



CITY OF COCOA
Planning & Zoning Board /
Local Planning Agency
City Council Chambers

Cocoa City Hall
65 Stone Street
Cocoa, FL 32922

AGENDA
Special Meeting
August 6, 2019
6:00 p.m.

I. OPENING MATTERS:

1. CALL TO ORDER
2. ROLL CALL
3. PLEDGE OF ALLEGIANCE

II. APPROVAL OF AGENDA AND MINUTES:

1. AGENDA: Meeting of Aug. 6, 2019
2. MINUTES: Meeting of July 17, 2019

III. OLD BUSINESS:

- A. **PZ-19-022 – Development Agreement (Integra Land Company)**
(Tabled from July 17, 2019)

Consideration of a Binding Development Agreement between the City of Cocoa, Florida and Integra Land Company to allow the developer to construct up to 249 apartments in 5 apartment buildings with 5 parking garage buildings and a community clubhouse on 2 parcels of land. (Parcel ID: 24-35-13-00-750 and 24-35-24-00-1)

IV. NEW BUSINESS: None

V. OTHER BUSINESS:

- A. Tree Board Update:
- Tree-City USA designation follow-up
- B. Recent Development Update (none)
- C. Open Discussion by Board members

VI. NEXT MEETING DATE:

Wednesday, Sept. 4, 2019

VII. ADJOURNMENT

(Over)

NOTICE TO PUBLIC:

This meeting may include the attendance of one (1) or more members of the Cocoa City Council who may or may not participate in the Board discussions held at this public hearing.

All persons and parties are hereby advised that if they should decide to appeal any decision made by this Board with respect to any matter considered at this hearing, they will need a record of the proceedings and that for such purpose, affected persons 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.

The facility where this public hearing will be held is accessible to the physically handicapped. Interested parties are hereby advised that they may appear at said meeting and be heard with respect to the application. Written comment from the public with regard to the application will also be accepted.

Information pertaining to the above may be inspected at the Planning & Zoning Division at 65 Stone Street, Cocoa, Florida between 8:00 a.m. and 5:00 p.m., Monday through Friday, beginning the Friday before the Board Meeting date, or by phoning (321) 433-8535.

**MINUTES
CITY OF COCOA
PLANNING & ZONING BOARD/ LOCAL PLANNING AGENCY
SPECIAL MEETING
July 17, 2019**

The special meeting of the Planning & Zoning Board/ Local Planning Agency was held on July 17, 2019 at City Hall, 65 Stone Street, Cocoa, FL, as publically noted.

I. CALL TO ORDER:

Chair Dobrin called the meeting to order at 6:00 p.m.

<u>ROLL CALL:</u>	Michael Dobrin	Chairperson
	Al Washington	Vice Chairperson
	Todd Anderson	Board Member
	Jeri Blanco	Board Member
	Sherry Ervin	Board Member
	Trina Gilliam	Board Member
	Marilyn Green	Board Member
	Aleck Greenwood	Board Member
	Lawrence Koss	Board Member
	Russell Sengel	Board Member
	Kristin Eick	Board Attorney
	Jake Williams Jr.	Board Liaison
	Courtney Jackson	Recording Secretary

<u>PRESENT:</u>	Michael Dobrin	Chairperson
	Al Washington	Vice Chairperson
	Todd Anderson	Board Member
	Jeri Blanco	Board Member
	Sherry Ervin	Board Member
	Trina Gilliam	Board Member
	Marilyn Green	Board Member
	Aleck Greenwood	Board Member
	Lawrence Koss	Board Member
	Russell Sengel	Board Member
	Kristin Eick	Board Attorney
	Jake Williams Jr.	Board Liaison

<u>ABSENT:</u>	Sherri Ervin	Board Member
	Todd Anderson	Board Member

STAFF PRESENT:

Dodie Selig, Planning & Zoning Manager, **Angela Essing**, Senior Planner

Chairperson Dobrin led the assembly in the Pledge of Allegiance to the flag of the United States of America.

II. APPROVAL OF AGENDA AND MINUTES:

1. AGENDA: Special Meeting of July 17, 2019

Comments concerning the Special Meeting of July 17, 2019

Chairperson Dobrin asked why Action Item A under New Business is being tabled until the next meeting in August.

Ms. Selig stated that Staff is still working on getting the language down. She listed the item as “tabled” since it would preserve advertising and would not incur additional costs.

* **MOTION TO APPROVE THE AGENDA AS PRESENTED BY BOARD MEMBER ERVIN; SECONDED BY BOARD MEMBER GILLIAM.**

AYES: Dobrin, Washington, Blanco, Gilliam, Green, Greenwood, Koss, Sengel

MOTION CARRIED (8-0)

2. MINUTES: Special Meeting of June 25, 2019

Comments concerning the June 25, 2019 Meeting Minutes

Discussion between **Board Member Koss** and **Ms. Selig** regarding how much fill a land developer could bring onto a property¹, if the City had a fill limit, and who determines how much fill is needed.

Board Member Koss expressed that after reading the previous minutes, he is concerned that if there are no future discussions about preventing potential property flooding due to fill and how to resolve flooding issues, he fears something could potentially happen. He further explained his concern about the Adamson Creek Retention Pond overflowing and how he would like to further the discussion with City Staff in the future.

Chairperson Dobrin asked what recourse² would the property owner have if the retention pond does not hold and if the City would have any liability.

Ms. Selig stated it would be a civil matter if it floods.

¹ Jake Williams left the room at 6:05pm

² Angela Essing entered the room at 6:08pm

Board Member Greenwood pointed out that developers bring in engineers, who are responsible for building any extra features. The goal is to have them build the extra features without affecting the other properties. They are a support mechanism to prevent some of the points that were brought up previously³. Noted some of the additional requirements that are needed to be followed by the developer and engineers to ensure it will not create any problems and to be able to continue building.

Board Attorney Eick stated that City Council imposed a condition that upon final plat approval, there be additional studies provided to ensure that there would not be an adverse impact on Mr. Jones' property. There have also been communications with the developer and their engineer to ensure the City's Comprehensive Plan standards and level of service standards for storm water were met.

* **MOTION TO APPROVE THE MINUTES AS PRESENTED BY BOARD MEMBER KOSS; SECONDED BY BOARD MEMBER GREEN.**

AYES: Dobrin, Washington, Blanco, Gilliam, Green, Greenwood, Koss, Sengel

MOTION PASSED UNANIMOUSLY (8-0)

III. OLD BUSINESS:

A. PZ-19-021-Text Amendment- Parking as a Special Exception use in Article XI, Section 22 (Tabled from June 25, 2019)

An ordinance of the city council of the city of cocoa, Brevard County, Florida; amending appendix A, article XI, section 22 of the zoning ordinance of the city of cocoa to allow parking as a special exception use in the Cocoa Village subdistrict of the cocoa waterfront overlay district.

Ms. Selig presented a map⁴ that showed exempt parcels locations and explained to the Board how the presented zoning ordinance language would affect the parking situation.

Chairperson Dobrin asked what changes the amended text to the Zoning Ordinance would bring to the parking situation.

Ms. Selig responded it would legalize parking there as it is currently private property and everyone parking there are trespassing.

Discussion between **Board Member Koss** and **Ms. Selig** regarding if the property owner would need to insure the parking lot once it is turned into an allowable parking lot for the public.

³ Mayor Williams Jr. entered the room at 6:08pm

⁴ :Exhibit 1: Map of exempt parcels

Board Member Greenwood asked for clarification regarding if the areas that are specifically outlined for not having a building, are considered separate legal parcels as shown on the map presented.

Ms. Selig confirmed that it was.

Discussion between **Chairperson Dobrin** and **Ms. Selig** about the length of ownership of the property and the purpose and intent of the owners purchasing a pay-for-parking lot.

Board Member Greenwood mentioned the issues with past parking studies involving bank parking lots and explained what the banks were allowed to do with their vacant lots.

Discussion between **Board Member Koss** and **Ms. Selig** regarding what the new language to the ordinance is hoping to accomplish.

Board Member Green asked for clarification regarding what would happen if a building is leveled and if they would be allowed to build a parking lot.

Ms. Selig assured the board that in order for someone to be considered for a special exception parking lot, there would need to be a building.

Board Member Green expressed her concern over wanting to ensure that the language is tight, so that it remains with the intent with what is proposed.

Ms. Selig explained why the City is requiring to have a building in order to have a public parking lot under the special exceptions rule.

Board Member Gilliam felt that the proposed language on page 3⁵ needed to be tighter.

Board Member Blanco expressed her concern for possible loopholes or gray areas.

Ms. Selig explained anyone can apply, but does not mean they will receive the special exception. Especially those that are in opposition of existing codes.

Chairperson Dobrin asked if the City has given any parking polls.

Discussion between **Board Member Greenwood** and **Board Member Koss** over the current parking situation, possible parking solutions, and how Cocoa Citizens and visitors might perceive the new text amendment.

Exhibit 2: City of Cocoa Code of Ordinances, Appendix A- Zoning, Article XI.- Schedule of District Regulations, Sec. 22, pg. 3

Chairperson Dobrin asked if the City ever thought about buying the lots instead of turning it over to private owners.

Ms. Selig responded saying comes down to money.

Board Member Greenwood gave an example of land that the City could buy for parking.

Board Member Green asked if the Bank of America were to be leveled and they put up a small kiosk that is considered a “commercial building”, if they could run a pay-for-parking business. Further expressed her concerns for the language in the proposed text amendment.

Ms. Selig explained the businesses have to meet specific building size requirements.

Chairperson Dobrin noted that he is concerned this is a situation they could possibly lose control over.

Board Liaison Williams announced that he and **City Manager Titkanich** are looking at locations for a parking garage, but did not disclose the location.

Chairperson Dobrin asked if the City can lease the lots.

Ms. Selig replied saying it is possible. She further explained Staff is trying to make the two codes become in synch with each other as to not conflict in a way that doesn't let things run wild. Believes the new language will control the situation.

Discussion between **Board Member Greenwood** and **Ms. Selig** over if there is a time limit for the ordinance once it is passed and if the Board could to come back to review the language should there be issues that arise after it passes.

Ed Green (104 Riverside Dr.) thinks the discussion of whether or not the City should buy property and all other discussion not including the question of approving the zoning language change, is beyond the scope of the Board. Mr. Green further explained his take on the new language and provided a possible solution for the “change of use” section of the code.

Ms. Selig pointed out that Mr. Green's suggestion is essentially what the code says currently.

Board Attorney Eick added that typically for special exception, any intensification, they put it as a condition it would have to come back to Board of Adjustment.

- * **MOTION TO APPROVE THE TEXT AMENDMENT AS WRITTEN BY COMMITTEE MEMBER BLANCO; SECONDED BY BOARD MEMBER GILLIAM**

AYES: Washington, Blanco, Gilliam, Green, Greenwood, Koss, Sengel

Opposed: Dobrin

MOTION CARRIED (7-0)

IV. NEW BUSINESS:

A. Pz-19-022- Development Agreement (Integra Land Company)

Consideration of Binding Development Agreement between the City of Cocoa, FL and Integra Land Company to allow the developer to construct up to 249 apartments in 5 apartment buildings with parking garage buildings and a community clubhouse on 2 parcels of land (Parcel ID: 24-35-13-00-750 and 24-35-24-00-1). (Tabled until August 6th, 2019)

- * **MOTION TO POSTPONE UNTIL THE NEXT MEETING IN AUGUST 6, 2019 MADE BY BOARD MEMBER KOSS; SECONDED BY BOARD MEMBER GILLIAM**

AYES: Dobrin, Washington, Blanco, Gilliam, Green, Greenwood, Koss, Sengel

MOTION PASSED UNANIMOUSLY (8-0)

V. OTHER BUSINESS:

A. Tree Board Update

- Article on "The Value of Trees" for the FYI newsletter was discussed by **Ms. Selig** and the Board.
- Consideration of "Tree Risk Assessment Certification" added to future code revisions list.

Ms. Selig noted that they will need to postpone the certification discussion due to the new Florida State law passed by Governor DeSantis, as it might be a conflict. Explained that both she and **Board Attorney Eick** would need to review the language of the new law.

Board Member Koss inquired about if their current tree code would be grandfathered in or if the new state law would overrule it.

Board Attorney Eick explained that in this case, state law would take precedence over it.

- Follow-up on trees in ROW at Beverly and Manor Drive

It was noted that one (1) oak tree as well as one (1) hickory tree were taken down by the City and there are two (2) cedar trees that are reportedly rotting.

Board Member Koss asked if the Board could have a tree expert recommend the appropriate trees for those locations to replace the ones they have lost. He is concerned that Public Works will not research the trees prior to planting them.

Board Member Greenwood agreed and felt it would be best to have someone who is neutral and without bias when picking a replacement tree.

Ms. Selig noted that City Council would need to decide that, but will pass the suggestion along.

B. Recent Development Update

Ms. Selig passed out a flyer⁶ and invited the Board to Growth Management Planning Officials Training. She discussed training details and thanked **Board Member Gilliam** for coordinating the event.

Chairperson Dobrin inquired about the progress of the new proposed hotel and **Board Attorney Eick** explained that the hotel's developer, Jack Brown, has been found in default and has 30 days to cure it.

Discussion with **Vice Chairperson Washington** and Staff if a Golden Corral and a Cracker Barrel are being put on SR524 and I-95.

C. Open discussion by Board Members

Board Member Greenwood discussed Cocoa receiving a Tree City USA designation and received the Board's consensus to reactive their Tree City USA designation.

Board Member Greenwood discussed Cocoa's Gravel Code and provided suggestions to allow property owners to keep the gravel in their driveways. He suggested to implement a concrete curbing to prevent the gravel from going into the storm drains and keeping the gravel clear from sidewalks. Received the Board's consensus to add a concrete curbing discussion to a future agenda.

Board Member Koss discussed the EPA's *Stormwater to Street Trees* PDF⁷ that was sent to the board members. Mentioned he would like to

⁶ Exhibit 3: Growth Management Planning Officials Training Flyer

implement a natural storm water management system and to discuss the PDF at the next meeting.

Board Liaison Williams asked if the Board would prefer a Volunteer Appreciation dinner vs. breakfast. The Board agreed to dinner.

VI. NEXT MEETING DATE:

August 6, 2019 at 6pm

VII. ADJOURNMENT:

- * **MOTION TO ADJOURN BY BOARD MEMBER ANDERSON; SECONDED BY BOARD MEMBER ERVIN.**

AYES: Dobrin, Washington, Blanco, Gilliam, Green, Greenwood, Koss, Sengel

MOTION PASSED UNANIMOUSLY (8-0)

MEETING WAS ADJOURNED AT 7:25p.m.

Michael Dobrin, Chairperson

Respectfully submitted by:

Courtney Jackson, Recording Secretary

⁷ Exhibit 4: Stormwater to Street Trees PDF Packet



**Classified Ad Receipt
(For Info Only - NOT A BILL)**

Customer: CITY OF COCOA (TE)

Ad No.: 0003677732

Address: 65 STONE ST
COCOA FL 32922
USA

Pymt Method Invoice

Net Amt: \$169.16

Run Times: 1

No. of Affidavits: 1

Run Dates: 07/11/19

Text of Ad:

AD #3677732 7/11/2019

CITY OF COCOA
NOTICE OF PUBLIC HEARING
NOTICE IS HEREBY GIVEN THAT
THE PLANNING & ZONING BOARD/LOCAL PLANNING AGENCY
AND THE COCOA CITY COUNCIL
PROPOSE TO CONSIDER THE FOLLOWING:

A. PZ-19-022 – Development Agreement (Integra Land Company)
Consideration of a Binding Development Agreement between the City of Cocoa, Florida and Integra Land Company to allow the developer to construct up to 249 apartments in 5 apartment buildings not to exceed 57 feet in height, with 5 parking garage buildings, a community clubhouse and certain public amenities on 2 parcels of land. (Parcel ID: 24-35-13-00-750 and 24-35-24-00-1)

PLANNING & ZONING BOARD/ LOCAL PLANNING AGENCY
PUBLIC HEARING WILL BE HELD ON

JULY 17, 2019
AT 6:00 P.M. OR SOON THEREAFTER IN THE
COCOA CITY HALL COUNCIL CHAMBERS LOCATED AT
65 STONE STREET, COCOA, FL

CITY COUNCIL WILL CONSIDER THESE ITEMS ON
JULY 24, 2019
AT 6:00 P.M. OR SOON THEREAFTER IN THE
COCOA CITY HALL COUNCIL CHAMBERS LOCATED AT
65 STONE STREET, COCOA, FL

Interested parties are hereby advised that they may appear at said meeting and be heard with respect to the application. All persons and parties are hereby advised that if they should decide to appeal any decision made by the City Council with respect to any matter considered at this hearing, they will need a record of the proceedings and that for such purpose, affected persons 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. The Local Planning Agency and City Council reserve the right to continue or postpone hearings to a date certain without re-advertising.

Information pertaining to the above may be inspected at the Planning & Zoning Division beginning the Friday before the meeting, between 8:00 a.m. and 5:00 p.m., Monday through Friday, or by phoning (321) 433-8535.

The facility where this public hearing will be held is accessible to the physically handicapped. SPECIAL ACCOMMODATIONS: Persons with disabilities needing special accommodations to participate in this proceeding should contact the City Clerk's Office at (321) 433-8484 no later than 48 hours prior to the proceeding for assistance.



City of Cocoa Planning & Zoning Board

STAFF REPORT

Date:	August 1, 2019
Project Name:	Development Agreement – Integra Land Company
Project No:	PZ-10-022
Meeting Date:	August 6, 2019
Project Planner:	Dodie Selig, AICP – Planning & Zoning Manager
Applicant/Owner:	Integra Land Company/Cocoa 524 LLC
Requested Action:	Consideration of a Binding Development Agreement between the City of Cocoa, Florida and Integra Land Company to allow the developer to construct up to 249 apartments in 5 apartment buildings not to exceed 57 feet in height, with 5 parking garage buildings, a community clubhouse and certain public amenities on 2 parcels of land (Parcel ID: 24-35-13-00-750 and 24-35-24-00-1) totaling 150.35 acres and located on the south side of State Road 524 between Westminster Dr. and London Blvd.

I. Development Agreement Background and Analysis

Project Background and Summary

The subject property totals 150.35 acres, portions of which are zoned RU-1-7 (Single-Family Residential), RU-2-15 (Multi-Family Residential) and C-N (Neighborhood Commercial). The developed area of the property will contain roughly 13 acres and will be located along the SR 524 frontage. The remainder of the property, roughly 137 acres, is a wetland area commonly known as Mud Lake.

