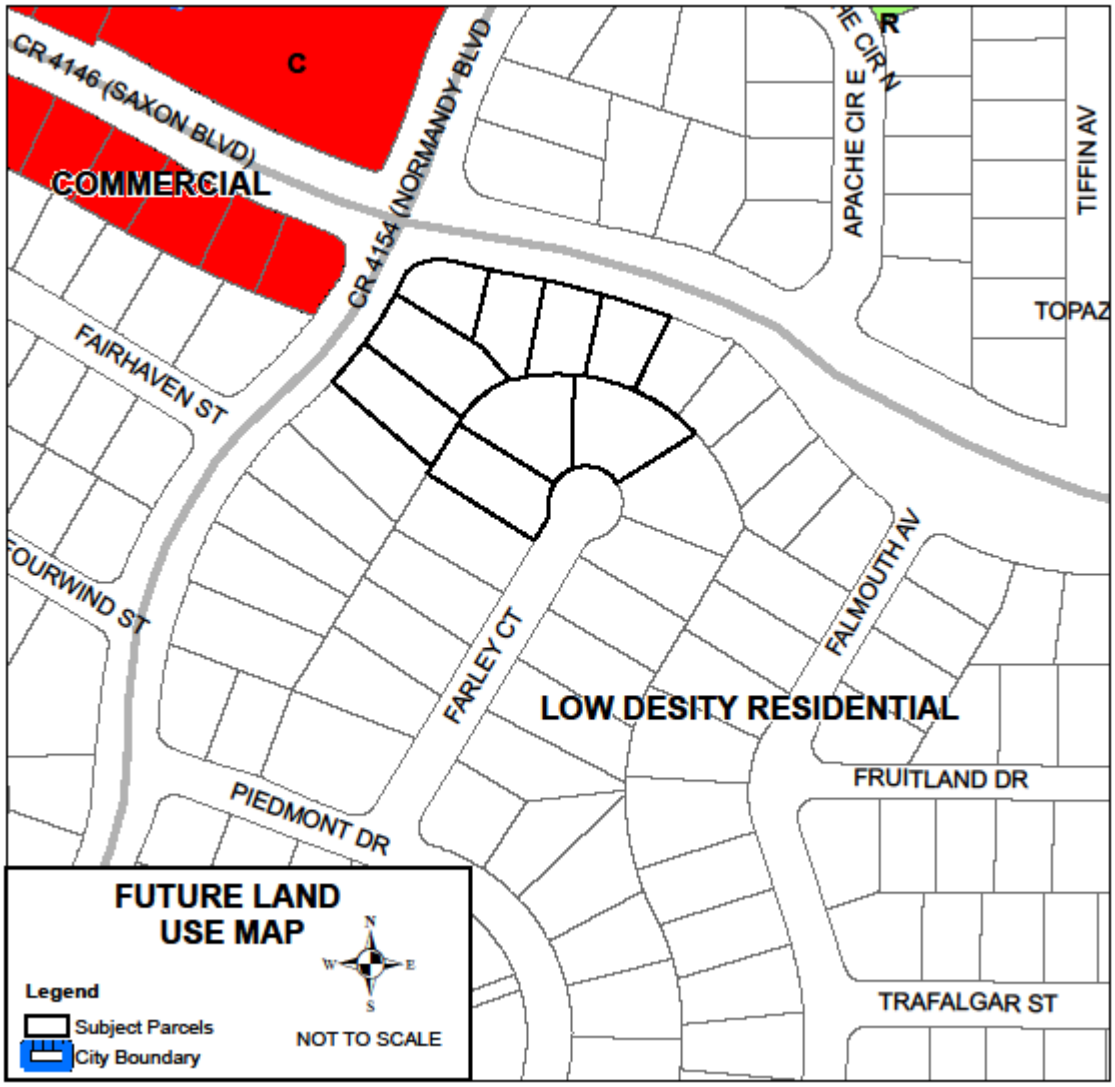
C
R
CR 4146 (SAXON BLVD)
COMMERCIAL
CR 4154 (NORMANDY BLVD)
APACHE CIR E
TIFFIN AV
TOPAZ
FAIRHAVEN ST
FOURWIND ST
FARLEY CT
FALMOUTH AV
LOW DESITY RESIDENTIAL
FRUITLAND DR
PIEDMONT DR
TRAFALGAR ST
FUTURE LAND USE MAP
N
W
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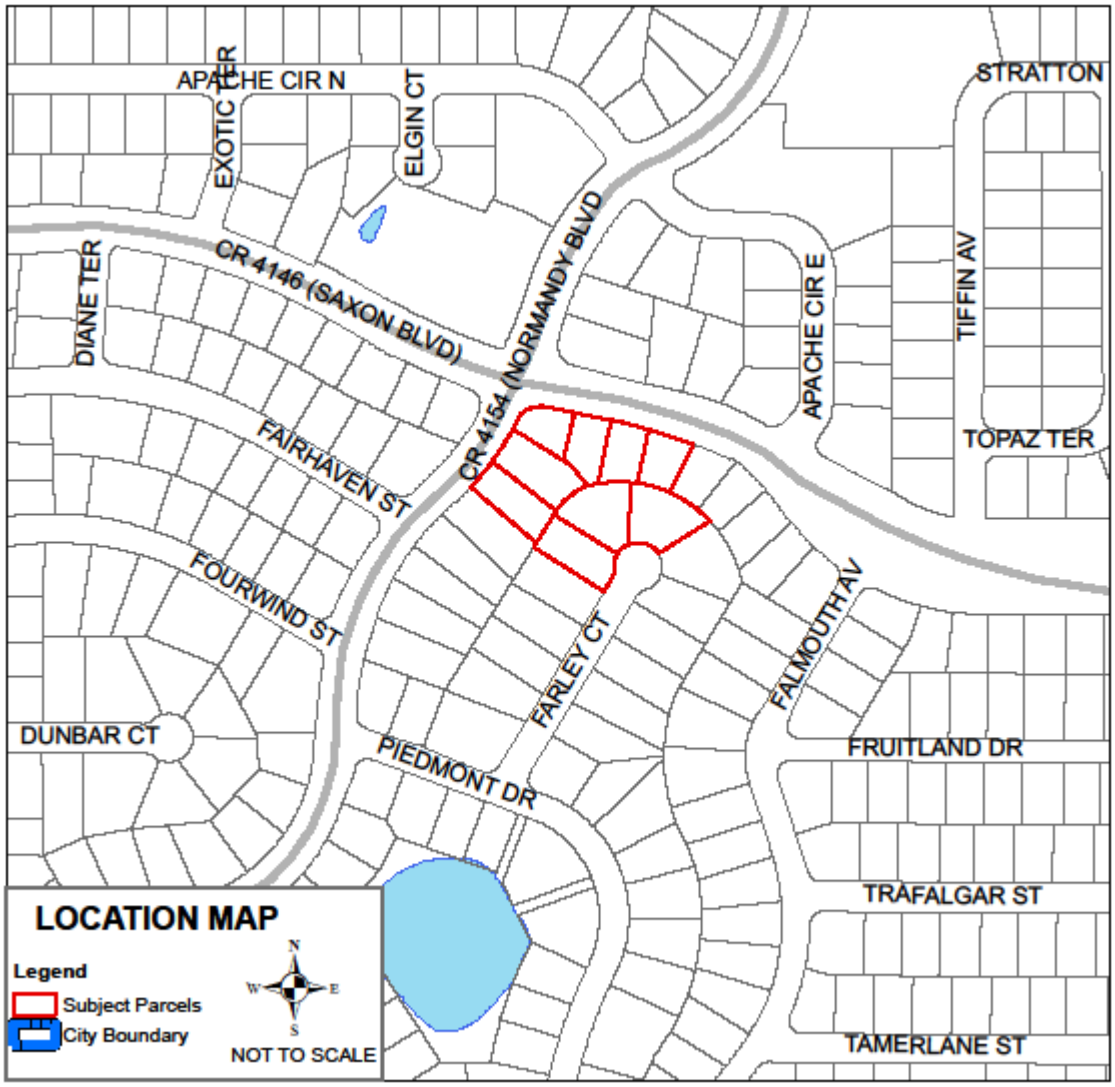
Legend
Subject Parcels
City Boundary
NOT TO SCALE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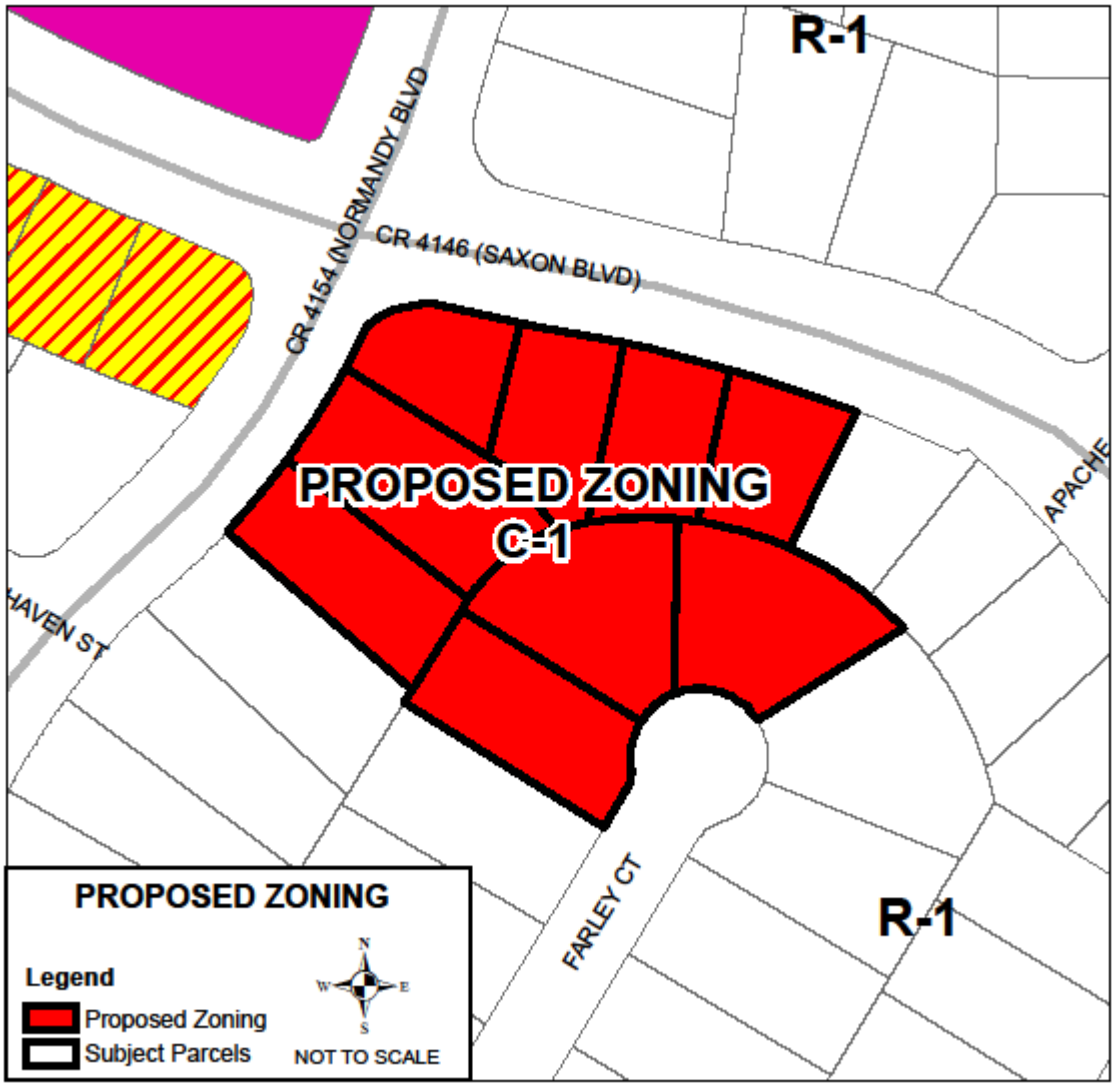
DUNBAR CT
PIEDMONT DR
FRUITLAND DR
TRAFALGAR ST
TAMERLANE ST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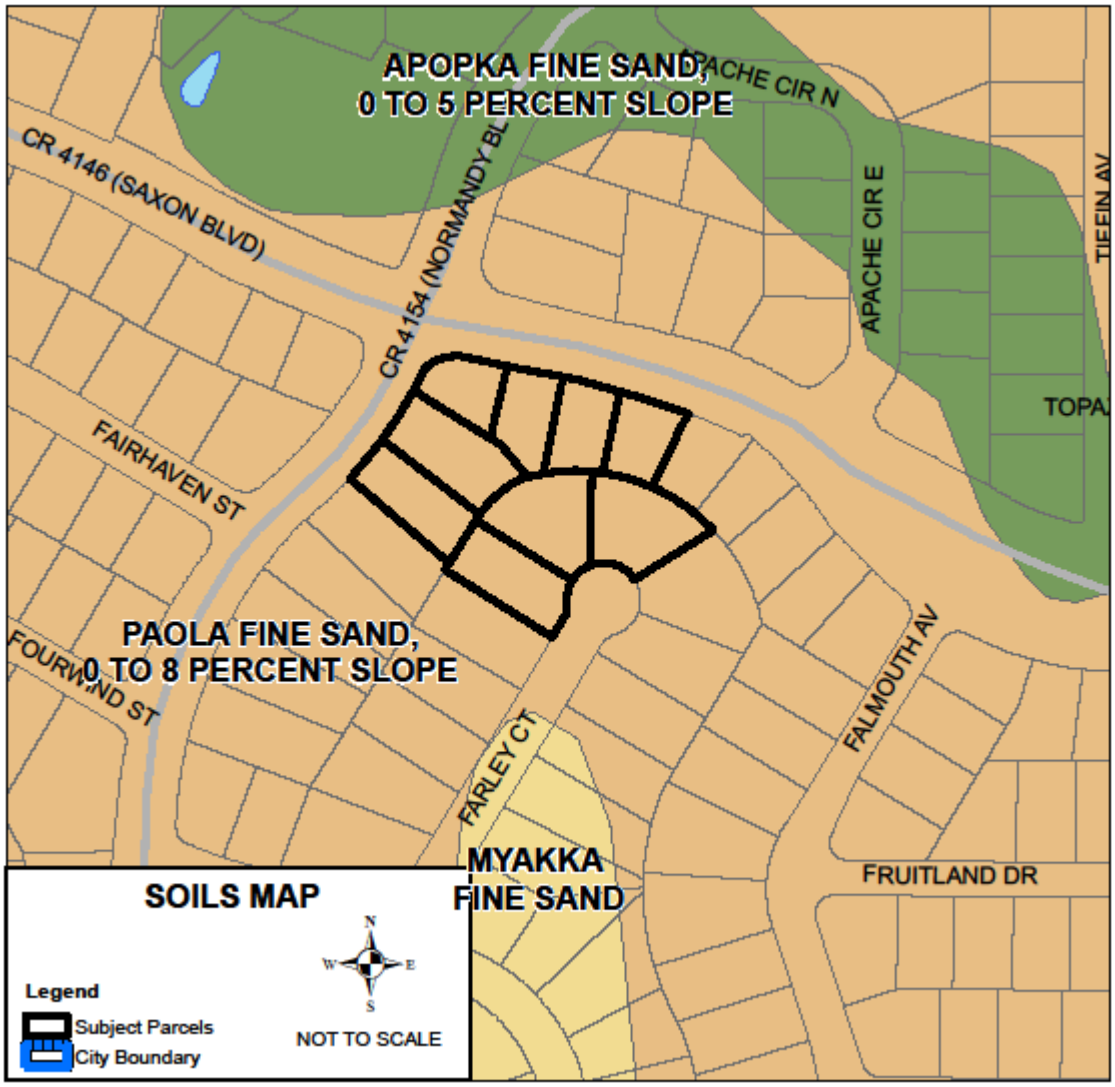
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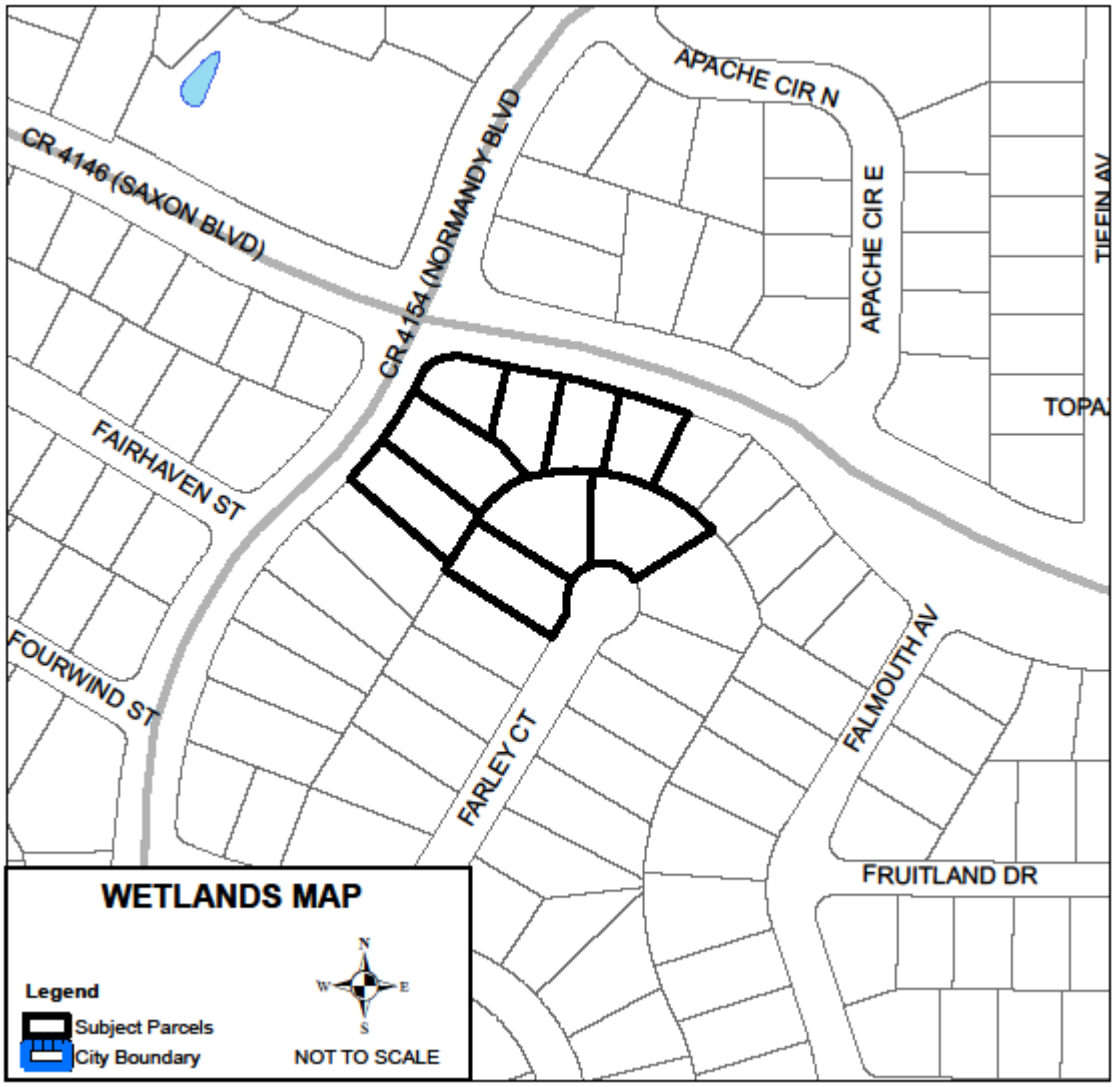
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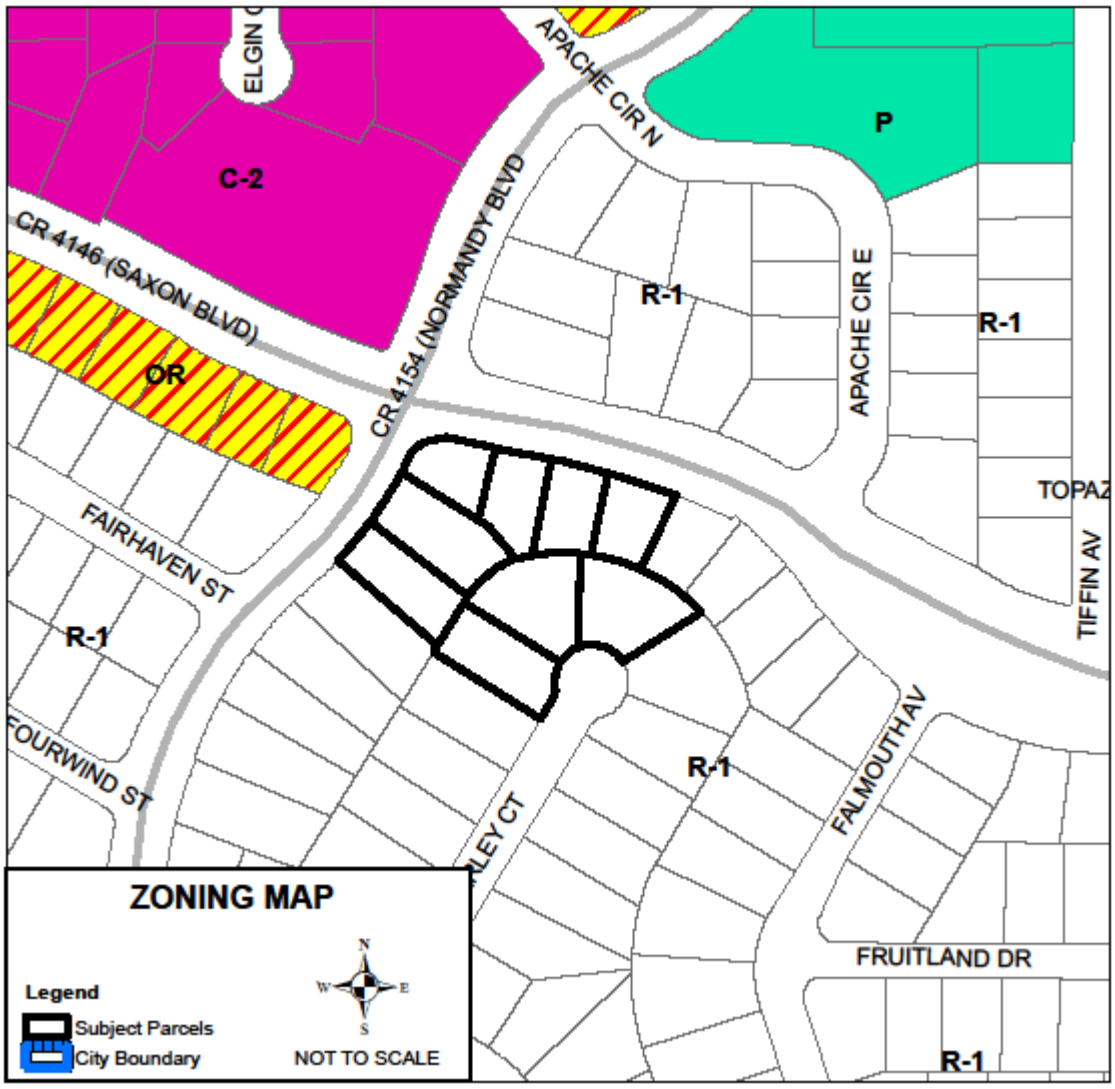
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CR 4154 (NORMANDY BLVD
FAIRHAVEN ST
FOURWIND ST
TOPAZ
TIFFIN AV
FALMOUTH AV
FRUITLAND DR

TRAFFIC IMPACT STUDY

CONVENIENCE MARKET
WITH GASOLINE PUMPS
CITY OF DELTONA, FLORIDA

Prepared for:

Holub Development Company
Post Office Box 730086
Ormond Beach, Florida 32173

Prepared by:

Traffic Planning and Design, Inc.
535 Versailles Drive
Maitland, Florida 32751
407-628-9955

Revised
January 2017

TPD № 4755

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: Convenience Market with Gasoline Pumps

LOCATION: Deltona, Florida

CLIENT: Holub Development Company

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.

NAME: Turgut Dervish, P.E.

P.E. No.: 20400

DATE: January 3, 2017

SIGNATURE: _____

TURGUT DERVISH
LICENSE
No. 20400
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

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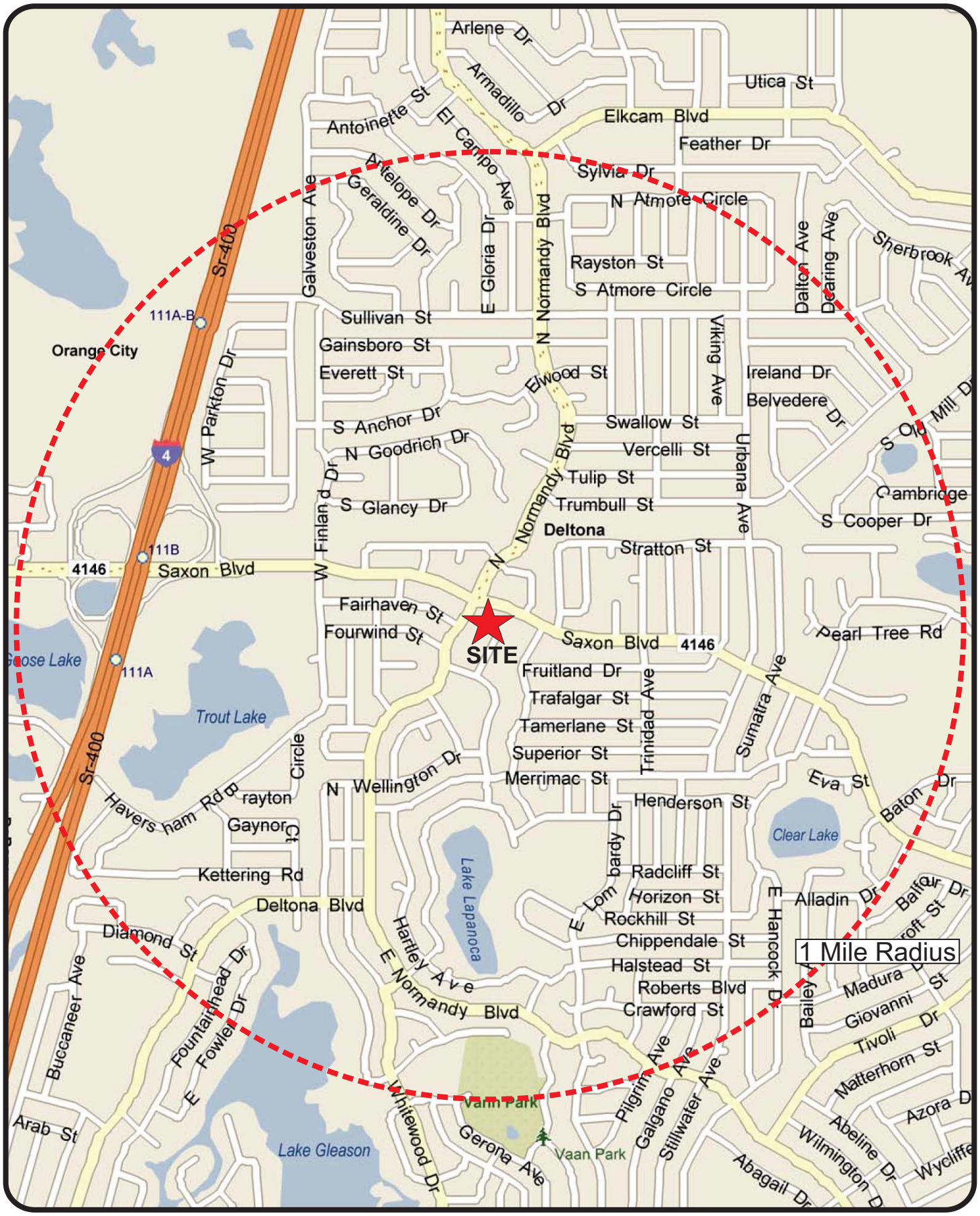
INTRODUCTION

This analysis was undertaken in order to assess the traffic impact of a proposed convenience market with gasoline pumps in Deltona, Florida. Located in the southeast corner of Saxon Boulevard and Normandy Boulevard, the development will consist of a 5,943 square foot building with 16 fueling positions. Access to the site will be provided via driveways on Saxon Boulevard and Normandy Boulevard. Saxon Boulevard is a four-lane arterial with an east-west orientation. Normandy Boulevard is a north-south major collector which has four lanes north of Saxon Boulevard and two lanes south of Saxon Boulevard. **Figure 1** depicts the site location.

The traffic analysis was performed in accordance with the River to Sea Transportation Planning Organization (R2C TPO) guidelines as documented in a study methodology submitted to the City as well as the County. This study methodology and related correspondence are included in **Appendix A**. Data used in the analysis consisted of site plan/development information provided by Project Engineers, roadway segment data obtained from the Volusia County 2014 Average Annual Daily Traffic and Historical Counts spreadsheets. Additionally Traffic Planning and Design, Inc. (TPD) personnel conducted a field survey of the area roadways and collected A.M./P.M. peak hour counts at study intersections.



Convenience Market with Gasoline Pumps
Project № 47554
Figure 1

Site Location

N
NTS

EXISTING CONDITIONS ANALYSIS

Existing conditions were analyzed within an area where the proposed development trips significantly impact roadways as per R2C TPO Guidelines utilizing a 3% significance. Based upon the significance test conducted in the study methodology, the proposed development will not significantly impact any roadway segment in the area. Therefore, the following roadway segments to which the site has access connections were included in the analysis:

- Saxon Boulevard, Normandy Boulevard to Tivoli Drive
- Normandy Boulevard, Saxon Boulevard to Deltona Boulevard

The following intersections were identified in consultation with the City and County for inclusion in the study:

- Saxon Boulevard and Finland Drive
- Saxon Boulevard and Normandy Boulevard
- Saxon Boulevard and Sterling Silver Boulevard
- Saxon Boulevard and Tivoli Drive
- Normandy Boulevard and Deltona Boulevard

Capacity analyses were performed for the study roadway segments and intersections for the existing traffic to establish their current operating conditions in terms of Levels of Service.

Roadway Segment Analysis

The roadway segments were analyzed by comparing the existing P.M. peak hour volumes of the segments with the corresponding capacities at the adopted LOS standard. The existing P.M. peak hour segment volumes were determined from the P.M. peak hour counts made at the study intersections. The peak hour roadway capacities were obtained from Volusia County's 2015 Average Annual Daily Traffic and Historical Counts. A summary of the peak hour roadway capacity analysis is presented in **Table 1**. The existing conditions analysis reveals that the study roadway segments currently operate at a satisfactory Levels of Service.

Table 1
Existing Peak Hour Roadway Capacity Analysis

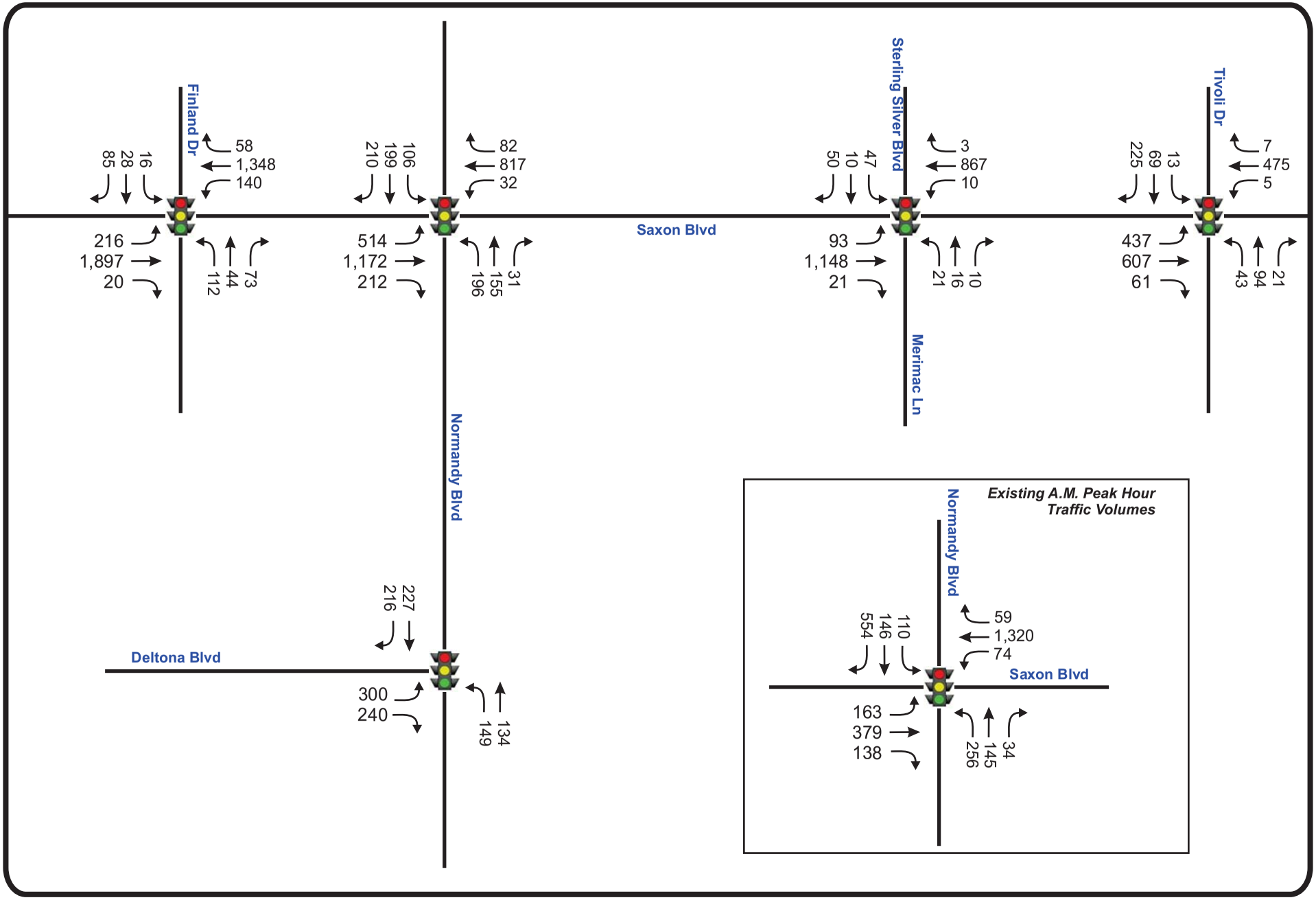
Roadway Segment	# of Lns	Area Type	LOS Standard*	Peak Hour Two-Way Capacity**	Existing Two-Way Peak Hour Volume***	V/C Ratio	Existing LOS
Saxon Boulevard							
Normandy Boulevard to Tivoli Drive	4	U	E	3,410	2,240	0.66	C
Normandy Boulevard							
Saxon Boulevard to Deltona Boulevard	2	U	E	1,015	877	0.86	D

* Obtained from the City of Deltona Transportation Element
** Obtained from Volusia County 2015 AADT & Historical Counts
*** Obtained from P.M. Peak Hour Intersection Counts

Intersection Analysis

A capacity analysis was conducted for each intersection using the latest version of the *Highway Capacity Software (HCS)* in accordance with the procedures of the 2010 *Highway Capacity Manual (HCM)*. The capacity analysis was performed using the existing intersection geometry, peak hour traffic volumes and signal timing data. The intersection of Saxon Road/Normandy Boulevard was analyzed for both the A.M. and P.M. peak hours. The other intersections were analyzed for the P.M. peak hour. The A.M./P.M. peak hour traffic volumes were determined from turning movement counts made at the study intersections during the 7-9 A.M. and 4:30-7:00 P.M. time periods. These counts are included in **Appendix B** along with signal timing data provided by Volusia County Traffic Engineering. The intersection peak hour volumes are displayed in **Figure 2.**

The intersection capacity analysis results are summarized in **Table 2** and detailed HCS worksheets are provided in **Appendix C.** This analysis indicates that the study intersections currently operate at overall satisfactory Levels of Service. At the Saxon Boulevard/Normandy Boulevard the southbound approach experiences delays in the A.M. peak hour due to the relatively heavy right turning movements.