The City's Board of Adjustment previously granted a height variance on November 9, 2014, to allow for an increase in height from 35 feet to 45 feet. In addition, the City's Planning and Zoning Board conditionally approved a site plan on April 8, 2015, to allow for the development of The Preserve at

Cocoa (formerly the Tree Tops development), which would have consisted of eight (8) apartment buildings with a total of 248 market-rate apartment units. Both of these approvals have expired and the subject property has never been developed.

The applicant has entered into a contract to purchase the subject property and desires to build a market-rate apartment complex consisting of 249 apartment units in 5 residential buildings with a clubhouse, 5 garages and on-site amenities. In addition, the applicant intends to deed approximately 137 acres of wetland to the City of Cocoa and will provide a parking area accessed from SR 524 for future public access to the Cocoa Conservation Area.

Staff Analysis of Development Agreement

The development agreement is accompanied by a Concept Plan (Exhibit B). This will guide the future development of the site. In recognition that the Concept Plan has been prepared prior to engineering and floodplain review, the Concept Plan may be slightly modified in the future to accommodate changes required by the City Code, including for drainage and flood storage, but may not be modified to include:

- 1) a different use of the Property;
- 2) an increase in the proposed number of units;
- 3) a reduction in the required amenities (see discussion below); or
- 4) a deviation from any condition (see discussion below).

The applicant (Developer) shall be required to develop the Project to include certain amenities, which shall be maintained in good and working condition throughout the life of the Project, shall be of adequate size to service the intended number of residential units, and shall be incorporated into the final site plan:

- a. The Developer agrees to include a community clubhouse with an exercise/workout room, business center, and “party room” that may be reserved by residents for events; swimming pool; and two (2) Level 3 (30 minute) electric car charging stations;
- b. The Developer agrees to incorporate the use of energy efficient lighting systems, insulation and ENERGY STAR rated windows, low-flow water fixtures, modern heat pumps, and energy-efficient HVAC systems;
- c. The project shall incorporate enhanced landscaping along SR 524 including tree plantings at 40 foot intervals and mixed- species hedges;
- d. The Developer shall provide a public parking area on the western side of the Property as generally depicted in the Concept Plan, consisting of ten (10) parking spaces with a cul-de-sac to allow for fire truck access and turnarounds. The Developer shall further construct a trailhead access stub-out, which shall consist of a four (4) foot walking trail into the Cocoa Conservation Area from the parking area for a distance of 10 feet, with overhanging branches cleared to eight (8) feet high. The Developer shall also install an informational kiosk at the trailhead

access point.

- e. The Developer shall provide overhead lighting for the public parking area and a conduit to allow for future installation of an electric car charging station.
- f. The Developer will deed approximately 137 acres of wetlands located south of the developed portion of the project, including the area known as Mud Lake, to the City. The deeded portion will also include the area at the western end of the subject property and adjacent to SR524 that will be developed as a trailhead parking area accessible to the public and providing for a future connection to the Cocoa Conservation Area.

In accordance with Section 15-21 of the City Code and, in exchange for the significant project enhancements described above, the City Council hereby approves the following variance and waiver from the City Code:

- a. Appendix A Zoning, Article XI, Section 5(E) RU-2-15. The maximum building height may be increased from thirty-five (35) feet to fifty-seven (57) feet for apartment buildings. Communal buildings and parking garages shall be no more than thirty-five (35) feet in height.
- b. Appendix A Zoning, Article XI, Section 5(K) RU-2-15. The maximum building width may be increased from 200 feet to 233 feet for apartment buildings.
- c. Appendix A Zoning, Article XI, Section 5(F) RU-2-15. The minimum living area requirement for one-bedroom apartments shall be decreased from eight hundred (800) square feet to six-hundred thirty-eight (638) square feet for a maximum of 79 one-bedroom apartment units.

Consistency with the City's Comprehensive Plan

Objective 3.1.1: Energy Efficiency. The City shall encourage energy efficiency in the design, construction and rehabilitation of new and existing residential buildings in the City and incorporate alternative energy technologies in the land development regulations.

GOAL 3.7: The City shall promote opportunities for the creation of housing and infill development within the City.

GOAL 11.1: The City of Cocoa will ensure, through effective planning and coordination with the School District, that adequate school capacity is available to accommodate enrollment demand for City residents.

Objective 11.1.2: The City shall ensure adequate public school capacity exists to accommodate new students generated by residential development. The City shall forward all applications for a residential development permit to the School District for a school concurrency evaluation and determination.

Policy 11.1.2.2: The City shall not approve any non-exempt residential development application for a new residential preliminary subdivision, site plan or functional equivalent until the School District School has issued a School Capacity Availability Determination Letter (SCADL) verifying available capacity.

Concurrency

Staff has done a preliminary concurrency review of services required by the project. A final review will be completed with the Site Plan application.

Wastewater

The Level of Service (LOS) for wastewater is 319 gallons per day per household, based on the 249 apartment units, the projected demand on the wastewater system is 79,431 gallons per day.

The Sellers Plant is currently permitted to treat 4.5 mgd of wastewater per day, and is currently operating at 2.25 mgd. The maximum per day over the past twelve months was 2.249 mgd. Thus, there is sufficient capacity for Wastewater.

Stormwater Management

The Level of Service (LOS) for Stormwater Management is as follows:

<i>Design Storm Event:</i>	25-year frequency/24-hour duration event
<i>On-Site Stormwater Management:</i>	Retention of the first one inch of rainfall for areas of more than one acre.
<i>Stormwater Quantity:</i>	Post development Stormwater runoff flow rates, quantities, peaks, and velocities shall be equal to or less than levels that existed prior to development.
<i>Stormwater Quality:</i>	No significant degradation of water quality in receiving water bodies.

Potable Water

The LOS for potable water is 122 gallons per capita per day (gpcd) per household. Based on the City of Cocoa EAR Population Projections report, the average permanent resident per dwelling unit is 2.35 per occupied unit. Thus, the average demand per household is estimated at 287 gpcd, and based on the 249 proposed dwelling units the overall demand is 71,463 gpcd.

The Dyal Plant provides potable for the City of Cocoa service area and it is currently permitted to operate at 48 million gallons per day (mgd). The maximum provision over the past twelve months is 34 mgd. Thus, there is sufficient capacity for Potable Water.

Solid Waste

The Level of Service (LOS) for the City of Cocoa is 1.2 tons of solid waste disposal per capita per year, and residential collection LOS shall be 2 times per week per household with green-waste and recyclables once per week. The City contracts with Waste Management for the provision

of solid waste, and the projected solid waste generated will be collected consistent with the adopted level of service standards.

Roadways (Transportation)

The minimum LOS for State Road 524 is 'D'.

The Space Coast TPO Traffic Counts Report for 2018 indicates that for the I-95 to Industry Road segment of SR524, the average annual daily traffic trips is 12,690, and it is classified as an Urban Minor Arterial roadway. Based on the Institute of Transportation Engineers (ITE) Trip Generation Manual (7th Edition), the average vehicle trips per dwelling unit (on a weekday) is 9.57. Based on the 249 dwelling units, the development is projected to generate 2,383 trips per day (on a weekday).

Based on the LOS of D and the Current Maximum Acceptable Volume (18,590) established by the SCTPO, there is sufficient capacity on SR524 to support this development.

Recreation

The Level of Service (LOS) for Recreation is 1.25 acres per 1,000 population.

Pursuant to the City of Cocoa Comprehensive Plan EAR (October 2010) Data and Analysis, there exists a surplus of 118.34 acres of parks, which was determined to be more than sufficient to meet the needs of the citizens through 2020. The City's current population is 18,833 which requires 23.54 acres of park and recreation facilities. The EAR identified the City as having 323.58 acres (including the 165.09 acres Cocoa Conservation Area) available for residents. Thus, the City has sufficient recreation/parks to support the project and maintain the adopted LOS.

Schools

The Applicant has submitted a School Capacity Availability application and will be required to provide a School Capacity Availability Letter prior to approval of a site plan.

Next Steps

The Development Agreement will need to be approved by City Council and is currently scheduled for the Council meeting on August 14th. If approved, the agreement will be signed and recorded in the Official Records of Brevard County, subject to applicable conditions.

II. Recommendation

Staff recommendation is that the Planning and Zoning Board recommend **approval** to City Council of the Binding Development Agreement and attached Concept Plan, subject to the following condition(s) of approval:

1. The Developer shall provide the City with a School Capacity Availability Determination Letter (SCADL), satisfactorily verifying available school capacity for the proposed Project prior to approval of the Project Site Plan.

THIS INSTRUMENT WAS PREPARED BY
AND SHOULD BE RETURNED TO:

Anthony A. Garganese
City Attorney of Cocoa
Garganese, Weiss, D'Agresta & Salzman, P.A.
111 N. Orange Avenue, Suite 2000
Orlando, FL 32802

(407) 425-9566

FOR RECORDING DEPARTMENT USE ONLY

CITY OF COCOA
INTEGRA COCOA APARTMENTS DEVELOPMENT AGREEMENT

Integra Luxury Apartments

THIS DEVELOPMENT AGREEMENT ("Agreement") is made and executed this _____ day of _____, 2019, by and between the **CITY OF COCOA**, a Florida Municipal Corporation ("City"), whose address is 65 Stone Street, Cocoa, Florida 32922 and **INTEGRA LAND COMPANY**, a Florida corporation ("Developer"), whose address is 1525 International Parkway, Suite 2001, Lake Mary, Florida 32746.

WITNESSETH:

WHEREAS, Developer has entered into a contract to purchase approximately 150.35 acres, more or less, of real property located on the southeast side of State Road 524, approximately 3,300 feet northeast of the Cox Road/State Road 524 intersection, Cocoa, Brevard County, Florida, with Tax Parcel IDs 24-35-13-00-750 and 24-35-24-00-1, more particularly described herein in **Exhibit A** ("Property"); and

WHEREAS, portions of the Property are zoned RU-1-7, Single-Family residential; RU-2-15, Multi-family residential; and C-N, Neighborhood Commercial, with a future land use of Low Density Residential and Neighborhood Commercial; and

WHEREAS, the Developer desires that the Property be developed into a luxury apartment complex consisting of five (5) apartment buildings and five (5) parking garages; and

WHEREAS, a height variance was previously granted by the City's Board of Adjustment on November 9, 2014, to allow for an increase in height from 35 feet to 45 feet and a site plan was also previously conditionally approved by the City's Planning and Zoning Board on April 8, 2015, to allow for the development of The Preserve at Cocoa (formerly the Tree Tops

development), which would have consisted of eight (8) apartment buildings with a total of 248 market-rate apartment units; and

WHEREAS, due to temporal limitations and conditions imposed by both the Board of Adjustment and Planning and Zoning Board in granting the variance and site plan, both approvals have long expired; and

WHEREAS, the previously granted height variance was premised upon the fact that the Property consists almost entirely of wetlands, with only approximately 8.7 percent of the Property being developable upland, and the height variance allowed the applicant to achieve use of its Property while largely conserving the wetlands; and

WHEREAS, the Developer now intends to propose a similar luxury apartment complex and intends to enhance public access opportunities to trails in the Cocoa Conservation Area and deed approximately 137 acres of wetland to the City of Cocoa; and

NOW THEREFORE, in consideration of the mutual promises and covenants contained herein, the parties mutually agree as follows:

1.0 Recitals. The foregoing recitals are true and correct and are hereby incorporated herein by this reference.

2.0 Authority. This Agreement is entered into pursuant to the Florida Municipal Home Rule Powers Act and Section 15-21 of the City Code.

3.0 Condition Precedent – Acquisition of Property by Developer. Developer represents and warrants to the City that they have entered into a binding written contract to purchase the Property (“Purchase Agreement”) and that the Developer intends to expeditiously pursue the completion of the closing on the Property upon the Effective Date of this Agreement. Based on this representation and warranty to the City, Developer further represents and warrants to the City that it is empowered to negotiate and enter into this Agreement. However, the acquisition of fee title to the Property by the Developer shall be a condition precedent to the City issuing any site work permits, including building permits or clearing and grading permits. As such, Developer shall keep the City fully apprised of the status of said closing and shall faithfully and expeditiously complete the closing within one-hundred and twenty (120) days of the Effective Date of this Agreement (“Closing Date”). If Developer fails to complete the closing by the Closing Date, the City Manager shall have the right, in his sole discretion and by written notice, to either extend the Closing Date for a reasonable time period not to exceed three (3) months to allow Developer to complete the closing, or terminate this Agreement. Upon the Effective Date of this Agreement, the Developer shall provide the City Manager and City Attorney a complete copy of a current title commitment (with copies of all supporting documents) for closing on the Property so the Parties can determine whether the title commitment, including the items listed on Schedule B II Exceptions, causes any material impediment to the City’s acquisition of a portion of the Property as described in Section 8.0 below. The City in its reasonable and sole discretion may declare any such impediment as a

default, and Developer shall be afforded an opportunity to cure said default under Section 27.0 of this Agreement. If the Developer fails to cure said default, the City Manager, in his sole discretion and by written notice, shall have the right to terminate this Agreement.

4.0 Project Description and Requirements. Developer shall, at its expense, design, permit and construct a luxury, multi-family residential apartment community in the City of Cocoa with market-rate apartment units. The apartment buildings, all amenity buildings, and parking garages shall be constructed in a single phase and consist of approximately 249 apartment units. Developer agrees that the apartment community shall include no more than five (5) apartment buildings, five (5) parking garages, a community clubhouse, and other buildings necessary to serve the project (“the Project”). The Developer shall be specifically required to develop the Project to include certain amenities, which shall be maintained in good and working condition throughout the life of the Project, shall be of adequate size to service the intended number of residential units, and shall be incorporated into the final site plan. These amenities include the community clubhouse with an exercise/workout room; business center; “party room” that may be reserved by residents for events; swimming pool; two (2) Level 3 (30 minute charging) electric car charging stations; and a public parking area and trailhead stub-out with a kiosk, with a pedestrian bridge for residents to access such trailhead, as described in Section 8.0 below. The Project is generally depicted on the Concept Plan, which consists of a proposed concept site plan that is attached hereto and fully incorporated by reference herein as **Exhibit B** (“Concept Plan”). The Project shall be constructed in accordance with the requirements set forth in this Agreement.

(Hereinafter the project description and requirements are referred to as the “**Project**”).

5.0 Concept Plan. The Project shall be substantially developed in accordance with the Concept Plan which is attached hereto **Exhibit B**. The Concept Plan is intended to be the general blueprint which details key aspects of the future physical development of the Property. The Concept Plan shall also serve as a necessary guide for future permit applications and permitting necessary to complete the construction of the Project. Developer shall have the obligation to further submit and obtain the City’s approval of a floodplain development permit, final site plan, and final engineering plans (“**Final Engineering Plans**”) consistent with the Concept Plan in all material respects and in compliance with the City Code. The City and Owner expressly acknowledge and agree that the Concept Plan attached as Exhibit B was prepared prior to application for a floodplain development permit or approval and submittal of attendant engineering plans. Therefore, while the City recognizes this Concept Plan may be reasonably modified to accommodate necessary changes related to drainage and flood storage, any such modification may not include (a) a different use of the Property; (b) an increase in the proposed number of units; (c) a reduction in the required amenities as provided in Sections 4.0 and 8.0; or (d) a deviation from any condition provided in this Section. Developer acknowledges and agrees that the Concept Plan was not created with specific surveyed dimensions and that during the Final Engineering Plan process such dimensions shall be surveyed, duly engineered, and provided to the City for consideration under applicable City Codes. The Concept Plan shall be subject to reasonable adjustments at the Final Engineering Plan phase in order to bring the

Project into full compliance with the City Code, and as a result, the exact location, layout and dimensions of the building, landscaping, entrances, utilities, parking and other site improvements may vary slightly between Concept Plan approval and approval of the Final Engineering Plans. These changes shall be allowed as long as the changes are consistent with the development standards noted in this Agreement and preserve the general character of the development shown on the Concept Plan.

6.0 Building Elevations and Floor Plans. The building and related floor plans shall be constructed substantially in accordance with the building elevations and floor plans depicted and set forth on **Exhibit “C,”** which is attached hereto and incorporated herein by this reference (**“Building Plans”**). Further, other aspects of the building façade and roof lines, color scheme, and architectural features depicted on the building may have to be adjusted during the City’s final review and approval procedures to satisfy the requirements of the City Code.

7.0 Future Permitting. Upon the Effective Date of this Agreement, the Developer, at its expense, may prepare and file all required applications, information, and engineering plans with the City of Cocoa that are necessary to obtain final site plan approval for the Project consistent with the Concept Plan. Should the Developer apply for final site plan approval for the Project prior to the Closing Date, the Developer acknowledges and agrees that any approval of such final site plan shall be conditioned upon the Developer conveying the property as provided in Section 8.0 below. The Developer further acknowledges and agrees that while the City may conduct a preliminary review of building permit or site work (clearing and grading) permit applications prior to the Closing Date and the conveyance of property as described in Section 8.0 below, the City shall not issue any such permit until after the Closing Date and such conveyance has occurred. Under no circumstances will the City approve any disturbance of the Property until the property conveyance as described in Section 8.0 has occurred. Further, the Developer shall diligently pursue and complete, in good faith, approval of the site plan within twelve (12) months of the Closing Date. If the Project fails to obtain such final approval from the City (a/k/a - a final development order) within the aforesaid twelve (12) months as a result of the Developer failing to timely and properly pursue such approval, the City shall have the right to declare the Developer in default pursuant to Section 27.0 of this Agreement. If the Developer does not cure the default within the cure period, the City shall have the right, but not obligation to, terminate this Agreement without penalty. The Developer shall be solely responsible for obtaining any and all necessary local and state permits including, but not limited to, building and environmental permit approvals which are required in order to permit the Project in compliance with local, state, and federal law. The Developer shall be responsible for all recording fees associated with this Agreement.

8.0 Project Enhancements; Conveyance of Property. In accordance with Section 15-21 of the City Code and in consideration of the variances and waivers granted in Section 9.0 below, the Developer agrees to incorporate the following development enhancements into the final site plan and affect conveyance of a portion of the Property as follows:

(a) The Developer shall construct and provide a public parking area on the western side of the Property as generally depicted in the Concept Plan, consisting of ten (10) parking spaces with a cul-de-sac to allow for fire truck access and turnarounds, such that the public may access walking trails on the property to be conveyed to the City as provided below. The Developer shall further construct a trailhead access stub-out, which shall consist of a four (4) foot walking trail into the conservation area from the parking area for a distance of ten (10) feet, with overhanging branches cleared to eight (8) feet high. The Developer shall also install an informational kiosk at the southern point of the ten (10) required parking spaces at the trailhead access. The Developer shall provide overhead lighting for the public parking area and a conduit to allow for future installation of an electric car charging station. The public parking area and trailhead shall be constructed in conjunction with the Project and in no event completed later than 18 months of building permit issuance. The Developer acknowledges and agrees that certificates of occupancy for the clubhouse and two apartment buildings may be issued prior to completion of the public parking area and trailhead. Further certificates of occupancy shall not be issued for the Project until the public parking area and trailhead is completed.

(b) Prior to receiving any site work or building permits, the Developer shall convey, free of charge and free and clear of all liens and mortgages, a portion of its Property as further described herein. At minimum, the property to be conveyed by the Developer to the City shall consist of:

- i. The entirety of Tax Parcel Number 24-35-24-00-1; and
- ii. The portion of Tax Parcel Number 24-35-13-00-750 that consists of wetland, excluding the upland buffer and mitigated wetland, as determined by a wetland survey approved by the St. John's River Water Management District and the City; and
- iii. The portion of Tax Parcel Number 24-35-13-00-750 west of the 55-foot drainage easement.

It is anticipated that the total conveyance shall consist of approximately 137 acres of wetland.

In order to initiate the conveyance, the Developer shall provide the City with a written notice requesting the City to accept conveyance of the property ("Written Notice"). The Written Notice must be accompanied by a survey and legal description, prepared by a duly registered and professional surveyor, of the new parcel that will be conveyed to the City, consisting of property identified in this subsection. The City shall have twenty (20) days to review the survey and notify the Developer of its acceptance or objection to the proposed legal description of the property to be conveyed. Should the City object to the legal description of the property to be conveyed, the City shall endeavor to negotiate with the Developer regarding such legal description. However, if the City and Developer cannot agree on the exact legal description of

the lands to be conveyed to the City within thirty (30) days after the objection to the proposed legal description has been provided to the Developer, the City may terminate this Agreement.

The Developer shall obtain at the Developer's expense within fifteen (15) days from the City's acceptance of the survey and legal description, a commitment for an Owner's Title Insurance Policy (ALTA FORM B-1970) from a title insurance company ("Title Company") acceptable to the City, agreeing to insure title to the Property in an amount equal to the estimated assessed value of the property to be conveyed, and subject to: no exceptions other than those matters herein permitted; those which will be discharged prior to or at Closing; and the standard printed exceptions and exclusions from coverage customarily contained in an Owner's Policy from the Title Company. The Developer shall provide the City a copy of the title commitment upon receipt of same. The City shall have twenty (20) days to examine the commitment and tender any objections thereto. At closing, Title Company shall provide the City standard "gap" coverage in the custom as established by title insurance practices in Florida. Subsequent to closing, Title Company, at the Developer's expense, shall provide an owner's title policy showing title up to and including the recording of the deed delivered at closing, said policy showing the continuation of good and marketable title in the Developer to the moment of recording the a warranty deed and subject only to the Permitted Exceptions and any matters created at closing. If the title commitment discloses unpermitted exceptions or matters that render the title non-marketable, the Developer, at its option, shall have forty-five (45) days from the date of receiving written notice of defects from the City within which to have the exceptions removed from the commitment or the defects cured to the reasonable satisfaction of the City. In such event, the time of closing shall be thirty (30) days after delivery of the commitment or the time expressly specified in this Agreement, whichever is later. If the Developer fails to have the commitment exceptions removed or the defects cured within the specified time, the City may terminate this Agreement or the City may elect, upon notice to the Developer within ten (10) days after the expiration of the forty-five (45) day curative period, to take title as it then is notwithstanding such exceptions or title defects. Notwithstanding anything herein contained to the contrary, the Developer shall exercise reasonable diligence in the curing of any defects in title, including the payment and discharge of any liens or encumbrances affecting the title status of the property. The Developer shall pay for the cost of recording any necessary curative instruments, the title insurance commitment, and the Owner's policy if issued, and recording of the deed. Each party shall pay their respective attorney's fees.

The City agrees that should the Developer abandon the Project after final site plan approval and conveyance of the above-described property, but prior to completion of construction and issuance of certificates of occupancy, the Developer's successors or assigns shall be permitted to apply the acreage of the above-described property already conveyed to the City for purposes of calculating density, floor area ratio, and maximum impervious surface or lot coverage, provided that, absent a written modification to this Agreement approved by the City Council, such calculations shall not be increased beyond that proposed in the final site plan and as provided in this Agreement for purposes of future development.

(c) All utilities constructed on the Property including, but not limited to, electric, water, sewer, cable, phone, fiber optics, natural gas and other similar kinds of utilities to service the Property shall be constructed underground unless otherwise necessary to be above ground and approved by the City.

(d) The Project shall incorporate the use of energy efficient lighting systems, insulation and ENERGY STAR rated windows, low-flow water fixtures, modern heat pumps, energy efficient HVAC systems, optional roof top solar panels, and at least two (2) electric car charging stations as provided above.

(e) The Project shall incorporate enhanced landscaping along the SR 524 frontage, to include planting of trees at 40-foot intervals and mixed-species hedges.

9.0 Variances and Waivers. In accordance with Section 15-21 of the City Code and, in exchange for the significant project enhancements described above in Section 8.0, the City Council hereby approves the following variance and waiver from the City Code:

(a) Appendix A Zoning, Article XI, Section 5(E) RU-2-15. The maximum building height may be increased from thirty-five (35) feet to fifty-seven (57) feet for apartment buildings. Communal buildings and parking garages shall be no more than thirty-five (35) feet in height.

(b) Appendix A Zoning, Article XI, Section 5(K) RU-2-15. The maximum building width may be increased from 200 feet to 233 feet for apartment buildings.

(c) Appendix A Zoning, Article XI, Section 5(F) RU-2-15. The minimum living area requirement for one-bedroom apartments shall be decreased from eight hundred (800) square feet to six-hundred thirty-eight (638) square feet for a maximum of 79 one-bedroom apartment units.

10.0 Performance Bond; Construction of Public Parking Area and Trailhead. Prior to building permit approval, the Developer shall be responsible for securing and filing with the City a performance guarantee for the construction of the public parking area and trail head access as provided in Section 8.0(a). The form of the performance guarantee shall consist of a performance bond issued by a surety licensed to do business in the State of Florida. The performance guarantee shall be subject to the approval of the City Attorney and the City's engineer as to form and manner of execution. Subject to approval by the City's engineer, the amount of the performance guarantee shall be equal to one hundred and ten percent (110%) of the amount of the Project engineer's maximum estimate or alternative bid estimates for the uncompleted public parking area and trail head access. The effective period of the performance guarantee shall be until the City has issued a written certificate of completion for such amenities. The City shall fully release the performance guarantee upon Developer's complete construction of the public parking area and trail head access. Whenever Developer fails to construct such amenities according to any approved development orders, the City may, upon written notice to the parties to the performance guarantee instrument, declare the performance guarantee to be in default and exercise the City's rights thereunder, including attorney's fees and costs expended by

the City related to the default. Upon default, no further development orders or other approvals shall be granted for the Project until the City determines that adequate progress has been made toward the completion of the public parking area and trail head access.

During construction, the Developer or its contractor shall furnish all labor, materials, supervision, equipment and transportation and will provide, directly or through third parties, all functions necessary to construct the public parking area and trailhead in accordance with the final site plan and all specifications of the City Code. Such functions shall include, without limitation, all engineering, design, make ready work, installation, and preparation of final As-Built drawings (the "Construction Services"). Prior to any payment, City shall require the Developer or its contractor to furnish release of all liens from any unpaid work, labor, or materials with respect to the Developer's, contractor's, or any subcontractor's performance under this Agreement, and/or receipt in full covering all work, labor, or materials for which a lien could be filed. The City shall not be responsible to the Developer or any other construction contractor for payments. The Developer shall be solely responsible for all costs of the Construction Services, including cost overruns that are the result of unforeseen and unbudgeted conditions or events of force majeure.

In addition, the construction contractor and/or the Developer shall be required to provide the City and its officials and employees with a written indemnification and hold harmless agreement in accordance with Florida Statutes for public construction contracts. The form of said indemnification shall be subject to approval of the City Attorney. Further, the construction contractor and/or the Developer must provide current certificates of worker's compensation, general liability and automobile insurance as provided in the City's Financial Operations Manual. In performing the Construction Services, the Developer, its contractors or subcontractors shall comply with all applicable federal, state and local laws, ordinances, and regulations, including without limitation providing Worker's Compensation, Unemployment Insurance and Social Security.

The construction contractor and/or the Developer shall be required to post a one (1) year maintenance bond or cash bond, which shall be in an amount not less than ten percent (10%) of the cost of the work, in favor of the City in accordance with Florida Statutes for public construction projects. The form of said bonds shall be subject to approval of the City Attorney.

11.0 Representations of the Parties. The City and Developer hereby each represent and warrant to the other that it has the power and authority to execute, deliver and perform the terms and provisions of this Agreement and has taken all necessary action to authorize the execution, delivery and performance of this Agreement. This Agreement will, when duly executed and delivered by the City and Developer, constitute a legal, valid and binding obligation enforceable against the parties hereto. Upon acquisition of the Property by the Developer and the recording of this Agreement in the Public Records of Brevard County, Florida, the Agreement shall be a binding obligation upon the Property in accordance with the terms and conditions of this Agreement. Developer represents that it has voluntarily and willfully executed

this Agreement for purposes of binding himself and the Property to the terms and conditions set forth in this Agreement.

12.0 Successors and Assigns. This Agreement shall automatically be binding upon and shall inure to the benefit of the City and Developer and their respective successors and assigns. The terms and conditions of this Agreement similarly shall be binding upon the Property and shall run with title to the same upon being duly recorded against the Property by the City.

13.0 Applicable Law; Venue. This Agreement shall be governed by and construed in accordance with the laws of the State of Florida. The venue of any litigation arising out of this Agreement shall be in Brevard County, Florida or, for federal court actions, in Orlando, Florida.

14.0 Amendments. This Agreement shall not be modified or amended except by written agreement duly executed by both parties hereto (or their successors or assigns) and approved by the City Council.

15.0 Entire Agreement; Exhibits. This Agreement and all attached exhibits hereto supersede any other agreement, oral or written, regarding the Property and contain the entire agreement between the City and Developer as to the subject matter hereof. The Exhibits attached hereto and referenced herein are hereby fully incorporated herein by this reference.

16.0 Severability. If any provision of this Agreement shall be held to be invalid or unenforceable to any extent by a court of competent jurisdiction, the same shall not affect in any respect the validity or enforceability of the remainder of this Agreement.

17.0 Effective Date. This Agreement shall become effective upon approval by the City Council and execution of this Agreement by both parties hereto.

18.0 Recordation. Upon full execution by the Parties and the closing required by Section 3.0, this Agreement shall be recorded in the Public Records of Brevard County, Florida by the City.

19.0 Relationship of the Parties. The relationship of the parties to this Agreement is contractual and Developer is an independent contractor and not an agent of the City. Nothing herein shall be deemed to create a joint venture or principal-agent relationship between the parties, and neither party is authorized to, nor shall either party act toward third persons or the public in any manner, which would indicate any such relationship with the other.

20.0 Sovereign Immunity. Notwithstanding any other provision set forth in this Agreement, nothing contained in this Agreement shall be construed as a waiver of the City's right to sovereign immunity under section 768.28, Florida Statutes, or other limitations imposed on the City's potential liability under state or federal law. As such, the City shall not be liable under this Agreement for punitive damages or interest for the period before judgment. Further,

the City shall not be liable for any claim or judgment, or portion thereof, to any one person for more than two hundred thousand dollars (\$200,000.00), or any claim or judgment, or portion thereof, which, when totaled with all other claims or judgments paid by the State or its agencies and subdivisions arising out of the same incident or occurrence, exceeds the sum of three hundred thousand dollars (\$300,000.00).

21.0 City's Police Power. Developer agrees and acknowledges that the City hereby reserves all police powers granted to the City by law. In no way shall this Agreement be construed as the City bargaining away or surrendering its police powers.

22.0 Interpretation. The parties hereby agree and acknowledge that they have both participated equally in the drafting of this Agreement and no party shall be favored or disfavored regarding the interpretation to this Agreement in the event of a dispute between the parties.

23.0 Third-Party Rights. This Agreement is not a third-party beneficiary contract and shall not in any way whatsoever create any rights on behalf of any third party.

24.0 Specific Performance. Strict compliance shall be required with each and every provision of this Agreement. The parties agree that failure to perform the obligations provided by this Agreement shall result in irreparable damage and that specific performance of these obligations may be obtained by a suit in equity.

25.0 Attorney's Fees. In connection with any arbitration or litigation arising out of this Agreement, each party shall be responsible for their own attorney's fees and costs.

26.0 Development Permits. Nothing herein shall limit the City's authority to grant or deny any development permit applications or requests subsequent to the effective date of this Agreement. The failure of this Agreement to address any particular City, County, State and/or Federal permit, condition, term or restriction shall not relieve Developer or the City of the necessity of complying with the law governing said permitting requirement, condition, term or restriction. Without imposing any limitation on the City's police powers, the City reserves the right to withhold, suspend or terminate any and all certificates of occupancy for any building, trailer, structure or unit if Developer is in breach of any term and condition of this Agreement.

27.0 Default. Failure by either party to perform each and every one of its obligations hereunder shall constitute a default, entitling the non-defaulting party to pursue whatever remedies are available to it under Florida law or equity including, without limitation, an action for specific performance and/or injunctive relief. Prior to any party filing any action as a result of a default under this Agreement, the non-defaulting party shall first provide the defaulting party with written notice of said default. Upon receipt of said notice, the defaulting party shall be provided a thirty (30) day opportunity in which to cure the default to the reasonable satisfaction of the non-defaulting party prior to filing said action.

28.0 Termination. In addition to those circumstances allowing termination as already provided herein, the City shall have the unconditional right, but not obligation, to terminate this Agreement, without notice or penalty, if Developer fails to receive building permits and substantially commence vertical construction of the Project within two (2) years of the Closing Date. In addition, the City shall have the right, but not obligation, to terminate the Agreement if Developer permanently abandons construction of the Project, provided, however, the City shall first deliver written notice and an opportunity to cure to the defaulting party as set forth in Section 27.0 above. If the City terminates this Agreement, the City shall record a notice of termination against the Property in the public records of Brevard County, Florida. This Agreement may otherwise be terminated by mutual written agreement of the Parties.

29.0 Indemnification and Hold Harmless. Developer shall be solely responsible for designing, permitting, constructing, operating and maintaining this Project. As such, Developer hereby agrees to indemnify, release, and hold harmless the City and its elected officials, employees and attorneys from and against all claims, losses, damages, personal injuries (including, but not limited to, death), or liability (including reasonable attorney's fees and costs through all appellate proceedings), directly or indirectly arising from, out of, or caused by Developer and Developer's contractor's and subcontractor's performance of design, permit and construction activities in furtherance of constructing the Project under this Agreement and the operation and maintenance of the Project thereafter. This indemnification shall survive the termination of this Agreement.

30.0 Force Majeure. The parties agree that in the event that the failure by either party to accomplish any action required hereunder within a specified time period ("Time Period") constitutes a default under the terms of this Agreement and, if any such failure is due to any unforeseeable or unpredictable event or condition beyond the control of such party, including, but not limited to, acts of God, acts of government authority (other than the City's own acts), acts of public enemy or war, riots, civil disturbances, power failure, shortages of labor or materials, injunction or other court proceedings beyond the control of such party, or severe adverse weather conditions ("Uncontrollable Event"), then, notwithstanding any provision of this Agreement to the contrary, that failure shall not constitute a default under this Agreement and any Time Period proscribed hereunder shall be extended by the amount of time that such party was unable to perform solely due to the Uncontrollable Event. The extended time period shall be agreed to in writing by the parties and said agreement shall not be unreasonably withheld by either party.

31.0 Notice. Whenever either party desires to give notice to the other, notice shall be sent by hand delivery or certified mail, return receipt requested, and shall be sent to:

For the City:

John A. Titkanich, Jr. AICP
City Manager
City of Cocoa
65 Stone Street
Cocoa, FL 32922

For Developer:

David G. McDaniel
1525 International Parkway, Suite 2001,
Lake Mary, Florida 32746

Either party may freely modify their respective contact person and address contained in this Paragraph by providing written notice of the modification to the other party. Any Notice given as provided herein shall be deemed received as follows: if delivered by personal service, on the date so delivered; and if mailed, on the third business day after mailing.

32.0 Assignment. Prior to completing the construction of the Project and reaching final build-out of the Project, Developer shall not assign this Agreement without the prior written consent of the City. However, Developer shall be entitled to assign its rights and obligations under this Agreement to a parent, subsidiary, or affiliated entity in which Developer or its members are members or interest holders. Any assignment authorized by this subparagraph shall require the assignee to be a formal signatory to this Agreement and fully assume all of Developer's obligations, commitments, representations, and warranties under this Agreement. Such assignment shall also require the written approval of the City by amendment to this Agreement, which shall not require a public hearing and shall not be unreasonably withheld. In any assignment, the rights and obligations contained herein shall be binding on successors in interest to the Property, and the terms and conditions of this Agreement shall bind and inure to the benefit of the parties hereto and any respective successors and assigns.

IN WITNESS WHEREOF, the parties have hereunto set their hands and seal on the date first above written.

CITY OF COCOA

By: _____
John A. Titkanich, Jr., City Manager

ATTEST:

Date: _____

By: _____
Carie Shealy, City Clerk, MMC

CITY SEAL

APPROVED AS TO FORM AND LEGALITY
For the use and reliance of the City of Cocoa, Florida
only.

Date: _____

By: _____
Anthony A. Garganese, City Attorney for
the City of Cocoa, Florida

DRAFT

Signed, sealed and delivered in the presence of the following witnesses:

INTEGRA LAND COMPANY

David G. McDaniel, President

Date: _____

Signature of Witness

Printed Name of Witness

Signature of Witness

Printed Name of Witness

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this _____ day of _____, 2019, by David G. McDaniel, the _____ of Integra Land Company, a Florida corporation. He is personally known to me or produced _____ as identification.