Convenience Market with Gasoline Pumps
Project № 4755
Figure 2

Existing P.M. Peak Hour Traffic Volumes

Table 2
Existing Intersection Capacity Analysis

Intersection	Control	Period	EB		WB		NB		SB		Overall	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Saxon Boulevard & Finland Drive	Signal	P.M	65.1	E	48.8	D	55.5	E	48.1	D	57.8	E
Saxon Boulevard & Normandy Boulevard	Signal	A.M. P.M.	38.1 41.0	D D	61.5 62.6	E E	61.9 57.3	E E	104.4 61.4	F E	66.6 50.8	E D
Saxon Boulevard & Sterling Silver Boulevard	Signal	P.M	12.4	B	14.6	B	28.7	C	22.1	C	14.1	B
Saxon Boulevard & Tivoli Drive	Signal	P.M	20.9	C	34.3	C	26.2	C	28.7	C	25.6	C
Normandy Boulevard & Deltona Boulevard	Signal	P.M	17.2	B	--	--	9.0	A	17.5	B	15.5	B

TRIP GENERATION AND PROPOSED DEVELOPMENT

The proposed development consists of a 5,943 square foot convenience market with gasoline pumps. **Figure 3** depicts the site plan, building layout and access configuration. The development is envisioned to be completed within two years or by 2018. To determine the impact of this development in the area, an analysis of its trip generation characteristics was made. This included the determination of the trips to be generated and the distribution/assignment of these trips to the area roadways.

Trip Generation

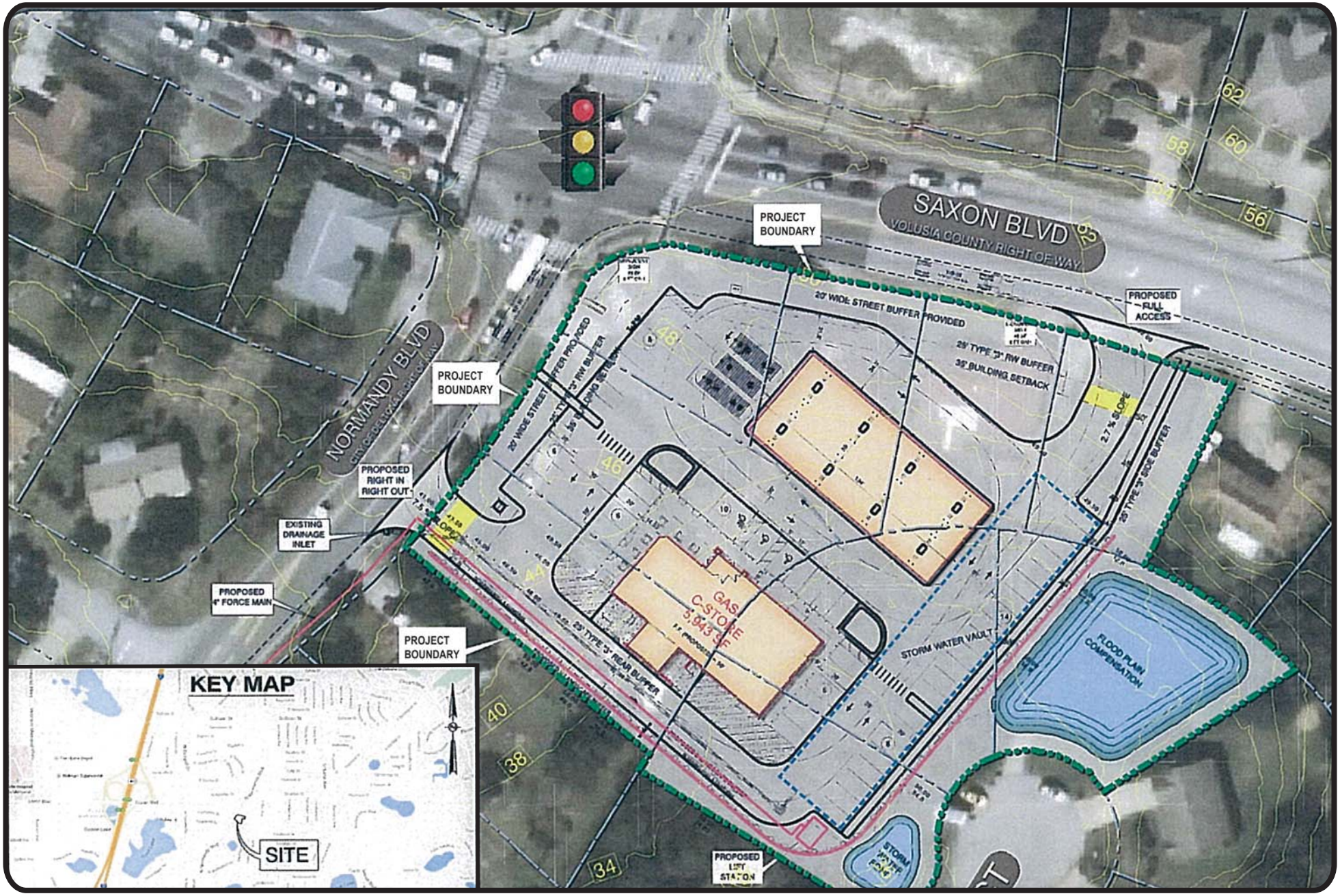
The trip generation of the proposed development was calculated with the use of data obtained from the *9th Edition* of the *Institute of Transportation Engineers* (ITE) *Trip Generation Manual.* This calculation is summarized in **Table 3** which shows the project's daily and A.M./P.M. peak hour generation. At the request of Volusia County, vehicle fueling positions (instead of square feet) were used in the trip generation calculation. Interestingly, the use of square feet instead of fueling positions would result in the same P.M. peak hour trips. The pass-by trip capture percentages shown in the table were obtained from the *3rd Edition of the ITE Trip Generation Handbook.* Subtracting the pass-by trips results in new net trips to be added to the area roadways. Reference pages from the Trip Generation Manual and Trip Generation Handbook are included in in the study methodology.

Table 3
Trip Generation Summary

Land Use	ITE Code	Quantity (VFP)*	Daily		A.M. Peak Hour				P.M. Peak Hour			
			Rate	Trips	Rate	Enter	Exit	Total	Rate	Enter	Exit	Total
Convenience Market w/Gasoline Pumps	853	16	542.60	8,682	16.57	132	133	265	19.07	152	153	305
Total Trips				**8,683**	**-----**	**132**	**133**	**265**	**-----**	**152**	**153**	**305**
Pass-by Trips (63% A.M./66% P.M.)				5,601	-----	83	84	167	-----	100	101	201
Net New Trips				**3,082**	**-----**	**49**	**49**	**98**	**-----**	**52**	**52**	**104**

* VFP = Vehicle Fueling Positions

The proposed development is estimated to generate 3,082 net new daily trips, of which 98 will occur in the A.M. peak hour and 104 in the P.M. peak hour. Background traffic on the adjacent roadways was checked to insure that the pass-by trips did not exceed the 14% threshold as per the R2C TIA Guidelines.



Convenience Market with Gasoline Pumps
Project № 4755
Figure 3

Site Plan and Access Configuration

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Trip Distribution/Trip Assignment

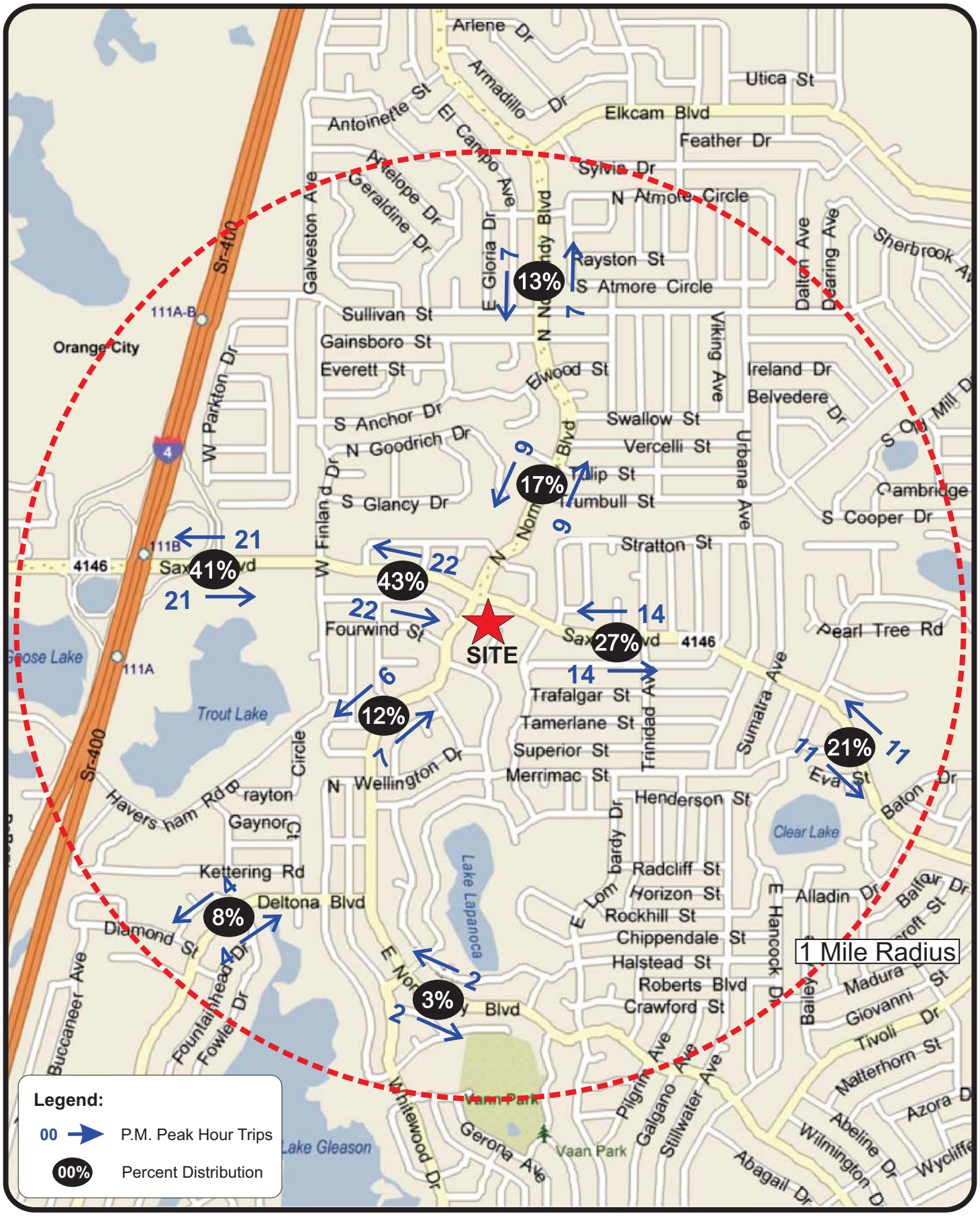
The distribution of the development's new trips was estimated with the use of the CFRPM model. Prior to the use of this model, a minor modification was made to add a traffic analysis zone representing the project. Subsequently, the model was run with a select zone analysis to obtain a distribution pattern for the project's new trips. The trip distribution pattern in the project vicinity is graphically shown in **Figure 4** and the model distribution plot is included in the study methodology. This distribution pattern was used to assign the project's new trips to the area roadways also shown in Figure 4. The project's pass-by trips will be assigned to the project entrances based upon the directional distribution of existing traffic on the adjacent roadways.

Critical/Near-Critical Segment Analysis

Based upon the information provided by Volusia County, there are several critical/near-critical roadway segments within a one-mile radius of the site. A map provided by Volusia County is included in the study methodology. The project's impact on the critical/near-critical segments is quantified in **Table 4**. This table shows that the project will have a de minimis or no significant impact on these roadway segments.

Table 4
Critical/Near-Critical Segment Analysis

Roadway Segment	2-way Peak Hour		V/C Ratio	Project Trips			Impact
	Capacity	Volume		Distribution	Volume	As % of Capacity	
Critical Roadways							
I-4							
Dirksen Drive to Saxon Boulevard	10,060	8,982	0.89	16%	17	0.17%	De minimis
Near-Critical Roadways							
I-4							
Saxon Boulevard to SR 472	10,060	8,055	0.80	12%	13	0.13%	De minimis
Saxon Boulevard							
I-4 to Finland Drive.	3,410	3,678	1.08	41%	43	1.26%	Not Significant
Finland Drive to Normandy Boulevard	3,410	3,532	1.04	43%	45	1.32%	Not Significant
Normandy Boulevard							
Saxon Boulevard to Deltona Boulevard	960	877	0.91	12%	13	1.35%	Not Significant
Deltona Boulevard to Tivoli Drive	960	750	0.78	4%	4	0.42%	Not Significant



Convenience Market with Gasoline Pumps
Project № 4755
Figure 4

Project Trip Distribution and Assignment

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PROJECTED TRAFFIC CONDITIONS

Projected traffic conditions for the project buildout in 2018 were analyzed using peak hour traffic volumes for the study roadway segments and intersections. The analysis was conducted for the projected background traffic volumes plus vested trips and project trips. Background traffic was determined by applying a growth factor to existing traffic. A trends analysis of historical AADT data obtained from Volusia County on Saxon Boulevard revealed a negative growth trend in the area. The trends analysis charts are included in **Appendix D**. Therefore, a minimum of 2% annual growth was used in the background traffic estimation. Background traffic volumes were then combined with vested trips from the RaceTrac located at Finland Drive and Saxon Boulevard (currently under construction) plus project trips to obtain total traffic volumes. The Saxon Sterling Silver office/retail development and the Halifax Medical Center identified for inclusion in the background traffic have already been constructed and their trips are included in the counts made at the study intersections.

Roadway Segment Analysis

A roadway segment analysis was performed for the study segments by comparing the projected P.M. peak hour volumes of the segment with the corresponding capacities at the adopted LOS standard. The analysis is summarized in **Table 5**. The results of the analysis show that the study roadway segments will continue to operate at a satisfactory Levels of Service in the projected conditions.

Table 5
Projected P.M. Peak Hour Roadway Capacity Analysis

Roadway Segment	# of Lanes	Area Type	LOS Capacity	2-way Pk Hr Capacity*	Two-Way Peak Hour Volumes				V/C Ratio	Projected LOS
					Back-ground**	Vested***	Project	Total		
Saxon Boulevard										
Normandy Boulevard to Tivoli Drive	4	U	E	3,410	2,330	54	41	2,428	0.71	C
Normandy Boulevard										
Saxon Boulevard to Deltona Boulevard	2	U	E	1,015	912	13	18	943	0.93	D

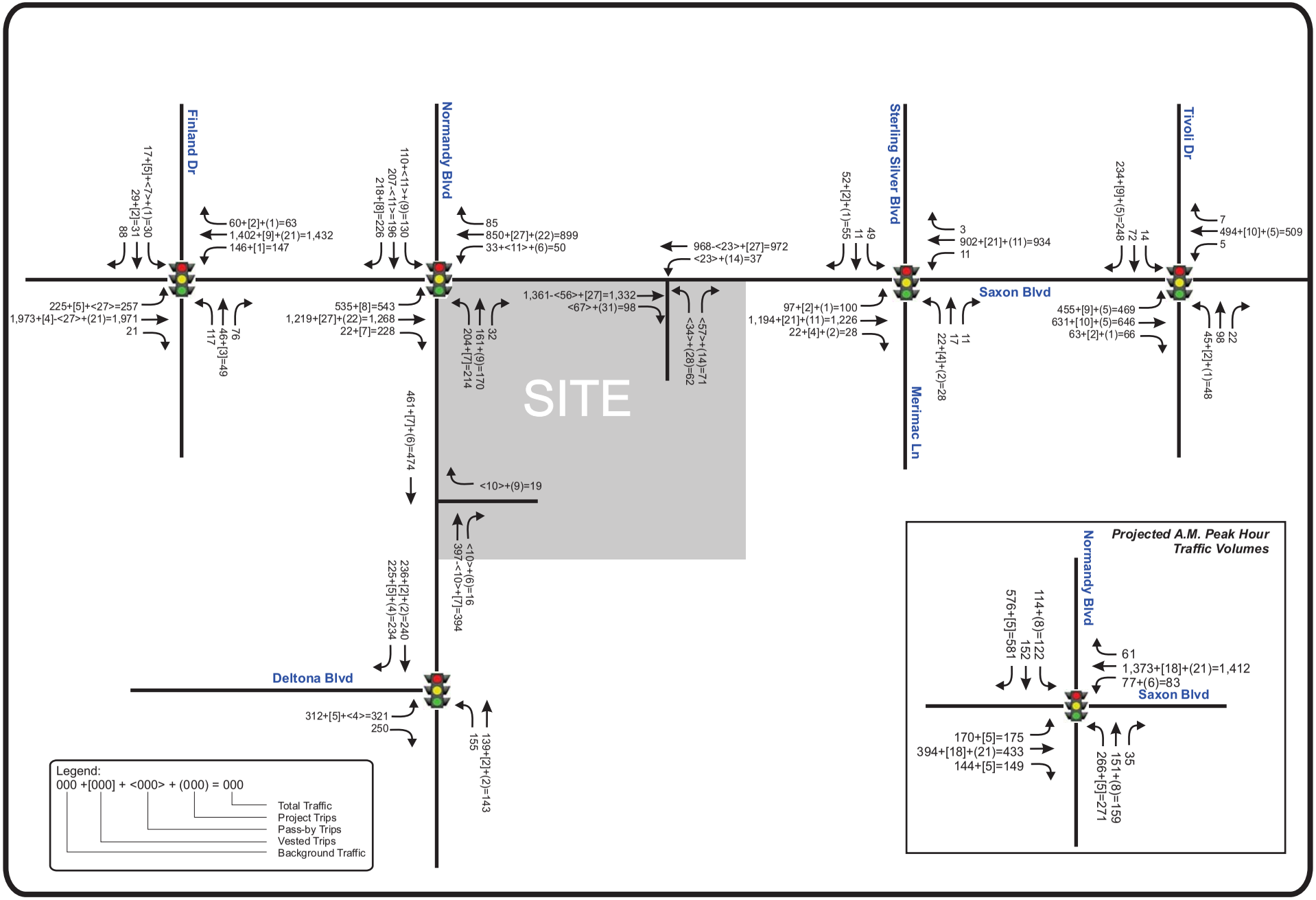
* Obtained from Volusia County 2015 AADT & Historical Counts
** Existing Traffic Volume X 1.04
*** Obtained from the Traffic Impact Study for the RaceTrac Gas Station @ Saxon Boulevard and Finland Drive

Intersection Analysis

To assess the projected operating conditions at the study intersections, intersection capacity analyses were conducted using projected A.M./P.M. peak hour traffic volumes. The analysis was conducted similar to the existing conditions analysis utilizing the procedures of the *Highway Capacity Manual (HCM)* and HCS software. **Figure 5** shows the projected A.M./P.M. peak hour turning movements for the study intersections/site access driveways consisting of background traffic, vested trips and project trips. Background traffic shown in the figure was determined by applying an annual growth rate as discussed previously. The projected Levels of Service are summarized in **Table 6** which shows that the study intersections will continue to operate at overall satisfactory Levels of Services in the projected conditions. As was the case with existing conditions, the southbound approach at Saxon Boulevard/Normandy Boulevard intersection will experience delays in the A.M. peak hour due to the heavy right turning movements. The project is not adding trips to this movement. The site access driveways proposed at locations on Saxon Boulevard and Normandy Boulevard will also operate at satisfactory Levels of Service. The criteria for the design and construction of the driveways will be further discussed/reviewed by the City. The HCS analysis worksheets are included in **Appendix E**.

Table 6
Projected Intersection Capacity Analysis

Intersection	Control	EB		WB		NB		SB		Overall	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Saxon Boulevard & Finland Drive	Signal	76.2	E	67.3	E	69.3	E	51.0	D	71.5	E
Saxon Boulevard & Normandy Boulevard (AM)	Signal	46.0	D	78.0	E	71.4	E	118.4	F	79.5	E
Saxon Boulevard & Normandy Boulevard (PM)	Signal	51.8	D	75.6	E	63.7	E	61.4	E	60.4	E
Saxon Boulevard & Sterling Silver Boulevard	Signal	12.7	B	14.8	B	30.7	C	23.7	C	14.5	B
Saxon Boulevard & Tivoli Dive	Signal	37.3	D	41.1	D	27.9	C	30.8	C	36.5	D
Normandy Boulevard & Deltona Boulevard	Signal	17.9	B	-	-	9.3	A	18.2	B	16.1	B
Site Access @ Normandy Boulevard	STOP	-	-	10.9	B	-	-	0.6	A	-	-
Site Access @ Saxon Boulevard	STOP	-	-	0.5	A	38.0	E	-	-	-	-



Retail Commercial @ Saxon and Normandy
Project № 4755

Figure 5

Projected P.M. Peak Hour Traffic Volumes

Alternative Mode Analysis

An alternative mode analysis was conducted to ensure alternative modes of transportation were adequately considered as part of the project. In the existing condition, alternative modes of transportation in the area include both pedestrian and transit facilities. There are paved sidewalks along both sides of Saxon Boulevard adjacent to the proposed development. Also, there are sidewalks on both sides of Normandy Boulevard north of Saxon Boulevard. At the signalized intersection of Saxon Boulevard and Normandy Boulevard there are protected crosswalks on all four approaches of the intersection. In addition, Volusia County's public transit system, VOTRAN, operates one bus route, with one-hour headways, along Saxon Boulevard and Normandy Boulevard north of Saxon Boulevard. A map depicting the bus route is included in **Appendix F**. There are benches located on Saxon Boulevard and Normandy Boulevard in the vicinity of the project. The site plan will be designed with pedestrian features and connectivity to the adjacent sidewalks and benches.

STUDY CONCLUSIONS

This analysis was undertaken in order to assess the traffic impact of a proposed convenience market with gasoline pumps in Deltona, Florida. Located in the southeast corner of Saxon Boulevard and Normandy Boulevard, the development will consist of a 5,943 square foot building with 16 fueling positions. The results of the study as documented herein are summarized below:

- The proposed development is estimated to generate 3,082 net new daily trips, of which 98 will occur in the A.M. peak hour and 104 will occur in the P.M. peak hour

- Based on the significance test, no roadway segments will be significantly impacted by the proposed development. Therefore, the adjacent roadway segments to which the site has access connections were included in the analysis along with five intersections identified in consultation with the City and County. The roadway segments are currently operating at a satisfactory Level of Service and will continue to do so at project buildout in 2018.

- The study intersections along the significantly impacted roadway segment are currently operating at overall LOS E or better traffic conditions and will continue to operate similarly at project buildout. At the intersection of Saxon Boulevard/Normandy Boulevard, the southbound approach experiences delays during the A.M. peak hour and will continue to do so at project buildout in 2018. The project is adding zero traffic to this movement.

- Access to the project site will be provided by two access connections, one on Saxon Boulevard and the other on Normandy Boulevard. At the Saxon Boulevard access connection the existing two-way left turn lane will serve the project trips arriving from the east. The Applicant will further consult with the City regarding the criteria in the design and construction of the site driveways.

APPENDICES

APPENDIX A

Study Methodology and Correspondence

Turgut Dervish

From: Melissa Winsett <mwinsett@volusia.org>
Sent: Friday, April 08, 2016 8:37 AM
To: Turgut Dervish
Subject: Fwd: Convenience Store Normandy/Saxon TIA methodology comments
Attachments: VCTE comments TIA Meth April 2016.pdf

>>> Melissa Winsett 4/8/2016 8:35 AM >>>
Hello, Turgut-

The city reviewed our comments and requested that we send them to you. Please see the attached.

Melissa K. Winsett
Transportation Planner III
Transportation Planning, Engineering Studies, Development Review

Volusia County Traffic Engineering
123 W. Indiana Ave., Room 400
DeLand, FL 32720-4262

mwinsett@volusia.org
386-736-5968 x12322 (DeLand Area)
386-257-6000 x12322 (Daytona Area)
386-423-3300 x12322 (New Smyrna Area)

Fax 386-740-5242

>>> Melissa Winsett 4/6/2016 4:06 PM >>>
Ron and Chris,

Please see the attached TIA methodology comments. Please forward them to the applicants if you have no questions or concerns.

Thank you.

Melissa K. Winsett
Transportation Planner III
Transportation Planning, Engineering Studies, Development Review

Volusia County Traffic Engineering
123 W. Indiana Ave., Room 400
DeLand, FL 32720-4262

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386-736-5968 x12322 (DeLand Area)
386-257-6000 x12322 (Daytona Area)
386-423-3300 x12322 (New Smyrna Area)

Fax 386-740-5242

TIA METHODOLGY SUBMISSION CHECKLIST

Project Name: Convenience Market with Gas Pumps

Location: Saxon Blvd/Normandy Blvd, Deltona

TRANSPORTATION IMPACT ANALYSIS METHODOLOGY	DESCRIPTION	INFORMATION INCLUDED			
		YES	NO	N/A	Remarks[1]
	Type of TIA Methodology ☐ COMP PLAN ☐ REZONING ☐ SITE PLAN		x		Please provide information
	Description of proposed land uses		x		# of Gas Pumps?
	Proposed Build-out schedule		x		Please provide
	Conceptual Site Plan	x			
	Site Location relative to surrounding roadway network (map)	x			
	Analysis Period(s): ☐ AM ☐ Mid-Day x PM ☐ Weekend	x			See Comment
	Traffic Volume Counts (Day & Time)	x			
	Vested Trip Information (verify with nearby local government(s))		x		See Comment
	Proposed development trip generation x Daily x 2-Way Peak Hour ☐ Internal Capture x Pass By Capture (<14% Adjacent Road)	x			
	Proposed development trip distribution and assignment (map) x CFRPM ☐ by Engineering Judgment	x			
	ROADWAY SIGNIFICANCE TEST TABLE – (includes all roadway segments within test area, number of lanes, adopted LOS capacity (cite source), project distribution percentages, project trips, project trips/adopted capacity ratio, significance test check) ALONG WITH all Critical and Near-Critical map road segments within the appropriate radius (5-mile radius for all uses except Parks/Recreation uses (1.5 mile radius) and Convenience Stores (1-mile radius)	x			
	ANALYSIS MAP – 5-mile study area boundary including all Critical and Near-Critical road segments and intersections within the appropriate radius	x			1-mile radius
	Proposed roadway segments to be analyzed (list)	x			
	Proposed intersections segments to be analyzed (list)		x		Refer to additional intersections
	Proposed Critical and Near-Critical segments to be analyzed - list	x			
	Background Traffic ☐ CFRPM x Historical Growth Rate (state and justify proposed minimum)	x			Add vested trips (specifically RaceTrac & Saxon Sterling Silver)
	Segment Analysis ☐ Signalized Corridor Analysis Required if part of signal system				N/A
	Intersection Analysis x HCS ☐ Syncro ☐ Other	x			
	List scheduled improvements within first three years ☐ FDOT Work Program ☐ County CIP ☐ City CIP		x		Required in TIA
	Proposed Alternative Modes Study (commit to studying project's alternative mode needs associated with transit connection, pedestrian & bicycle facilities, school student access needs, etc. ☐Study to include TPO's Transit Development Design Guidelines		x		Required in TIA
	Transportation Improvements			x	N/A
	Concurrency mitigation strategy			x	N/A
	2nd Submission: Response to Previous Comments			x	N/A

1 – Remarks: Justify "NO" and "N/A"

Reviewed By: Jon Cheney, Melissa Winsett Date: 4-6-16

Volusia County FLORIDA

Volusia County
Traffic Engineering

Project Name: **Convenience Market with Gasoline Pumps**
Subject: **TIA methodology comments**
Date: **4-6-16**

Comments

1) Page 1: Please provide the buildout year and the type of development application (site plan, rezoning, etc.).

2) Trip Generation: Please provide the number of gasoline pumps that are proposed. If 8 are proposed, using the ITE #853 trip rate is acceptable using the square footage of the convenience store. However, if the number of fueling positions is 16, please use the number of Vehicle Fueling Positions to generate traffic.

3) Site Plan: In the TIA, please provide a more detailed site plan that depicts access. For distances between a signalized intersection and Intermediate or Major Driveway, please refer to Table V of the Volusia County Land Development Code. Please understand that Volusia County reserves the right to restrict access onto Saxon Blvd depending on driveway location distance to the signalized intersection at Saxon Blvd/Normandy Blvd.

4) Study Intersections: Please add:
    a. Saxon Blvd/Sterling Silver Blvd
    b. Saxon Blvd/Finland Drive
    c. Saxon Blvd/Normandy Blvd
        i. AM analysis is required due to citizens' concerns about heavy congestion, especially northbound left turns vs. southbound right turns.
        ii. Northbound left turn signal warrant required.

5) Traffic Impact Assessment/background traffic: Growth growth rates and vested trips need to be addressed and agreed upon *during the methodology phase* prior to moving into the TIA phase. The Racetrac at Saxon Blvd/Finland Drive is required to be analyzed as vested trips. Please contact the city to determine if any other developments should be considered (developments that have traffic volume that is not reflected in the county's 2014 AADTs) such as Saxon Sterling Silver.

6) TIA is required to include the list of scheduled improvements within the next three years.

7) Please include a Multimodal analysis that shows/describes how bicycles, pedestrian and transit users will access in and around the site.

TO: Chris Bowley, AICP
Melissa Winsett

FROM: Turgut Dervish, P.E.