(NOTARY SEAL)

(Notary Public Signature)

(Print Name)

Notary Public, State of _____

Commission No.: _____

My Commission Expires: _____

DEVELOPER IS HEREBY ADVISED THAT SHOULD DEVELOPER FAIL TO FULLY EXECUTE, AND DELIVER TO THE CITY, THIS AGREEMENT WITHIN THIRTY (30) DAYS FROM THE DATE THAT THE CITY COUNCIL APPROVES THIS AGREEMENT, THIS AGREEMENT, AND THE DEVELOPMENT PERMIT APPROVALS REFERENCED HEREUNDER, SHALL AUTOMATICALLY BE DEEMED NULL AND VOID.

EXHIBIT A LEGAL DESCRIPTION

PARCEL #1:

ALL OF THAT PORTION OF THE SOUTHEAST 1/4 OF SECTION 13, TOWNSHIP 24 SOUTH, RANGE 35 EAST, WHICH LIES SOUTHERLY OF STATE ROAD NO 524 (A 200.00 FOOT WIDE RIGHT OF WAY AS SHOWN ON STATE ROAD RIGHT OF WAY MAP SECTION 70070-2501) AND LESS AND EXCEPT THEREFROM THOSE LANDS AS DESCRIBED IN OFFICIAL RECORDS BOOK 3338, PAGE 2213, OF THE BREVARD COUNTY PUBLIC RECORDS, SAID SUBJECT PARCEL BEING FULLY DESCRIBED AS FOLLOWS:

BEGIN AT A CONCRETE MONUMENT STAMPED "PRM#2412", WHICH MARKS THE SOUTHWEST CORNER OF SAID SOUTHEAST 1/4 OF SECTION 13, THENCE NORTH 00°08'35" EAST, ALONG THE WEST LINE OF SAID SOUTHEAST 1/4 A DISTANCE OF 413.73 FEET TO A POINT ON THE SOUTHERLY RIGHT OF WAY LINE OF SAID STATE ROAD NO. 524, THENCE DEPARTING SAID WEST LINE, NORTH 53°28'30" EAST, ALONG SAID SOUTHERLY RIGHT OF WAY LINE, A DISTANCE OF 2,805.42 FEET TO A POINT ON THE WESTERLY LINE OF SAID LANDS AS DESCRIBED IN OFFICIAL RECORDS BOOK 3338, PAGE 2213: THENCE DEPARTING SAID SOUTHERLY RIGHT OF WAY LINE AND ALONG SAID WESTERLY LINE OF OFFICIAL RECORDS BOOK 3338, PAGE 2213, THE FOLLOWING 2 COURSES TO WIT: SOUTH 10°03'38" EAST, A DISTANCE OF 1,390.07; SOUTH 09°45'48" EAST, A DISTANCE OF 680.18 FEET TO A POINT ON THE SOUTH LINE OF SAID SOUTHEAST 1/4 OF SAID SECTION 13, SAID POINT LYING 2.72 FEET WESTERLY OF THE SOUTHEAST CORNER OF SAID SOUTHEAST 1/4 AS MEASURED ALONG SAID SOUTH LINE OF SAID SOUTHEAST 1/4: THENCE DEPARTING SAID WESTERLY LINE SOUTH 89°01'35" WEST, ALONG SAID SOUTH LINE OF THE SOUTHEAST 1/4, A DISTANCE OF 2,614.01 FEET TO THE POINT OF BEGINNING.

PARCEL #2:

THAT PORTION OF THE EAST 1/2 OF THE SOUTHWEST QUARTER OF SECTION 13, TOWNSHIP 24 SOUTH, RANGE 35 EAST, AND THAT PORTION OF THE SOUTHEAST QUARTER OF SAID SECTION 13, LYING SOUTHEASTERLY OF STATE ROAD 528, AND ALSO ALL OF THE NORTH 1/2 OF THE NORTHEAST QUARTER OF SECTION 24, TOWNSHIP 24 SOUTH, RANGE 35 EAST, BREVARD COUNTY, FLORIDA.

LESS AND EXCEPT PARCELS 'A' & 'B' DESCRIBED BELOW:

LESS PARCEL 'A':

THAT PORTION OF THE EAST 1/2 OF THE SOUTHWEST 1/4 OF SECTION 13, TOWNSHIP 24 SOUTH, RANGE 35 EAST, LYING SOUTHEASTERLY OF STATE ROAD 528, BREVARD COUNTY, FLORIDA.

LESS PARCEL 'B':

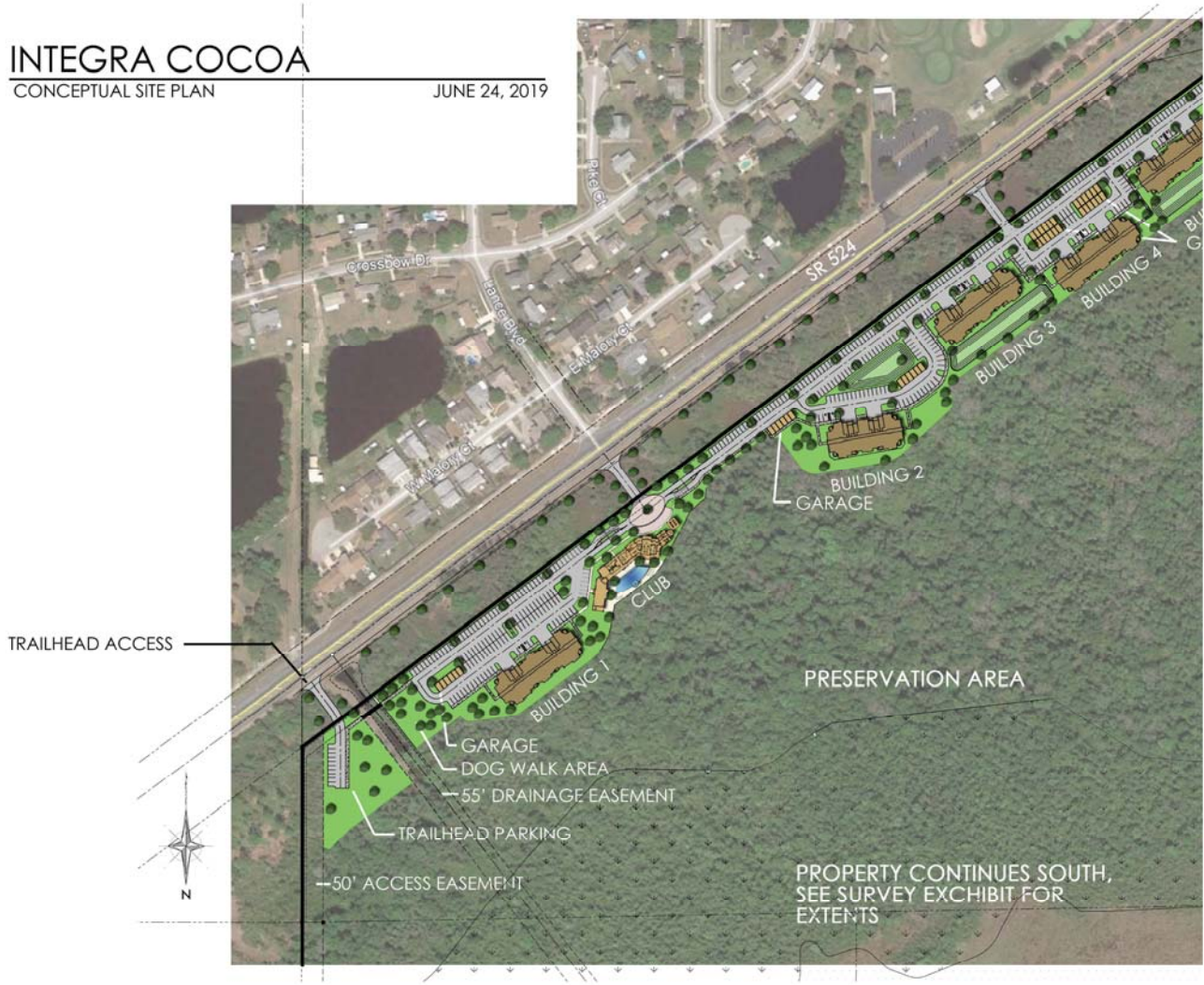
A PARCEL OF LAND LYING IN SECTIONS 13 AND 24, TOWNSHIP 24 SOUTH, RANGE 35 EAST, BREVARD COUNTY, FLORIDA, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGIN AT THE INTERSECTION OF THE SOUTHERLY RIGHT-OF-WAY LINE OF STATE ROAD 524 (A 200 FOOT RIGHT-OF WAY PER S.R.D RIGHT-OF-WAY MAP SECTION 70070-2501, SHEET 5 OF 8, DATED 12/09/70) WITH THE EAST LINE OF THE SOUTHEAST 1/4 OF SAID SECTION 13, THENCE SOUTH 00°00'21" WEST, ALONG THE EAST LINE OF THE SOUTHEAST 1/4 OF SAID SECTION 13, A DISTANCE OF 2333.77 FEET; THENCE NORTH 10°09'57" WEST, A DISTANCE OF 695.56 FEET; THENCE NORTH 10°27'47" WEST, A DISTANCE OF 1390.30 FEET TO THE SOUTHERLY RIGHT-OF-WAY LINE OF STATE ROAD NO. 524; THENCE NORTH 53°05'55" EAST, ALONG SAID SOUTHERLY RIGHT-OF-WAY LINE, A DISTANCE OF 469.54 FEET TO THE POINT OF BEGINNING.

INTEGRA COCOA

CONCEPTUAL SITE PLAN

JUNE 24, 2019





TYPICAL BUILDING ELEVATION



BUILDING 2

GARAGE

BUILDING 3

GARAGE

BUILDING 4

GARAGE

BUILDING 5

GARAGE

VIEW FROM SR 524

(RIGHT)

INTEGRA COCOA

CONCEPTUAL ELEVATION

JUNE 24, 2019



CONCEPTUAL CLUB ELEVATION



GARAGE

BUILDING 1

CLUB

GARAGE BUILDING 2

VIEW FROM SR 524

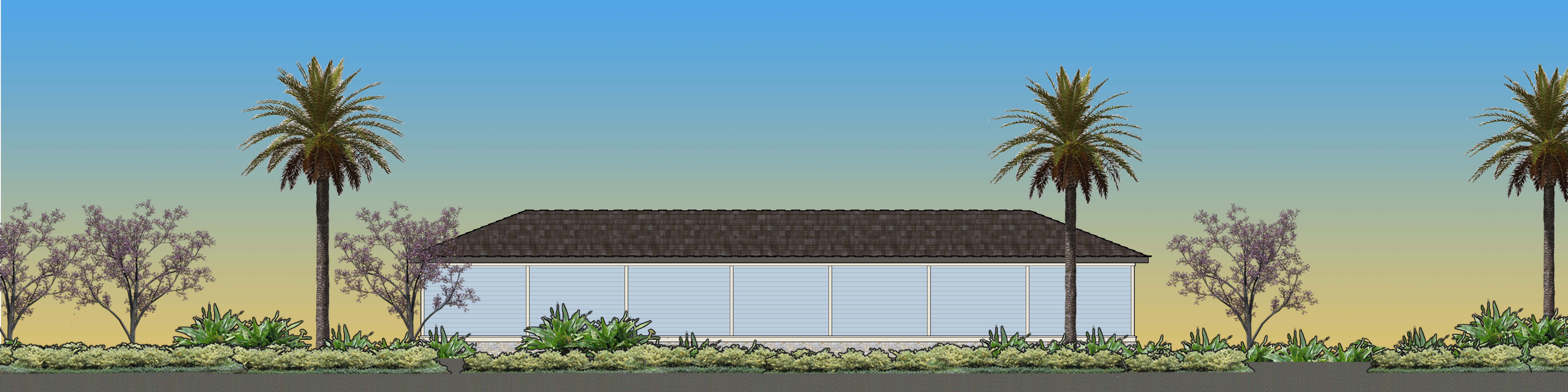
(LEFT)

INTEGRA COCOA

CONCEPTUAL ELEVATION

JUNE 24, 2019



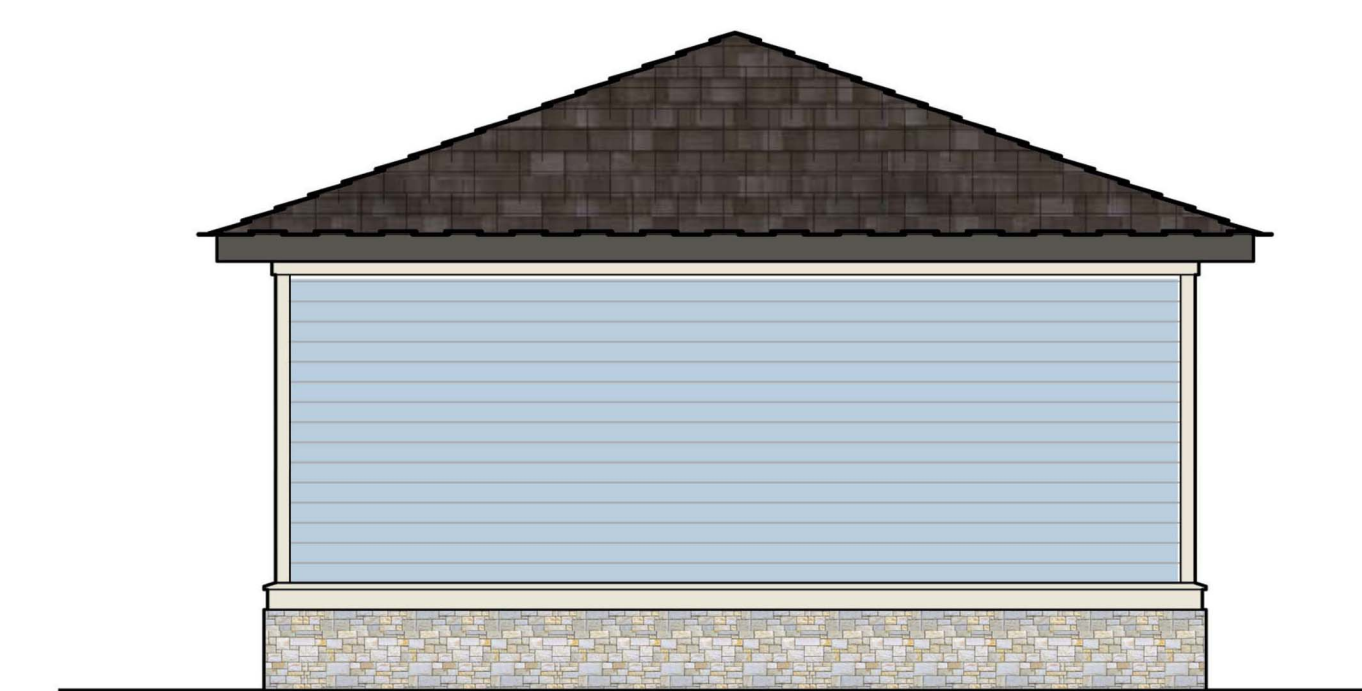


VIEW FROM SR 524

BACK ELEVATION



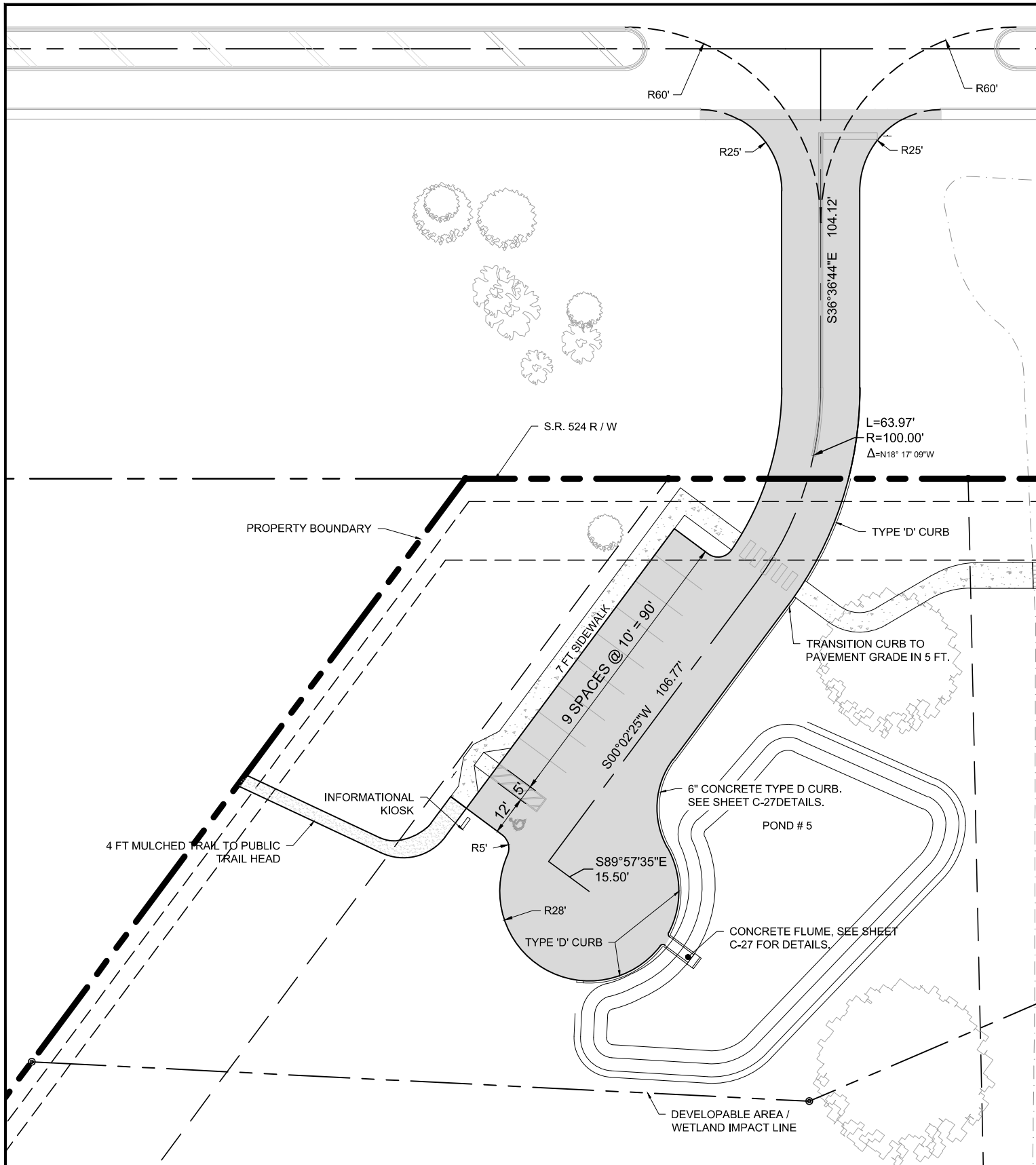
FRONT ELEVATION



SIDE ELEVATION

INTEGRA COCOA

6 CAR GARAGE BUILDING



SCALE 1" = 40'

MBV
ENGINEERING, INC.
MOIA BOWLES VILLAMIZAR & ASSOCIATES

CIVIL • STRUCTURAL • SURVEYING • ENVIRONMENTAL

INTEGRA PRESERVE TRAILS

TRAILHEAD ACCESS PARKING EXHIBIT

JOB NO.	19-1002
DESIGNED	DWB
DRAWN	DWB
CHECKED	DWB
DATE	8/2/2019

TRANSPORTATION CONCURRENCY ANALYSIS

Integra Cocoa FDOT Driveway Permit

Brevard County, Florida

PREPARED FOR

David McDaniel
Integra Land Company
1525 International Parkway
Suite 2001
Lake Mary, FL 34746

PREPARED BY



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May 2019

Ryan Fetchko, P.E.
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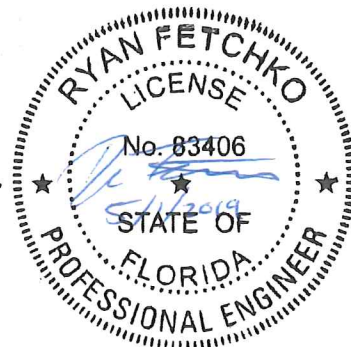




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1

Introduction

VHB has been retained by Integra Land Company a Florida corporation to conduct a traffic impact study for the proposed Integra Cocoa Property development to be located on the south side of SR 524 between Cox Road and London Boulevard in Cocoa, Florida. The project location is illustrated on **Figure 1**. The analysis quantifies both the existing traffic conditions along area roadways surrounding the parcel and the projected future traffic conditions expected for the Build condition (including development of the proposed site). The site plan can be found in **Appendix A**.

Project Description

The proposed development will be located on the south side of SR 524 in Cocoa, Florida. The site is bound by SR 524 to the north, and vacant land to the south, east, and west.

For the purpose of this analysis, the proposed development will consist of 249 mid-rise apartments with a build-out year of 2021. The project will have direct access to SR 524 via a full access driveway in line with existing Lance Boulevard.

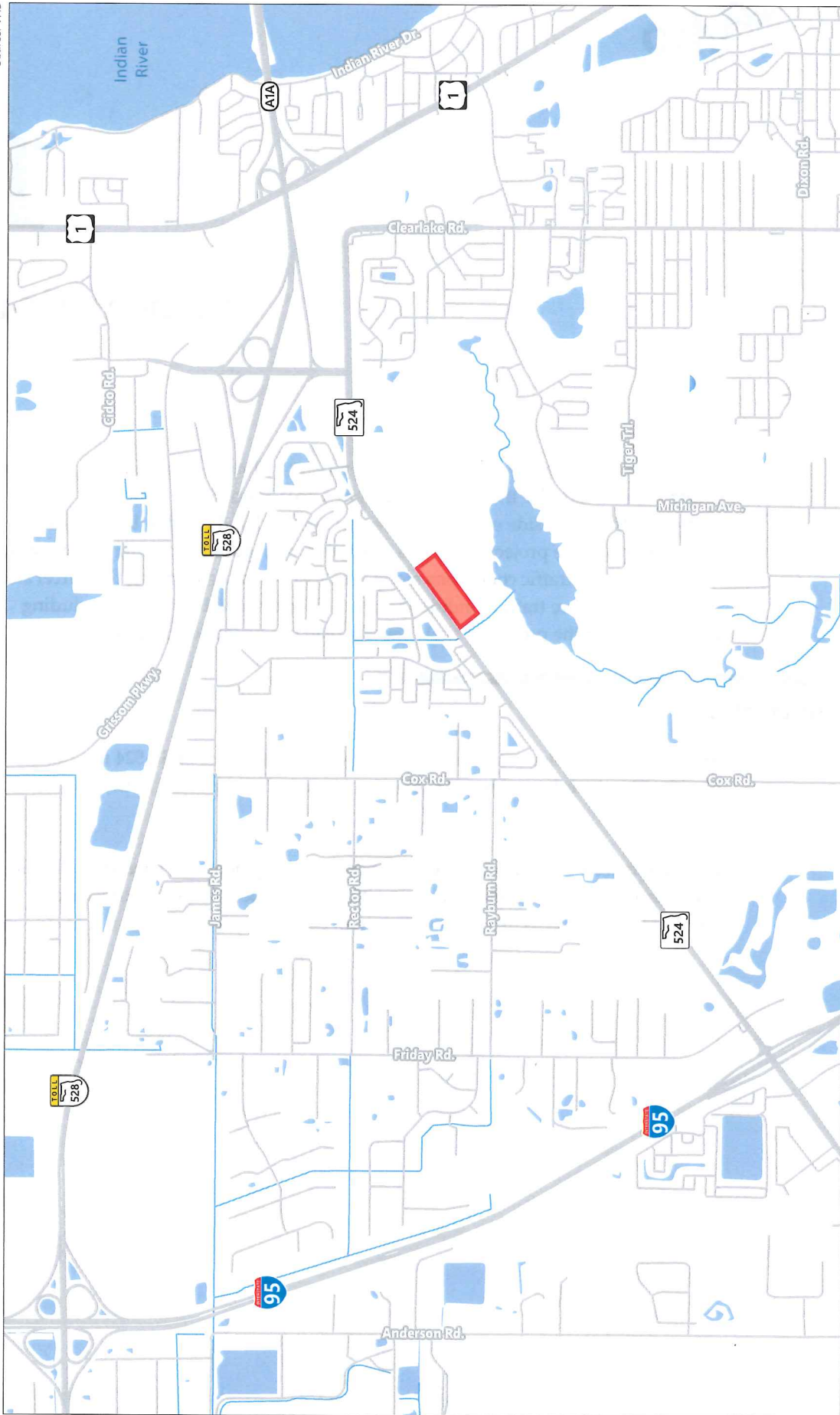


Figure 1
Location Map

Project Location





Trip Generation

Table 1 summarizes the trip generation for the proposed development. The daily and peak hour trips were calculated based on equations contained in the Institute of Transportation Engineers' *Trip Generation*, 10th Edition. ITE Land Use Code 221 – Multi Family Mid-Rise was the most appropriate for the proposed development. As shown in **Table 1**, the proposed development is expected to generate 1,356 new daily trips, 90 new AM peak hour trips (23 in, 67 out), and 110 new PM peak hour trips (67 in, 43 out). The ITE Trip Generation summary sheets can be found in **Appendix B**.

Trip Distribution and Assignment

The distribution of site generated traffic is a function of the existing roadway volumes from the traffic counts taken, surrounding land use characteristics, and proposed site access plan. The distribution of primary trips to and from the site is shown in **Figure 2**. The Central Florida Regional Planning Model (CFRPM) version 6.1 plot can be found in **Appendix C**.



Table 1 : Project Trip Generation

Integra Cocoa
Trip Generation Comparison Summary

ITE Code	Land Use	Size / Units	Daily Trips	Total Trips					
				AM Peak Hour			PM Peak Hour		
				Total	Enter	Exit	Total	Enter	Exit
221	Multi Family (Mid-Rise)	249 / DU	1,356	90	23	67	110	67	43
Totals:				90	23	67	110	67	43

VHB

Apr-19

Notes:

*Trip generation rates/equations are based on the Institute of Transportation (ITE)
Trip Generation Manual 10th Edition.*

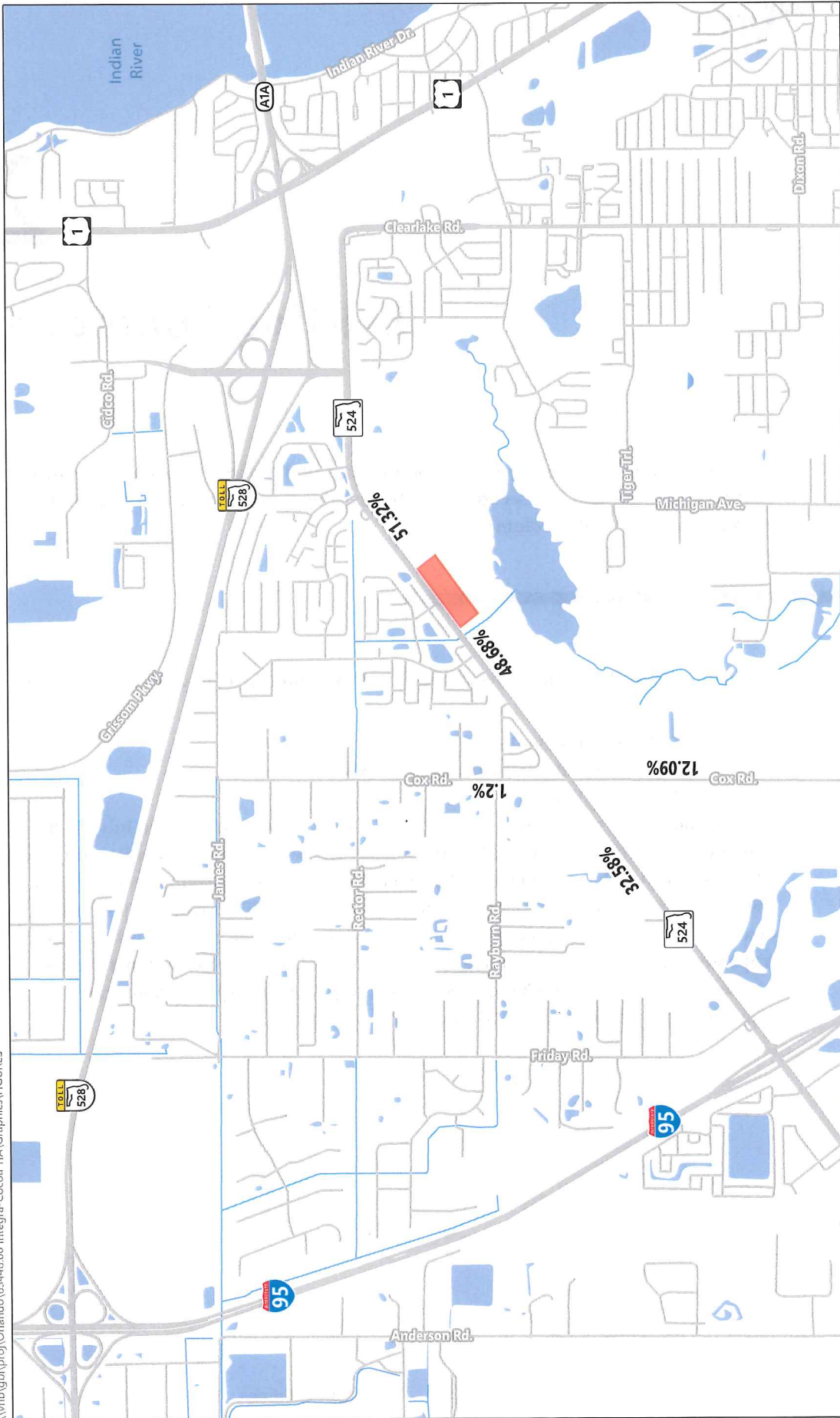


Figure 2
Project Trip Distribution

Project Location
AM (PM)
Peak Hour Traffic Volumes



Existing Conditions

This section summarizes existing transportation conditions observed in the study area, including roadway and intersection geometry, existing traffic control, and daily and evening peak hour traffic volumes.

Study Area

The candidate roadways are shown in **Table 2**. In addition the following intersections were analyzed:

- SR 524 at London Boulevard
- SR 524 at Lance Boulevard/Project Entrance
- SR 524 at Cox Road

Turning movement counts were collected at the study intersections (dated July 27, 2018 for London Boulevard and January 23, 2019 for Lance Boulevard and Cox Road) during the AM (7:00-9:00 A.M.) and PM (4:00-6:00 P.M.) peak periods. These counts were adjusted using a Seasonal Factor of 1.03 for London Boulevard and 1.00 for Lance Boulevard and Cox Road to reflect average daily conditions. A copy of the data collected is included in **Appendix D**. Existing signals timings provided by the City of Cocoa were used in the intersection analysis. **Figure 3** illustrates the existing AM and PM peak hour traffic volumes. The signal timings can be observed in **Appendix E**.



Table 2 : Test for Significance Project Impact (3%)

CR 466 Property						
<i>Test for Significance Project Impact (3%)</i>						
PM PEAK HOUR						
Roadway	No. of Lanes	Adopted LOS	LOS MSV	Dis%	Project Trips	Significance %
SR 524						
Cox Rd to London Blvd	2	D	924	51.32%	23	2.49%
Cox Road						
SR 520 to SR 524	2	E	792	12.09%	6	0.76%
SR 524 to James Rd	2	E	792	1.20%	1	0.13%

Source:

VHB

FDOT Florida Traffic Online

2013 Quality Level of Service Handbook

SCTPO

As shown in **Table 2**, there are no roadways with significance exceeding 3.00% within the list of roadways evaluated.



Existing Roadway Capacity Analysis

VHB conducted an assessment to determine the existing level of service of the study roadways. The level of service (LOS) of a given roadway is related to prevailing traffic volumes and to capacity, which is defined as the maximum number of vehicles that can pass through a roadway section during a specified period of time. The capacity of a roadway is determined by a number of factors including composition of traffic (cars, buses, and trucks); roadway alignment; width and number of lanes; posted travel speeds and other variables.

The level of service and remaining capacity for each of the study roadways were determined based on the 2012 FDOT Quality/Level of Service Handbook Tables. A comparison of the PM peak hour directional traffic volumes were made against the roadway capacities to determine the existing level of service. The existing roadway capacity analysis was performed for all roadways within the study area as shown in **Table 3**. In summary, all study roadways operate at an acceptable level of service.



Table 3 : YR 2019 Existing Roadway Capacity Analysis

Integra Cocoa
YR 2019 Existing Roadway Capacity Analysis

<i>PM PEAK HOUR</i>									
Roadway	No. of Lanes	Adopted LOS	Directional PM Peak Hour Capacity	2018 Directional PM Peak Hour	2016 Peak Hour V/C Ratio	Remaining Directional PM Peak Hour Capacity	Over Capacity Yes/No		
SR 524 Cox Rd to London Blvd	2	D	924	751	0.81	173	NO		
Cox Road SR 520 to SR 524	2	E	792	234	0.30	558	NO		
SR 524 to James Rd	2	E	792	152	0.19	640	NO		

Source:
VHB
FDOT Traffic Online/ VHB Counts

Existing Unsignalized Intersection Capacity Analysis

The existing intersections were evaluated using the methodology outlined in the Highway Capacity Manual and using the Synchro 10 Software. The results of the unsignalized intersection capacity analysis for the AM and PM peak hour are shown in **Table 4**. The analysis results for unsignalized intersections reflect the operation of the mainline left turn movements or the critical turning movements from the minor street. The Synchro unsignalized intersection report printouts are provided in the **Appendix F**.

Table 4: Unsignalized Intersection Capacity Analysis – Existing Conditions

Intersection	Control Type	Movement	2019 AM Peak Hour			2019 PM Peak Hour		
			V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
SR 524 & Lance Blvd	TWSC	SBLR	0.12	13.2	B	0.14	16.0	C
		EBL	0.01	8.2	A	0.02	9.4	A

Source: VHB, Inc. using Synchro 10 software.

1 Average delay in seconds per vehicle

As **Table 4** indicates, the study intersection is operating at LOS C or better.



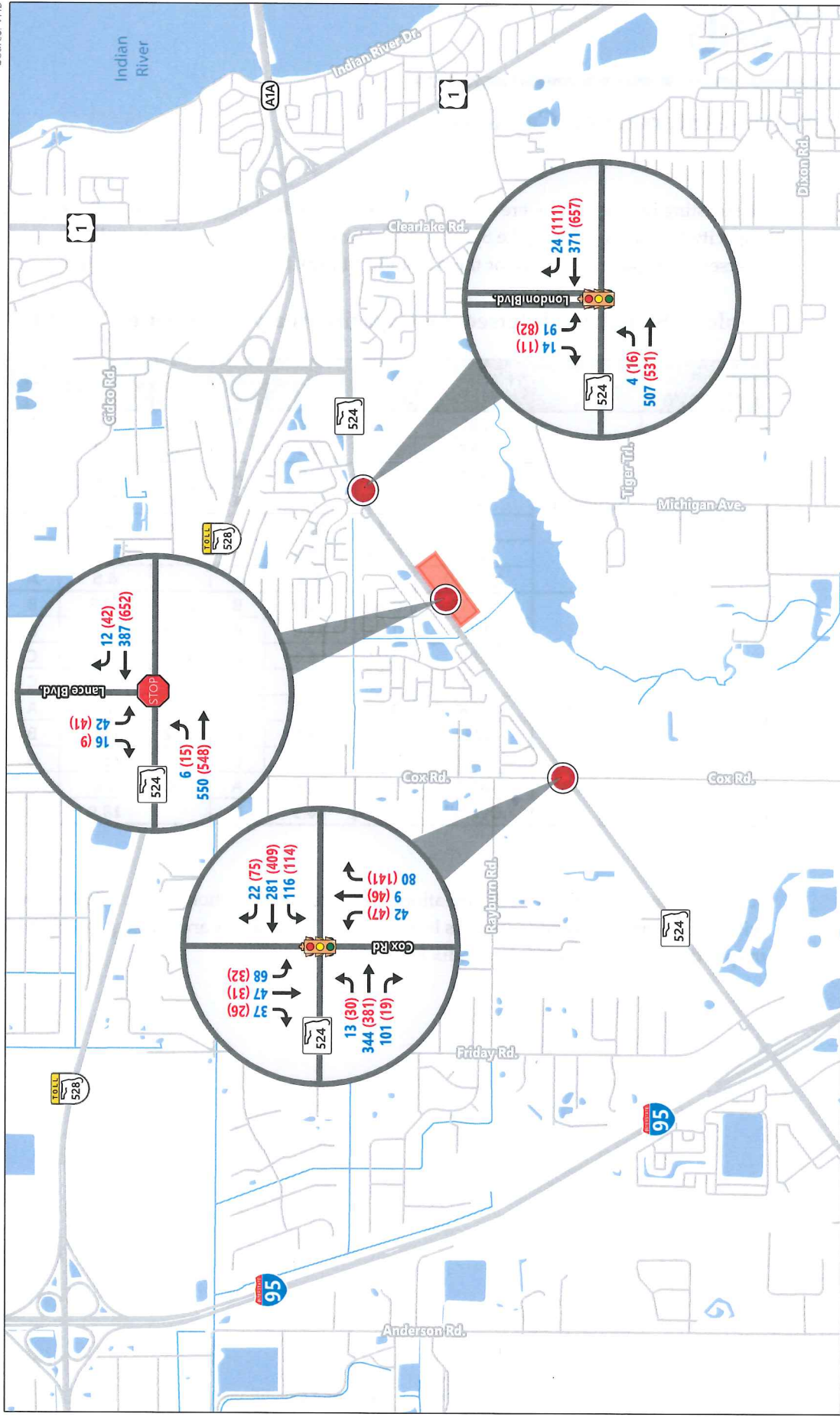
Existing Signalized Intersection Capacity Analysis

The existing intersections were evaluated using the methodology outlined in the Highway Capacity Manual and using the Synchro 10 Software. The results of the signalized intersection capacity analysis for the AM and PM peak hour are shown in **Table 5**.