DATE: March 29, 2016

RE: Convenience Market with Gasoline Pumps
Saxon Boulevard and Normandy Boulevard
City of Deltona
TPD № 4755

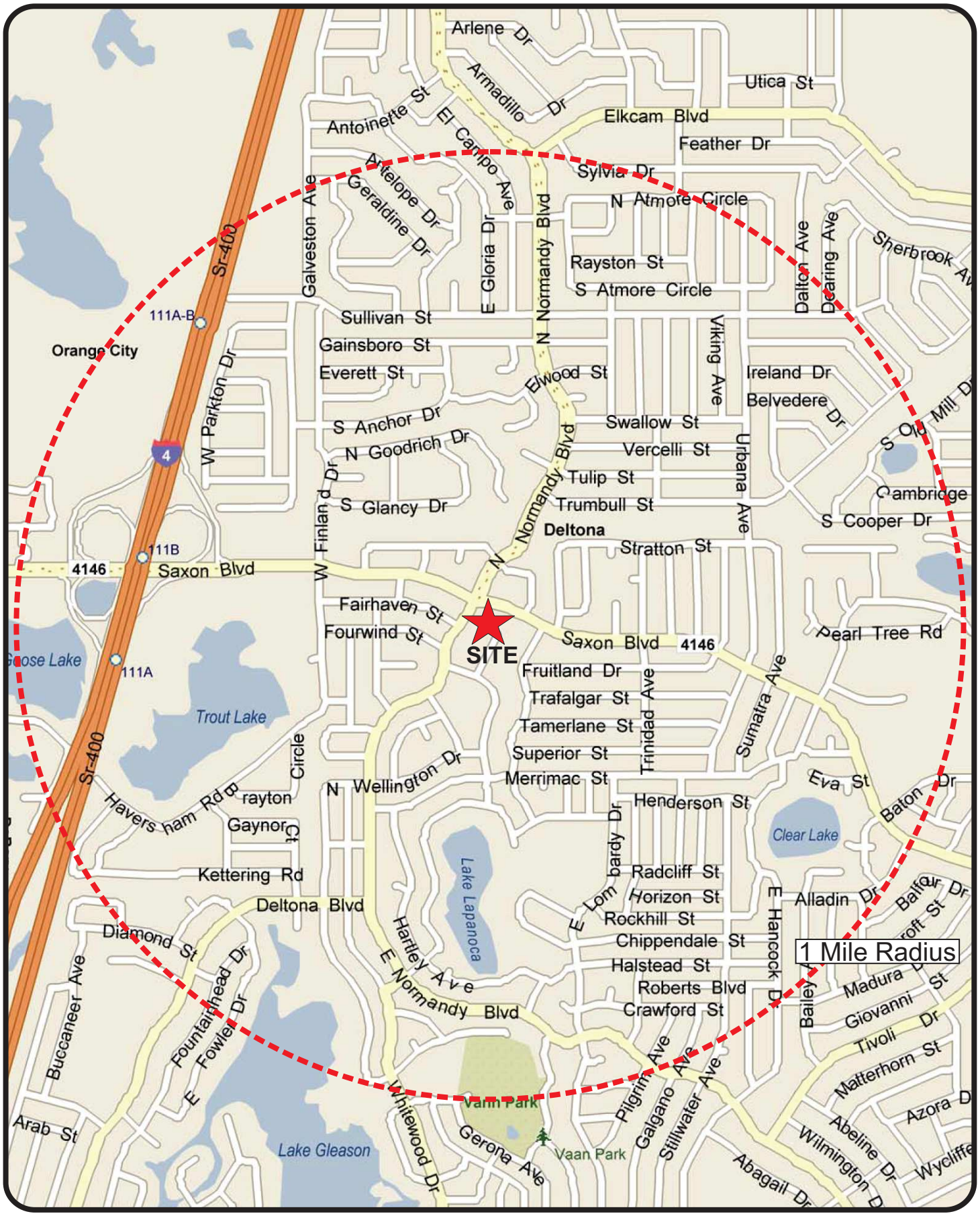
The following is our proposed traffic study methodology for the Traffic Impact Analysis (TIA) for the above-referenced convenience market. Its site is located on the southeast corner of the intersection of Saxon Boulevard and Normandy Boulevard. **Figure 1** depicts this site location and the area roadways within one-mile from the site. The City of Deltona requested that the analysis be conducted as per the River to Sea Transportation Planning Organization (R2C TPO) Transportation Impact Analysis (TIA) guidelines. In accordance with these guidelines, this letter outlines the proposed methodology by which the analysis will be conducted.

Proposed Development

The proposed development is for 5,943 square feet of convenience market with gasoline pumps. **Figure 2** depicts the conceptual site plan and its access configuration.

Trip Generation

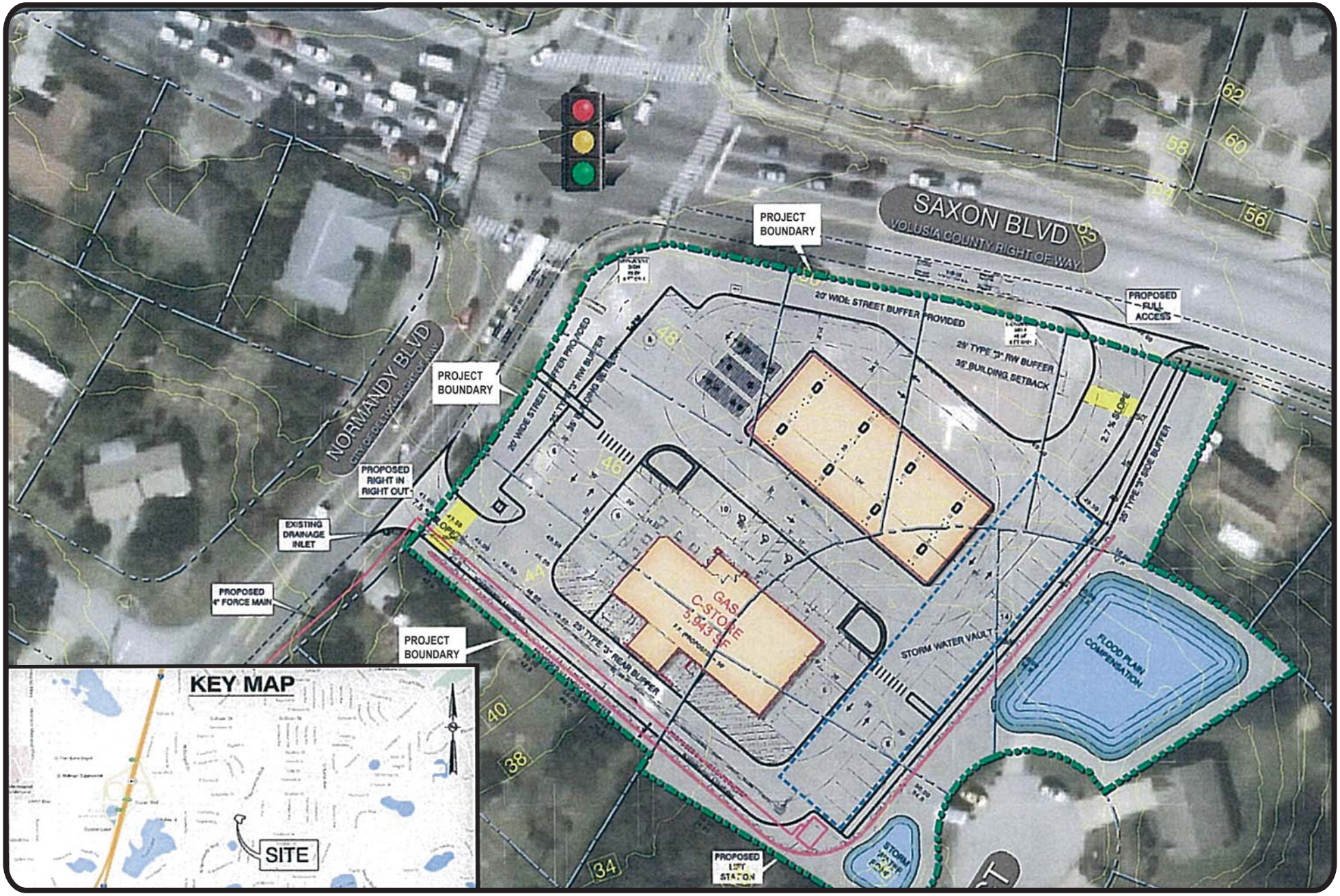
The trip generation of the proposed development will be calculated with the trip generation rates from the *9th Edition of the ITE Trip Generation Manual.* This calculation is summarized in **Table 1** which includes estimations of pass-by trips based upon *ITE's Trip Generation Handbook, 3rd Edition*. As shown in the table, the proposed development is estimated to generate 1,708 new net daily trips, of which 103 will occur in the P.M. peak hour. The pass-by trips will be limited to 14% of the background traffic on the adjacent roadways as per the R2C TPO Guidelines. The ITE trip generation sheets are included in **Attachment A**.



Convenience Market with Gasoline Pumps
Project № 4755
Figure 1

Site Location

N
NTS



Convenience Market with Gasoline Pumps
Project № 4755
Figure 2

Site Plan and Access Configuration

N
NTS

TABLE 1
Trip Generation Calculation Summary

Land Use	ITE Code	Quantity (SF)	Daily		PM Peak Hour			
			Rate	Trips	Rate	Enter	Exit	Total
Convenience Market w/Gasoline Pumps	853	5,943	845.60	5,025	50.92	151	152	303
Total Trips				**5,025**	**-----**	**151**	**152**	**303**
Pass-by Trips (66%)				3,317	-----	100	100	200
New Net Trips				**1,708**	**-----**	**51**	**52**	**103**

Trip Distribution

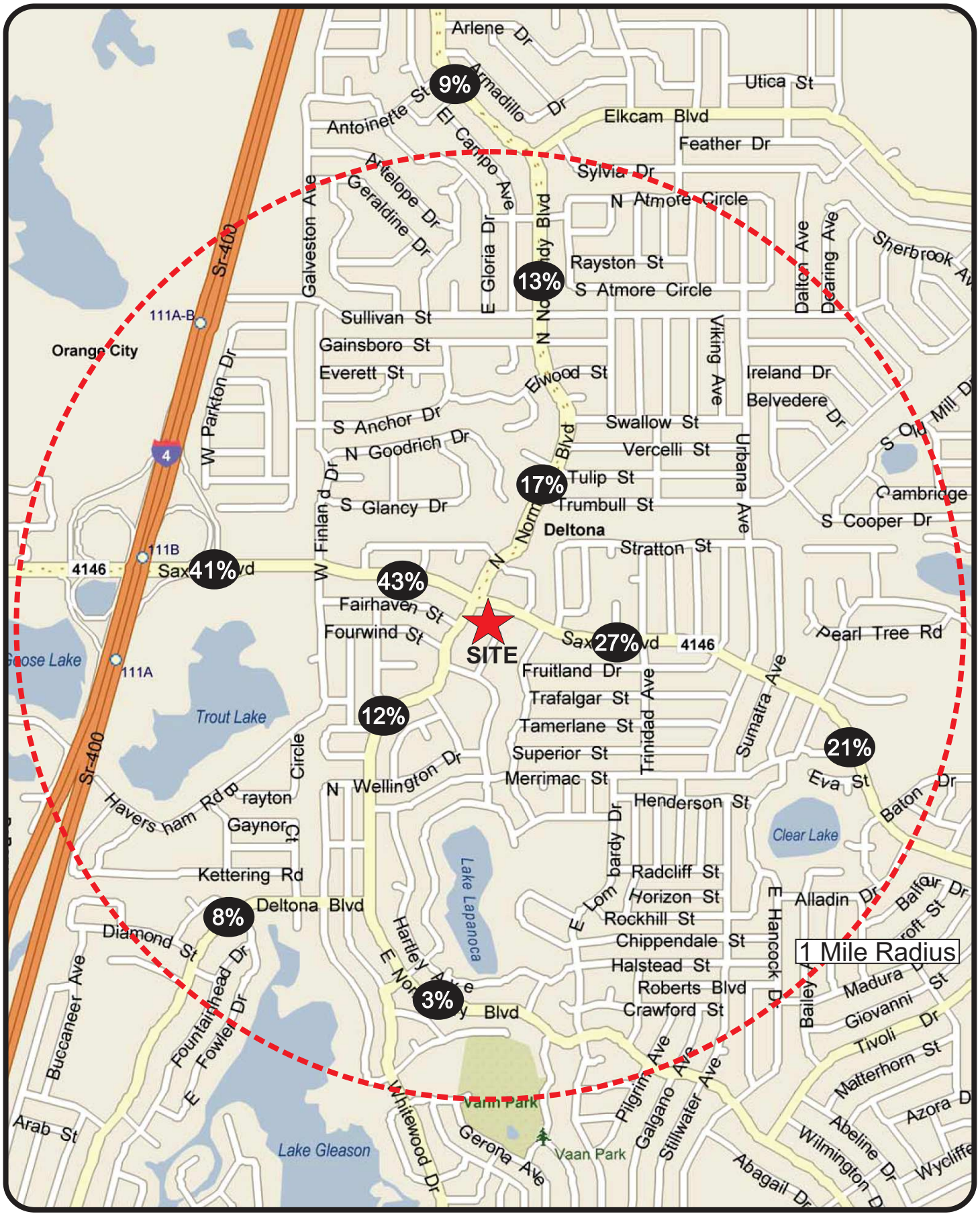
The estimation of the distribution of the project's new net trips in the area will be based upon the latest version of the Central Florida Regional Planning Model (CFRPM). **Figure 3** illustrates the obtained trip distribution plot. This distribution will be used to assign the project trips to the area roadways and intersections. The model trip distribution plots are included in Attachment A with trip generation data.

Traffic Impact Area

For projects generating between 100 to no more than 300 or more two-way peak hour external trips, the R2C TPO guidelines require that all road segments where the project consumes three percent (3%) or more of the roadway's two-way peak hour service volume based upon the adopted LOS be included in the analysis. To determine the traffic impact area for this project, a significance test was conducted as summarized in **Table 2**. Based upon the significance test, none of the area roadways will be significantly impacted by the proposed development. Therefore, the following roadway segments to which the site has access connections will be included in the analysis:

- Saxon Boulevard
    - Normandy Boulevard to Tivoli Drive
- Normandy Boulevard
    - Saxon Boulevard to Deltona Boulevard

The roadway segments will be analyzed for existing and buildout conditions for the P.M. peak hour as per the R2C TIA guidelines.



Convenience Market with Gasoline Pumps
Project № 4755
Figure 3

Project Trip Distribution

TABLE 2
Significance Analysis

Roadway Segment	Area	Functional Class	# of Lanes	Peak Hour Two-Way Capacity*	LOS Standard	Project Distribution**	Project Trips	Significance
Saxon Boulevard								
I-4 to Finland Dr	U	Minor Arterial	4	3,410	E	41%	42	1.2%
Finland Dr to Normandy Blvd	U	Minor Arterial	4	3,410	E	43%	44	1.3%
Normandy Blvd to Tivoli Dr	U	Minor Arterial	4	3,410	E	27%	28	0.82%
Tivoli Dr to Providence Blvd	U	Minor Arterial	2	1,020	E	21%	22	2.1%
Normandy Boulevard								
Rhode Island Ave to Elkcam Blvd	U	Major Collector	4	2,630	D	9%	9	0.3%
Elkham Blvd to Saxon Blvd	U	Major Collector	4	2,630	D	17%	18	0.68%
Saxon Blvd to Deltona Blvd	U	Major Collector	2	960	D	12%	12	1.25%
Deltona Blvd to Tivoli Dr	U	Major Collector	3	960	D	4%	4	0.42%
Deltona Boulevard								
Normandy Blvd to Cloverleaf Blvd	U	Major Collector	4	2,630	D	8%	8	0.3%

* Obtained from 2014 Volusia County AADT & Historical Counts

** Highest % distribution on the segment

Study Intersections

The following intersections that are part of the study roadway segments will be included in the traffic analysis:

- Saxon Boulevard and Normandy Boulevard
- Saxon Boulevard and Tivoli Drive
- Normandy Boulevard and Deltona Boulevard
- Site Entrances

The intersections will be analyzed utilizing weekday P.M. peak hour counts. The counts will be obtained during the 4-6 P.M. time period by 15-minute intervals at each intersection.

The intersections will be analyzed for existing and projected conditions with the use of the latest version of the Highway Capacity Study (HCS) software, in accordance with the procedures of the *2010 Highway Capacity Manual.* Existing traffic counts at the intersections will be expanded to the project's buildout year using annual growth factors determined from a trends analysis of available historical daily traffic volumes.

Traffic Impact Assessment

To assess the impact of the project traffic on the study roadways/intersections, the following steps will be followed in the analysis of the study roadways and intersections:

Roadways

- Determine background traffic volumes on impacted roadways based upon historical growth trend of daily volumes on the area roadways.
- Combine project traffic with background traffic to obtain total traffic flows.
- Perform traffic analysis utilizing FDOT Level of Service Standards/Guidelines consistent with the City's comprehensive plan.

Intersections

- Conduct intersection counts during the P.M. peak period at the study intersections.
- Expand existing traffic counts to the project's buildout year using growth factors based upon historical traffic volume data.
- Combine project traffic with background traffic to obtain total traffic.
- Perform intersection capacity analysis utilizing the latest HCM/HCS operational analysis procedures for the P.M. peak hour.

Critical and Near-Critical Roadways

To determine whether the development will impact critical and near-critical roadways, an impact area map of one-mile radius was obtained from Volusia County (**Attachment B**). The following roadways segments will be added to the analysis as per section 3a and b of the R2C TPO TIA guidelines:

- Saxon Boulevard
  FDOT Park & Ride to Normandy Boulevard

- I-4
  Segments north and south of Saxon Boulevard

- Normandy Boulevard
  Saxon Boulevard to Tivoli Drive

Traffic Report

A traffic report will be prepared documenting the study procedures, analysis and calculations/ recommendations.

Improvements

If warranted, appropriate roadway and intersection improvements will be identified.

Attachment A

Trip Generation Sheets/Distribution Plots

Convenience Market with Gasoline Pumps
(853)

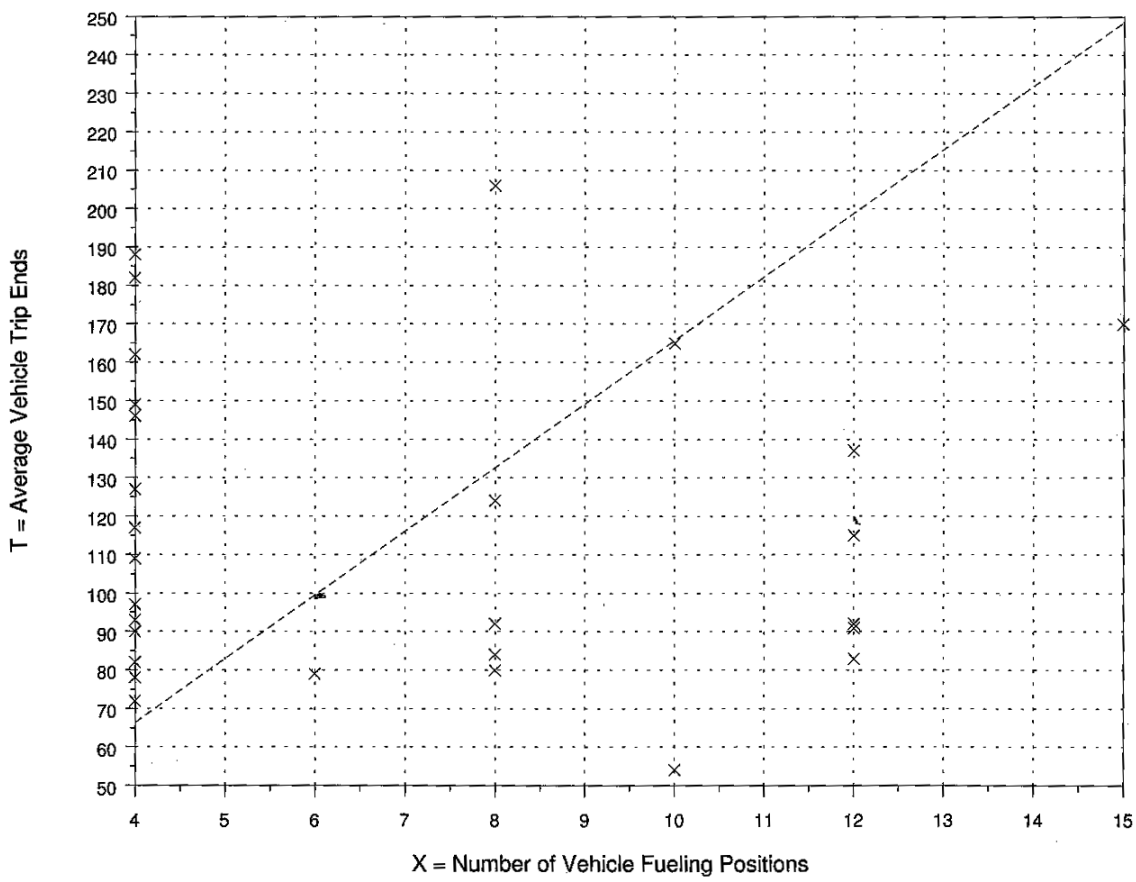
Average Vehicle Trip Ends vs: Vehicle Fueling Positions
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 28
Average Vehicle Fueling Positions: 7
Directional Distribution: 50% entering, 50% exiting

Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
16.57	5.40 - 47.00	11.34

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

Convenience Market with Gasoline Pumps
(853)

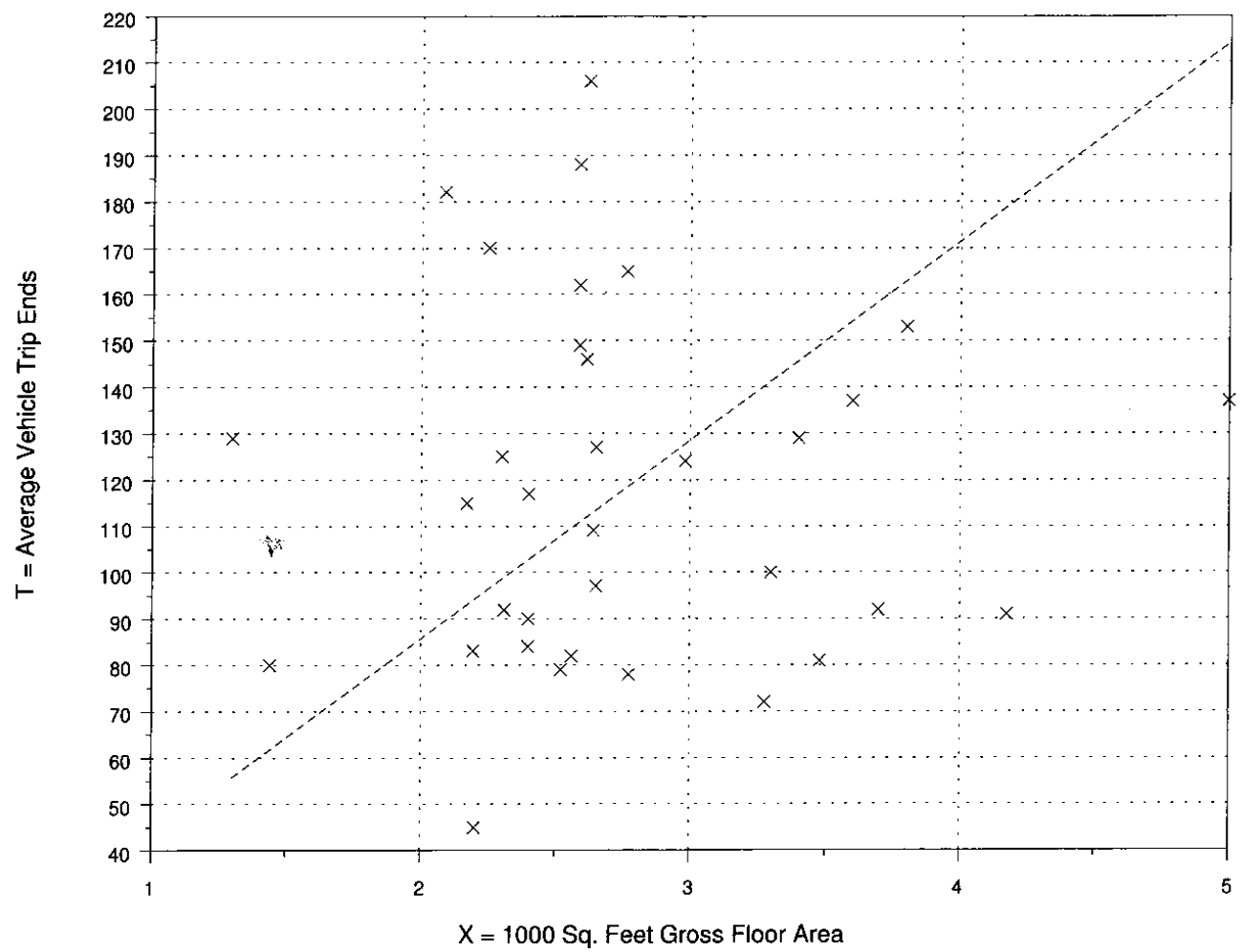
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
A.M. Peak Hour of Generator

Number of Studies: 34
Average 1000 Sq. Feet GFA: 3
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
42.86	20.45 - 99.23	18.85

Data Plot and Equation



× **Actual Data Points**

------ **Average Rate**

Fitted Curve Equation: Not given

R^2 = ****

Convenience Market with Gasoline Pumps
(853)

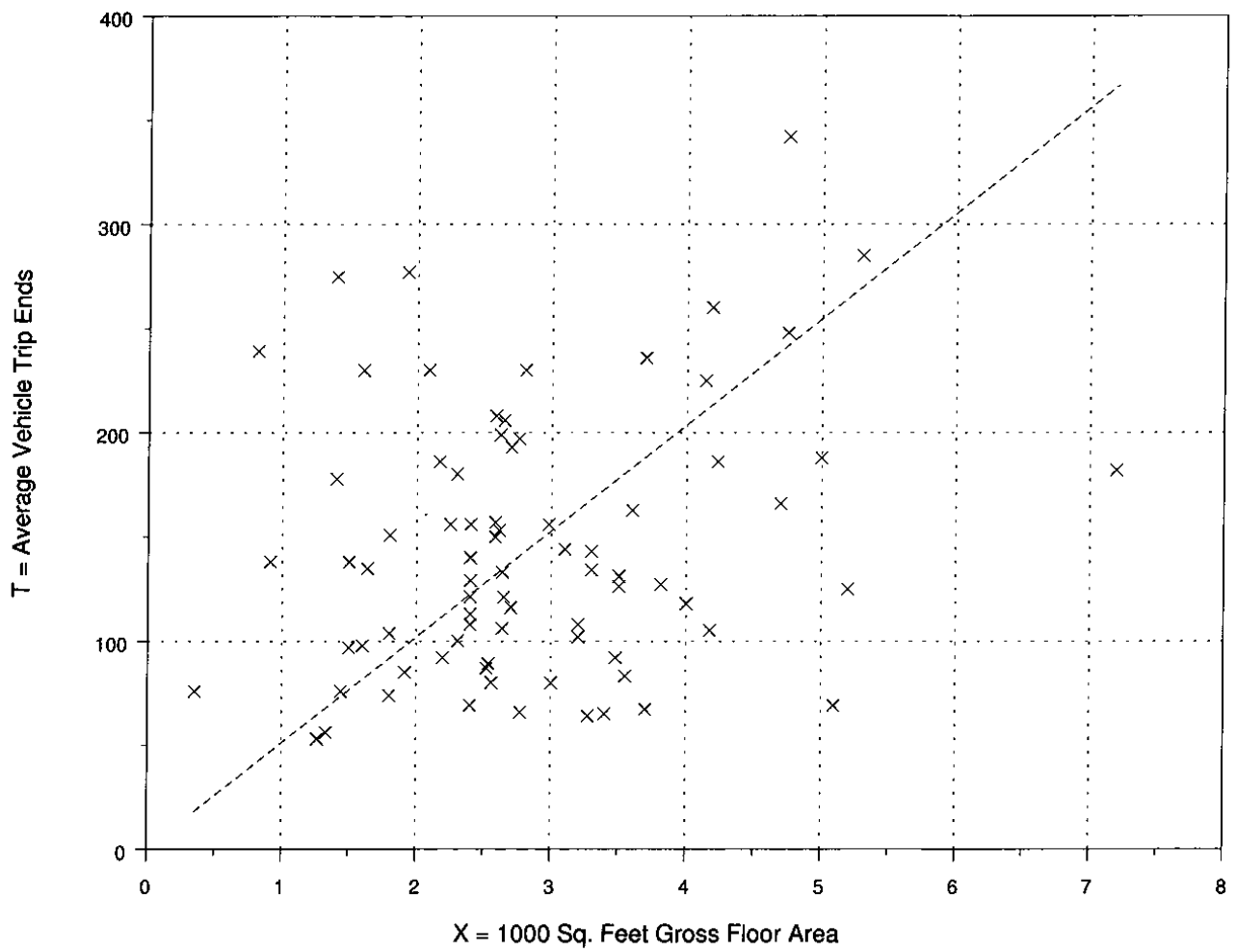
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 78
Average 1000 Sq. Feet GFA: 3
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
50.92	13.53 - 292.89	32.15

Data Plot and Equation



× Actual Data Points

------ Average Rate

Fitted Curve Equation: Not given

R^2 = ****

Table F.15 Pass-By and Non-Pass-By Trips Weekday, AM Peak Period
Land Use Code 853—Convenience Market with Gasoline Pumps

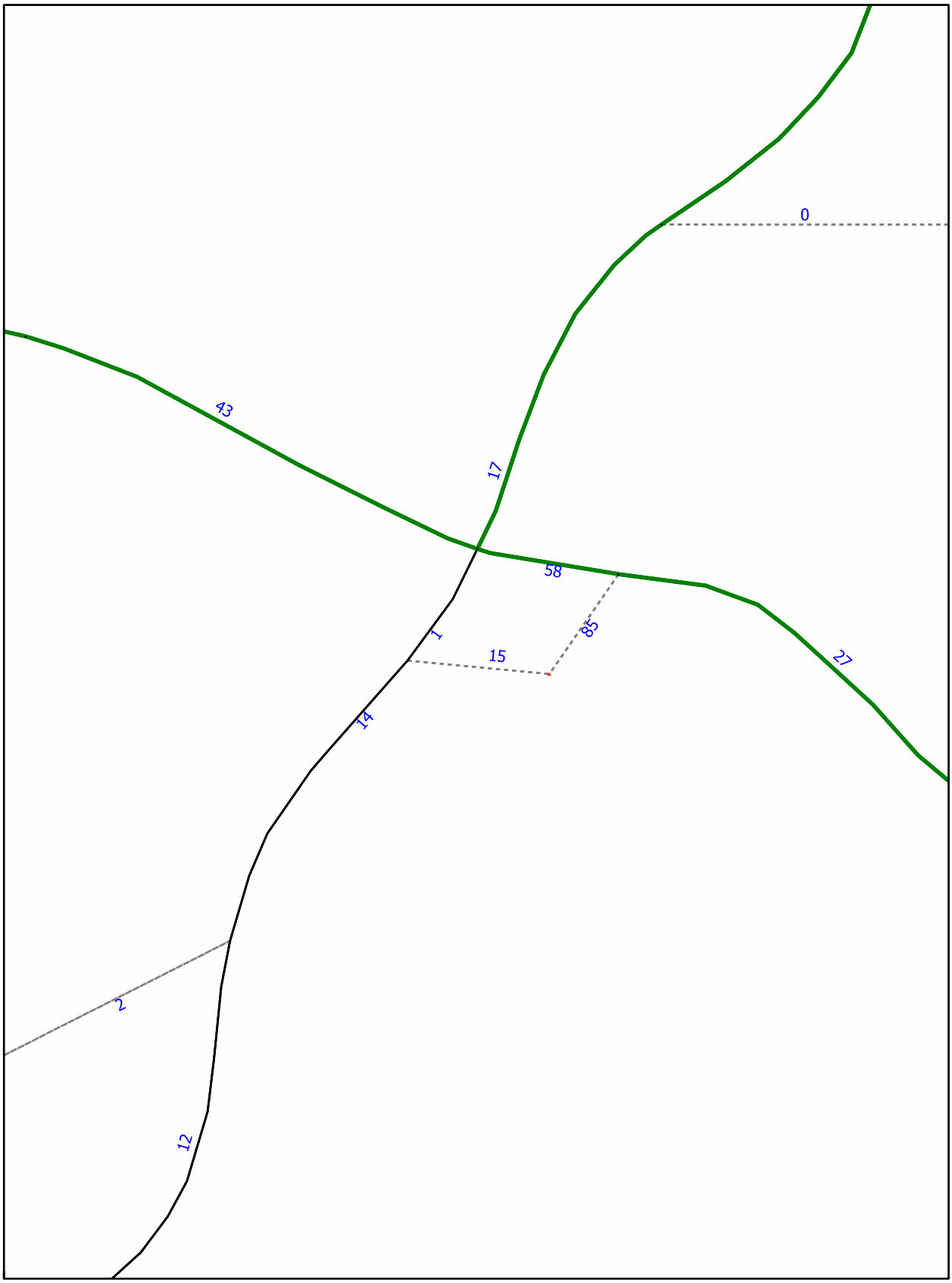
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]
						PRIMARY	DIVERTED	TOTAL		
2.8	Louisville area, KY	1993	—	7:00–9:00 a.m.	54	11	35	46	1,240	Barton-Aschman Assoc.
2.4	Louisville area, KY	1993	—	7:00–9:00 a.m.	48	17	35	52	1,210	Barton-Aschman Assoc.
4.2	Louisville area, KY	1993	47	7:00–9:00 a.m.	62	19	19	38	1,705	Barton-Aschman Assoc.
2.6	Crestwood, KY	1993	—	7:00–9:00 a.m.	72	15	13	28	940	Barton-Aschman Assoc.
3.7	Louisville area, KY	1993	49	7:00–9:00 a.m.	66	16	18	34	990	Barton-Aschman Assoc.
3.0	New Albany, IN	1993	62	7:00–9:00 a.m.	74	10	16	26	790	Barton-Aschman Assoc.
2.3	Louisville, KY	1993	58	7:00–9:00 a.m.	64	5	31	36	1,255	Barton-Aschman Assoc.
2.2	New Albany, IN	1993	79	7:00–9:00 a.m.	56	6	38	44	635	Barton-Aschman Assoc.
3.6	Louisville area, KY	1993	49	7:00–9:00 a.m.	67	4	29	33	1,985	Barton-Aschman Assoc.

Average Pass-By Trip Percentage: 63
"—" means no data were provided

Table F.16 Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 853—Convenience Market with Gasoline Pumps

						PRIMARY	DIVERTED	TOTAL		
2.8	Louisville area, KY	1993	—	4:00–6:00 p.m.	62	11	27	38	2,875	Barton-Aschman Assoc.
2.4	Louisville area, KY	1993	—	4:00–6:00 p.m.	58	13	29	42	2,655	Barton-Aschman Assoc.
4.2	Louisville area, KY	1993	61	4:00–6:00 p.m.	58	26	16	42	2,300	Barton-Aschman Assoc.
2.6	Crestwood, KY	1993	68	4:00–6:00 p.m.	67	15	18	33	950	Barton-Aschman Assoc.
3.7	Louisville area, KY	1993	70	4:00–6:00 p.m.	61	16	23	39	2,175	Barton-Aschman Assoc.
3.0	New Albany, IN	1993	80	4:00–6:00 p.m.	65	15	20	35	1,165	Barton-Aschman Assoc.
2.3	Louisville, KY	1993	67	4:00–6:00 p.m.	57	16	27	43	1,954	Barton-Aschman Assoc.
2.2	New Albany, IN	1993	115	4:00–6:00 p.m.	48	16	36	52	820	Barton-Aschman Assoc.
3.6	Louisville area, KY	1993	60	4:00–6:00 p.m.	56	17	27	44	2,505	Barton-Aschman Assoc.
2.6	Seminole Co., FL	1989	82	4:00–6:00 p.m.	73	20	7	27	—	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	98	4:00–6:00 p.m.	81	15	4	19	—	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	115	4:00–6:00 p.m.	69	16	15	31	—	Tipton Associates Inc.
2.6	Volusia Co., FL	1989	98	4:00–6:00 p.m.	74	15	11	26	—	Tipton Associates Inc.
2.4	Volusia Co., FL	1989	38	4:00–6:00 p.m.	74	24	2	26	—	Tipton Associates Inc.
2.7	Volusia Co., FL	1989	82	4:00–6:00 p.m.	87	8	5	13	—	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	99	2:00–4:00 p.m.	64	28	8	36	—	Tipton Associates Inc.
2.4	Volusia Co., FL	1989	38	2:00–4:00 p.m.	88	21	11	32	—	Tipton Associates Inc.

Average Pass-By Trip Percentage: 66
"—" means no data were provided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43
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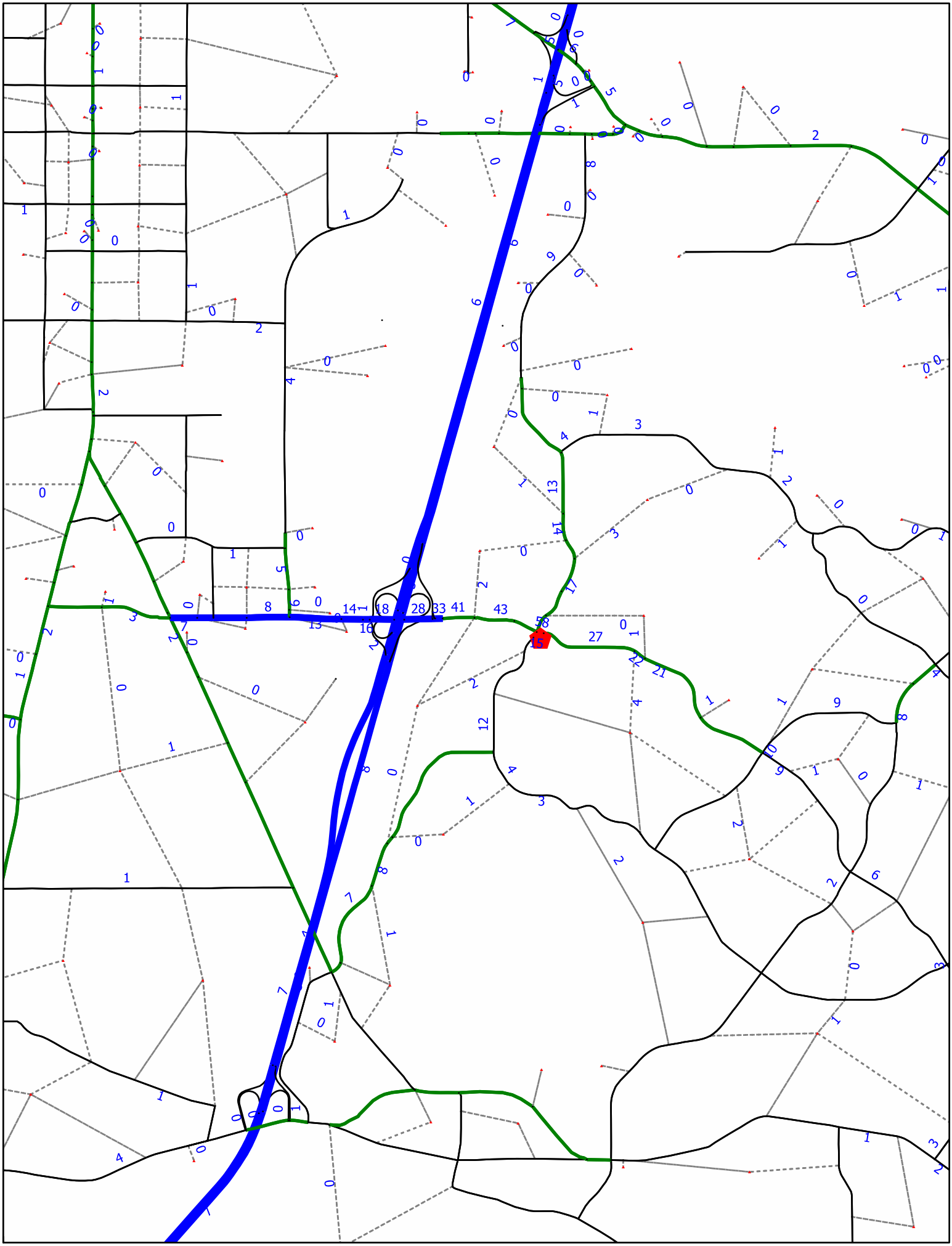
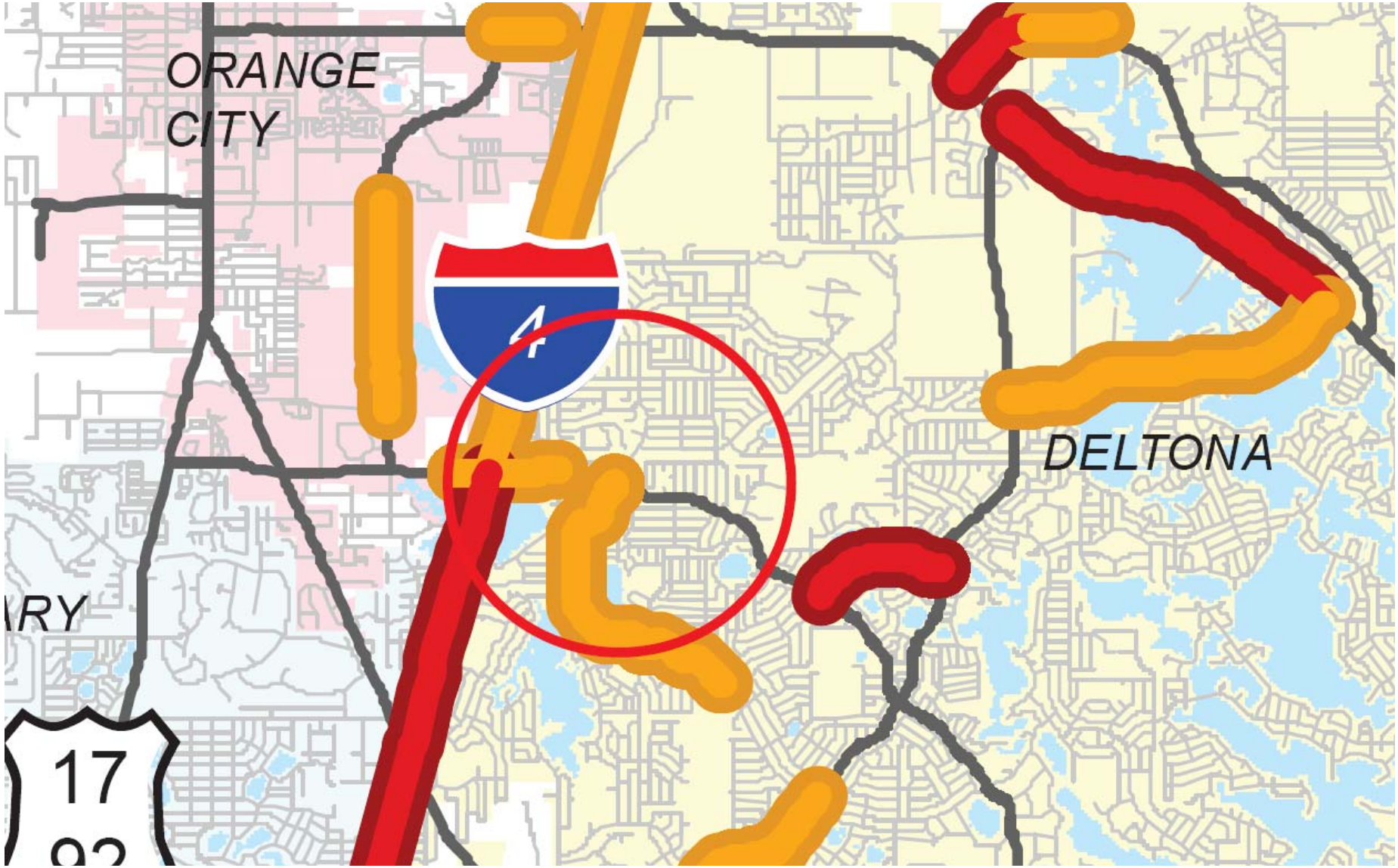


Attachment B

Critical/Near Critical Roadway Map

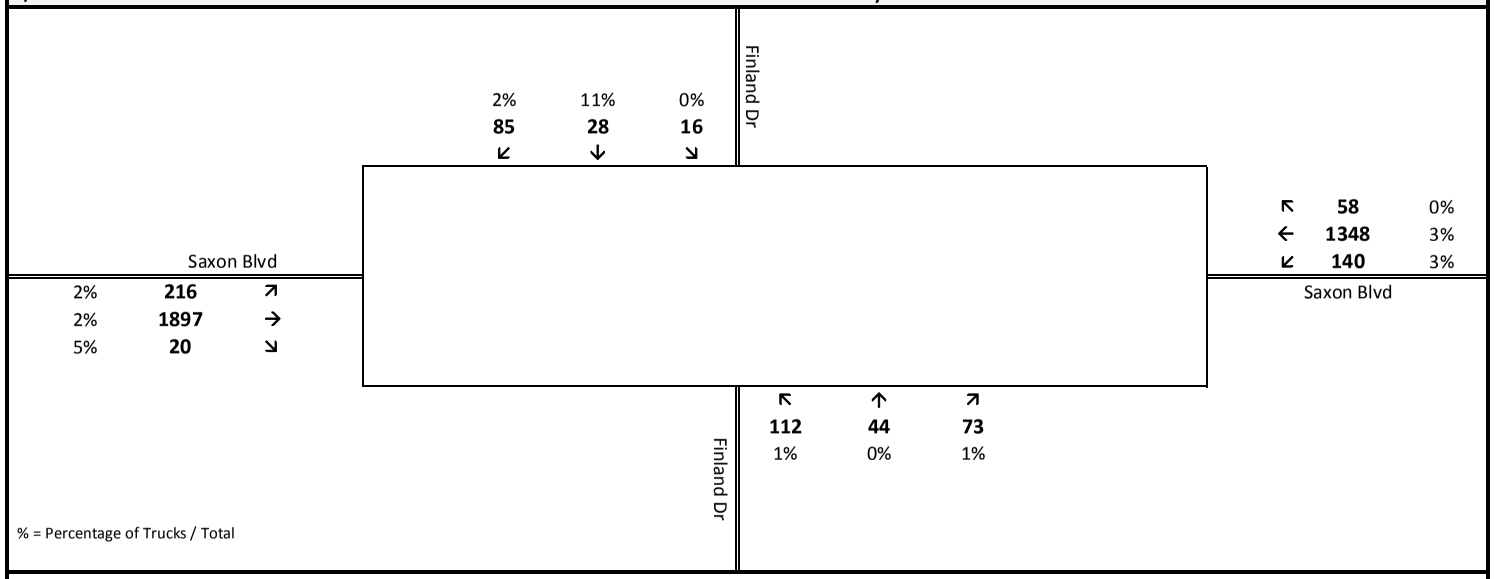
Level of Service 2014
Critical / Near Critical* State and County Roadways



APPENDIX B

Traffic Counts and
Signal Timing Data

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Finland Dr	**Study Period:**	PM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	16	25	83	136	1301	58	111	44	72	211	1863	19	3939
Trucks	0	3	2	4	47	0	1	0	1	5	34	1	98
Total	**16**	**28**	**85**	**140**	**1348**	**58**	**112**	**44**	**73**	**216**	**1897**	**20**	**4037**
Peak Hour Factor	**0.913**												
Peak Hour	**05:45 PM to to 06:45 PM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	2	8	30	12	199	4	31	6	10	39	399	15	755
5:00:00 PM	5	4	19	21	252	9	35	9	19	50	460	6	889
5:15:00 PM	3	13	34	11	304	7	36	11	9	60	481	6	975
5:30:00 PM	3	2	8	23	302	5	32	15	10	23	449	4	876
5:45:00 PM	4	1	20	36	300	11	29	19	12	49	457	5	943
6:00:00 PM	8	8	37	33	385	17	35	9	17	61	495	1	1,106
6:15:00 PM	3	15	15	41	355	12	26	8	23	65	461	10	1,034
6:30:00 PM	1	4	13	30	308	18	22	8	21	41	484	4	954
6:45:00 PM	2	9	17	47	296	11	26	9	14	41	414	7	893

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Finland Dr	**Study Period:**	PM

Total Vehicle Traffic

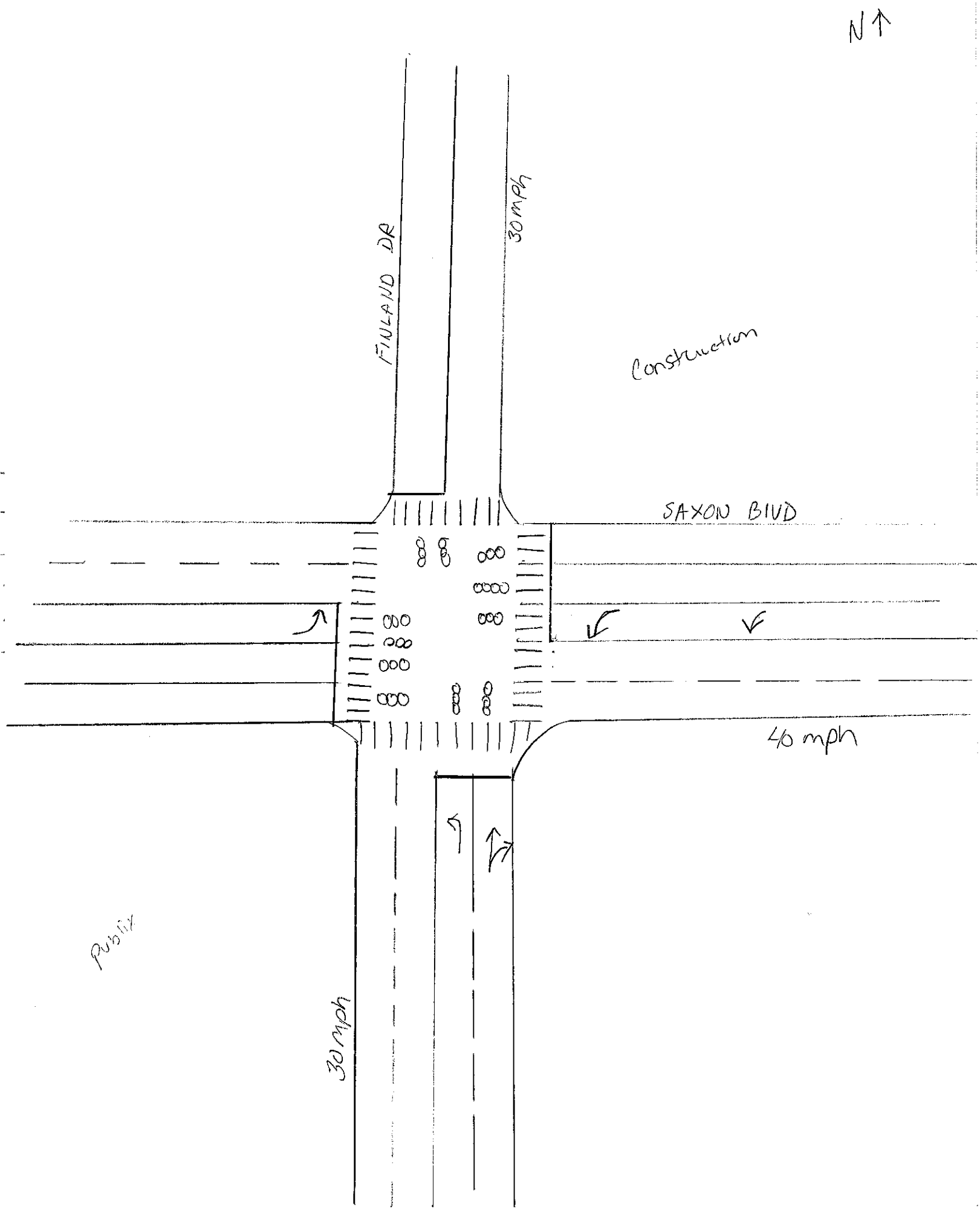
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	2	8	30	12	199	4	31	6	10	39	399	15	755
5:00:00 PM	5	4	19	21	252	9	35	9	19	50	460	6	889
5:15:00 PM	3	13	34	11	304	7	36	11	9	60	481	6	975
5:30:00 PM	3	2	8	23	302	5	32	15	10	23	449	4	876
5:45:00 PM	4	1	20	36	300	11	29	19	12	49	457	5	943
6:00:00 PM	8	8	37	33	385	17	35	9	17	61	495	1	1,106
6:15:00 PM	3	15	15	41	355	12	26	8	23	65	461	10	1,034
6:30:00 PM	1	4	13	30	308	18	22	8	21	41	484	4	954
6:45:00 PM	2	9	17	47	296	11	26	9	14	41	414	7	893

Car Traffic

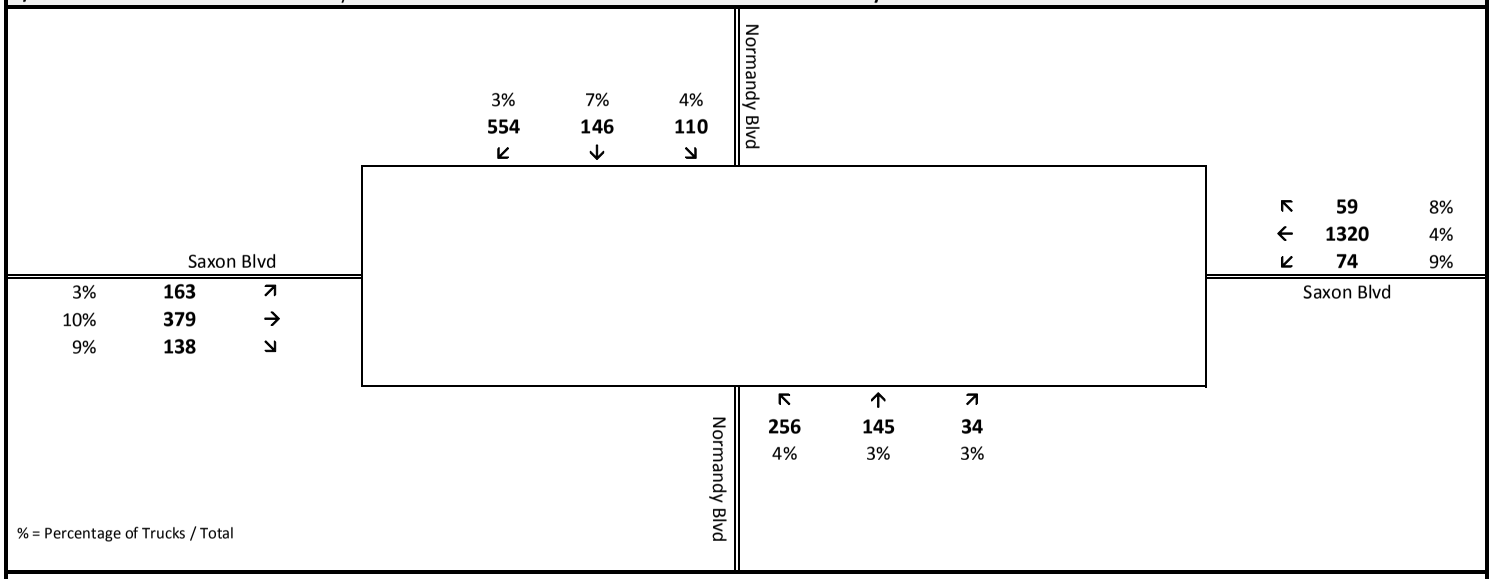
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	2	8	28	11	185	4	31	6	10	37	397	15	734
5:00:00 PM	5	4	18	21	247	9	35	9	19	48	458	6	879
5:15:00 PM	3	11	33	9	294	7	36	11	9	60	479	6	958
5:30:00 PM	3	2	8	23	299	5	32	15	9	23	443	4	866
5:45:00 PM	4	1	20	36	293	11	28	19	12	48	449	5	926
6:00:00 PM	8	8	36	31	365	17	35	9	17	61	486	1	1074
6:15:00 PM	3	12	15	40	343	12	26	8	22	63	454	10	1008
6:30:00 PM	1	4	12	29	300	18	22	8	21	39	474	3	931
6:45:00 PM	2	9	15	46	280	11	26	9	14	39	402	7	860

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	0	2	1	14	0	0	0	0	2	2	0	21
5:00:00 PM	0	0	1	0	5	0	0	0	0	2	2	0	10
5:15:00 PM	0	2	1	2	10	0	0	0	0	0	2	0	17
5:30:00 PM	0	0	0	0	3	0	0	0	1	0	6	0	10
5:45:00 PM	0	0	0	0	7	0	1	0	0	1	8	0	17
6:00:00 PM	0	0	1	2	20	0	0	0	0	0	9	0	32
6:15:00 PM	0	3	0	1	12	0	0	0	1	2	7	0	26
6:30:00 PM	0	0	1	1	8	0	0	0	0	2	10	1	23
6:45:00 PM	0	0	2	1	16	0	0	0	0	2	12	0	33


N
FINLAND DR
30 mph
Construction
SAXON BLVD
40 mph
Publix
30 mph

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	AM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	106	136	536	67	1272	54	246	141	33	158	341	125	3215
Trucks	4	10	18	7	48	5	10	4	1	5	38	13	163
Total	**110**	**146**	**554**	**74**	**1320**	**59**	**256**	**145**	**34**	**163**	**379**	**138**	**3378**
Peak Hour Factor	**0.970**												
Peak Hour	**07:30 AM to to 08:30 AM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00:00 AM	19	20	105	9	220	14	50	34	3	18	72	19	583
7:15:00 AM	24	25	129	15	260	16	59	35	6	20	102	20	711
7:30:00 AM	39	44	144	21	327	18	59	41	10	35	89	36	863
7:45:00 AM	38	20	133	21	334	13	66	42	6	53	94	38	858
8:00:00 AM	23	39	158	18	332	15	76	31	8	41	102	28	871
8:15:00 AM	10	43	119	14	327	13	55	31	10	34	94	36	786
8:30:00 AM	7	62	106	13	328	11	51	25	3	41	116	36	799
8:45:00 AM	11	30	175	12	350	9	35	21	3	55	65	18	784

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	AM

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00:00 AM	19	20	105	9	220	14	50	34	3	18	72	19	583
7:15:00 AM	24	25	129	15	260	16	59	35	6	20	102	20	711
7:30:00 AM	39	44	144	21	327	18	59	41	10	35	89	36	863
7:45:00 AM	38	20	133	21	334	13	66	42	6	53	94	38	858
8:00:00 AM	23	39	158	18	332	15	76	31	8	41	102	28	871
8:15:00 AM	10	43	119	14	327	13	55	31	10	34	94	36	786
8:30:00 AM	7	62	106	13	328	11	51	25	3	41	116	36	799
8:45:00 AM	11	30	175	12	350	9	35	21	3	55	65	18	784

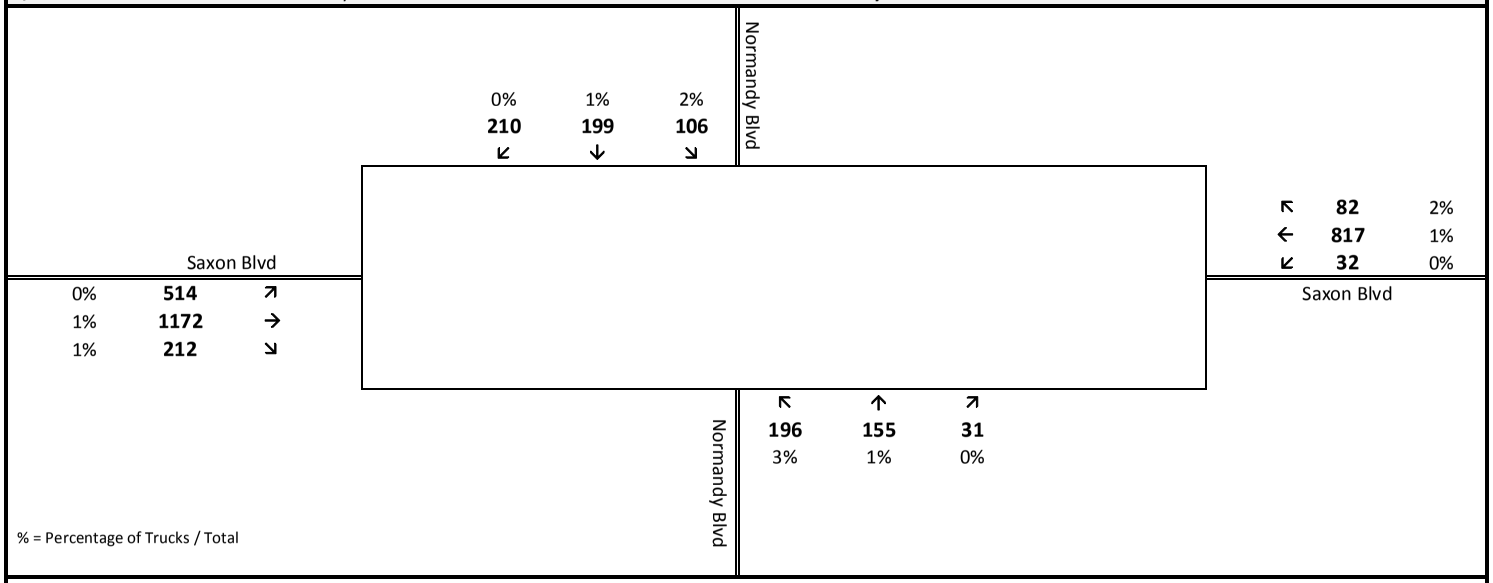
Car Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00:00 AM	19	20	104	8	215	13	45	31	2	18	69	17	561
7:15:00 AM	24	25	127	13	251	16	52	31	5	20	97	18	679
7:30:00 AM	38	40	140	20	313	17	53	37	10	35	81	33	817
7:45:00 AM	37	20	126	19	324	13	65	42	5	51	83	36	821
8:00:00 AM	21	38	154	15	321	13	74	31	8	40	90	24	829
8:15:00 AM	10	38	116	13	314	11	54	31	10	32	87	32	748
8:30:00 AM	7	58	105	13	323	11	50	18	3	39	108	33	768
8:45:00 AM	11	30	173	12	342	8	32	18	2	53	58	18	757

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00:00 AM	0	0	1	1	5	1	5	3	1	0	3	2	22
7:15:00 AM	0	0	2	2	9	0	7	4	1	0	5	2	32
7:30:00 AM	1	4	4	1	14	1	6	4	0	0	8	3	46
7:45:00 AM	1	0	7	2	10	0	1	0	1	2	11	2	37
8:00:00 AM	2	1	4	3	11	2	2	0	0	1	12	4	42
8:15:00 AM	0	5	3	1	13	2	1	0	0	2	7	4	38
8:30:00 AM	0	4	1	0	5	0	1	7	0	2	8	3	31
8:45:00 AM	0	0	2	0	8	1	3	3	1	2	7	0	27
													0

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	PM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	104	197	209	32	811	80	191	154	31	513	1160	210	3692
Trucks	2	2	1	0	6	2	5	1	0	1	12	2	34
Total	**106**	**199**	**210**	**32**	**817**	**82**	**196**	**155**	**31**	**514**	**1172**	**212**	**3726**
Peak Hour Factor	**0.968**												
Peak Hour	**05:00 PM to to 06:00 PM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	22	38	46	4	203	13	56	40	5	92	289	53	861
5:00:00 PM	26	48	44	10	210	17	45	44	9	137	297	54	941
5:15:00 PM	34	49	53	8	230	21	51	32	7	125	304	48	962
5:30:00 PM	30	53	59	10	176	34	52	37	4	118	285	42	900
5:45:00 PM	16	49	54	4	201	10	48	42	11	134	286	68	923
6:00:00 PM	19	46	70	9	204	14	52	32	7	148	280	46	927
6:15:00 PM	16	48	71	6	180	11	51	40	8	122	285	53	891
6:30:00 PM	24	44	62	11	184	11	43	35	10	128	278	53	883
6:45:00 PM	25	49	57	5	222	6	38	25	8	135	232	44	846

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	PM

Total Vehicle Traffic

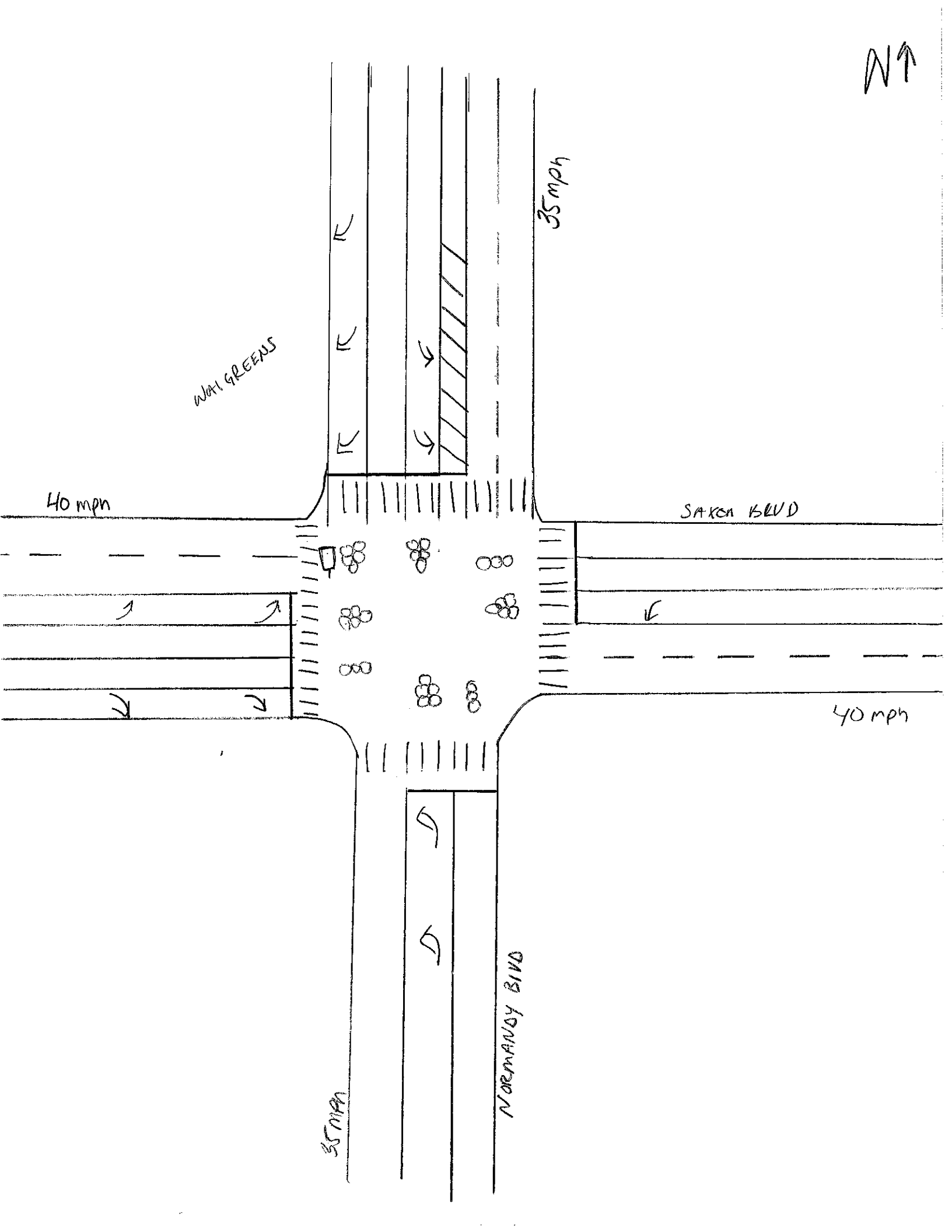
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	22	38	46	4	203	13	56	40	5	92	289	53	861
5:00:00 PM	26	48	44	10	210	17	45	44	9	137	297	54	941
5:15:00 PM	34	49	53	8	230	21	51	32	7	125	304	48	962
5:30:00 PM	30	53	59	10	176	34	52	37	4	118	285	42	900
5:45:00 PM	16	49	54	4	201	10	48	42	11	134	286	68	923
6:00:00 PM	19	46	70	9	204	14	52	32	7	148	280	46	927
6:15:00 PM	16	48	71	6	180	11	51	40	8	122	285	53	891
6:30:00 PM	24	44	62	11	184	11	43	35	10	128	278	53	883
6:45:00 PM	25	49	57	5	222	6	38	25	8	135	232	44	846