Table 5 : Signalized Intersection Capacity Analysis – Existing Conditions

Intersection	Control Type	Movement	2019 AM Peak Hour			2019 PM Peak Hour		
			V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
SR 524 & London Blvd	Signalized	EBL	0.01	3.8	A	0.03	5.6	A
		EBT	0.39	4.0	A	0.40	3.9	A
		WBT	0.31	3.0	A	0.48	3.6	A
		WBR	0.00	0.0	A	0.00	0.0	A
		SBL	0.74	48.8	D	0.66	46.5	D
		SBR	0.13	39.5	D	0.10	39.6	D
		Overall		8.3	A		6.6	A
SR 524 & Cox Rd	Signalized	NBLTR	0.20	10.9	B	0.32	12.8	B
		SBLTR	0.21	11.0	B	0.12	10.9	B
		EBL	0.03	16.6	B	0.10	20.0	C
		EBT	0.80	24.0	C	0.82	25.8	C
		EBR	0.00	0.0	A	0.00	0.0	A
		WBL	0.39	15.5	B	0.42	17.0	B
		WBT	0.45	13.3	B	0.56	15.4	B
		WBR	0.00	0.0	A	0.00	0.0	A
		Overall		16.5	B		18.0	B

As **Table 5** indicates, the overall operation of the study intersections are at LOS B or better with all movements having v/c ratios less than 1.0. The analysis and subsequent HCM 6 output data can be found in **Appendix F**.



Project Location
 AM (PM)
 Peak Hour Traffic Volumes



Figure 3
 2019 AM and PM
 Peak Hour Traffic Volumes



3

Future Conditions

To determine the impacts of the site-generated traffic volumes on the surrounding study intersections, future traffic conditions were analyzed. The background traffic volumes were projected to a future year of 2021 based on historical traffic data. From the resulting trends analysis (as documented in **Appendix G**), a minimum 2% growth rate was applied to the roadway and intersection counts. Additionally, the anticipated number of trips generated from the development were calculated based on the trip generation rates/equations obtained from the *ITE Trip Generation Manual, 10th Edition* (see **Table 1**) and distributed to the roadways and intersections (including project driveways) based on the site layout and model distribution (see **Figure 2**). It should be noted that the future traffic volumes were derived by using the forecasted traffic from the London Cove project located to the east and adding this project's traffic volumes. The intersection volume derivation is documented in **Appendix H**.

Future Roadway Capacity Analysis

The future capacity analysis for the study area roadways for the project build-out can be found in **Table 5** for the PM peak hour condition. The analysis concludes that all of the roadway segments for future conditions operate below capacity.



Table 5 : Year 2021 Future Roadway Capacity Analysis

Integra Cocoa															
Future (YR 2021) PM Peak Hour Roadway Analysis															
Roadway	No. of Lanes	Level of Service			2019 Directional PM Peak Hour *	Count Year	Growth Rate **	Background Traffic		YR 2021 Project Traffic		Total Traffic	Deficient Yes/No	Project Deficiency Yes/No	Remaining Capacity
		Adopted LOS	MSV	Background Total				Background Deficient Yes/No	Project Trips	Project Dis %					
SR 524															
Cox Rd to Project Entrance	2	D	924		751	2018	3.6%	831	NO	33	48.68%	864	NO	NO	60
Project Entrance to London Blvd	2	D	924		751	2018	3.6%	831	NO	35	51.32%	866	NO	NO	58
Cox Road															
SR 520 to SR 524	2	E	792		234	2019	2.0%	243	NO	9	12.09%	252	NO	NO	540
SR 524 to James Rd	2	E	792		152	2019	2.0%	158	NO	1	1.20%	159	NO	NO	633
Source:															
April-19															

Source:

VHB, Inc.

Notes:

* FDOT Traffic Online/ VHB Count

** Trend derived from latest 5 years of Daily Traffic Counts/ Minimum 2.0% Growth

Future Unsignalized Intersection Capacity Analysis

The analysis for the operation at the unsignalized intersections was conducted by determining the operation for the future buildout condition with project trips added.

To determine the operational conditions at the unsignalized intersections, the connections were evaluated for AM and PM peak hour conditions using Synchro 10 software. The results of the unsignalized intersection capacity analysis for the AM and PM peak hour are shown in **Table 6**. The analysis results for unsignalized intersections reflect the operation of the mainline left turn movements or the critical turning movements from the minor street. The Synchro unsignalized intersection report printouts are provided in the **Appendix I**. **Figure 4** and **Figure 5** illustrate the AM and PM peak hour future traffic volumes.

Table 6 : Unsignalized Intersection Capacity Analysis – Future Buildout Condition

Intersection	Control Type	Movement	2021 AM Peak Hour			2021 PM Peak Hour		
			V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
SR 524 & Lance Blvd/Project Entrance	TWSC	EBL	0.01	8.5	A	0.02	9.6	A
		WBL	0.02	9.1	A	0.04	9.1	A
		NBLTR	0.33	29.9	D	0.31	39.7	E
		SBLTR	0.19	17.7	C	0.20	21.8	C

Source: VHB, Inc. using Synchro 10 software.

1 Average delay in seconds per vehicle

As **Table 6** indicates, the overall operation of the study intersections are at LOS E or better.

Future Signalized Intersection Capacity Analysis

The analysis for the operation at the signalized intersections were conducted by determining the operation for the future buildout condition with project trips added.

The intersection operations for the future buildout condition is depicted in Table 7. The Synchro signalized intersection report printouts are provided in the Appendix I.

Table 7 : Signalized Intersection Capacity Analysis – Future Buildout Condition

Intersection	Control Type	Movement	2021 AM Peak Hour			2021 PM Peak Hour		
			V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
SR 524 & London Blvd	Signalized	EBL	0.01	20.8	C	0.90	23.1	C
		EBT	0.67	28.3	C	0.64	24.9	C
		EBR	0.14	17.5	B	0.10	15.2	B
		WBL	0.37	37.7	D	0.23	29.5	C
		WBT	0.46	16.9	B	0.68	20.0	C
		WBR	0.00	0.0	A	0.00	0.0	A
		NBL	0.55	61.2	E	0.54	61.0	E
		NBTR	0.41	41.7	D	0.33	44.7	D
		SBLT	0.43	50.5	D	0.37	51.4	D
		SBR	0.04	37.3	D	0.04	41.5	D
		Overall		30.2	C		27.0	C
SR 524 & Cox Rd	Signalized	NBLTR	0.20	12.3	B	0.33	15.4	B
		SBLTR	0.22	12.4	B	0.13	13.0	B
		EBL	0.04	24.2	C	0.12	28.3	C
		EBT	0.85	11.5	C	0.86	34.0	C
		EBR	0.00	0.0	A	0.00	0.0	A
		WBL	0.51	22.0	C	0.53	23.2	C
		WBT	0.52	19.5	B	0.61	20.9	C
		WBR	0.00	0.0	A	0.00	0.0	A
		Overall		22.3	C		23.8	C

Source: VHB, Inc. using Synchro 10 software.

1 Average delay in seconds per vehicle

2 Overall level of service

As Table 7 indicates, the overall operation of the study intersections are at LOS C or better. Also, all turning movements have v/c ratios less than 1.0.

Turn Lane Need Evaluation

The need for a westbound-to-southbound left turn lane at the SR 524 project driveway was evaluated following guidance provided from the National Cooperative Highway Research Program (NCHRP) Report 457. Pursuant to this resource, the opposing volumes (621 vehicles) versus the advancing volumes (34 vehicles) are compared to justify the need for an exclusive left turn lane. Per Figure 2-5 of NCHRP Report 457 the criteria is met. Therefore, an exclusive left turn lane is recommended.

The need for an eastbound-to-southbound right turn lane at the SR 524 project driveway was evaluated. Pursuant to NCHRP Report 457, the right turn volumes are compared to the major road volumes to determine the need for an exclusive right turn lane. In this case, there are 33 vehicles conducting a right turn compared to 621 vehicles on CR SR 524 in the eastbound direction for the PM peak hour condition. According to Figure 2-6, the criteria is met. Therefore, an exclusive right turn lane is recommended. The NCHRP Report 457 data can be found in **Appendix J**.

Intersection Queue Analysis

An intersection queue analysis was performed for dedicated turn lanes where project trips are present at the study area intersections. The analysis compares the existing storage length to the buildout traffic queue. As shown in **Table 8**, the westbound left at SR 524 and Cox Road is not sufficient to accommodate queue and deceleration as it pertains to FDOT standards. Although this lane does not meet FDOT standards it fails during the existing conditions due to the speed on the roadway.



Table 8: Intersection Queue Analysis

Intersection	Mvmnt	95th Percentile Queue Project Trips (feet)	Rounded Queue	Design Speed	Deceleration Length (feet) ¹	Total Turn Lane Length Required	Existing Length	Sufficient
SR 524 at London Blvd	EBT*	488	500	60	405	905	-	Yes
	WBT**	515	525	60	405	930	-	Yes
SR 524 at Lance Blvd/Project Entrance	EBR*	0	0	60	405	405	NEW	New
	WBL**	3	25	60	405	430	NEW	New
	NBLTR*	35	50	30	145	195	NEW	New
SR 524 at Cox Rd	EBT**	340	350	60	405	755	-	Yes
	WBL**	78	100	60	405	505	250	Existing Deficient
	WBT**	275	275	60	405	680	-	Yes
	WBR*	0	0	60	405	405	425	Yes
	NBLTR**	150	150	40	155	305	-	Yes
	SBLTR*	75	75	45	185	260	-	Yes

*Highest Peak Hour (AM)
 ** Highest Peak Hour (PM)
 *** Calculated as a signalized intersection
¹ FDOT Index 301

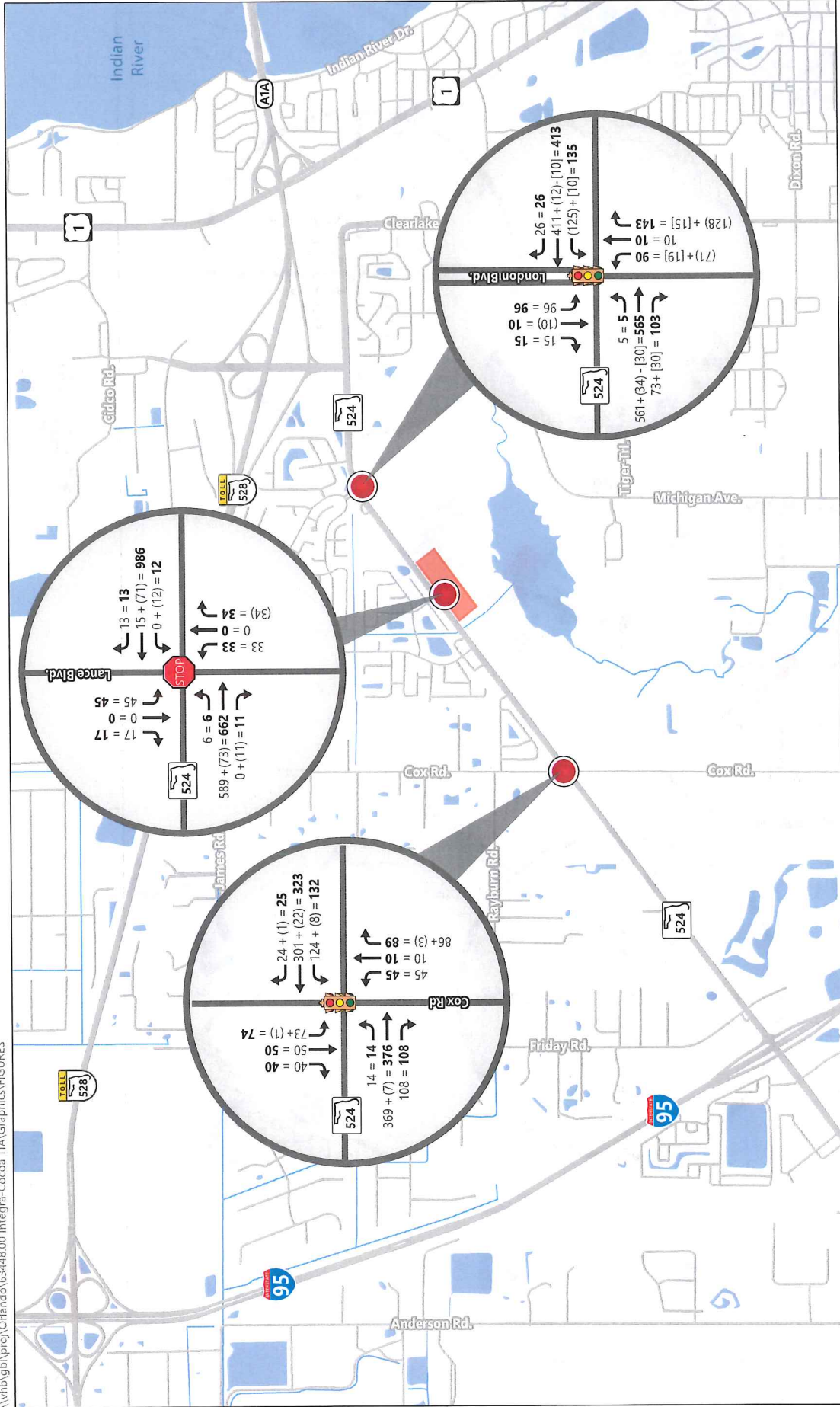


Figure 4
2021 Future Build
AM Peak Hour Traffic Volumes

Project Location

X+X+X = XX — Total Traffic

— Pass By Traffic

— Project Traffic

— Background Traffic

N.T.S.

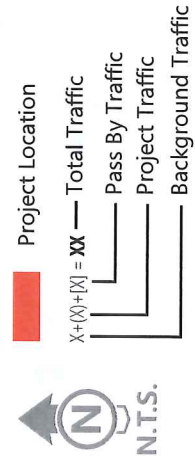
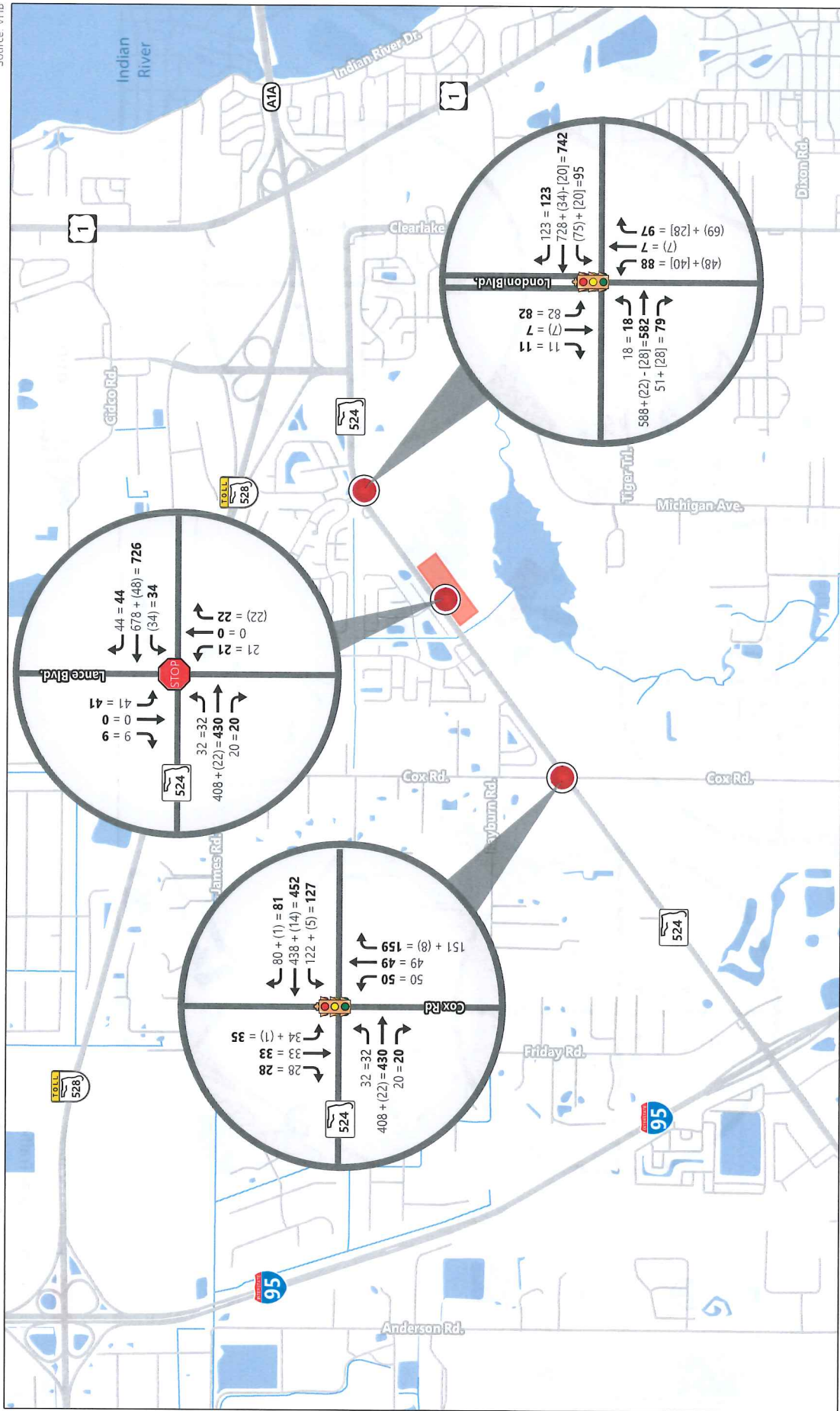


Figure 5
2021 Future Build
PM Peak Hour Traffic Volumes





4

Conclusions

This traffic analysis has been prepared in support of obtaining concurrency through the City of Cocoa (249 apartments), to be located on the south side of SR 524 between Cox Road and London Boulevard in Cocoa, Florida.