Car Traffic

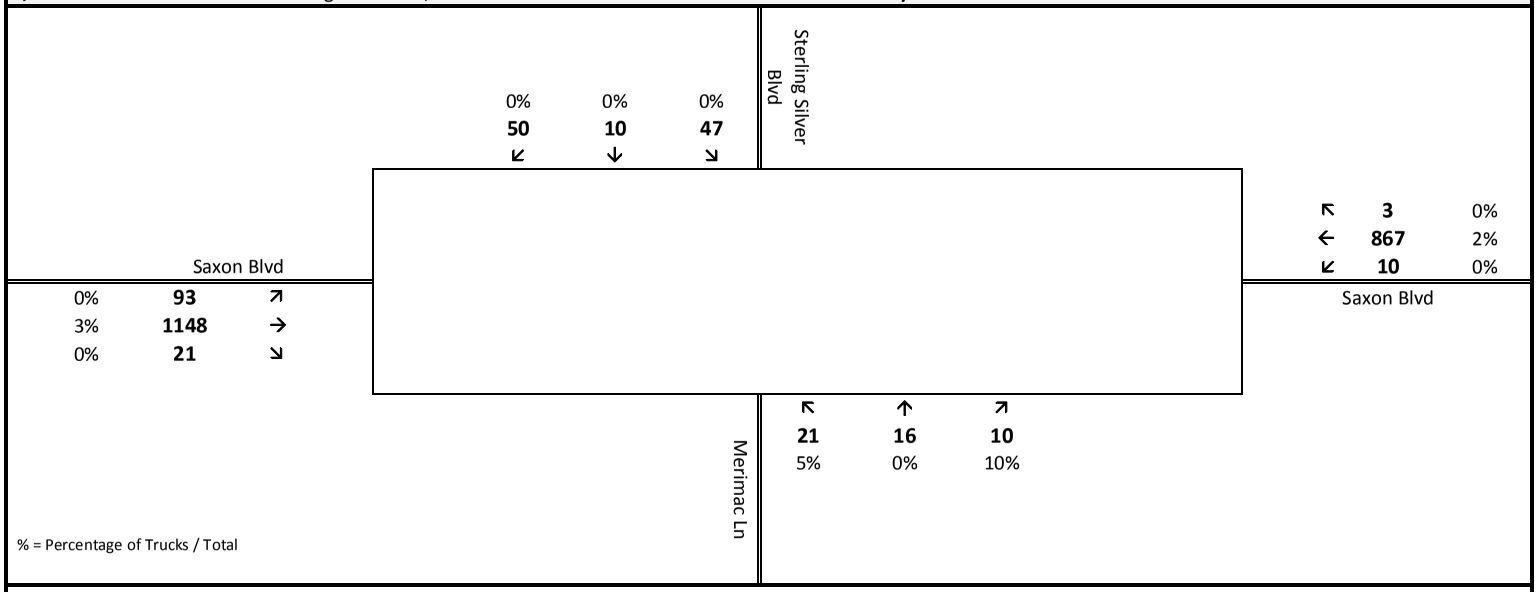
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	22	38	46	4	200	13	56	40	5	91	288	53	856
5:00:00 PM	25	47	44	10	208	17	44	43	9	137	294	54	932
5:15:00 PM	34	49	52	8	228	19	49	32	7	124	302	47	951
5:30:00 PM	29	53	59	10	175	34	52	37	4	118	282	42	895
5:45:00 PM	16	48	54	4	200	10	46	42	11	134	282	67	914
6:00:00 PM	19	46	69	9	202	14	52	32	7	147	278	46	921
6:15:00 PM	16	47	71	6	179	11	50	40	8	122	284	52	886
6:30:00 PM	24	44	61	11	183	11	43	34	10	127	277	53	878
6:45:00 PM	25	49	57	5	219	6	38	25	8	135	231	42	840

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	0	0	0	3	0	0	0	0	1	1	0	5
5:00:00 PM	1	1	0	0	2	0	1	1	0	0	3	0	9
5:15:00 PM	0	0	1	0	2	2	2	0	0	1	2	1	11
5:30:00 PM	1	0	0	0	1	0	0	0	0	0	3	0	5
5:45:00 PM	0	1	0	0	1	0	2	0	0	0	4	1	9
6:00:00 PM	0	0	1	0	2	0	0	0	0	1	2	0	6
6:15:00 PM	0	1	0	0	1	0	1	0	0	0	1	1	5
6:30:00 PM	0	0	1	0	1	0	0	1	0	1	1	0	5
6:45:00 PM	0	0	0	0	3	0	0	0	0	0	1	2	6


N
35mph
WALGREENS
40 mph
SAXON BLVD
40 mph
NORMANDY BLVD
35MPH

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Sterling Silver Blvd/Merimac Ln	**Study Period:**	PM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	47	10	50	10	851	3	20	16	9	93	1112	21	2242
Trucks	0	0	0	0	16	0	1	0	1	0	36	0	54
Total	**47**	**10**	**50**	**10**	**867**	**3**	**21**	**16**	**10**	**93**	**1148**	**21**	**2296**
Peak Hour Factor	**0.966**												
Peak Hour	**05:00 PM to to 06:00 PM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	9	4	6	2	169	1	4	2	2	30	239	5	473
5:00:00 PM	5	2	20	5	210	2	1	4	3	28	292	4	576
5:15:00 PM	8	2	8	3	222	1	10	6	3	23	301	7	594
5:30:00 PM	13	4	10	2	234	0	4	2	1	22	276	6	574
5:45:00 PM	21	2	12	0	201	0	6	4	3	20	279	4	552
6:00:00 PM	13	2	12	3	200	3	5	3	0	32	263	4	540
6:15:00 PM	11	5	24	3	171	1	6	6	2	25	261	5	520
6:30:00 PM	5	3	15	0	170	2	5	1	3	18	252	7	481

Date:	26-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Sterling Silver Blvd/Merimac Ln	**Study Period:**	PM

Total Vehicle Traffic

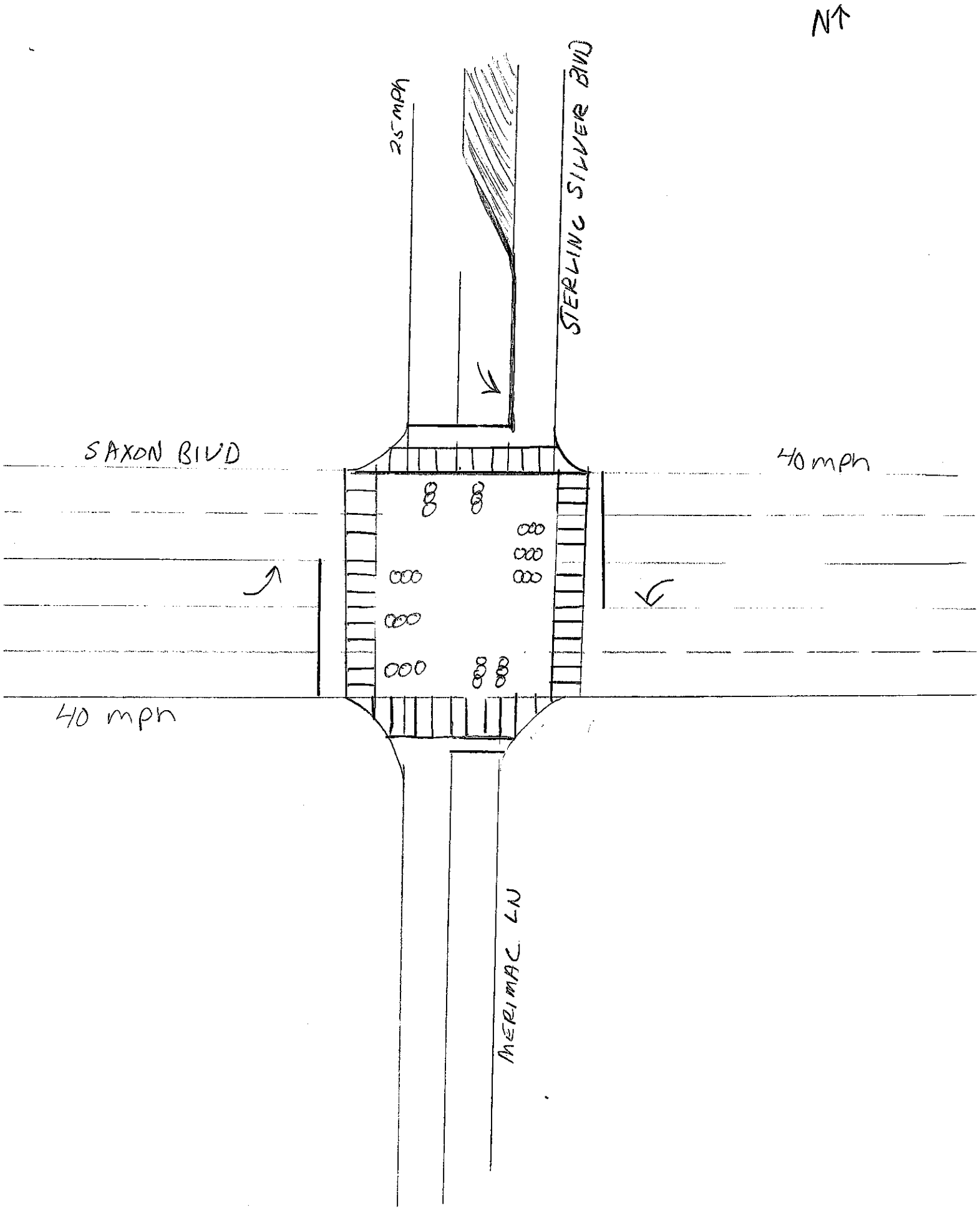
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	9	4	6	2	169	1	4	2	2	30	239	5	473
5:00:00 PM	5	2	20	5	210	2	1	4	3	28	292	4	576
5:15:00 PM	8	2	8	3	222	1	10	6	3	23	301	7	594
5:30:00 PM	13	4	10	2	234	0	4	2	1	22	276	6	574
5:45:00 PM	21	2	12	0	201	0	6	4	3	20	279	4	552
6:00:00 PM	13	2	12	3	200	3	5	3	0	32	263	4	540
6:15:00 PM	11	5	24	3	171	1	6	6	2	25	261	5	520
6:30:00 PM	5	3	15	0	170	2	5	1	3	18	252	7	481
6:45:00 PM	3	3	10	4	159	2	9	8	6	21	235	3	463

Car Traffic

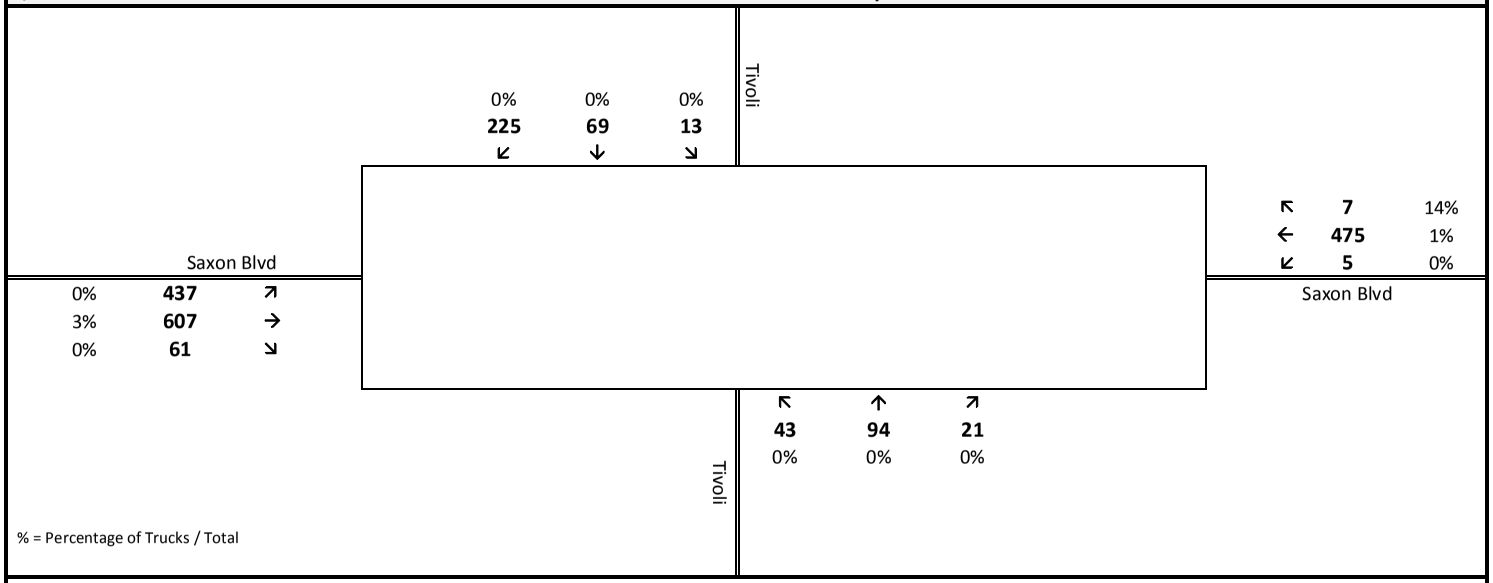
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	9	4	6	2	165	0	4	2	2	30	233	5	462
5:00:00 PM	5	2	20	5	207	2	1	4	3	28	282	4	563
5:15:00 PM	8	2	8	3	217	1	9	6	3	23	291	7	578
5:30:00 PM	13	4	10	2	227	0	4	2	1	22	269	6	560
5:45:00 PM	21	2	12	0	200	0	6	4	2	20	270	4	541
6:00:00 PM	13	2	12	3	199	3	5	3	0	31	256	4	531
6:15:00 PM	11	5	24	3	167	1	6	6	2	25	252	5	507
6:30:00 PM	5	3	15	0	168	2	5	1	3	18	242	7	469
6:45:00 PM	3	3	10	4	156	2	9	8	6	21	228	3	453

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	0	0	0	4	1	0	0	0	0	6	0	11
5:00:00 PM	0	0	0	0	3	0	0	0	0	0	10	0	13
5:15:00 PM	0	0	0	0	5	0	1	0	0	0	10	0	16
5:30:00 PM	0	0	0	0	7	0	0	0	0	0	7	0	14
5:45:00 PM	0	0	0	0	1	0	0	0	1	0	9	0	11
6:00:00 PM	0	0	0	0	1	0	0	0	0	1	7	0	9
6:15:00 PM	0	0	0	0	4	0	0	0	0	0	9	0	13
6:30:00 PM	0	0	0	0	2	0	0	0	0	0	10	0	12
6:45:00 PM	0	0	0	0	3	0	0	0	0	0	7	0	10


N
25 mph
STERLING SILVER BLVD
SAXON BLVD
40 mph
40 mph
MERIMAC LN

Date:	27-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Tivoli	**Study Period:**	PM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	13	69	224	5	472	6	43	94	21	435	588	61	2031
Trucks	0	0	1	0	3	1	0	0	0	2	19	0	26
Total	**13**	**69**	**225**	**5**	**475**	**7**	**43**	**94**	**21**	**437**	**607**	**61**	**2057**
Peak Hour Factor	**0.978**												
Peak Hour	**05:15 PM to to 06:15 PM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	9	51	4	72	2	10	20	4	92	124	15	403
5:00:00 PM	1	8	55	3	99	3	9	26	4	104	148	22	482
5:15:00 PM	2	17	68	0	110	2	7	24	4	110	158	23	525
5:30:00 PM	3	15	46	1	129	3	10	19	6	111	147	10	500
5:45:00 PM	6	19	57	0	119	2	14	23	6	99	164	17	526
6:00:00 PM	2	18	54	4	117	0	12	28	5	117	138	11	506
6:15:00 PM	3	21	59	2	115	5	15	16	2	130	131	20	519
6:30:00 PM	1	33	51	3	108	8	18	22	0	104	140	15	503
6:45:00 PM	3	17	47	2	116	0	21	35	5	99	113	15	473

Date:	27-Apr-16	**City:**	Deland
E/W Street Name:	Saxon Blvd	**County:**	Volusia
N/S Street Name:	Tivoli	**Study Period:**	PM

Total Vehicle Traffic

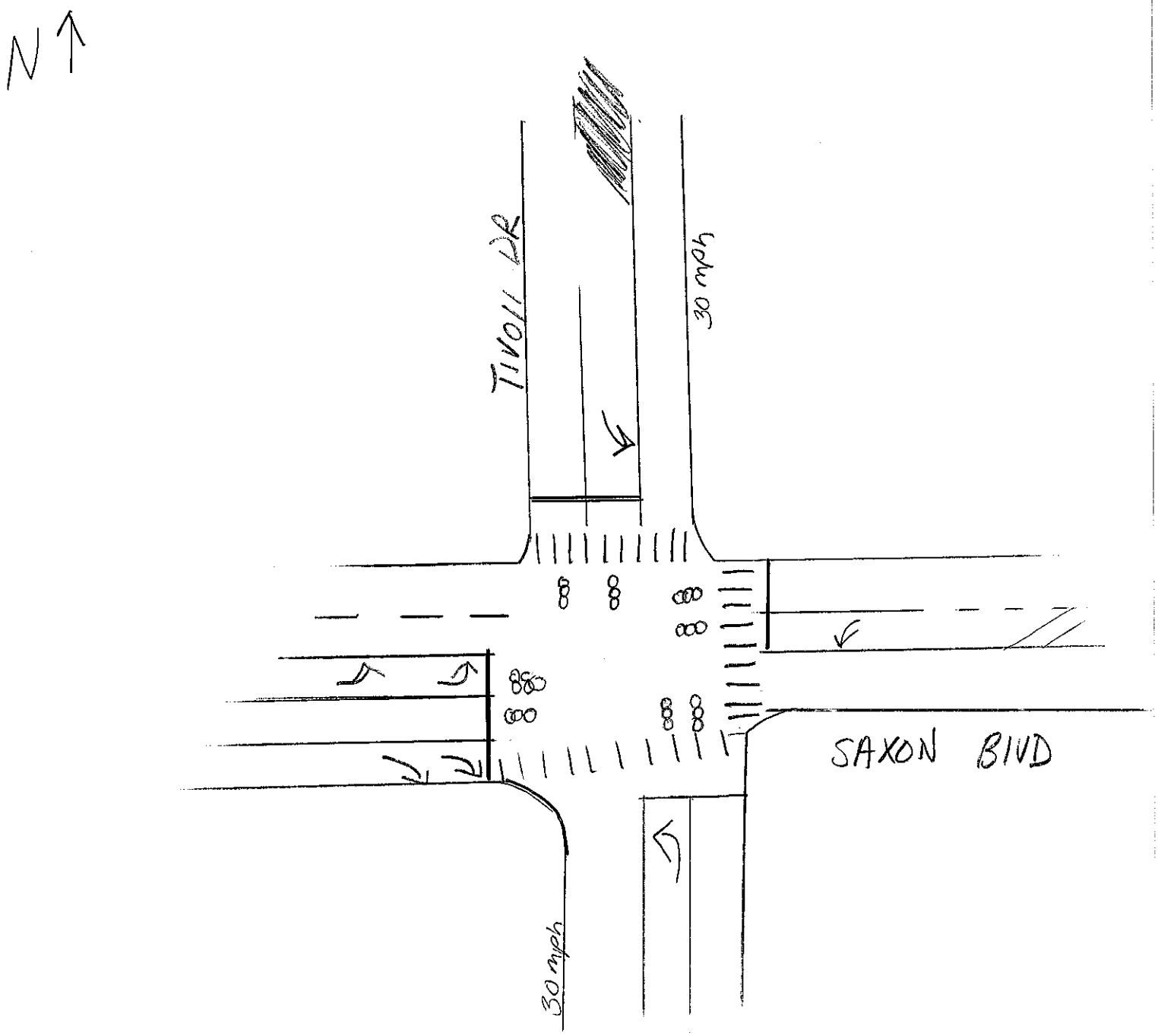
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	9	51	4	72	2	10	20	4	92	124	15	403
5:00:00 PM	1	8	55	3	99	3	9	26	4	104	148	22	482
5:15:00 PM	2	17	68	0	110	2	7	24	4	110	158	23	525
5:30:00 PM	3	15	46	1	129	3	10	19	6	111	147	10	500
5:45:00 PM	6	19	57	0	119	2	14	23	6	99	164	17	526
6:00:00 PM	2	18	54	4	117	0	12	28	5	117	138	11	506
6:15:00 PM	3	21	59	2	115	5	15	16	2	130	131	20	519
6:30:00 PM	1	33	51	3	108	8	18	22	0	104	140	15	503
6:45:00 PM	3	17	47	2	116	0	21	35	5	99	113	15	473

Car Traffic

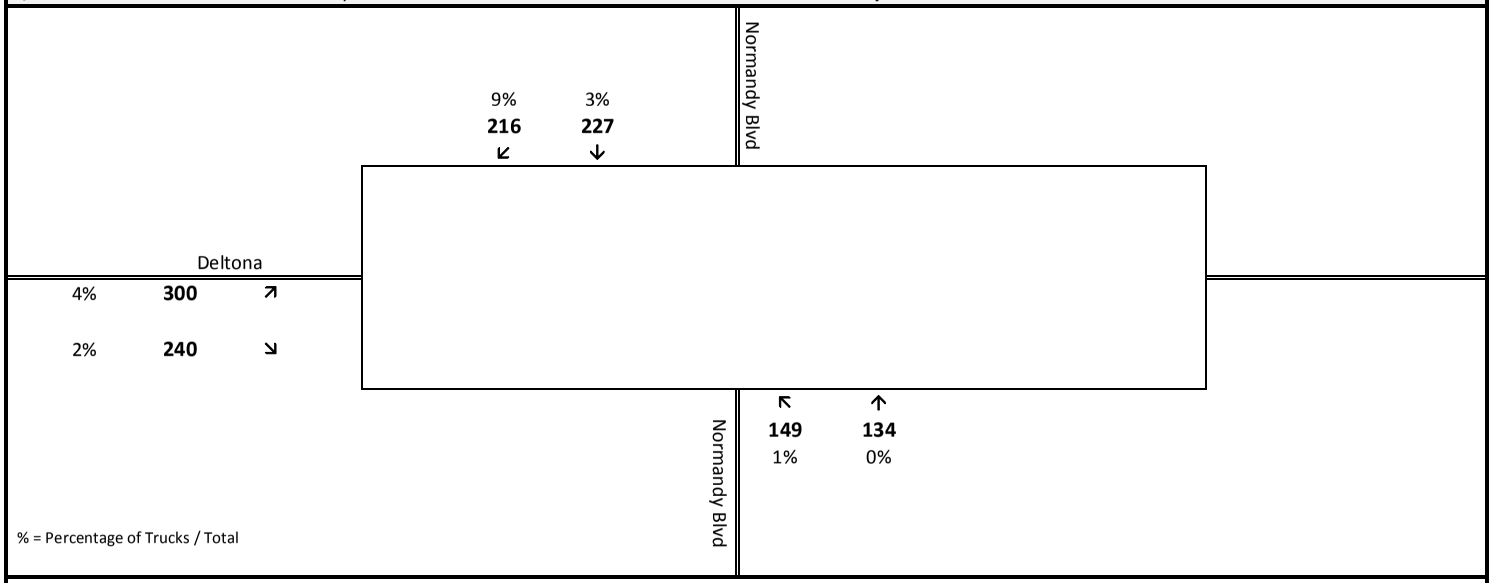
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	9	50	4	69	2	10	20	4	92	119	15	394
5:00:00 PM	1	8	54	3	98	2	9	23	4	102	140	22	466
5:15:00 PM	2	17	67	0	109	2	7	24	4	110	151	23	516
5:30:00 PM	3	15	46	1	128	2	10	19	6	111	146	10	497
5:45:00 PM	6	19	57	0	119	2	14	23	6	99	157	17	519
6:00:00 PM	2	18	54	4	116	0	12	28	5	115	134	11	499
6:15:00 PM	3	21	59	2	112	5	15	15	2	130	125	20	509
6:30:00 PM	1	33	51	3	107	8	18	22	0	104	137	15	499
6:45:00 PM	3	17	47	2	116	0	21	34	5	98	112	14	469

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	0	1	0	3	0	0	0	0	0	5	0	9
5:00:00 PM	0	0	1	0	1	1	0	3	0	2	8	0	16
5:15:00 PM	0	0	1	0	1	0	0	0	0	0	7	0	9
5:30:00 PM	0	0	0	0	1	1	0	0	0	0	1	0	3
5:45:00 PM	0	0	0	0	0	0	0	0	0	0	7	0	7
6:00:00 PM	0	0	0	0	1	0	0	0	0	2	4	0	7
6:15:00 PM	0	0	0	0	3	0	0	1	0	0	6	0	10
6:30:00 PM	0	0	0	0	1	0	0	0	0	0	3	0	4
6:45:00 PM	0	0	0	0	0	0	0	1	0	1	1	1	4


N
TIVOLI DR
30 mph
SAXON BLVD
30 mph

Date:	9-May-16	**City:**	Deland
E/W Street Name:	Deltona	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	PM



Peak Hour Traffic

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Cars	0	221	197	0	0	0	147	134	0	289	0	236	1224
Trucks	0	6	19	0	0	0	2	0	0	11	0	4	42
Total	**0**	**227**	**216**	**0**	**0**	**0**	**149**	**134**	**0**	**300**	**0**	**240**	**1266**
Peak Hour Factor	**0.912**												
Peak Hour	**05:00 PM to to 06:00 PM**												

Total Vehicle Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	46	48	0	0	0	38	30	0	58	0	56	276
5:00:00 PM	0	47	64	0	0	0	40	25	0	69	0	61	306
5:15:00 PM	0	59	52	0	0	0	44	36	0	81	0	75	347
5:30:00 PM	0	65	44	0	0	0	31	34	0	76	0	54	304
5:45:00 PM	0	56	56	0	0	0	34	39	0	74	0	50	309
6:00:00 PM	0	67	44	0	0	0	28	42	0	58	0	48	287
6:15:00 PM	0	53	62	0	0	0	26	38	0	82	0	28	289
6:30:00 PM	0	45	56	0	0	0	36	27	0	54	0	40	258
6:45:00 PM	0	41	40	0	0	0	28	30	0	42	0	33	214

Date:	9-May-16	**City:**	Deland
E/W Street Name:	Deltona	**County:**	Volusia
N/S Street Name:	Normandy Blvd	**Study Period:**	PM

Total Vehicle Traffic

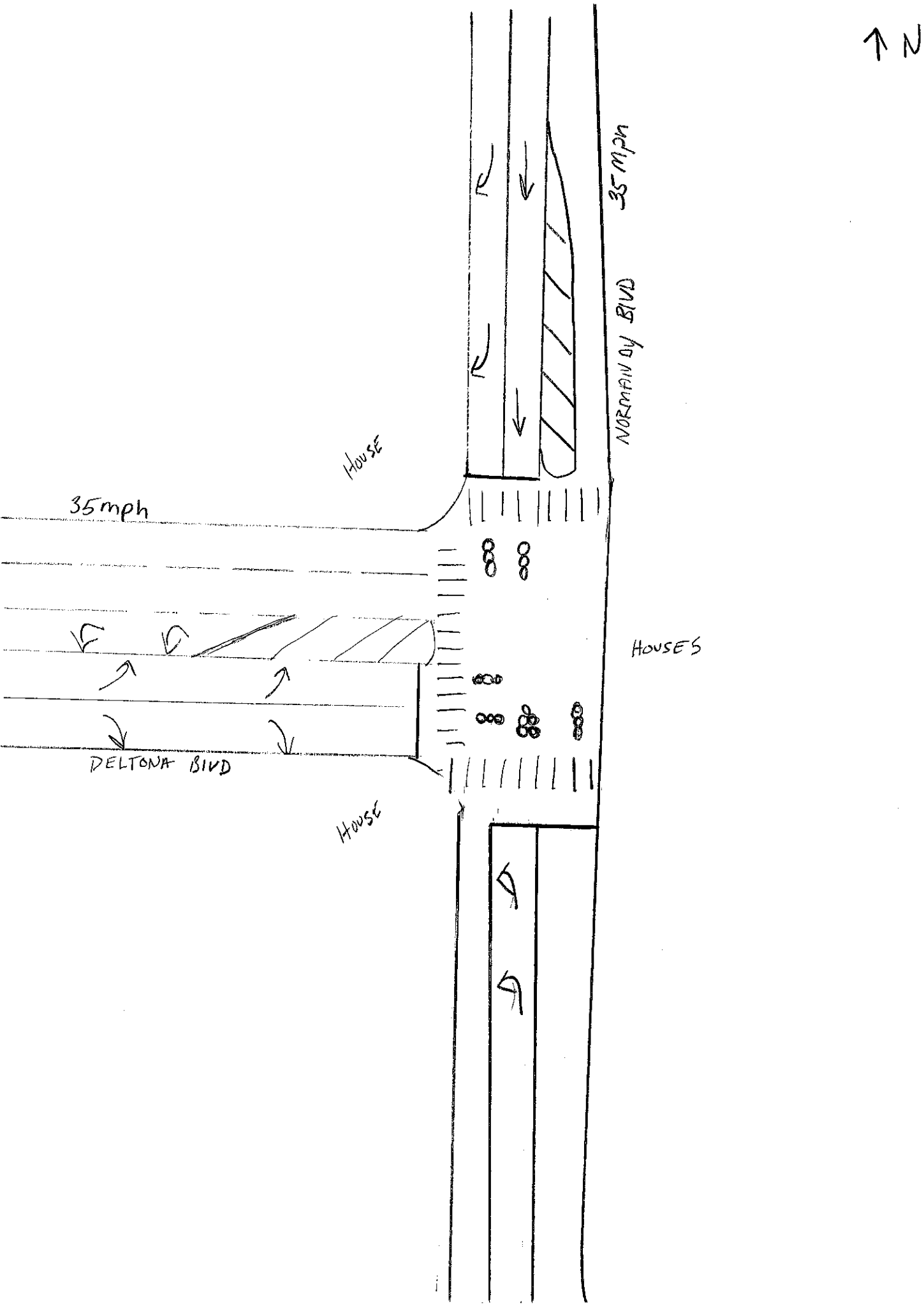
Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	46	48	0	0	0	38	30	0	58	0	56	276
5:00:00 PM	0	47	64	0	0	0	40	25	0	69	0	61	306
5:15:00 PM	0	59	52	0	0	0	44	36	0	81	0	75	347
5:30:00 PM	0	65	44	0	0	0	31	34	0	76	0	54	304
5:45:00 PM	0	56	56	0	0	0	34	39	0	74	0	50	309
6:00:00 PM	0	67	44	0	0	0	28	42	0	58	0	48	287
6:15:00 PM	0	53	62	0	0	0	26	38	0	82	0	28	289
6:30:00 PM	0	45	56	0	0	0	36	27	0	54	0	40	258
6:45:00 PM	0	41	40	0	0	0	28	30	0	42	0	33	214

Car Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	45	46	0	0	0	37	30	0	54	0	53	265
5:00:00 PM	0	46	59	0	0	0	38	25	0	69	0	60	297
5:15:00 PM	0	57	47	0	0	0	44	36	0	78	0	74	336
5:30:00 PM	0	63	39	0	0	0	31	34	0	72	0	52	291
5:45:00 PM	0	55	52	0	0	0	34	39	0	70	0	50	300
6:00:00 PM	0	64	40	0	0	0	26	42	0	56	0	48	276
6:15:00 PM	0	51	59	0	0	0	26	38	0	77	0	28	279
6:30:00 PM	0	44	51	0	0	0	36	27	0	53	0	40	251
6:45:00 PM	0	41	40	0	0	0	28	30	0	42	0	33	214

Truck Traffic

Interval Starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:45:00 PM	0	1	2	0	0	0	1	0	0	4	0	3	11
5:00:00 PM	0	1	5	0	0	0	2	0	0	0	0	1	9
5:15:00 PM	0	2	5	0	0	0	0	0	0	3	0	1	11
5:30:00 PM	0	2	5	0	0	0	0	0	0	4	0	2	13
5:45:00 PM	0	1	4	0	0	0	0	0	0	4	0	0	9
6:00:00 PM	0	3	4	0	0	0	2	0	0	2	0	0	11
6:15:00 PM	0	2	3	0	0	0	0	0	0	5	0	0	10
6:30:00 PM	0	1	5	0	0	0	0	0	0	1	0	0	7
6:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0


N
35 mph
NORMANDY BLVD
HOUSE
35mph
HOUSES
DELTONA BLVD
HOUSE

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: Saxon Boulevard & Finland Drive
Deltona

ISOLATED:

DATE: 2/20/2015

SIGNAL #: 321

CO-ORD: X

Design By: M. Tobin

System #: 18

Controller Timing Chart

PHASE	1	2	3	4	5	6	7	8
DIRECTION	WBL	EB	-	SB	EBL	WB	-	NB
TURN TYPE	PROT	-	-	-	PROT	-	-	-
MIN GREEN	5	11		6	5	11		6
EXTENSION	3	4		4	3	4		4
CLEARANCE	4.5	4.5		4.0	4.5	4.5		4.0
ALL RED	3.0	3.0		3.0	3.0	3.0		3.0
WALK	-	7		7	-	7		7
FDW	-	22		24	-	22		24
MAX 1	20	60		25	20	60		25
MAX 2								
MAX 3	-	85		-	-	85		-
ADJUST	-	10		-	-	10		-
RECALL	-	MIN		-	-	MIN		-
DETECTOR	NON-LOCK	LOCK		NON-LOCK	NON-LOCK	LOCK		NON-LOCK
FLASH	RED	YELLOW		RED	RED	YELLOW		RED
SET	-	2		-	-	2		-
CLEAR	-	2		-	-	2		-

BASE DAY		1	2	3	4	5	6	7
MON #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
TUES#1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
WED #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
THU #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
FRI #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
SAT #2	TIME	00:01-00:00						
	PLAN	FREE						
SUN #3	TIME	00:01-00:00						
	PLAN	FREE						

Crosswalk Length
P2
75 Feet
P4
81 Feet
P6
64 Feet
P8
74 Feet

CONTROLLER TYPE		CONDITION OF OVERHEAD	OK	PROM NUMBER	
3000E		OVERHEAD STREET NAMES	NO		SIGNAL OWNER
PHASES:	8Φ	ILLUMINATED STREET NAMES	YES	8216A 3.7.3	County
CABINET TYPE	V	PRE-EMPTION	NO	IP ADDRESS	LED YES
CABINET DATE	06/1994	PRE-EMPTION TYPE	N/A	10.77.8.38	

REMARKS:

1	2	4
5	6	8

VOLUSIA COUNTY TRAFFIC ENGINEERING
SYSTEM INVENTORY

Switch IP.# 10.77.8.6
Controller IP.# 10.77.8.38
Camera IP # -

DATE: 2/20/2015 DESIGNED BY: M. Tobin

LOCATION: Saxon Boulevard & Finland Drive
CITY: Deltona ID NO: 321 SYSTEM ID: 18

CONTROLLER TIME CHART

MVMNT	MIN	EXT	CLR	A.R.	WALK	FDW	MAX1	MAX2	MAX3	ADJST	REC	DET	FL	SET	CLR
1	5	3	4.5	3	-	-	20	-	-	-	-	NL	R	-	-
2	11	4	4.5	3	7	22	60	-	85	10	MIN	L	Y	2	2
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	6	4	4	3	7	24	25	-	-	-	-	NL	R	-	-
5	5	3	4.5	3	-	-	20	-	-	-	-	NL	R	-	-
6	11	4	4.5	3	7	22	60	-	85	10	MIN	L	Y	2	2
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	6	4	4	3	7	24	25	-	-	-	-	NL	R	-	-

TP# 1

CO-ORDINATION

PLAN	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
CYCLE	120	130						
OFF 1	55	77						
OFF 2								
OFF 3								
OFF 4								
OFF 5								
PERM	10%	10%	10%	10%	10%	10%	10%	10%

PHASE SPLITS (seconds)

CY/SP		C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
15.5	PH 1	20	21	-	-	-	-		
22.5	PH 2	64	79	-	-	-	-		
0	PH 3	-	-	-	-	-	-		
17	PH 4	36	30	-	-	-	-		
15.5	PH 5	20	25	-	-	-	-		
22.5	PH 6	64	75	-	-	-	-		
0	PH 7	-	-	-	-	-	-		
17	PH 8	36	30	-	-	-	-		

1	2	4
5	6	8

BASE DAY		1	2	3	4	5	6	7	8	9	10	11	
MON #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
TUES#1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
WED #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
THU #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
FRI #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
SAT	TIME	00:01-00:00											
	PLAN	FREE											
SUN	TIME	00:01-00:00											
	PLAN	FREE											

TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: Saxon Blvd & N. Normandy Blvd
Deltona

ISOLATED:

DATE: 1/9/2015

SIGNAL #: 157

CO-ORD: X

Design By: M. Tobin

System #: 18

Controller Timing Chart

PHASE	1	2	3	4	5	6	7	8
DIRECTION	EBL	WB	SBL	NB	WBL	EB	NBL	SB
TURN TYPE	PERM/PROT	-	PERM/PROT	-	PERM/PROT	-	PERM/PROT	-
MIN GREEN	5	11	5	6	5	11	5	6
EXTENSION	3	4	3	4	3	4	3	4
CLEARANCE	4.5	4.5	4.5	4.0	4.5	4.5	4.0	4.5
ALL RED	4.0	4.0	4.0	3.5	4.0	4.0	3.5	4.0
WALK	-	7	-	7	-	7	-	7
FDW	-	29	-	23	-	18	-	23
MAX 1	20	45	20	40	20	45	20	40
MAX 2	-	-	-	-	-	-	-	-
MAX 3	40	60	-	-	-	60	-	-
ADJUST	5	5	-	-	-	5	-	-
RECALL	-	MIN	-	-	-	MIN	-	-
DETECTOR	NON-LOCK	LOCK	NON-LOCK	NON-LOCK	NON-LOCK	LOCK	NON-LOCK	NON-LOCK
FLASH	-	YELLOW	-	RED	-	YELLOW	-	RED
SET	2	2	-	-	-	2	-	-
CLEAR	2	2	-	-	-	2	-	-

BASE DAY		1	2	3	4	5	6	7
MON #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
TUES#1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
WED #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
THU #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
FRI #1	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00		
	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE		
SAT #2	TIME	00:01-00:00						
	PLAN	FREE						
SUN #3	TIME	00:01-00:00						
	PLAN	FREE						

Crosswalk Length
P2
100 Feet
P4
75 Feet
P6
60 Feet
P8
80 Feet

CONTROLLER TYPE		CONDITION OF OVERHEAD	Ok	PROM NUMBER	
3000E		OVERHEAD STREET NAMES	NO		
PHASES:	8Φ	ILLUMINATED STREET NAMES	NO	8216A 3.7.3	SIGNAL OWNER
CABINET TYPE	V	PRE-EMPTION	NO	IP ADDRESS	County
CABINET DATE	06/1992	PRE-EMPTION TYPE	N/A	10.77.8.37	LED YES

REMARKS:

1	2	3	4
5	6	7	8

VOLUSIA COUNTY TRAFFIC ENGINEERING
SYSTEM INVENTORY

Switch IP.# 10.77.8.5
Controller IP.# 10.77.8.37
Camera IP # 10.77.8.67

DATE: 1/9/2015 DESIGNED BY: M. Tobin

LOCATION: Saxon Blvd & N. Normandy Blvd
CITY: Deltona SIGNAL ID NO: 157 SYSTEM ID: 18

CONTROLLER TIME CHART

MVMNT	MIN	EXT	CLR	A.R.	WALK	FDW	MAX1	MAX2	MAX3	ADJST	REC	DET	FL	SET	CLR
1	5	3	4.5	4	-	-	20	-	40	5	-	NL	-	2	2
2	11	4	4.5	4	7	29	45	-	60	5	MIN	L	Y	2	2
3	5	3	4.5	4	-	-	20	-	-	-	-	NL	-	-	-
4	6	4	4	3.5	7	23	40	-	-	-	-	NL	R	-	-
5	5	3	4.5	4	-	-	20	-	-	-	-	NL	-	-	-
6	11	4	4.5	4	7	18	45	-	60	5	MIN	L	Y	2	2
7	5	3	4	3.5	-	-	20	-	-	-	-	NL	-	-	-
8	6	4	4.5	4	7	23	40	-	-	-	-	NL	R	-	-

TP# 1

CO-ORDINATION

PLAN	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
CYCLE	120	130						
OFF 1	20	92						
OFF 2								
OFF 3								
OFF 4								
OFF 5								
PERM	10%	10%	10%	10%	10%	10%	10%	10%

PHASE SPLITS (seconds)

	CY/SP	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
16.5	PH 1	18	42	-	-	-	-		
23.5	PH 2	56	42	-	-	-	-		
16.5	PH 3	18	16	-	-	-	-		
17.5	PH 4	28	30	-	-	-	-		
16.5	PH 5	18	20	-	-	-	-		
23.5	PH 6	56	64	-	-	-	-		
15.5	PH 7	24	23	-	-	-	-		
18.5	PH 8	22	23	-	-	-	-		

1	2	3	4
5	6	7	8

BASE DAY		1	2	3	4	5	6	7	8	9	10	11	
	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
MON #1	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
TUES#1	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
WED #1	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
THU #1	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
	TIME	00:01-06:30	06:30-09:30	09:30-15:30	15:30-20:00	20:00-00:00							
FRI #1	PLAN	FREE	C1O1S1	FREE	C2O1S1	FREE							
	TIME	00:01-00:00											
SAT	PLAN	FREE											
	TIME	00:01-00:00											
SUN	PLAN	FREE											

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: Saxon Blvd & Sterling Silver Blvd
Deltona

FREE: X

DATE: 8/18/2015

SIGNAL #: 447

CO-ORD:

Design By: M. Tobin

NETWORK #: ???

Controller Timing Chart

PHASE	1	2	3	4	5	6	7	8	
DIRECTION	EBL	WB	SBL	NB	WBL	EB	-	SB	
TURN TYPE	PERM/PROT	-	PERM/PROT	-	PERM/PROT	-	-	-	
MIN GREEN	7	11	5	6	5	11		6	
WALK	-	5	-	7	-	5	-	7	
PED CLR	-	11	-	11	-	11	-	11	
YELLOW	4.5	4.5	3.5	3.5	4.5	4.5		3.5	
RED CLR	2.0	2.0	2.0	2.0	2.0	2.0		2.0	
EXTENSION	3	3	3	3	3	3		3	
MAX 1	20	65	20	20	20	65		35	
MAX 2	-	-	-	-	-	-	-	-	
MAX 3	-	-	-	-	-	-	-	-	
DYM MAX	-	-	-	-	-	-	-	-	
DYM STP	-	-	-	-	-	-	-	-	
RECALL	-	MIN	-	-	-	MIN	-	-	
DETECTOR	LOCK	LOCK	NON-LOCK	NON-LOCK	LOCK	LOCK		NON-LOCK	
FLASH	RED	YELLOW	-	RED	RED	YELLOW	-	RED	

COORDINATION TIMINGS

PATTERN	1	2	3	4	5	6	7	8	
CYCLE						-	-	-	
OFFSET						-	-	-	

PHASE	1	2	3	4	5	6	7	8	
PATTERN 1									
PATTERN 2									
PATTERN 3									
PATTERN 4									
PATTERN 5									
PATTERN 6	-	-	-	-	-	-	-	-	
PATTERN 7	-	-	-	-	-	-	-	-	

Controller IP		Switch IP		Camera IP	
Controller Gateway		Switch Gateway		Camera Gateway	

REMARKS:

1	2	3	4
5	6	7	8

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: Saxon Blvd & Sterling Silver Blvd
Deltona

FREE: X

DATE: 8/18/2015

SIGNAL #: 447

CO-ORD:

Design By: M. Tobin

NETWORK #: ???

TIME OF DAY SCHEDULE

BASE DAY		1	2	3	4	5	6	7
MON	TIME	00:00-07:00	07:00-09:30	09:30-11:30	11:30-16:00	16:00-18:00	18:00-20:00	20:00-00:00
	PATTERN	FREE	PATTERN 1	PATTERN 2	PATTERN 3	PATTERN 4	PATTERN 2	FREE
TUES	TIME	00:00-07:00	07:00-09:30	09:30-11:30	11:30-16:00	16:00-18:00	18:00-20:00	20:00-00:00
	PATTERN	FREE	PATTERN 1	PATTERN 2	PATTERN 3	PATTERN 4	PATTERN 2	FREE
WED	TIME	00:00-07:00	07:00-09:30	09:30-11:30	11:30-16:00	16:00-18:00	18:00-20:00	20:00-00:00
	PATTERN	FREE	PATTERN 1	PATTERN 2	PATTERN 3	PATTERN 4	PATTERN 2	FREE
THU	TIME	00:00-07:00	07:00-09:30	09:30-11:30	11:30-16:00	16:00-18:00	18:00-20:00	20:00-00:00
	PATTERN	FREE	PATTERN 1	PATTERN 2	PATTERN 3	PATTERN 4	PATTERN 2	FREE
FRI	TIME	00:00-07:00	07:00-09:30	09:30-11:30	11:30-16:00	16:00-18:00	18:00-20:00	20:00-00:00
	PATTERN	FREE	PATTERN 1	PATTERN 2	PATTERN 3	PATTERN 4	PATTERN 2	FREE
SAT	TIME	00:00-08:00	08:00-20:00	20:00-00:00				
	PATTERN	FREE	PATTERN 5	FREE				
SUN	TIME	00:00-09:30	09:30-20:00	20:00-00:00				
	PATTERN	FREE	PATTERN 5	FREE				

Crosswalk Length
P2
? Feet
P4
? Feet
P6
? Feet
P8
? Feet

CONTROLLER TYPE		CONDITION OF OVERHEAD	NEW	PROGRAM NUMBER	
Econolite ASC/3		OVERHEAD STREET NAMES	NO		SIGNAL OWNER
PHASES:	8Φ	ILLUMINATED STREET NAMES	YES	V1.12.05	City
CABINET TYPE	V	PRE-EMPTION	NO	Controller IP Address	LED YES
CABINET DATE	6/2015	PRE-EMPTION TYPE	N/A	0	

REMARKS:

1	2	3	4
5	6	7	8

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: Saxon Blvd & Tivoli Drive
Deltona

ISOLATED: X

DATE: 1/13/2015

SIGNAL #: 232

CO-ORD:

Design By: M. Tobin

System #: -

Controller Timing Chart

PHASE	1	2	3	4	5	6	7	8	
DIRECTION	-	EB	-	NB/SB	EBL	WB	-	-	
TURN TYPE	-	-	-	-	PERM/PROT	-	-	-	
MIN GREEN		11		5	5	11			
EXTENSION		4		3	3	4			
CLEARANCE		4.0		4.0	4.5	4.0			
ALL RED		2.5		2.5	2.5	2.5			
WALK		7		7	-	7			
FDW		16		20	-	16			
MAX 1		30		30	15	30			
MAX 2		-		-	-	-			
MAX 3		-		40	30	-			
ADJUST		-		5	5	-			
RECALL		MIN		-	-	MIN			
DETECTOR		LOCK		NON-LOCK	NON-LOCK	LOCK			
FLASH		YELLOW		RED	-	YELLOW			
SET		-		2	2	-			
CLEAR		-		2	2	-			

BASE DAY		1	2	3	4	5	6	7
MON #1	TIME	00:01-00:00						
	PLAN	FREE						
TUES#1	TIME	00:01-00:00						
	PLAN	FREE						
WED #1	TIME	00:01-00:00						
	PLAN	FREE						
THU #1	TIME	00:01-00:00						
	PLAN	FREE						
FRI #1	TIME	00:01-00:00						
	PLAN	FREE						
SAT #2	TIME	00:01-00:00						
	PLAN	FREE						
SUN #3	TIME	00:01-00:00						
	PLAN	FREE						

Crosswalk Length
P2
55 Feet
P4
52 Feet
P6
53 Feet
P8
69 Feet

CONTROLLER TYPE		CONDITION OF OVERHEAD	OK	PROM NUMBER		
1880 EL		OVERHEAD STREET NAMES	NO			
PHASES:	8Φ	ILLUMINATED STREET NAMES	YES	92R09	SIGNAL OWNER	
CABINET TYPE	V	PRE-EMPTION	NO	IP ADDRESS	County	
CABINET DATE	10/2003	PRE-EMPTION TYPE	N/A	-	LED	-

REMARKS:

2 4
5 6

VOLUSIA COUNTY TRAFFIC ENGINEERING
SYSTEM INVENTORY

Switch IP.# _____
Controller IP.# -
Camera IP # _____

DATE: 1/13/2015 DESIGNED BY: M. Tobin

LOCATION: Saxon Blvd & Tivoli Drive
CITY: Deltona SIGNAL ID NO: 232 SYSTEM ID: -

CONTROLLER TIME CHART

MVMNT	MIN	EXT	CLR	A.R.	WALK	FDW	MAX1	MAX2	MAX3	ADJST	REC	DET	FL	SET	CLR
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	11	4	4	2.5	7	16	30	-	-	-	MIN	L	Y	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	5	3	4	2.5	7	20	30	-	40	5	-	NL	R	2	2
5	5	3	4.5	2.5	-	-	15	-	30	5	-	NL	-	2	2
6	11	4	4	2.5	7	16	30	-	-	-	MIN	L	Y	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TP# xx

CO-ORDINATION

PLAN	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1	
CYCLE							
OFF 1							
OFF 2							
OFF 3							
OFF 4							
OFF 5							
PERM	10%	10%	10%	10%	10%	10%	10%

PHASE SPLITS (seconds)

CY/SP	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
PH 1	-	-	-	-	-	-		
PH 2	-	-	-	-	-	-		
PH 3	-	-	-	-	-	-		
PH 4	-	-	-	-	-	-		
PH 5	-	-	-	-	-	-		
PH 6	-	-	-	-	-	-		
PH 7	-	-	-	-	-	-		
PH 8	-	-	-	-	-	-		

	2	4
5	6	

BASE DAY		1	2	3	4	5	6	7	8	9	10	11
MON #1	TIME	00:01-00:00										
	PLAN	FREE										
TUES#1	TIME	00:01-00:00										
	PLAN	FREE										
WED #1	TIME	00:01-00:00										
	PLAN	FREE										
THU #1	TIME	00:01-00:00										
	PLAN	FREE										
FRI #1	TIME	00:01-00:00										
	PLAN	FREE										
SAT	TIME	00:01-00:00										
	PLAN	FREE										
SUN	TIME	00:01-00:00										
	PLAN	FREE										

COUNTY OF VOLUSIA TRAFFIC SIGNAL TIMING SHEET

LOCATION: N. Normandy Blvd & Deltona Blvd
Deltona

FREE: X

DATE: 2/9/2015

SIGNAL #: 283

CO-ORD:

Design By: M. Tobin

System #: -

Controller Timing Chart

PHASE	1	2	3	4	5	6	7	8
DIRECTION	-	NB	-	EB	NBL	SB	-	-
TURN TYPE	-	-	-	-	PERM/PROT	-	-	-
MIN GREEN		10		4	3	10		
EXTENSION		3		2.5	2.5	3		
CLEARANCE		4.0		4.0	4.0	4.5		
ALL RED		2.5		2.0	2.5	2.5		
WALK		-		7	-	7		
FDW		-		18	-	21		
MAX 1		25		20	15	25		
MAX 2		-		-	-	-		
MAX 3		-		-	-	-		
ADJUST		-		-	-	-		
RECALL		MIN		-	-	MIN		
DETECTOR		LOCK		NON-LOCK	NON-LOCK	LOCK		
FLASH		YELLOW		RED	-	YELLOW		
SET		-		-	-	-		
CLEAR		-		-	-	-		

BASE DAY		1	2	3	4	5	6	7
MON #1	TIME	00:00-00:00						
	PLAN	FREE						
TUES#1	TIME	00:00-00:00						
	PLAN	FREE						
WED #1	TIME	00:00-00:00						
	PLAN	FREE						
THU #1	TIME	00:00-00:00						
	PLAN	FREE						
FRI #1	TIME	00:00-00:00						
	PLAN	FREE						
SAT #2	TIME	00:00-00:00						
	PLAN	FREE						
SUN #3	TIME	00:00-00:00						
	PLAN	FREE						

Crosswalk Length
P2
-
P4
63 Feet
P6
73 Feet
P8
-

CONTROLLER TYPE		CONDITION OF OVERHEAD		PROM NUMBER	
3000E		OVERHEAD STREET NAMES	YES		SIGNAL OWNER
PHASES:	8Φ	ILLUMINATED STREET NAMES	NO	8216A 3.6.4	
CABINET TYPE	V	PRE-EMPTION	NO	IP ADDRESS	Deltona
CABINET DATE	-	PRE-EMPTION TYPE	N/A	-	LED YES

REMARKS:

2 4
5 6

CITY: Deltona

SIGNAL ID NO: 283

SYSTEM ID: -

CONTROLLER TIME CHART

TP# XX

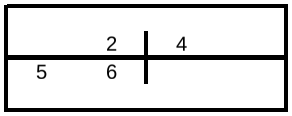
MVMNT	MIN	EXT	CLR	A.R.	WALK	FDW	MAX1	MAX2	MAX3	ADJST	REC	DET	FL	SET	CLR
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	10	3	4	2.5	-	-	25	-	-	-	MIN	L	Y	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	4	2.5	4	2	7	18	20	-	-	-	-	NL	R	-	-
5	3	2.5	4	2.5	-	-	15	-	-	-	-	NL	-	-	-
6	10	3	4.5	2.5	7	21	25	-	-	-	MIN	L	Y	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CO-ORDINATION

PLAN	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
CYCLE								
OFF 1								
OFF 2								
OFF 3								
OFF 4								
OFF 5								
PERM	10%	10%	10%	10%	10%	10%	10%	10%

PHASE SPLITS (seconds)

CY/SP	C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		
PH 1	-	-	-	-	-	-		
PH 2	-	-	-	-	-	-		
PH 3	-	-	-	-	-	-		
PH 4	-	-	-	-	-	-		
PH 5	-	-	-	-	-	-		
PH 6	-	-	-	-	-	-		
PH 7	-	-	-	-	-	-		
PH 8	-	-	-	-	-	-		



BASE DAY		1	2	3	4	5	6	7	8	9	10	11	
MON #1	TIME	00:00-00:00											
	PLAN	FREE											
TUES#1	TIME	00:00-00:00											
	PLAN	FREE											
WED #1	TIME	00:00-00:00											
	PLAN	FREE											
THU #1	TIME	00:00-00:00											
	PLAN	FREE											
FRI #1	TIME	00:00-00:00											
	PLAN	FREE											
SAT #2	TIME	00:00-00:00											
	PLAN	FREE											
SUN #3	TIME	00:00-00:00											
	PLAN	FREE											

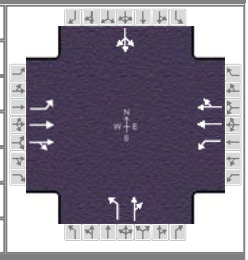
TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
C1/S1	C2/S1	C3/S1	C4/S1	C5/S1	C6/S1		

APPENDIX C

Existing HCS Capacity Analysis Worksheets

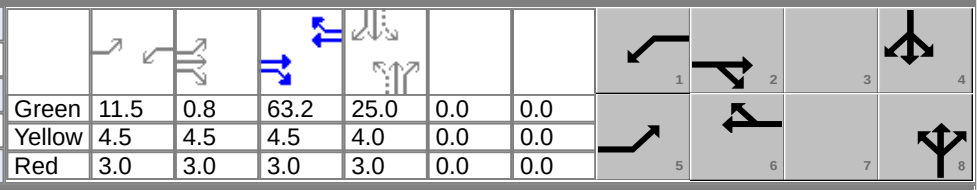
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	MJA	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.91
Urban Street	Saxon Blvd	Analysis Year	2016	Analysis Period	1> 17:45
Intersection	Saxon Blvd & Finland Dr…	File Name	Saxon Blvd & Finland Dr Existing PM Peak OPT.xus		
Project Description	PM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	216	1897	20	140	1348	58	112	44	73	16	28	85

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	11.5	0.8	63.2	25.0	0.0	0.0
Yellow	4.5	4.5	4.5	4.0	0.0	0.0
Red	3.0	3.0	3.0	3.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	2.0	4.0	2.0	4.0		6.0		8.0
Phase Duration, s	27.3	79.0	19.0	70.7		32.0		32.0
Change Period, ($Y+R_c$), s	7.5	7.5	7.5	7.5		7.0		7.0
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0		5.4		5.4
Queue Clearance Time (g_s), s	19.0		13.4			25.1		12.7
Green Extension Time (g_e), s	0.8	0.0	0.0	0.0		0.0		1.8
Phase Call Probability	1.00		1.00			1.00		0.99
Max Out Probability	0.00		1.00			1.00		0.12

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	237	1053	1053	154	776	769	123	129			142	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1863	1856	1757	1845	1818	1274	1708			1487	
Queue Service Time (g_s), s	17.0	71.5	71.5	11.4	48.6	49.0	12.4	8.5			0.0	
Cycle Queue Clearance Time (g_c), s	17.0	71.5	71.5	11.4	48.6	49.0	23.1	8.5			10.7	
Green Ratio (*g/C*)	0.15	0.55	0.55	0.09	0.49	0.49	0.19	0.19			0.19	
Capacity (*c*), veh/h	271	1024	1021	155	896	883	195	328			317	
Volume-to-Capacity Ratio (*X*)	0.877	1.028	1.032	0.990	0.866	0.870	0.630	0.391			0.447	
Back of Queue (*Q*), ft/ln (95 th percentile)	325.3	1296.7	1286.4	319.7	787.9	775	198.6	169			193.1	
Back of Queue (*Q*), veh/ln (95 th percentile)	12.8	51.0	51.5	12.6	31.0	31.0	7.8	6.8			7.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	
Uniform Delay (d_1), s/veh	53.9	29.3	29.3	59.2	29.7	29.8	57.0	45.9			46.7	
Incremental Delay (d_2), s/veh	8.9	35.5	36.7	69.0	11.0	11.4	7.3	1.1			1.4	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Control Delay (*d*), s/veh	62.8	64.8	66.0	128.1	40.6	41.2	64.4	46.9			48.1	
Level of Service (LOS)	E	F	F	F	D	D	E	D			D	
Approach Delay, s/veh / LOS	65.1	E		48.8	D		55.5	E		48.1	D	
Intersection Delay, s/veh / LOS	57.8						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.1	B	2.9	C	2.9	C
Bicycle LOS Score / LOS	2.4	B	1.9	A	0.9	A	0.7	A

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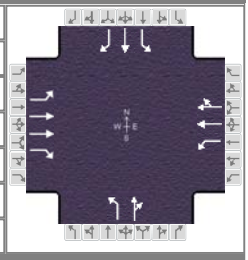
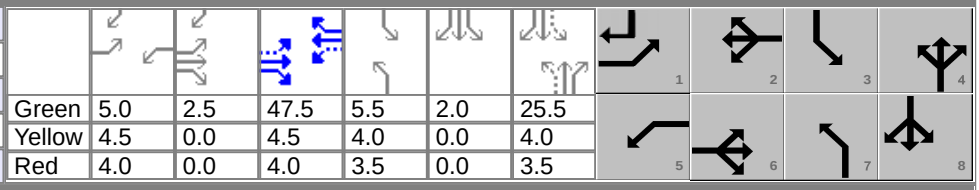
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	MJA	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	AM Peak	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2016	Analysis Period	1> 7:30
Intersection	Saxon Blvd & Normandy…	File Name	Saxon Blvd & Normandy Blvd Existing AM Peak…		
Project Description	AM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	163	379	138	74	1320	59	256	145	34	110	146	554

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.0	2.5	47.5	5.5	2.0	25.5
Yellow	4.5	0.0	4.5	4.0	0.0	4.0
Red	4.0	0.0	4.0	3.5	0.0	3.5

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	3.0	1.1	4.0	1.1	4.0	1.1	3.0
Phase Duration, s	16.0	58.5	13.5	56.0	13.0	33.0	15.0	35.0
Change Period, ($Y+R_c$), s	8.5	8.5	8.5	8.5	7.5	8.5	8.5	8.5
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0	4.1	5.3	4.1	5.3
Queue Clearance Time (g_s), s	8.9		5.2		7.5	13.4	8.1	28.5
Green Extension Time (g_e), s	0.0	0.0	0.2	0.0	0.0	4.0	0.0	0.0
Phase Call Probability	1.00		0.92		1.00	1.00	0.98	1.00
Max Out Probability	1.00		0.00		1.00	0.44	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	168	391	128	76	712	704	264	181		113	151	514
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1690	1505	1675	1845	1819	1691	1705		1774	1845	1563
Queue Service Time (g_s), s	6.9	9.1	6.5	3.2	45.5	45.7	5.5	11.4		6.1	8.3	26.5
Cycle Queue Clearance Time (g_c), s	6.9	9.1	6.5	3.2	45.5	45.7	5.5	11.4		6.1	8.3	26.5
Green Ratio (*g/C*)	0.46	0.42	0.42	0.44	0.40	0.40	0.25	0.20		0.26	0.22	0.28
Capacity (*c*), veh/h	176	1408	627	432	730	720	296	348		287	407	443
Volume-to-Capacity Ratio (*X*)	0.953	0.277	0.204	0.176	0.975	0.977	0.892	0.521		0.395	0.369	1.161
Back of Queue (*Q*), ft/ln (95 th percentile)	232.6	173.5	112.9	57.2	878.4	874.9	307.8	226.5		122.8	182.3	935.1
Back of Queue (*Q*), veh/ln (95 th percentile)	9.2	6.6	4.3	2.3	33.3	33.1	12.1	8.6		4.8	6.9	35.4
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh	29.2	23.1	22.3	20.2	35.7	35.7	47.1	42.5		35.9	39.7	43.0
Incremental Delay (d_2), s/veh	53.9	0.5	0.7	0.2	27.7	28.5	26.8	1.9		0.9	0.8	95.0
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	83.1	23.6	23.1	20.4	63.3	64.2	74.0	44.4		36.7	40.5	138.0
Level of Service (LOS)	F	C	C	C	E	E	E	D		D	D	F
Approach Delay, s/veh / LOS	38.1	D		61.5	E		61.9	E		104.4	F	
Intersection Delay, s/veh / LOS	66.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.9	C	3.0	C
Bicycle LOS Score / LOS	1.1	A	1.7	A	1.2	A	1.8	A

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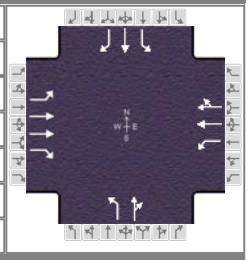
HCS 2010 Signalized Intersection Results Summary

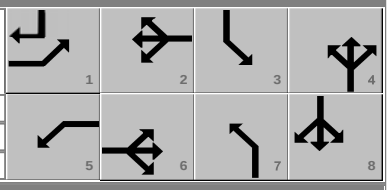
General Information				Intersection Information	
Agency	TPD, Inc.			Duration, h	0.25
Analyst	MJA	Analysis Date	May 10, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2016	Analysis Period	1> 17:00
Intersection	Saxon Blvd & Normandy…	File Name	Saxon Blvd & Normandy Blvd Existing PM Peak…		
Project Description	PM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	514	1172	212	32	817	82	196	155	31	106	199	210

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	3.5	19.5	36.5	5.5	7.0	15.5
Yellow	4.5	4.5	4.5	4.5	0.0	4.5
Red	4.0	4.0	4.0	4.0	0.0	4.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	3.0	1.1	4.0	1.1	4.0	1.1	3.0
Phase Duration, s	40.0	73.0	12.0	45.0	21.0	31.0	14.0	24.0
Change Period, ($Y+R_c$), s	8.5	8.5	8.5	8.5	7.5	8.5	8.5	8.5
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0	4.1	5.2	4.1	5.2
Queue Clearance Time (g_s), s	33.5		3.7		14.9	14.4	7.5	16.0
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0
Phase Call Probability	1.00		0.70		1.00	1.00	0.98	1.00
Max Out Probability	1.00		0.00		1.00	0.50	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	530	1208	195	33	466	452	202	189		109	205	193
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1791	1594	1810	1881	1826	1757	1831		1774	1881	1610
Queue Service Time (g_s), s	31.5	33.3	9.1	1.7	30.7	30.7	12.9	12.4		5.5	14.0	11.3
Cycle Queue Clearance Time (g_c), s	31.5	33.3	9.1	1.7	30.7	30.7	12.9	12.4		5.5	14.0	11.3
Green Ratio (*g/C*)	0.54	0.50	0.50	0.31	0.28	0.28	0.23	0.17		0.16	0.12	0.36
Capacity (*c*), veh/h	521	1778	791	209	528	513	251	317		205	224	582
Volume-to-Capacity Ratio (*X*)	1.017	0.680	0.246	0.158	0.881	0.881	0.805	0.595		0.533	0.915	0.331
Back of Queue (*Q*), ft/ln (95 th percentile)	771.1	509.4	156.9	33.6	591	578.6	276.5	250.4		38.9	350.1	199
Back of Queue (*Q*), veh/ln (95 th percentile)	30.8	20.2	6.2	1.3	23.5	23.0	11.1	9.9		1.6	13.9	7.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh	37.1	24.9	18.8	32.0	44.7	44.7	44.1	49.6		50.6	56.6	30.1
Incremental Delay (d_2), s/veh	43.7	2.1	0.7	0.3	18.7	19.2	17.2	3.6		2.6	38.1	0.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	80.7	27.0	19.5	32.3	63.4	63.9	61.2	53.2		53.2	94.7	30.6
Level of Service (LOS)	F	C	B	C	E	E	E	D		D	F	C
Approach Delay, s/veh / LOS	41.0	D		62.6	E		57.3	E		61.4	E	
Intersection Delay, s/veh / LOS	50.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.1	B	1.3	A	1.1	A	1.3	A

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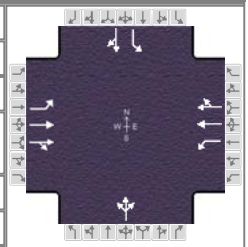
HCS 2010 Signalized Intersection Results Summary

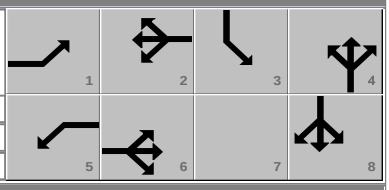
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	DWF	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak (Existing)	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2016	Analysis Period	1> 17:00
Intersection	Saxon Blvd & Sterling Si…	File Name	Saxon Blvd & Sterling-Merrimac Existing PM Pea…		
Project Description	PM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	93	1148	21	10	867	3	21	16	10	47	10	50