The following is a summary of study findings:

- The proposed development is expected to generate 1,356 new daily trips, 90 new AM peak hour trips (23 in, 67 out), and 110 new PM peak hour trips (67 in, 43 out).
- The existing conditions analysis shows that all study roadways operate at an acceptable level of service.
- The existing signalized intersection analysis reveals that the study intersections are operating at an overall LOS B or better.
- The future condition analysis shows that the project driveway will operate with an acceptable LOS. A dedicated eastbound right turn lane and a dedicated westbound left turn lane are recommended to be constructed.
- The signalized intersections AM and PM peak hour future build condition operates at an acceptable level of service.
- The analysis concludes that all study area roadways exhibit traffic volumes lower than their respective maximum service.

Recommendations:

- Construct a 405' eastbound right turn lane at the intersection of SR 524 and Lance Boulevard/Project Entrance.
- Construct a 430' westbound left turn lane at the intersection of SR 524 and Lance Boulevard/Project Entrance.
- Restripe the westbound left turn lane at SR 524 and Cox Road to be 505'.

APPENDICES

APPENDIX A

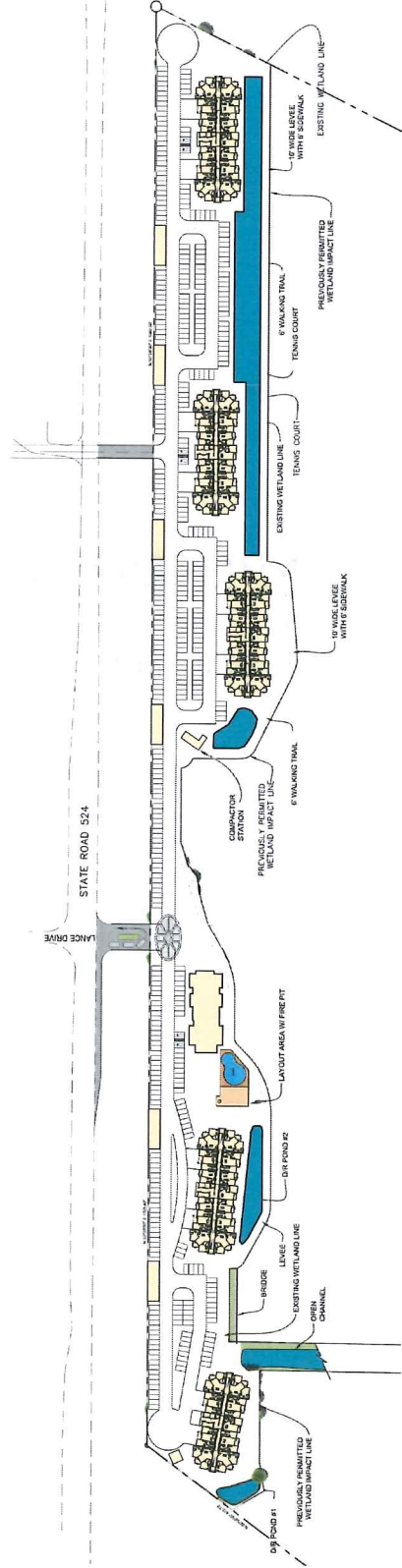
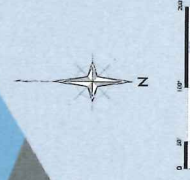
Site Plan

DATA

UNIT TOTAL	
1 - BEDROOM	99
2 - BEDROOM	118
3 - BEDROOM	32
TOTAL	249

PARKING TOTAL	
SURFACE (9X19)	433
GARAGES	66
TOTAL	499
SPACES PER UNIT	2.0

TOTAL ACREAGE
13.14 acres



APPENDIX B

ITE Trip Generation Summary Sheets

Multifamily Housing (Mid-Rise) (221)

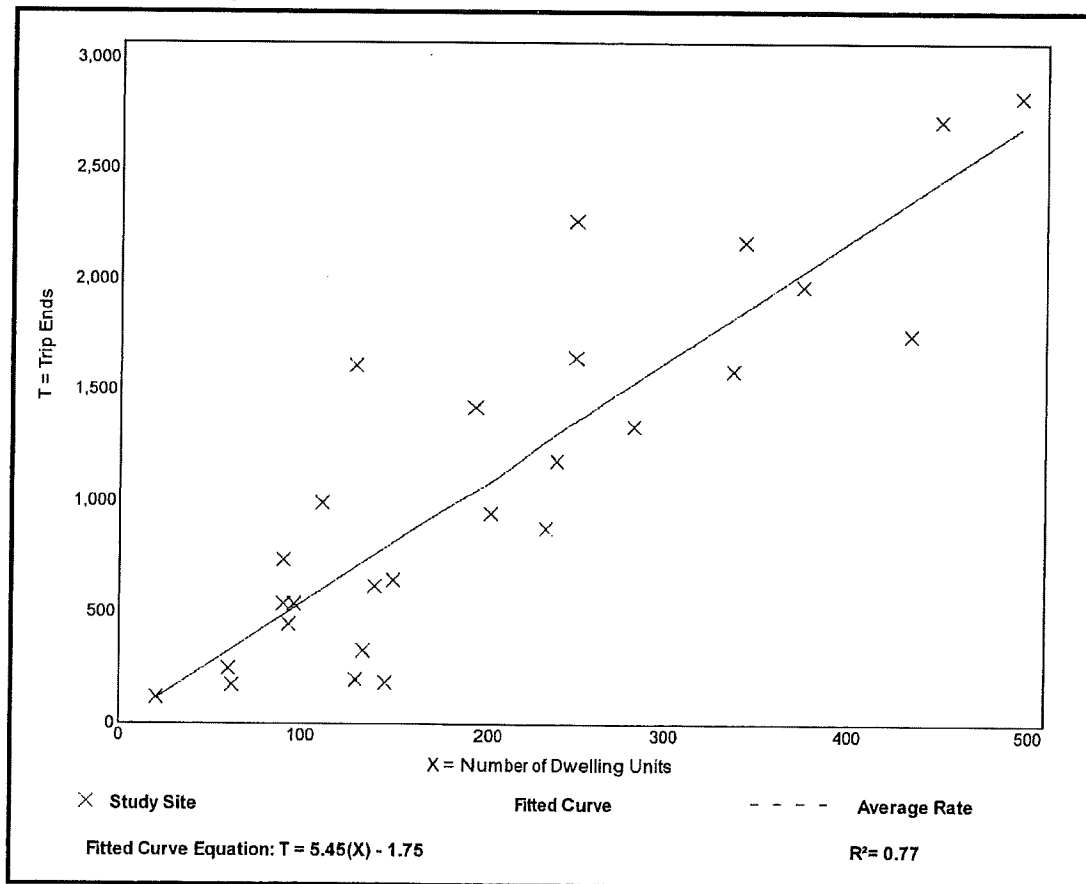
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 27
Avg. Num. of Dwelling Units: 205
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
5.44	1.27 - 12.50	2.03

Data Plot and Equation



Multifamily Housing (Mid-Rise) (221)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 53

Avg. Num. of Dwelling Units: 207

Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate

0.36

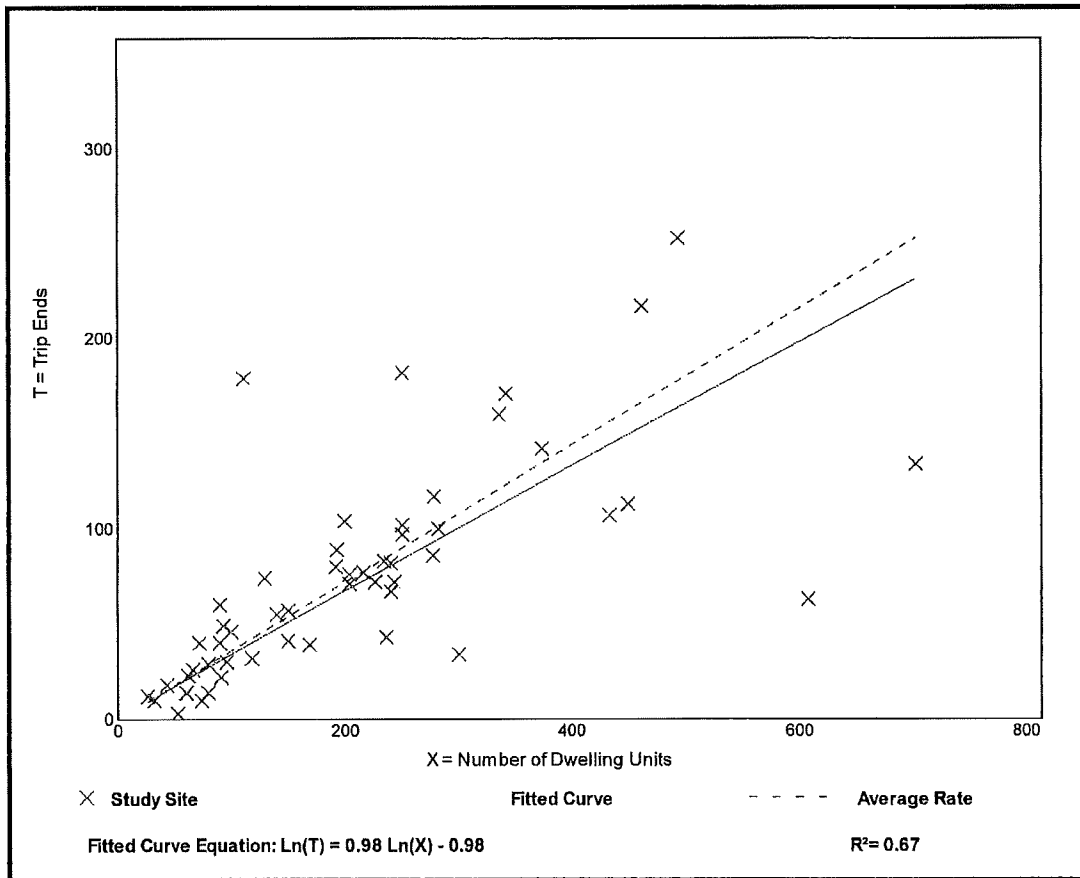
Range of Rates

0.06 - 1.61

Standard Deviation

0.19

Data Plot and Equation



Multifamily Housing (Mid-Rise) (221)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 60

Avg. Num. of Dwelling Units: 208

Directional Distribution: 61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate

0.44

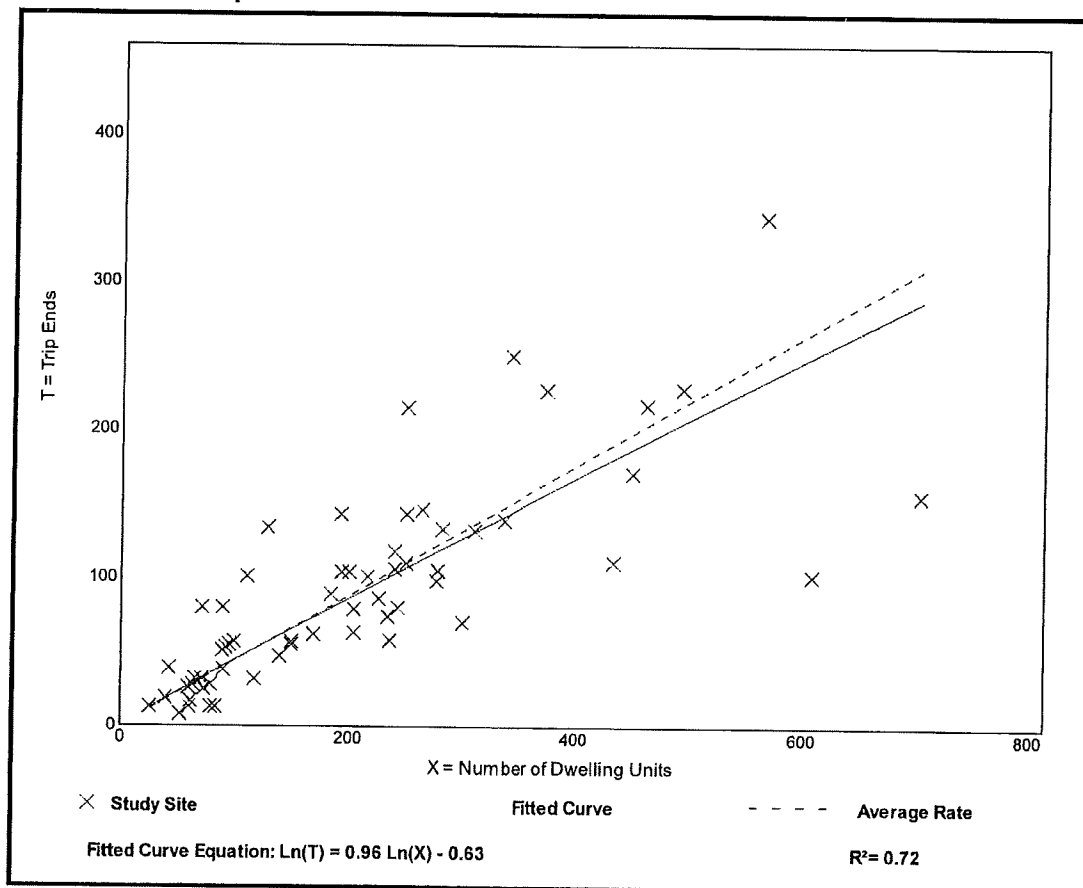
Range of Rates

0.15 - 1.11

Standard Deviation

0.19

Data Plot and Equation



APPENDIX C

CFRPM Travel Demand Model Plot

APPENDIX D

Traffic Count Data

Roadway Count Summary

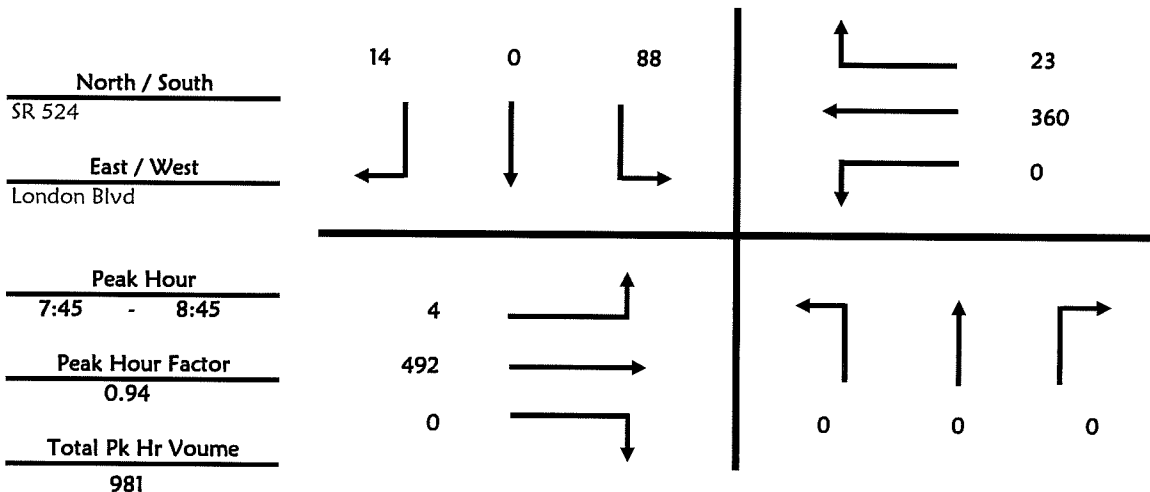
Vanasse Hangen Brustlin, Inc.

County Bevard City Cocoa
 Intersection SR 524 & London Blvd
 Date July 27, 2018 All Vehicles
 Time Period 7:00 to 9:00

VHB Project #: 63290

Time Period	Northbound			Southbound		
	Left	Through	Right	Left	Through	Right
7:00 - 7:15	0	0	0	15	0	5
7:15 - 7:30	0	0	0	17	0	2
7:30 - 7:45	0	0	0	19	0	5
7:45 - 8:00	0	0	0	22	0	3
8:00 - 8:15	0	0	0	29	0	4
8:15 - 8:30	0	0	0	24	0	5
8:30 - 8:45	0	0	0	13	0	2
8:45 - 9:00	0	0	0	23	0	3
	0	0	0	162	0	29

Time Period	Eastbound			Westbound		
	Left	Through	Right	Left	Through	Right
7:00 - 7:15	0	101	0	0	62	2
7:15 - 7:30	0	113	0	0	81	4
7:30 - 7:45	1	134	0	0	90	1
7:45 - 8:00	2	133	0	0	93	5
8:00 - 8:15	0	108	0	0	72	4
8:15 - 8:30	2	129	0	0	79	7
8:30 - 8:45	0	122	0	0	116	7
8:45 - 9:00	1	125	0	0	78	8
	6	965	0	0	671	38



Roadway Count Summary

Vanasse Hangen Brustlin, Inc.

County Bevard City Cocoa
 Intersection SR 524 & London Blvd
 Date July 27, 2018 All Vehicles
 Time Period 16:00 to 18:00

VHB Project #: 63290

Time Period	Northbound			Southbound		
	Left	Through	Right	Left	Through	Right
16:00 - 16:15	0	0	0	14	0	1
16:15 - 16:30	0	0	0	5	0	0
16:30 - 16:45	0	0	0	19	0	2
16:45 - 17:00	0	0	0	17	0	1
17:00 - 17:15	0	0	0	16	0	4
17:15 - 17:30	0	0	0	23	0	3
17:30 - 17:45	0	0	0	17	0	4
17:45 - 18:00	0	0	0	13	0	2
	0	0	0	124	0	17

Time Period	Eastbound			Westbound		
	Left	Through	Right	Left	Through	Right
16:00 - 16:15	5	142	0	0	134	17
16:15 - 16:30	3	88	0	0	181	27
16:30 - 16:45	2	122	0	0	174	26
16:45 - 17:00	1	128	0	0	146	18
17:00 - 17:15	9	127	0	0	165	25
17:15 - 17:30	4	140	0	0	153	39
17:30 - 17:45	2	131	0	0	165	21
17:45 - 18:00	7	127	0	0	111	25
	33	1,005	0	0	1,229	198

North / South	10	0	75		108
SR 524					638
East / West					0
London Blvd					
Peak Hour					
16:30 - 17:30	16				
Peak Hour Factor	517				
0.94	0				
Total Pk Hr Volume					
1,364					

Roadway Count Summary

Vanasse Hangen Brustlin, Inc.