Signal Information			
Cycle, s	60.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	0.8	4.8	24.7	2.8	3.3	0.0
Yellow	4.5	0.0	4.5	3.5	3.5	0.0
Red	2.0	0.0	2.0	2.0	2.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4	3	8
Case Number	1.1	4.0	1.1	4.0		8.3	1.0	4.0
Phase Duration, s	12.1	36.0	7.3	31.2		8.8	8.3	17.1
Change Period, ($Y+R_c$), s	6.5	6.5	6.5	6.5		5.5	5.5	5.5
Max Allow Headway (*MAH*), s	4.1	4.0	4.1	4.0		4.4	4.3	4.4
Queue Clearance Time (g_s), s	3.7	17.1	2.2	13.3		3.8	3.4	3.9
Green Extension Time (g_e), s	0.2	11.2	0.0	11.3		0.3	0.1	0.4
Phase Call Probability	0.80	1.00	0.16	1.00		0.56	0.56	0.65
Max Out Probability	0.00	0.07	0.00	0.05		0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	96	604	601	10	449	448		48		48	62	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1845	1833	1810	1863	1860		1574		1810	1652	
Queue Service Time (g_s), s	1.7	15.1	15.1	0.2	11.3	11.3		1.7		1.4	1.9	
Cycle Queue Clearance Time (g_c), s	1.7	15.1	15.1	0.2	11.3	11.3		1.8		1.4	1.9	
Green Ratio (*g/C*)	0.51	0.49	0.49	0.42	0.41	0.41		0.06		0.13	0.19	
Capacity (*c*), veh/h	427	900	894	240	761	760		173		239	318	
Volume-to-Capacity Ratio (*X*)	0.225	0.671	0.672	0.043	0.590	0.590		0.279		0.203	0.194	
Back of Queue (*Q*), ft/ln (95 th percentile)	23.8	219.7	213.6	3.2	186.3	181.8		31.5		27.7	32.6	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.0	8.6	8.5	0.1	7.3	7.3		1.3		1.1	1.3	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	9.1	11.8	11.8	11.4	13.9	13.9		27.8		23.4	20.5	
Incremental Delay (d_2), s/veh	0.3	0.9	0.9	0.1	0.7	0.7		0.9		0.4	0.3	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (*d*), s/veh	9.4	12.7	12.7	11.5	14.7	14.7		28.7		23.8	20.8	
Level of Service (LOS)	A	B	B	B	B	B		C		C	C	
Approach Delay, s/veh / LOS	12.4	B		14.6	B		28.7	C		22.1	C	
Intersection Delay, s/veh / LOS	14.1						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.6	A	1.2	A	0.6	A	0.7	A

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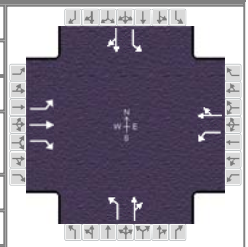
HCS 2010 Signalized Intersection Results Summary

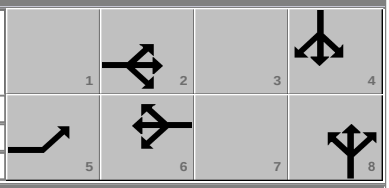
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	DWF	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak (Existing)	PHF	0.98
Urban Street	Saxon Blvd	Analysis Year	2016	Analysis Period	1> 17:15
Intersection	Saxon Blvd & Tivoli Dr	File Name	Saxon Blvd & Tivoli Dr Existing PM Peak.xus		
Project Description	PM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	437	607	61	5	475	7	43	94	21	13	69	225

Signal Information			
Cycle, s	75.2	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	14.2	22.7	18.3	0.0	0.0	0.0
Yellow	4.5	4.0	4.0	0.0	0.0	0.0
Red	2.5	2.5	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		4
Case Number	1.0	3.0		6.3		6.0		6.0
Phase Duration, s	21.2	50.4		29.2		24.8		24.8
Change Period, ($Y+R_c$), s	7.0	6.5		6.5		6.5		6.5
Max Allow Headway (*MAH*), s	4.1	5.1		5.1		4.3		4.3
Queue Clearance Time (g_s), s	14.0	17.8		20.7		17.4		14.5
Green Extension Time (g_e), s	0.2	5.7		2.0		1.6		1.7
Phase Call Probability	1.00	1.00		1.00		0.97		1.00
Max Out Probability	1.00	0.52		0.68		0.05		0.02

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	446	619	62	5	492		44	117		13	300	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1845	1610	817	1876		1096	1840		1295	1670	
Queue Service Time (g_s), s	12.0	15.8	1.3	0.3	18.7		2.9	3.9		0.6	12.5	
Cycle Queue Clearance Time (g_c), s	12.0	15.8	1.3	0.3	18.7		15.4	3.9		4.5	12.5	
Green Ratio (*g/C*)	0.52	0.58	0.58	0.30	0.30		0.24	0.24		0.24	0.24	
Capacity (*c*), veh/h	487	1077	940	342	566		181	448		345	407	
Volume-to-Capacity Ratio (*X*)	0.916	0.575	0.066	0.015	0.869		0.242	0.262		0.038	0.737	
Back of Queue (*Q*), ft/ln (95 th percentile)	285	239.5	16.8	2.8	353.3		35.3	74.6		8.7	217.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	11.4	9.4	0.7	0.1	14.1		1.4	3.0		0.3	8.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	15.7	9.8	6.8	18.5	24.9		33.3	23.0		24.8	26.3	
Incremental Delay (d_2), s/veh	21.2	0.9	0.0	0.0	9.5		0.7	0.3		0.0	2.6	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	36.8	10.7	6.8	18.5	34.4		34.0	23.3		24.9	28.9	
Level of Service (LOS)	D	B	A	B	C		C	C		C	C	
Approach Delay, s/veh / LOS	20.9	C		34.3	C		26.2	C		28.7	C	
Intersection Delay, s/veh / LOS	25.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	2.3	B	2.4	B
Bicycle LOS Score / LOS	2.3	B	1.3	A	0.8	A	1.0	A

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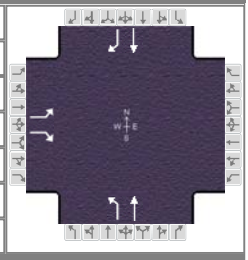
HCS 2010 Signalized Intersection Results Summary

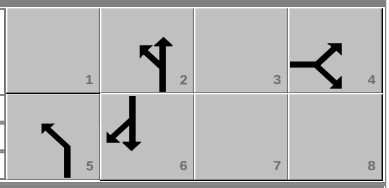
General Information				Intersection Information	
Agency	TPD, Inc.			Duration, h	0.25
Analyst	MJA	Analysis Date	May 10, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.91
Urban Street	Normandy Blvd	Analysis Year	2016	Analysis Period	1> 17:00
Intersection	Normandy Blvd & Delto…	File Name	Normandy Blvd & Deltona Blvd Existing PM Peak.…		
Project Description	PM Peak (Existing)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	300		240				149	134			227	216

Signal Information			
Cycle, s	46.1	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.5	10.9	11.2	0.0	0.0	0.0
Yellow	4.0	4.5	4.0	0.0	0.0	0.0
Red	2.5	2.5	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			5	2		6
Case Number		9.0			1.0	4.0		7.3
Phase Duration, s		17.2			11.0	29.0		17.9
Change Period, ($Y+R_c$), s		6.0			6.5	7.0		7.0
Max Allow Headway (*MAH*), s		3.2			3.6	4.2		4.2
Queue Clearance Time (g_s), s		10.2			4.9	4.0		8.7
Green Extension Time (g_e), s		1.0			0.3	2.3		2.2
Phase Call Probability		1.00			0.88	1.00		1.00
Max Out Probability		0.04			0.00	0.00		0.02

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14				5	2			6	16
Adjusted Flow Rate (*v*), veh/h	330		264				164	147			249	237
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1740		1579				1792	1900			1845	1477
Queue Service Time (g_s), s	8.2		7.0				2.9	2.0			5.5	6.7
Cycle Queue Clearance Time (g_c), s	8.2		7.0				2.9	2.0			5.5	6.7
Green Ratio (*g/C*)	0.24		0.24				0.38	0.48			0.24	0.24
Capacity (*c*), veh/h	422		383				466	904			437	350
Volume-to-Capacity Ratio (*X*)	0.780		0.688				0.352	0.163			0.571	0.679
Back of Queue (*Q*), ft/ln (95 th percentile)	131.2		99.1				42.4	27.1			93.1	96.8
Back of Queue (*Q*), veh/ln (95 th percentile)	5.1		3.9				1.6	1.1			3.7	3.8
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00				0.00	0.00			0.00	0.00
Uniform Delay (d_1), s/veh	16.3		15.9				10.5	6.9			15.6	16.0
Incremental Delay (d_2), s/veh	1.2		0.8				0.3	0.1			1.2	2.3
Initial Queue Delay (d_3), s/veh	0.0		0.0				0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh	17.5		16.7				10.9	7.0			16.7	18.3
Level of Service (LOS)	B		B				B	A			B	B
Approach Delay, s/veh / LOS	17.2	B		0.0			9.0	A		17.5	B	
Intersection Delay, s/veh / LOS	15.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	0.7	A	2.3	B
Bicycle LOS Score / LOS		F			1.0	A	1.3	A

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APPENDIX D

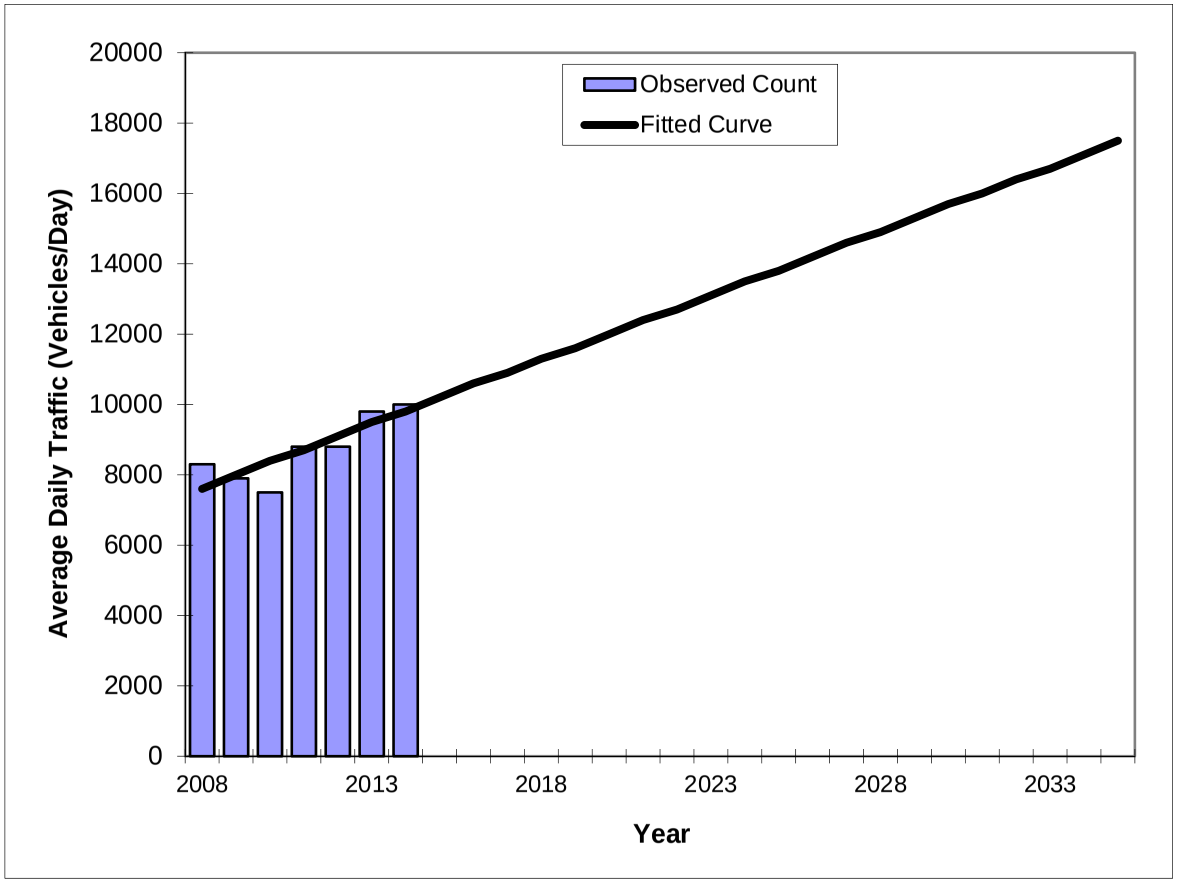
Trends Analysis Charts

Traffic Trends - V3.0

NORMANDY BLVD -- Elkcam to Ft Smith

FIN#	1234
Location	1

County:	Volusia (79)
Station #:	0
Highway:	NORMANDY BLVD



Year	Traffic (ADT/AADT) Count*	Trend**
2008	8300	7600
2009	7900	8000
2010	7500	8400
2011	8800	8700
2012	8800	9100
2013	9800	9500
2014	10000	9800
2018 Opening Year Trend		
2018	N/A	11300
2020 Mid-Year Trend		
2020	N/A	12000
2025 Design Year Trend		
2025	N/A	13800
TRANPLAN Forecasts/Trends		

*Axle-Adjusted

** Annual Trend Increase:	364
Trend R-squared:	72.09%
Trend Annual Historic Growth Rate:	4.82%
Trend Growth Rate (2014 to Design Year):	3.71%
Printed:	3-May-16

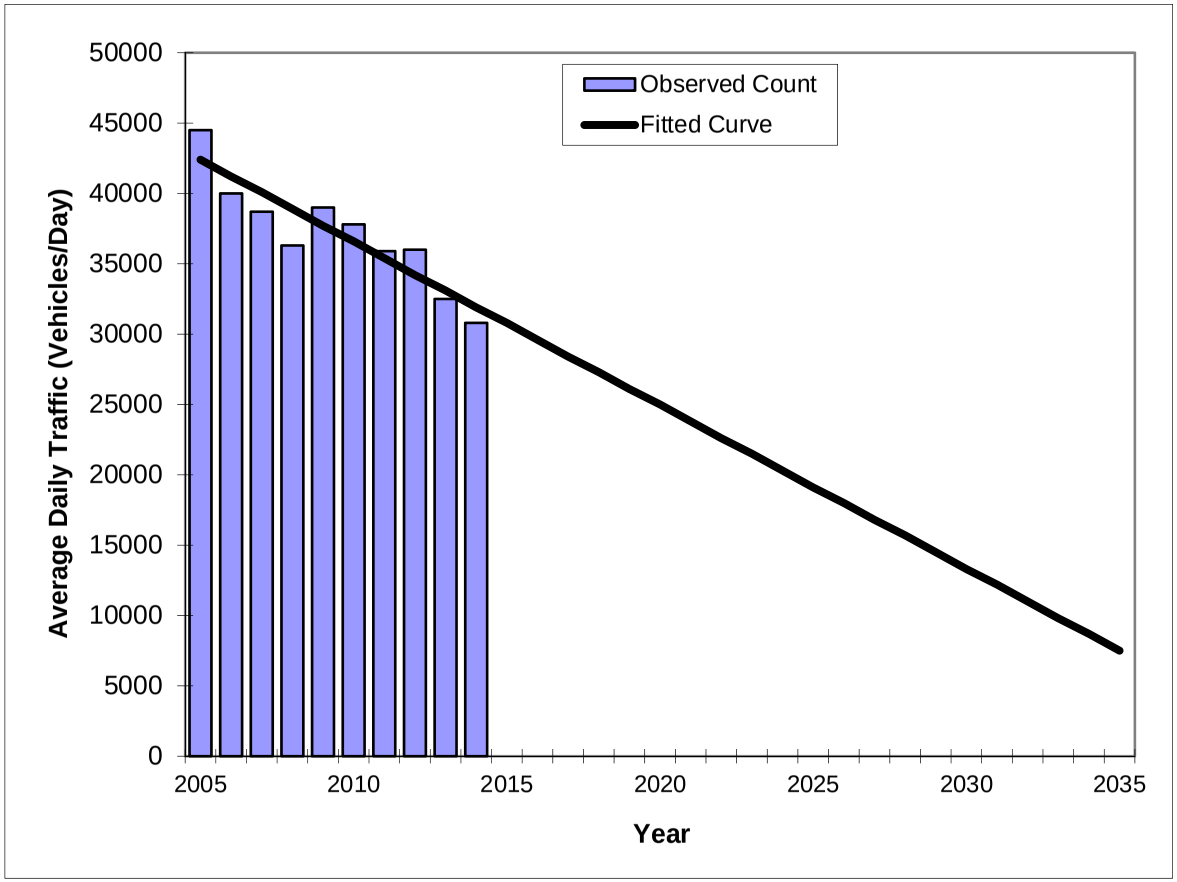
Straight Line Growth Option

Traffic Trends - V3.0

SAXON BLVD -- Finland to Normandy

FIN#	1234
Location	1

County:	Volusia (79)
Station #:	0
Highway:	SAXON BLVD



Year	Traffic (ADT/AADT) Count*	Trend**
2005	44500	42400
2006	40000	41200
2007	38700	40100
2008	36300	38900
2009	39000	37700
2010	37800	36600
2011	35900	35400
2012	36000	34200
2013	32500	33100
2014	30800	31900
2018 Opening Year Trend		
2018	N/A	27300
2020 Mid-Year Trend		
2020	N/A	25000
2025 Design Year Trend		
2025	N/A	19100
TRANPLAN Forecasts/Trends		

** Annual Trend Increase:	-1,162
Trend R-squared:	83.14%
Trend Annual Historic Growth Rate:	-2.75%
Trend Growth Rate (2014 to Design Year):	-3.65%
Printed:	3-May-16
Straight Line Growth Option	

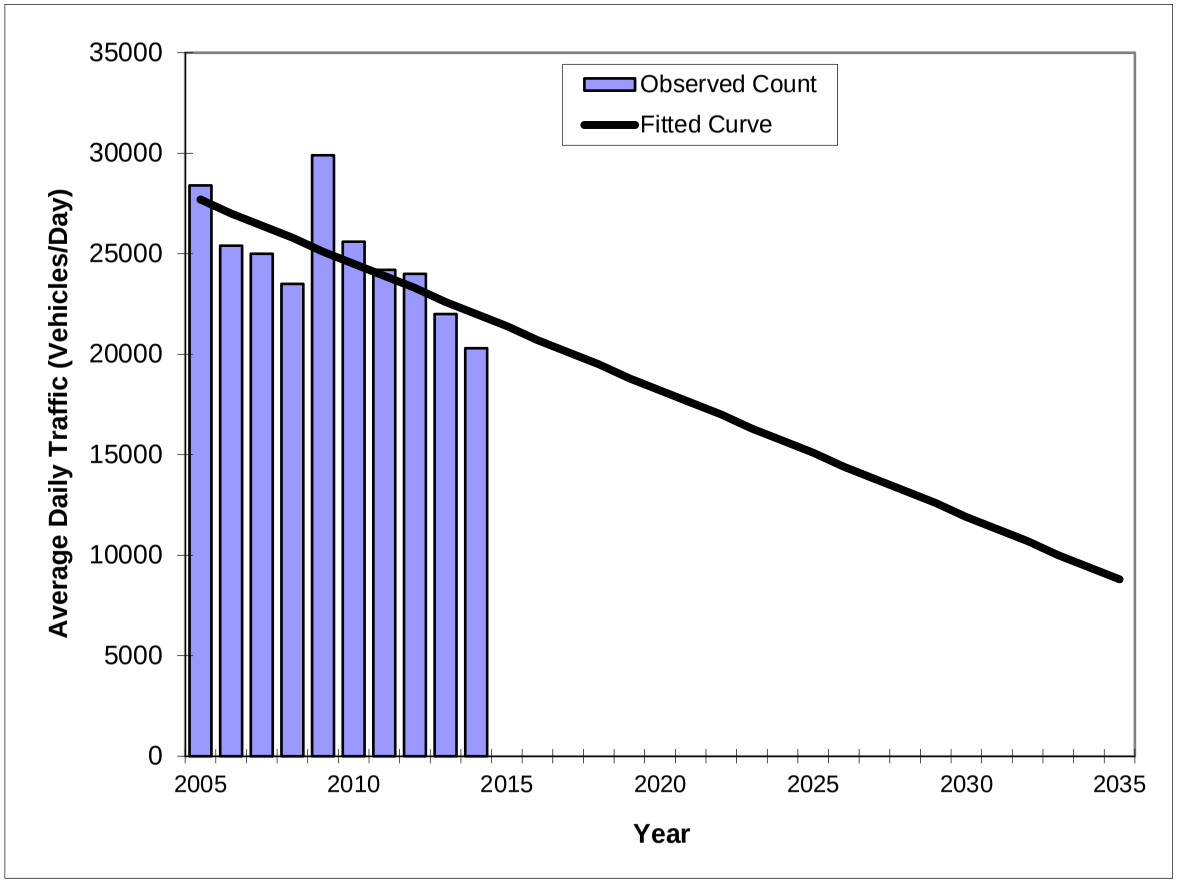
*Axle-Adjusted

Traffic Trends - V3.0

SAXON BLVD -- Normandy to Tivoli

FIN#	1234
Location	1

County:	Volusia (79)
Station #:	0
Highway:	SAXON BLVD



Year	Traffic (ADT/AADT) Count*	Trend**
2005	28400	27700
2006	25400	27000
2007	25000	26400
2008	23500	25800
2009	29900	25100
2010	25600	24500
2011	24200	23900
2012	24000	23300
2013	22000	22600
2014	20300	22000
2018 Opening Year Trend		
2018	N/A	19500
2020 Mid-Year Trend		
2020	N/A	18200
2025 Design Year Trend		
2025	N/A	15100
TRANPLAN Forecasts/Trends		

*Axle-Adjusted

** Annual Trend Increase:	-630
Trend R-squared:	46.22%
Trend Annual Historic Growth Rate:	-2.29%
Trend Growth Rate (2014 to Design Year):	-2.85%
Printed:	3-May-16

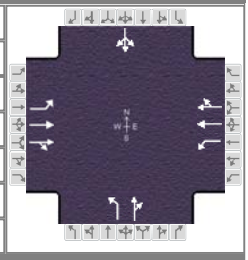
Straight Line Growth Option

APPENDIX E

Projected HCS Capacity Analysis Worksheets

HCS 2010 Signalized Intersection Results Summary

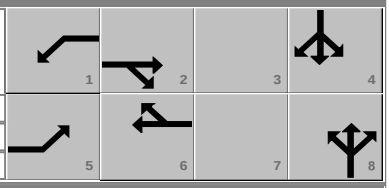
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	MJA	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.91
Urban Street	Saxon Blvd	Analysis Year	2018	Analysis Period	1> 17:45
Intersection	Saxon Blvd & Finland Dr…	File Name	Saxon Blvd & Finland Dr Projected PM Peak OPT…		
Project Description	PM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	257	1971	21	147	1432	63	117	49	76	30	31	88

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	11.5	4.2	59.8	25.0	0.0	0.0
Yellow	4.5	4.5	4.5	4.0	0.0	0.0
Red	3.0	3.0	3.0	3.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	2.0	4.0	2.0	4.0		6.0		8.0
Phase Duration, s	30.7	79.0	19.0	67.3		32.0		32.0
Change Period, ($Y+R_c$), s	7.5	7.5	7.5	7.5		7.0		7.0
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		5.4		5.4
Queue Clearance Time (g_s), s	22.2		13.5			27.0		16.9
Green Extension Time (g_e), s	1.0	0.0	0.0	0.0		0.0		1.6
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		1.00			1.00		0.45

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	282	1095	1095	162	825	818	129	137			164	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1863	1856	1757	1845	1817	1267	1713			1361	
Queue Service Time (g_s), s	20.2	71.5	71.5	11.5	56.8	57.5	10.1	9.2			5.7	
Cycle Queue Clearance Time (g_c), s	20.2	71.5	71.5	11.5	56.8	57.5	25.0	9.2			14.9	
Green Ratio (g/C)	0.18	0.55	0.55	0.09	0.46	0.46	0.19	0.19			0.19	
Capacity (c), veh/h	317	1025	1021	155	849	836	154	329			295	
Volume-to-Capacity Ratio (X)	0.892	1.068	1.072	1.039	0.972	0.979	0.834	0.417			0.555	
Back of Queue (Q), ft/ln (95 th percentile)	373.2	1446.6	1435.4	346.3	988.3	979.5	241.7	181.4			225.1	
Back of Queue (Q), veh/ln (95 th percentile)	14.7	57.0	57.4	13.6	38.9	39.2	9.5	7.3			8.9	
Queue Storage Ratio (RQ) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	
Uniform Delay (d_1), s/veh	52.2	29.3	29.3	59.3	34.3	34.5	61.1	46.1			48.1	
Incremental Delay (d_2), s/veh	8.6	48.2	49.7	83.0	24.8	26.4	31.6	1.2			2.9	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Control Delay (d), s/veh	60.8	77.5	78.9	142.3	59.0	60.9	92.7	47.3			51.0	
Level of Service (LOS)	E	F	F	F	E	E	F	D			D	
Approach Delay, s/veh / LOS	76.2	E		67.3	E		69.3	E		51.0	D	
Intersection Delay, s/veh / LOS	71.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.1	B	2.9	C	2.9	C
Bicycle LOS Score / LOS	2.5	B	2.0	A	0.9	A	0.8	A

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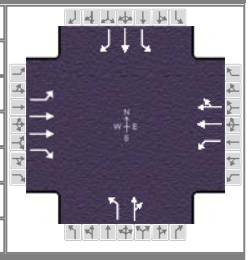
HCS 2010 Signalized Intersection Results Summary

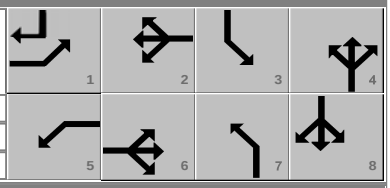
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	MJA	Analysis Date	May 12, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	AM Peak	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2018	Analysis Period	1> 7:30
Intersection	Saxon Blvd & Normandy…	File Name	Saxon Blvd & Normandy Blvd Projected AM Peak…		
Project Description	AM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	175	433	149	83	1412	61	271	159	35	122	152	581

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.5	2.0	47.5	5.5	2.0	25.5
Yellow	4.5	0.0	4.5	4.0	0.0	4.0
Red	4.0	0.0	4.0	3.5	0.0	3.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	3.0	1.1	4.0	1.1	4.0	1.1	3.0
Phase Duration, s	16.0	58.0	14.0	56.0	13.0	33.0	15.0	35.0
Change Period, ($Y+R_c$), s	8.5	8.5	8.5	8.5	7.5	8.5	8.5	8.5
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0	4.1	5.3	4.1	5.3
Queue Clearance Time (g_s), s	9.5		5.6		7.5	14.4	8.5	28.5
Green Extension Time (g_e), s	0.0	0.0	0.3	0.0	0.0	4.0	0.0	0.0
Phase Call Probability	1.00		0.94		1.00	1.00	0.98	1.00
Max Out Probability	1.00		0.00		1.00	0.53	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	180	446	138	86	760	753	279	196		126	157	539
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1690	1505	1675	1845	1820	1691	1709		1774	1845	1563
Queue Service Time (g_s), s	7.5	10.7	7.1	3.6	47.5	47.5	5.5	12.4		6.5	8.7	26.5
Cycle Queue Clearance Time (g_c), s	7.5	10.7	7.1	3.6	47.5	47.5	5.5	12.4		6.5	8.7	26.5
Green Ratio (*g/C*)	0.46	0.41	0.41	0.44	0.40	0.40	0.25	0.20		0.26	0.22	0.28
Capacity (*c*), veh/h	171	1394	620	409	730	720	291	349		276	407	443
Volume-to-Capacity Ratio (*X*)	1.056	0.320	0.223	0.209	1.040	1.045	0.959	0.561		0.456	0.385	1.217
Back of Queue (*Q*), ft/ln (95 th percentile)	285.5	203.4	124.2	64	1037.3	1036.9	360.5	244.2		137.7	190.5	1048
Back of Queue (*Q*), veh/ln (95 th percentile)	11.2	7.7	4.7	2.5	39.3	39.3	14.2	9.2		5.4	7.2	39.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh	32.1	23.9	22.8	20.2	36.3	36.3	48.1	42.9		36.7	39.8	43.0
Incremental Delay (d_2), s/veh	84.4	0.6	0.8	0.3	44.3	45.8	41.5	2.6		1.2	0.8	116.8
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	116.5	24.5	23.7	20.5	80.5	82.0	89.5	45.5		37.9	40.7	159.8
Level of Service (LOS)	F	C	C	C	F	F	F	D		D	D	F
Approach Delay, s/veh / LOS	46.0	D		78.0	E		71.4	E		118.4	F	
Intersection Delay, s/veh / LOS	79.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.9	C	3.0	C
Bicycle LOS Score / LOS	1.1	A	1.8	A	1.3	A	1.8	A

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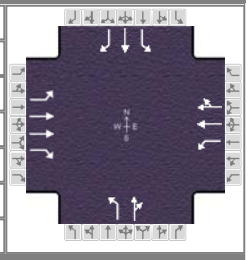
HCS 2010 Signalized Intersection Results Summary

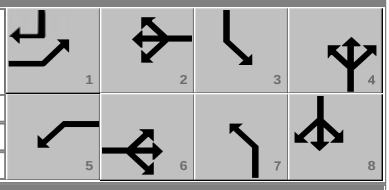
General Information				Intersection Information	
Agency	TPD, Inc.			Duration, h	0.25
Analyst	MJA	Analysis Date	May 12, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2018	Analysis Period	1> 17:00
Intersection	Saxon Blvd & Normandy…	File Name	Saxon Blvd & Normandy Blvd Projected PM Peak…		
Project Description	PM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	543	1268	228	50	899	85	214	170	32	130	196	226

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.2	18.8	36.5	5.5	7.0	15.5
Yellow	4.5	4.5	4.5	4.5	0.0	4.5
Red	4.0	4.0	4.0	4.0	0.0	4.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	3.0	1.1	4.0	1.1	4.0	1.1	3.0
Phase Duration, s	40.0	72.3	12.7	45.0	21.0	31.0	14.0	24.0
Change Period, ($Y+R_c$), s	8.5	8.5	8.5	8.5	7.5	8.5	8.5	8.5
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0	4.1	5.2	4.1	5.2
Queue Clearance Time (g_s), s	33.5		4.6		15.5	15.5	7.5	15.8
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
Phase Call Probability	1.00		0.84		1.00	1.00	0.99	1.00
Max Out Probability	1.00		0.03		1.00	0.68	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	560	1307	211	52	510	496	221	205		134	202	209
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1791	1594	1810	1881	1829	1757	1833		1774	1881	1610
Queue Service Time (g_s), s	31.5	38.1	10.1	2.6	34.7	34.7	13.5	13.5		5.5	13.8	12.4
Cycle Queue Clearance Time (g_c), s	31.5	38.1	10.1	2.6	34.7	34.7	13.5	13.5		5.5	13.8	12.4
Green Ratio (*g/C*)	0.54	0.49	0.49	0.31	0.28	0.28	0.23	0.17		0.16	0.12	0.36
Capacity (*c*), veh/h	502	1757	782	192	528	514	253	317		193	224	582
Volume-to-Capacity Ratio (*X*)	1.116	0.744	0.270	0.268	0.965	0.965	0.871	0.647		0.694	0.901	0.359
Back of Queue (*Q*), ft/ln (95 th percentile)	769.7	575.5	174.6	52.9	701.2	686.2	317	273.5		98.6	340.7	214.3
Back of Queue (*Q*), veh/ln (95 th percentile)	30.8	22.8	6.9	2.1	27.8	27.2	12.7	10.9		3.9	13.5	8.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh	39.7	26.6	19.4	32.3	46.1	46.1	45.3	50.0		53.2	56.5	30.5
Incremental Delay (d_2), s/veh	76.0	2.9	0.8	0.7	31.4	31.9	26.4	5.1		10.2	35.2	0.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	115.7	29.5	20.3	33.0	77.5	78.0	71.7	55.2		63.4	91.7	31.0
Level of Service (LOS)	F	C	C	C	E	E	E	E		E	F	C
Approach Delay, s/veh / LOS	51.8	D		75.6	E		63.7	E		61.4	E	
Intersection Delay, s/veh / LOS	60.4						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.9	C	3.0	C
Bicycle LOS Score / LOS	2.2	B	1.4	A	1.2	A	1.4	A

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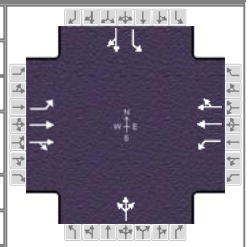
HCS 2010 Signalized Intersection Results Summary

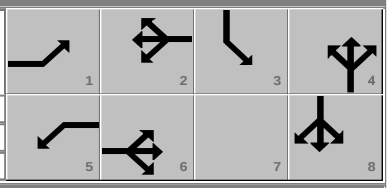
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	DWF	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak (Projected)	PHF	0.97
Urban Street	Saxon Blvd	Analysis Year	2018	Analysis Period	1> 17:00
Intersection	Saxon Blvd & Sterling Si…	File Name	Saxon Blvd & Sterling-Merrimac Projected PM Pe…		
Project Description	PM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	100	1226	28	11	934	3	28	17	11	49	11	55

Signal Information			
Cycle, s	64.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	0.9	5.0	27.8	3.0	3.9	0.0
Yellow	4.5	0.0	4.5	3.5	3.5	0.0
Red	2.0	0.0	2.0	2.0	2.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4	3	8
Case Number	1.1	4.0	1.1	4.0		8.3	1.0	4.0
Phase Duration, s	12.4	39.3	7.4	34.3		9.4	8.5	17.9
Change Period, ($Y+R_c$), s	6.5	6.5	6.5	6.5		5.5	5.5	5.5
Max Allow Headway (*MAH*), s	4.1	4.0	4.1	4.0		4.4	4.3	4.4
Queue Clearance Time (g_s), s	3.8	19.3	2.2	14.9		4.3	3.6	4.2
Green Extension Time (g_e), s	0.2	12.7	0.0	12.9		0.3	0.1	0.5
Phase Call Probability	0.84	1.00	0.18	1.00		0.65	0.60	0.71
Max Out Probability	0.00	0.12	0.00	0.09		0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	103	649	644	11	483	483		58		51	68	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1845	1830	1810	1863	1861		1551		1810	1652	
Queue Service Time (g_s), s	1.8	17.3	17.3	0.2	12.9	12.9		2.1		1.6	2.2	
Cycle Queue Clearance Time (g_c), s	1.8	17.3	17.3	0.2	12.9	12.9		2.3		1.6	2.2	
Green Ratio (*g/C*)	0.53	0.51	0.51	0.45	0.43	0.43		0.06		0.14	0.19	
Capacity (*c*), veh/h	414	937	930	229	803	802		177		229	316	
Volume-to-Capacity Ratio (*X*)	0.249	0.692	0.693	0.050	0.602	0.602		0.327		0.221	0.215	
Back of Queue (*Q*), ft/ln (95 th percentile)	26.6	247.4	240.9	3.6	209	203.9		40.7		31.3	39.2	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.1	9.7	9.6	0.1	8.2	8.2		1.6		1.3	1.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	9.2	12.1	12.1	11.6	14.1	14.1		29.6		24.9	22.0	
Incremental Delay (d_2), s/veh	0.3	0.9	0.9	0.1	0.7	0.7		1.1		0.5	0.3	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (*d*), s/veh	9.5	13.0	13.0	11.7	14.9	14.9		30.7		25.4	22.4	
Level of Service (LOS)	A	B	B	B	B	B		C		C	C	
Approach Delay, s/veh / LOS	12.7	B		14.8	B		30.7	C		23.7	C	
Intersection Delay, s/veh / LOS	14.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.6	A	1.3	A	0.6	A	0.7	A

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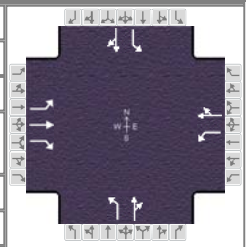
HCS 2010 Signalized Intersection Results Summary

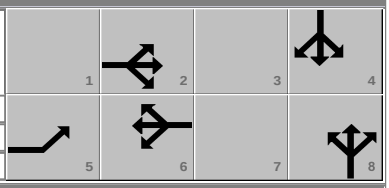
General Information				Intersection Information	
Agency	TPD			Duration, h	0.25
Analyst	DWF	Analysis Date	May 6, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak (Projected)	PHF	0.98
Urban Street	Saxon Blvd	Analysis Year	2018	Analysis Period	1> 17:15
Intersection	Saxon Blvd & Tivoli Dr	File Name	Saxon Blvd & Tivoli Dr Projected PM Peak (existi…		
Project Description	PM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	469	646	66	5	509	7	48	98	22	14	72	248

Signal Information			
Cycle, s	82.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	15.0	25.5	21.4	0.0	0.0	0.0
Yellow	4.5	4.0	4.0	0.0	0.0	0.0
Red	2.5	2.5	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		4
Case Number	1.0	3.0		6.3		6.0		6.0
Phase Duration, s	22.0	54.0		32.0		27.9		27.9
Change Period, ($Y+R_c$), s	7.0	6.5		6.5		6.5		6.5
Max Allow Headway (*MAH*), s	4.1	5.1		5.1		4.4		4.4
Queue Clearance Time (g_s), s	17.0	21.2		24.0		20.3		16.7
Green Extension Time (g_e), s	0.0	4.9		1.5		1.5		1.8
Phase Call Probability	1.00	1.00		1.00		0.98		1.00
Max Out Probability	1.00	0.74		0.93		0.16		0.05

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	479	659	67	5	527		49	122		14	327	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1845	1610	787	1877		1070	1839		1289	1667	
Queue Service Time (g_s), s	15.0	19.2	1.5	0.4	22.0		3.6	4.3		0.7	14.7	
Cycle Queue Clearance Time (g_c), s	15.0	19.2	1.5	0.4	22.0		18.3	4.3		5.0	14.7	
Green Ratio (*g/C*)	0.52	0.58	0.58	0.31	0.31		0.26	0.26		0.26	0.26	
Capacity (*c*), veh/h	457	1070	934	333	585		176	481		357	436	
Volume-to-Capacity Ratio (*X*)	1.047	0.616	0.072	0.015	0.901		0.279	0.254		0.040	0.748	
Back of Queue (*Q*), ft/ln (95 th percentile)	472.7	290.4	21	3	427.3		43.5	83.9		10	252.2	
Back of Queue (*Q*), veh/ln (95 th percentile)	18.9	11.3	0.8	0.1	17.1		1.7	3.4		0.4	10.1	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	20.4	11.3	7.6	19.6	27.0		36.2	23.9		25.9	27.8	
Incremental Delay (d_2), s/veh	55.1	1.3	0.0	0.0	14.3		0.9	0.3		0.0	3.2	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	75.5	12.5	7.6	19.6	41.3		37.1	24.2		26.0	31.0	
Level of Service (LOS)	F	B	A	B	D		D	C		C	C	
Approach Delay, s/veh / LOS	37.3	D		41.1	D		27.9	C		30.8	C	
Intersection Delay, s/veh / LOS	36.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	2.3	B	2.4	B
Bicycle LOS Score / LOS	2.5	B	1.4	A	0.8	A	1.0	A

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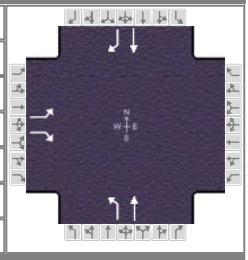
HCS 2010 Signalized Intersection Results Summary

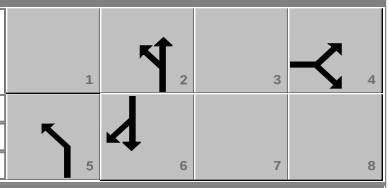
General Information				Intersection Information	
Agency	TPD, Inc.			Duration, h	0.25
Analyst	MJA	Analysis Date	May 10, 2016	Area Type	Other
Jurisdiction	Volusia	Time Period	PM Peak	PHF	0.91
Urban Street	Normandy Blvd	Analysis Year	2018	Analysis Period	1> 17:00
Intersection	Normandy Blvd & Delto…	File Name	Normandy Blvd & Deltona Blvd Projected PM Pea…		
Project Description	PM Peak (Projected)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	321		250				155	143			240	234

Signal Information			
Cycle, s	48.7	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.9	12.0	12.3	0.0	0.0	0.0
Yellow	4.0	4.5	4.0	0.0	0.0	0.0
Red	2.5	2.5	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			5	2		6
Case Number		9.0			1.0	4.0		7.3
Phase Duration, s		18.3			11.4	30.4		19.0
Change Period, ($Y+R_c$), s		6.0			6.5	7.0		7.0
Max Allow Headway (*MAH*), s		3.2			3.6	4.2		4.2
Queue Clearance Time (g_s), s		11.3			5.1	4.3		9.7
Green Extension Time (g_e), s		1.0			0.3	2.5		2.3
Phase Call Probability		1.00			0.90	1.00		1.00
Max Out Probability		0.07			0.00	0.01		0.04

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14				5	2			6	16
Adjusted Flow Rate (*v*), veh/h	353		275				170	157			264	257
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1740		1579				1792	1900			1845	1477
Queue Service Time (g_s), s	9.3		7.7				3.1	2.3			6.1	7.7
Cycle Queue Clearance Time (g_c), s	9.3		7.7				3.1	2.3			6.1	7.7
Green Ratio (*g/C*)	0.25		0.25				0.39	0.48			0.25	0.25
Capacity (*c*), veh/h	440		399				464	913			456	365
Volume-to-Capacity Ratio (*X*)	0.802		0.689				0.367	0.172			0.578	0.704
Back of Queue (*Q*), ft/ln (95 th percentile)	151.7		110.4				47	31.3			104.9	112.4
Back of Queue (*Q*), veh/ln (95 th percentile)	5.9		4.3				1.8	1.3			4.2	4.4
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00				0.00	0.00			0.00	0.00
Uniform Delay (d_1), s/veh	17.1		16.5				10.9	7.2			16.1	16.7
Incremental Delay (d_2), s/veh	1.3		0.8				0.4	0.1			1.2	2.5
Initial Queue Delay (d_3), s/veh	0.0		0.0				0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh	18.4		17.3				11.2	7.3			17.3	19.2
Level of Service (LOS)	B		B				B	A			B	B
Approach Delay, s/veh / LOS	17.9	B		0.0			9.3	A		18.2	B	
Intersection Delay, s/veh / LOS	16.1						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	0.7	A	2.3	B
Bicycle LOS Score / LOS		F			1.0	A	1.3	A

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HCS 2010 Two-Way Stop Control Summary Report

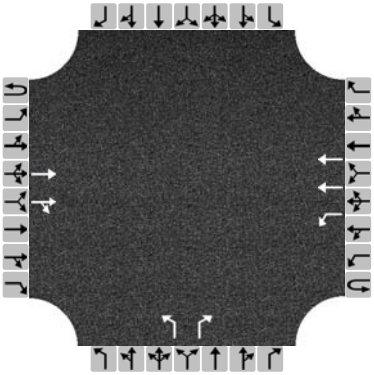
General Information

Analyst	MJA
Agency/Co.	TPD
Date Performed	5/12/2016
Analysis Year	2018
Time Analyzed	PM Peak (Projected)
Intersection Orientation	East-West
Project Description	4755

Site Information

Intersection	Saxon Blvd & Site Access
Jurisdiction	Volusia
East/West Street	Saxon Blvd
North/South Street	Site Access
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			1332	98		37	972			62		71				
Percent Heavy Vehicles						3				3		3				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						39				65		75				
Capacity						436				125		351				
v/c Ratio						0.09				0.52		0.21				
95% Queue Length						0.3				2.4		0.8				
Control Delay (s/veh)						14.1				61.1		18.0				
Level of Service (LOS)						B				F		C				
Approach Delay (s/veh)					0.5				38.0							
Approach LOS									E							

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HCS 2010 Two-Way Stop Control Summary Report

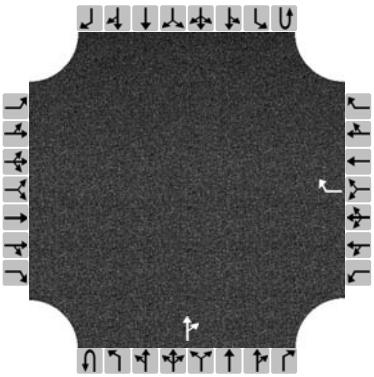
General Information

Analyst	MJA
Agency/Co.	TPD
Date Performed	5/12/2016
Analysis Year	2016
Time Analyzed	PM Peak (Projected)
Intersection Orientation	North-South
Project Description	4755

Site Information

Intersection	Normandy Blvd & Site Acce
Jurisdiction	Volusia
East/West Street	Site Access
North/South Street	Normandy Blvd
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	1	0	0	1	0	0	0	0	0
Configuration								R				TR				
Volume (veh/h)								19			394	16				
Percent Heavy Vehicles								3								
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)								20								
Capacity								628								
v/c Ratio								0.03								
95% Queue Length								0.1								
Control Delay (s/veh)								10.9								
Level of Service (LOS)								B								
Approach Delay (s/veh)					10.9											
Approach LOS					B											

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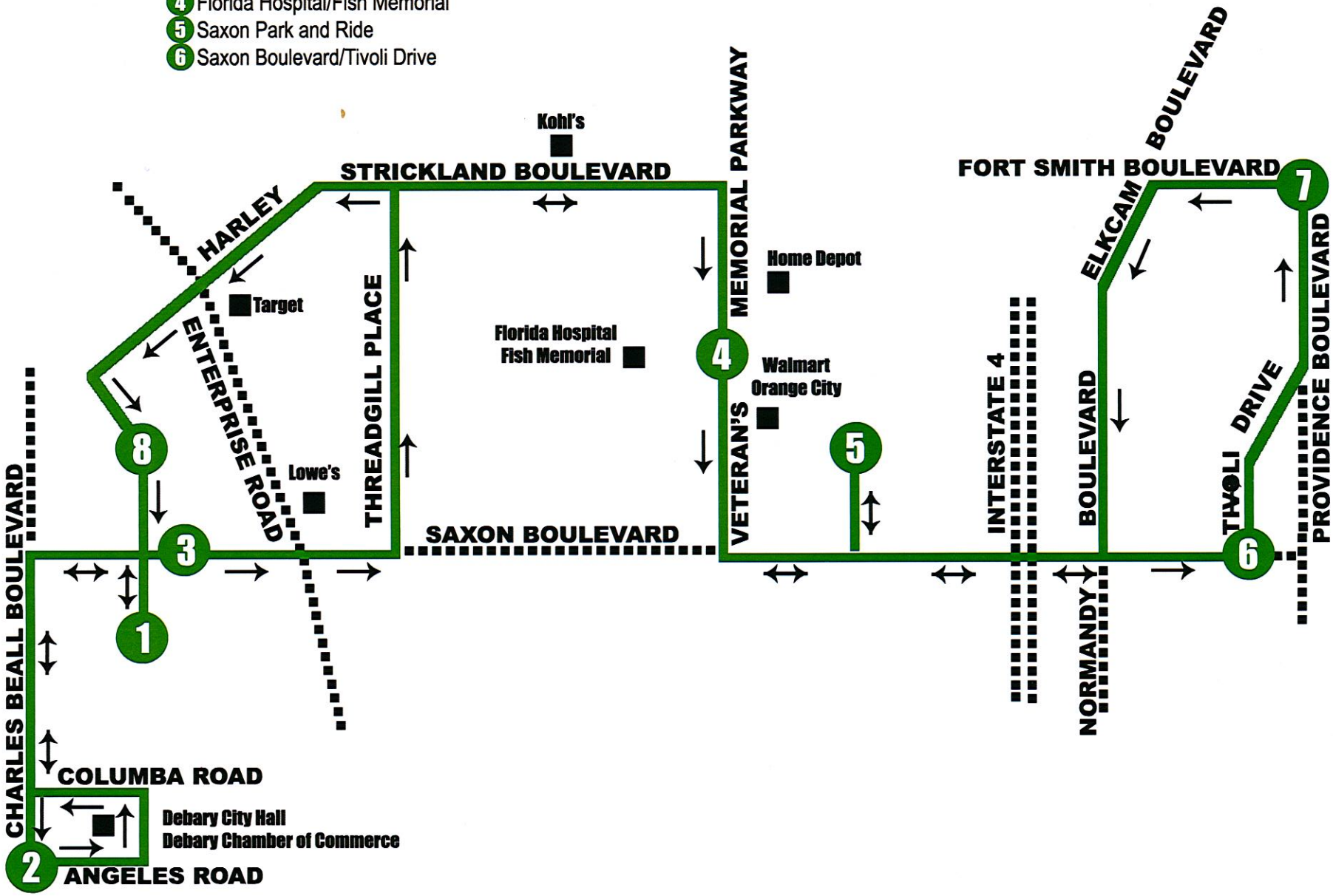
APPENDIX F

Bus Route Map

ROUTE 23 - ORANGE CITY

Serving:

1. Market Place Shopping Plaza
2. Charles Bealle Boulevard. Angeles Road
3. Saxon Market Place
4. Florida Hospital/Fish Memorial
5. Saxon Park and Ride
6. Saxon Boulevard/Tivoli Drive
7. Providence Boulevard/Fort Smith Boulevard
8. Crowne Center



Memorandum

To: Ron Paradise
Assistant Director
City of Deltona
Planning & Development Services

Date: December 23, 2016

Project #: 62354.03

From: Kok Wan Mah, P.E., PTOE
Senior Transportation Engineer

Re: Review of Traffic Impact Study for Convenience Store with Gas Pumps
Continuing Professional Services Contract – Daytona Beach, Florida
Contract No. RZ16-004, RFQ #14012

CC: Chris Bowley, AICP
Joseph Ruiz
Jorge Tolosa, P.E.

The following summary of comments are associated with the traffic impact analysis methodology for the proposed Convenience Store with Gas Pumps in Deltona, Florida. The subject study was prepared by Traffic Planning and Design, Inc. and is dated May 2016. This review examined the requirements needed to conduct a traffic impact study, following the R2CTPO TIA Guidelines. The comments are as follows:

Comment #1 – Trip Generation

The number of daily trips in the last paragraph on page 7 does not match the net daily trips in Table 3. This correction does not change the results of the analysis.

Comment #2 – Intersection Volumes

It is unclear how the attenuation of pass-by trips is accounted for. On Figure 3, at the intersection of Saxon and Normandy, a total of 485 vehicles turn south (50+207+228), of which, 22 pass-by trips are identified. At the site access a total of 474 vehicles pass the driveway, which appear to lose 11 of the pass-by trips. Please clarify.

Comment #3 – Alternative Mode Analysis

Please verify if a minimum of 4-foot wide sidewalks as required by City of Deltona Code of Ordinances, Section 96-41 (a) will be maintained adjacent to the project property after the development of the site.

Comment #4 – Alternative Mode Analysis

It should be noted that the nearest eastbound transit stop is located approximately 0.25 miles from the project site. The nearest westbound transit stop is located approximately 560 feet from the project site.

225 E. Robinson Street, Suite 300
Landmark Center Two
Orlando, FL 32801-4326
P 407.839.4006

Both of these are in front of residential homes. With the redevelopment of this site, it is suggested that the City and the Applicant engage in a discussion with VOTRAN to determine if these stops should be relocated adjacent to the proposed project, which would provide for a better opportunity for a transit stop.

Comment #5 – HCS Analyses

Please check the timing and phasings used in the analyses. The green times used in the HCS analyses are not consistent with the minimum greens on the signal timing sheets. Please verify if any data analysis conclusions change as a result.

Comment #6 – HCS Analyses

Review of certain inputs used in the HCS analyses, such as truck percentages and peak hour factors for each lane group cannot be verified with the HCS printouts. Electronic files are requested.

Comment #7 – Site Access Drives

Please consult with City of Deltona Code Section 96-37(a)(10)b for criteria required in the design and construction of the site access driveways. The driveway shall conform to Major Driveway entrance (based on daily trip ends).

LDC Section 96-37(a)(10)c.1.(iii), states that "the minimum acceptable spacing between intermediate or major driveways and an intersection shall be similar to the criteria for intersections of local streets with a thoroughfare. Refer to subsection 96-37(3)a.2". According to Section 96-37(3)a.2, the minimum distance between a local street intersection and any other intersection of the thoroughfare shall be a 660 feet. However, as described in page 7 of the TIA, the proposed full access driveway entrance (a T-type intersection) along Saxon Boulevard is located approximately 300 feet east of the signal at Saxon Blvd and Normandy Blvd. However, the driveway, as depicted in the preliminary site plan, is designed as far away as possible on the parcel.

Comment #8 – Queues

The 95% queues on the westbound approach of Saxon Blvd and Normandy Blvd are shown to extend beyond the full access driveway on Saxon Blvd. This will present issues for the single-lane approach of the driveway, as left turns will not be able to exit without considerable delays. Please confirm and provide an explanation of how the project driveway will provide for safe and efficient ingress and egress for the site.

Comment #9 – Level of Service Standard

Per Policy T1-4.3 of the City of Deltona Transportation Element, the acceptable level of service standard for arterials and collectors is "E".

Comment #10 – Service Volumes

Please verify the two-way peak-hour volumes shown for Normandy Drive in Table 4.

Based on the peer review relating to the TIA supporting the proposed convenience store with 16 fueling stations on the southeast corner of Saxon Boulevard and Normandy Boulevard, VHB recommends that the City of Deltona transmits these comments to the Applicant and that a revised TIA be provided addressing these comments. The revised TIA should identify if any study roadway segments or intersections are anticipated to be adversely impacted by the development based on any changes resulting from the included comments. In addition, the revised TIA should provide convincing analysis and documentation to demonstrate that the proposed full driveway access at Saxon Blvd meets the requirements set forth in the City of Deltona LDC. We appreciate the opportunity to provide this service to the City of Deltona. If you have any questions, please do not hesitate to contact us.

Sincerely,

Kok Wan Mah, P.E., PTOE
Senior Transportation Engineer
VHB
kmah@vhb.com
407.641.0690

Response to Traffic Study Review Comments
Convenience Market with Gasoline Pumps
City of Deltona, Florida

This is in response to the traffic-related comments for the "Convenience Market with Gasoline Pumps" traffic study dated May 2016. Each of the comments is listed first in **bold** followed by our response.

Comment # 1 – Trip Generation

The number of daily trips in the last paragraph on page 7 does not match the net daily trips in Table 3. This correction does not change the results of the analysis.

Response:
The paragraph was changed to reflect the correct new net daily trips. It should be pointed out that the correct new net trips as shown in the table were used in the analysis.

Comment # 2 – Intersection Volumes

It is unclear how the attenuation of pass-by trips is accounted for. On figure 3, at the intersection of Saxon and Normandy, a total of 485 vehicles turn south (50+207+228), of which 22 pass-by trips are identified. At the site access, a total of 474 vehicles pass the driveway, which appear to lose 11 of the pass-by trips. Please clarify.

Response:
In Figure 3, the (+) and (-) signs for the southbound pass-by trips were erroneously switched (a graphical error) but the totals are correct. In the revised report, the southbound through movement was corrected to (207-<11>=196) and the southbound left turn movement to (110+<11>+(9)=130).

TPD No. 4755
January 03, 2017

Comment # 3 – Alternative Mode Analysis

Please verify if a minimum of 4-foot wide sidewalks as required by City of Deltona Code of Ordinances, Section 96-41 (a) will be maintained adjacent to the project property after the development of the site.

Response:
A minimum of 4-foot sidewalks will be maintained adjacent to the project property after the development of the site.

Comment # 4 – Alternative Mode Analysis

It should be noted that the nearest eastbound transit stop is located approximately 0.25 miles from the project site. The nearest westbound transit stop is located approximately 560 feet from the project site.
Both of these are in front of the residential homes. With the redevelopment of this site, it is suggested that the City and the Applicant engage in a discussion with VOTRAN to determine if these stops should be relocated adjacent to the proposed project, which would provide for a better opportunity for a transit stop.

Response:
The Applicant is willing to engage in a discussion with the City and VOTRAN to determine if these bus stops should be relocated adjacent to the proposed project.

Comment # 5 – HCS Analysis

Please check the timing and phasing used in the analyses. The green times used in the HCS analyses are not consistent with the minimum greens on the signal timing sheets. Please verify if any data analysis conclusions change as a result.

Response:
The HCS analyses are consistent with the minimum greens on the signal timing sheets. However, the signals at the intersections of Saxon Blvd/Finland Ave and Saxon Blvd/Normandy Blvd are coordinated with a cycle length of 120 seconds during the A.M. peak hour and 130 seconds during the P.M. peak hour. The splits were optimized in the HCS analyses for these two intersection while preserving the same cycle length and coordination. Electronic files are submitted separately for clarification.

Comment # 6 – HCS Analysis

Review if certain inputs used in the HCS analyses, such as truck percentages and peak hour factors for each lane group cannot be verified with the HCS printouts, Electronic files are requested.

Response:
Inputs used in the analyses were reviewed and verified. Electronic files will be provided separately.

Comment # 7 – Site Access Drives

Please consult with City of Deltona Code Section 96-37(a)(10)b for criteria required in the design and construction of the site access driveways. The driveway shall conform to Major Driveway entrance (based on daily trip ends).
LDC Section 96-37(a)(10)c.1.(iii), states that "the minimum acceptable spacing between intermediate or major driveways and an intersection shall be similar to the criteria for intersections of local streets with a thoroughfare. Refer to subsection 96-37(3)a.2". According to Section 96-37(3)a.2, the minimum distance between a local street intersection and any other intersection of the thoroughfare shall be 660 feet. However, as described in page 7 of the TIA, the proposed full access driveway entrance (a T-type intersection) along Saxon Boulevard is located approximately 300 feet east of the signal at Saxon Blvd and Normandy Blvd. However, the driveway, as depicted in the preliminary site plan, is designed as far away as possible on the parcel.

Response:
We will consult with the City regarding the criteria in the design and construction of the site driveways. The site's major driveway on Saxon Boulevard is proposed to be located as far away as possible from Normandy Boulevard. However, this location will not meet the 660 feet minimum distance from Normandy Boulevard. It is interesting to note that there are sixteen (16) local streets which intersect Saxon Boulevard between Finland Drive and Sterling Silver Boulevard (a distance of one mile). These local streets create sixteen spacings none of which meet the 660 feet standard measured edge-to-edge of street. Measured center-to-center, only two spacings out of sixteen meet the 660 feet standard.

Comment # 8 – Queues

The 95% queues on the westbound approach of Saxon Blvd and Normandy Blvd are shown to extend beyond the full access driveway on Saxon Blvd. This will present issues for the single-lane approach of the driveway, as left turns will not be able to exit without considerable delays. Please confirm and provide an explanation of how the project driveway will provide for safe and efficient ingress and egress for the site.

Response:
We agree that there will be instances where queues on the westbound approach will extend beyond the site access driveway on Saxon Boulevard. This situation will only inconvenience the proposed development traffic and not the traffic on Saxon Boulevard. A two-lane approach is envisioned for this driveway so that the right turns will not be impacted by the queues. Based upon the HCS analysis, the exiting left turns will experience 60 second delays with a v/c ratio of 0.52 at this driveway. Furthermore, the exiting vehicles from the site can use the Normandy Boulevard access and take advantage of the signal at Saxon Boulevard.

Comment # 9 – Level of Service Standard

Per Policy T1-4.3 of the City of Deltona Transportation Element, the acceptable level of service standard for arterials and collectors is "E".

Response:
The acceptable level of service standards were taken from the Volusia County 2015 Average Annual Daily Traffic & Historical Counts as documented in the traffic study methodology included as Appendix A in the traffic study. The traffic study methodology was submitted to and reviewed by the City and County prior to the conduct of the study. Table 1 and Table 5 were changed in the revised report to reflect the correct Level of Service standard.

Comment # 10 – Service Volumes

Please verify the two-way peak-hour volumes shown for Normandy Drive in Table 4.

Response:
The two-way peak-hour volumes for Normandy Road were reviewed and corrected accordingly in the revised report.

Memorandum

To: Ron Paradise
Assistant Director
City of Deltona
Planning & Development Services

Date: January 5, 2017

Project #: 62354.03

From: Kok Wan Mah, P.E., PTOE
Senior Transportation Engineer

Re: Additional Comments for Convenience Store with Gas Pumps
Continuing Professional Services Contract – Daytona Beach, Florida
Contract No. RZ16-004, RFQ #14012

CC: Chris Bowley, AICP
Joseph Ruiz
Jorge Tolosa, P.E.

The following summary of comments are associated with the traffic impact analysis methodology for the proposed Convenience Store with Gas Pumps in Deltona, Florida. The subject study was prepared by Traffic Planning and Design, Inc. and is dated May 2016. This review examined the requirements needed to conduct a traffic impact study, following the R2CTPO TIA Guidelines. The comments are as follows:

Comment # 1 – Trip Generation

The number of daily trips in the last paragraph on page 7 does not match the net daily trips in Table 3. This correction does not change the results of the analysis.

Response:
The paragraph was changed to reflect the correct new net daily trips. It should be pointed out that the correct new net trips as shown in the table were used in the analysis.

VHB Response: Corrected. No further action.

Comment # 2 – Intersection Volumes

It is unclear how the attenuation of pass-by trips is accounted for. On figure 3, at the intersection of Saxon and Normandy, a total of 485 vehicles turn south (50+207+228), of which 22 pass-by trips are identified. At the site access, a total of 474 vehicles pass the driveway, which appear to lose 11 of the pass-by trips. Please clarify.

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Response:
In Figure 3, the (+) and (-) signs for the southbound pass-by trips were erroneously switched (a graphical error) but the totals are correct. In the revised report, the southbound through movement was corrected to (207-<11>=196) and the southbound left turn movement to (110+<11>+(9)=130).

VHB Response: Corrected. No further action.

Comment # 3 – Alternative Mode Analysis
Please verify if a minimum of 4-foot wide sidewalks as required by City of Deltona Code of Ordinances, Section 96-41 (a) will be maintained adjacent to the project property after the development of the site.

Response:
A minimum of 4-foot sidewalks will be maintained adjacent to the project property after the development of the site.

VHB Response: Acknowledged. No further action.

Comment # 4 – Alternative Mode Analysis

It should be noted that the nearest eastbound transit stop is located approximately 0.25 miles from the project site. The nearest westbound transit stop is located approximately 560 feet from the project site. Both of these are in front of the residential homes. With the redevelopment of this site, it is suggested that the City and the Applicant engage in a discussion with VOTRAN to determine if these stops should be relocated adjacent to the proposed project, which would provide for a better opportunity for a transit stop.

Response:
The Applicant is willing to engage in a discussion with the City and VOTRAN to determine if these bus stops should be relocated adjacent to the proposed project.

VHB Response: No further comment.

Comment # 5 – HCS Analysis

Please check the timing and phasing used in the analyses. The green times used in the HCS analyses are not consistent with the minimum greens on the signal timing sheets. Please verify if any data analysis conclusions change as a result.

Response:
The HCS analyses are consistent with the minimum greens on the signal timing sheets. However, the signals at the intersections of Saxon Blvd/Finland Ave and Saxon Blvd/Normandy Blvd are coordinated with a cycle length of 120 seconds during the A.M. peak hour and 130 seconds during the P.M. peak hour. The splits were optimized in the HCS analyses for these two intersection while preserving the same cycle length and coordination. Electronic files are submitted separately for clarification.

VHB Response: Verified. No further action.

Comment # 6 – HCS Analysis

Review if certain inputs used in the HCS analyses, such as truck percentages and peak hour factors for each lane group cannot be verified with the HCS printouts, Electronic files are requested.
Response:
Inputs used in the analyses were reviewed and verified. Electronic files will be provided separately.

VHB Response: Verified. No further action.

Comment # 7 – Site Access Drives

Please consult with City of Deltona Code Section 96-37(a)(10)b for criteria required in the design and construction of the site access driveways. The driveway shall conform to Major Driveway entrance (based on daily trip ends).
LDC Section 96-37(a)(10)c.1.(iii), states that "the minimum acceptable spacing between intermediate or major driveways and an intersection shall be similar to the criteria for intersections of local streets with a thoroughfare. Refer to subsection 96-37(3)a.2". According to Section 96-37(3)a.2, the minimum distance between a local street intersection and any other intersection of the thoroughfare shall be 660 feet. However, as described in page 7 of the TIA, the proposed full access driveway entrance (a T-type intersection) along Saxon Boulevard is located approximately 300 feet east of the signal at Saxon Blvd and Normandy Blvd. However, the driveway, as depicted in the preliminary site plan, is designed as far away as possible on the parcel.

Response:
We will consult with the City regarding the criteria in the design and construction of the site driveways. The site's major driveway on Saxon Boulevard is proposed to be located as far away as possible from Normandy Boulevard. However, this location will not meet the 660 feet minimum distance from Normandy Boulevard. It is interesting to note that there are sixteen (16) local streets which intersect Saxon Boulevard between Finland Drive and Sterling

Silver Boulevard (a distance of one mile). These local streets create sixteen spacings none of which meet the 660 feet standard measured edge-to-edge of street. Measured center-to-center, only two spacings out of sixteen meet the 660 feet standard.

VHB Response: In their response to Comment # 8, the applicant states that "A two-lane approach is envisioned for this driveway (at Saxon Blvd) so that the right turns will not be impacted by the queues." As such, it is recommended, that the site plan of the driveway on Saxon Blvd be revised to show a two-lane egress approach, which is also a requirement per the City of Deltona Land Development Code, to provide efficient operations for vehicles exiting the project site. Furthermore, the City reserves the right in the future to restrict outbound left turns in the case that operational and/or safety concerns are observed for the project traffic at the Saxon Blvd driveway.

Comment # 8 – Queues

The 95% queues on the westbound approach of Saxon Blvd and Normandy Blvd are shown to extend beyond the full access driveway on Saxon Blvd. This will present issues for the single-lane approach of the driveway, as left turns will not be able to exit without considerable delays. Please confirm and provide an explanation of how the project driveway will provide for safe and efficient ingress and egress for the site.

Response:
We agree that there will be instances where queues on the westbound approach will extend beyond the site access driveway on Saxon Boulevard. This situation will only inconvenience the proposed development traffic and not the traffic on Saxon Boulevard. A two-lane approach is envisioned for this driveway so that the right turns will not be impacted by the queues. Based upon the HCS analysis, the exiting left turns will experience 60 second delays with a v/c ratio of 0.52 at this driveway. Furthermore, the exiting vehicles from the site can use the Normandy Boulevard access and take advantage of the signal at Saxon Boulevard.
See VHB Response to Comment #7.

Comment # 9 – Level of Service Standard

Per Policy T1-4.3 of the City of Deltona Transportation Element, the acceptable level of service standard for arterials and collectors is "E".

Response:
The acceptable level of service standards were taken from the Volusia County 2015 Average Annual Daily Traffic & Historical Counts as documented in the traffic study methodology included as Appendix A in the traffic study.

The traffic study methodology was submitted to and reviewed by the City and County prior to the conduct of the study. Table 1 and Table 5 were changed in the revised report to reflect the correct Level of Service standard.

VHB Response: Corrected. No further action.

Comment # 10 – Service Volumes

Please verify the two-way peak-hour volumes shown for Normandy Drive in Table 4.

Response:

The two-way peak-hour volumes for Normandy Road were reviewed and corrected accordingly in the revised report.

VHB Response: Corrected. No further action.

Based on the peer review relating to the TIA and responses to comments supporting the proposed convenience store with 16 fueling stations on the southeast corner of Saxon Boulevard and Normandy Boulevard, VHB recommends that the City of Deltona reviews these comments and responses, and if satisfactory, draft development order conditions that would be presented to the Applicant as part of the development entitlements.

Sincerely,

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