County Brevard

City cocoa

Intersection SR 524

& Cox Road

Date January 23, 2019

All Vehicles

VHB Project #: 81936.19

AM Peak Hour

Time Period	Northbound			Southbound			Eastbound			Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
7:00 AM - 7:15 AM	5	2	10	9	7	8	0	64	19	19	63	6
7:15 AM - 7:30 AM	3	2	12	11	8	8	1	87	26	26	61	1
7:30 AM - 7:45 AM	6	1	15	20	9	10	2	101	38	28	56	3
7:45 AM - 8:00 AM	12	4	18	19	11	13	5	83	31	41	64	3
8:00 AM - 8:15 AM	14	3	23	15	13	4	3	81	21	32	90	10
8:15 AM - 8:30 AM	10	1	24	14	14	10	3	79	11	15	71	6
8:30 AM - 8:45 AM	6	4	16	14	12	6	4	79	14	25	76	11
8:45 AM - 9:00 AM	4	4	16	9	9	7	3	74	6	20	59	7
TOTAL	60	21	134	111	83	66	21	648	166	206	540	47
Peak Hour												
7:30 AM - 8:30 AM	42	9	80	68	47	37	13	344	101	116	281	22

Mid-day

Time Period	Northbound			Southbound			Eastbound			Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
11:00 AM - 11:15 AM	5	8	20	10	4	6	1	67	7	21	72	9
11:15 AM - 11:30 AM	8	2	26	11	5	4	4	88	7	27	64	11
11:30 AM - 11:45 AM	10	4	17	16	4	2	2	55	10	25	59	15
11:45 AM - 12:00 PM	8	4	36	11	6	6	7	75	8	26	69	11
12:00 PM - 12:15 PM	16	7	46	8	11	2	3	83	11	25	78	13
12:15 PM - 12:30 PM	9	7	29	8	7	4	3	66	11	36	82	14
12:30 PM - 12:45 PM	8	5	27	12	13	5	2	75	9	23	81	12
12:45 PM - 1:00 PM	12	6	25	6	11	3	6	80	9	36	70	14
TOTAL	76	43	226	82	61	32	28	589	72	219	575	99
Peak Hour												
12:00 PM - 1:00 PM	45	25	127	34	42	14	14	304	40	120	311	53

PM Peak Hour

Time Period	Northbound			Southbound			Eastbound			Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM - 4:15 PM	47	12	55	12	9	5	9	77	11	21	115	22
4:15 PM - 4:30 PM	9	9	22	15	4	6	5	84	6	20	106	18
4:30 PM - 4:45 PM	6	13	31	14	7	3	10	106	8	28	96	22
4:45 PM - 5:00 PM	7	12	23	15	4	6	4	87	6	24	97	16
5:00 PM - 5:15 PM	21	10	55	12	5	6	6	88	3	22	106	21
5:15 PM - 5:30 PM	9	7	32	8	10	4	11	105	8	24	93	19
5:30 PM - 5:45 PM	12	21	29	7	10	9	7	88	4	30	100	21
5:45 PM - 6:00 PM	5	8	25	5	6	7	6	100	4	38	110	14
TOTAL	116	92	272	88	55	46	58	735	50	207	823	153
Peak Hour												
5:00 PM - 6:00 PM	47	46	141	32	31	26	30	381	19	114	409	75

Roadway Count Summary

Vanasse Hangen Brustlin, Inc.

County Brevard

City cocoa

Intersection SR 524

& Lance Blvd

Date January 23, 2019

All Vehicles

VHB Project #: 81936.19

AM Peak Hour

Time Period	Northbound			Southbound			Eastbound			Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
7:00 AM - 7:15 AM	0	0	0	7	0	4	0	99	0	0	72	2
7:15 AM - 7:30 AM	0	0	0	9	0	7	0	128	0	0	77	2
7:30 AM - 7:45 AM	0	0	0	13	0	4	0	149	0	0	68	1
7:45 AM - 8:00 AM	0	0	0	10	0	4	2	144	0	0	105	2
8:00 AM - 8:15 AM	0	0	0	8	0	3	2	129	0	0	119	4
8:15 AM - 8:30 AM	0	0	0	11	0	5	2	128	0	0	95	5
8:30 AM - 8:45 AM	0	0	0	5	0	2	1	116	0	0	101	7
8:45 AM - 9:00 AM	0	0	0	8	0	0	0	107	0	0	97	6
TOTAL	0	0	0	71	0	29	7	1,000	0	0	734	29
Peak Hour 7:30 AM - 8:30 AM	0	0	0	42	0	16	6	550	0	0	387	12

Mid-day

Time Period	Northbound			Southbound			Eastbound			Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
11:00 AM - 11:15 AM	0	0	0	9	0	0	1	107	0	0	98	4
11:15 AM - 11:30 AM	0	0	0	3	0	2	0	125	0	0	108	8
11:30 AM - 11:45 AM	0	0	0	4	0	4	0	109	0	0	102	3
11:45 AM - 12:00 PM	0	0	0	4	0	1	0	125	0	0	118	3
12:00 PM - 12:15 PM	0	0	0	3	0	1	1	137	0	0	123	5
12:15 PM - 12:30 PM	0	0	0	7	0	1	2	103	0	0	124	6
12:30 PM - 12:45 PM	0	0	0	5	0	0	1	112	0	0	126	4
12:45 PM - 1:00 PM	0	0	0	10	0	4	1	114	0	0	117	6
TOTAL	0	0	0	45	0	13	6	932	0	0	916	39
Peak Hour 12:00 PM - 1:00 PM	0	0	0	25	0	6	5	466	0	0	490	21

PM Peak Hour

Time Period	Northbound			Southbound			Eastbound			Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM - 4:15 PM	0	0	0	5	0	6	4	139	0	0	165	13
4:15 PM - 4:30 PM	0	0	0	6	0	2	4	123	0	0	160	11
4:30 PM - 4:45 PM	0	0	0	5	0	2	4	141	0	0	151	8
4:45 PM - 5:00 PM	0	0	0	10	0	3	3	122	0	1	153	17
5:00 PM - 5:15 PM	0	0	0	9	0	2	2	162	0	0	164	13
5:15 PM - 5:30 PM	0	0	0	7	0	2	4	146	0	0	151	7
5:30 PM - 5:45 PM	0	0	0	11	0	4	4	112	0	0	176	13
5:45 PM - 6:00 PM	0	0	0	12	0	1	5	128	0	0	161	9
TOTAL	0	0	0	65	0	22	30	1,073	0	1	1,281	91
Peak Hour 5:00 PM - 6:00 PM	0	0	0	39	0	9	15	548	0	0	652	42

APPENDIX E

Signal Timings

Changed yellow & Red times per FDOT

Phase Times [1.1.1]

	1	2	3	4	5	6	7	8
Min Green		10		7		10		7
Gap, Ext		3		3		3		3
Max 1		60		30		60		30
Max 2		75		40		75		40
Yel Clearance		5.3 4.7		3.4 4		5.1 4.7		4
Red Clearance		2		2.5		2		2
Walk						5		
Ped Clearance						27		
Red Revert								
Add Initial								
Max Initial								
Time B4 Reduct								
Cars B4 Reduct								
Time To Reduce								
Reduce By								
Min Gap								
DyMaxLim								
Max Step								

Auto Flash Parms [1.4.1]

Flash Parameter	Clearance Time
Mode	VOT_MON
Yellow	45
Red	30

Auto Flash, Phases/Overlaps [1.4.2]

Yel (phases)	2	6						
Yel (overlaps)								

SR 524 & London Blvd (ID 1019) (Standard File)

01/13/14

Speed Limit = 45 Miles

Phase Options [1.1.2]

	1	2	3	4	5	6	7	8
Enable		1		1		1		
Min Recall		1				1		
Max Recall								
Ped Recall								
Soft Recall								
Lock Calls		1				1		
Auto Flash Entry								1
Auto Flash Exit		1				1		
Dual Entry		1				1		
Enable Simul Gap		1				1		
Gaurant Passage								
Rest In Walk								
Condition Service								
Non-Actuated 1								
Non-Actuated 2								
Add Init Calc								

Phase Options+ [1.1.3]

	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Reservice								
Walk Thru Yel								
Skip Red No Call								
Red Rest								
Max II								
Conflicting Phase								
Conflicting Phase								
Omit Yellow								
Ped Out/Olap								
Start Yel, Next Ph								

Detector, Vehicle Parameters 1-24 [5.1]

Det#	Call Φ	Switch Φ	Delay	Extend	Queue	NoAct	MaxPres	ErrCnt	FailTime
1	1						15	70	1
2	2						15	70	15
3	3						15	70	15
4	4						15	70	15
5	5						15	70	15
6	6						15	70	15
7	7						15	70	15
8	8						15	70	15
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									

Detector, Vehicle Parameters 41-64 [5.1]

Det#	Call Φ	Switch Φ	Delay	Extend	Queue	NoAct	MaxPres	ErrCnt	FailTime
41									
42									
43									
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									

Signal Clearance Timings

Section: 7C070
 MP: 4.194
 Maintaining Agency: Cocoa
 Controller: Naztec

Location: SR 524 & London Blvd.
 North/South Street: London Blvd.
 East/West Street: SR 524

Direction	Width of Intersection measured on Google (ft)	Field verified Width of Intersection (ft)	Speed Limit (mph)	Field Measured Slope	Phase	Calculated Yellow Clearance (sec)	Existing Yellow Clearance (sec)	Proposed Yellow Clearance (sec)	Calculated Red Clearance* (sec)	Existing Red Clearance (sec)	Proposed Red Clearance (sec)	Width of Crosswalk (ft)	Existing Ped Walk (sec)	Existing Ped Clearance (sec)	Calculated Ped Clearance Timing (sec)	Proposed Ped Clearance Timing (sec)
SBL	108		25		4	3.3	4.0	3.4	3.5	2.0	2.5					
SB	N/A	x	25	-0.50%	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EBL	78		50		N/A	5.2	5.0	5.2	2.7	2.5	2.0					
EB	88	x	50	-0.50%	2	5.2	5.0	5.2	1.5	2.5	2.0	N/A	N/A	N/A	N/A	N/A
WBL	N/A		50		N/A	N/A	N/A	N/A	N/A	N/A	N/A					
WB	112	x	50	-0.20%	6	5.1	5.0	5.1	1.8	2.5	2.0	91	5	27	26	26

* speed of 25 mph was used for left turn calculation of red clearance time unless speed limit of approach was lower

Field Measurements (Grade)						
Approach Direction	Speed Limit	Dilemma Zone Field Locations				
		Location A	Location B	Location C	Slope used	
SB	25	Distance from stop bar (ft)	0	51	102	
		Smart level (%)	-0.40%	-0.50%	-0.40%	-0.50%
EB	50	Distance from stop bar (ft)	0	150	330	
		Smart level (%)	0.10%	-0.40%	-0.50%	-0.50%
WB	50	Distance from stop bar (ft)	0	160	360	
		Smart level (%)	-0.20%	-0.10%	-0.20%	-0.20%

APPENDIX F

Synchro Analysis – Existing Conditions

HCM 6th Signalized Intersection Summary 3: SR 524 & London Blvd

2019 Existing - AM
04/19/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	507	371	24	91	14
Future Volume (veh/h)	4	507	371	24	91	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1752	1618	1767	1870	1870
Adj Flow Rate, veh/h	4	539	395	0	97	15
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	10	19	9	2	2
Cap, veh/h	783	1368	1264		131	116
Arrive On Green	0.78	0.78	0.78	0.00	0.07	0.07
Sat Flow, veh/h	989	1752	1618	1497	1781	1585
Grp Volume(v), veh/h	4	539	395	0	97	15
Grp Sat Flow(s),veh/h/ln	989	1752	1618	1497	1781	1585
Q Serve(g_s), s	0.1	8.8	6.4	0.0	4.8	0.8
Cycle Q Clear(g_c), s	6.5	8.8	6.4	0.0	4.8	0.8
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	783	1368	1264		131	116
V/C Ratio(X)	0.01	0.39	0.31		0.74	0.13
Avail Cap(c_a), veh/h	783	1368	1264		477	424
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	3.8	3.1	2.9	0.0	40.9	39.0
Incr Delay (d2), s/veh	0.0	0.9	0.1	0.0	8.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.0	2.7	1.5	0.0	4.3	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	3.8	4.0	3.0	0.0	48.8	39.5
LnGrp LOS	A	A	A		D	D
Approach Vol, veh/h		543	395	A	112	
Approach Delay, s/veh		4.0	3.0		47.6	
Approach LOS		A	A		D	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		77.5		12.5		77.5
Change Period (Y+Rc), s		7.2		5.9		* 7.2
Max Green Setting (Gmax), s		52.8		24.1		* 53
Max Q Clear Time (g_c+I1), s		10.8		6.8		8.4
Green Ext Time (p_c), s		3.2		0.2		2.2
Intersection Summary						
HCM 6th Ctrl Delay			8.3			
HCM 6th LOS			A			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection

Int Delay, s/veh 0.8

Movement SEL SER NEL NET SWT SWR

Lane Configurations	Y		Y	↑	↑	↑
Traffic Vol, veh/h	42	16	6	550	387	12
Future Vol, veh/h	42	16	6	550	387	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	125	-	-	350
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	6	2	7	15	2
Mvmt Flow	44	17	6	579	407	13

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	998	407	420	0	-	0
Stage 1	407	-	-	-	-	-
Stage 2	591	-	-	-	-	-
Critical Hdwy	6.42	6.26	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.354	2.218	-	-	-
Pot Cap-1 Maneuver	270	636	1139	-	-	-
Stage 1	672	-	-	-	-	-
Stage 2	553	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	269	636	1139	-	-	-
Mov Cap-2 Maneuver	461	-	-	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	553	-	-	-	-	-

Approach SE NE SW

HCM Control Delay, s	13.2	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt NEL NET SELn1 SWT SWR

Capacity (veh/h)	1139	-	499	-	-
HCM Lane V/C Ratio	0.006	-	0.122	-	-
HCM Control Delay (s)	8.2	-	13.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

HCM 6th Signalized Intersection Summary
20: SR 524 & Cox Rd

2019 Existing - AM

04/19/2019

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	42	9	80	68	47	37	13	344	101	116	281	22
Future Volume (veh/h)	42	9	80	68	47	37	13	344	101	116	281	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No				No				No			
Adj Sat Flow, veh/h/ln	1737	1737	1737	1826	1826	1826	1870	1752	1841	1856	1633	1870
Adj Flow Rate, veh/h	45	10	85	72	50	39	14	366	0	123	299	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	11	11	11	5	5	5	2	10	4	3	18	2
Cap, veh/h	246	80	381	353	239	161	402	457		314	667	
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.26	0.26	0.00	0.07	0.41	0.00
Sat Flow, veh/h	377	181	862	602	541	365	1080	1752	1560	1767	1633	1585
Grp Volume(v), veh/h	140	0	0	161	0	0	14	366	0	123	299	0
Grp Sat Flow(s),veh/h/ln	1420	0	0	1509	0	0	1080	1752	1560	1767	1633	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.1	0.0	0.0	0.6	11.7	0.0	2.8	8.0	0.0
Cycle Q Clear(g_c), s	3.3	0.0	0.0	3.4	0.0	0.0	0.6	11.7	0.0	2.8	8.0	0.0
Prop In Lane	0.32		0.61	0.45		0.24	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	706	0	0	753	0	0	402	457		314	667	
V/C Ratio(X)	0.20	0.00	0.00	0.21	0.00	0.00	0.03	0.80		0.39	0.45	
Avail Cap(c_a), veh/h	706	0	0	753	0	0	849	1182		466	1483	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	10.3	0.0	0.0	10.3	0.0	0.0	16.6	20.7	0.0	14.7	12.9	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.6	0.0	0.0	0.0	3.3	0.0	0.8	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.9	0.0	0.0	2.1	0.0	0.0	0.2	7.6	0.0	1.7	4.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.9	0.0	0.0	11.0	0.0	0.0	16.6	24.0	0.0	15.5	13.3	0.0
LnGrp LOS	B	A	A	B	A	A	B	C		B	B	
Approach Vol, veh/h	140				161				380			
Approach Delay, s/veh	10.9				11.0				23.8			
Approach LOS	B				B				C			
Timer - Assigned Phs	2		3		4		6		8			
Phs Duration (G+Y+Rc), s	31.0		8.9		20.2		31.0		29.0			
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5		4.5			
Max Green Setting (Gmax), s	26.5		9.5		40.5		26.5		54.5			
Max Q Clear Time (g_c+I1), s	5.3		4.8		13.7		5.4		10.0			
Green Ext Time (p_c), s	0.7		0.1		1.9		0.8		1.6			
Intersection Summary												
HCM 6th Ctrl Delay	16.5											
HCM 6th LOS	B											

Notes

Unsignalized Delay for [NER, SWR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary 3: SR 524 & London Blvd

2019 Existing - PM
04/19/2019

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	531	657	111	77	10
Future Volume (veh/h)	16	531	657	111	77	10
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1796	1856	1870	1870	1870
Adj Flow Rate, veh/h	17	565	699	0	82	11
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	7	3	2	2	2
Cap, veh/h	568	1409	1455		125	111
Arrive On Green	0.78	0.78	0.78	0.00	0.07	0.07
Sat Flow, veh/h	747	1796	1856	1585	1781	1585
Grp Volume(v), veh/h	17	565	699	0	82	11
Grp Sat Flow(s),veh/h/ln	747	1796	1856	1585	1781	1585
Q Serve(g_s), s	0.7	8.9	11.7	0.0	4.0	0.6
Cycle Q Clear(g_c), s	12.5	8.9	11.7	0.0	4.0	0.6
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	568	1409	1455		125	111
V/C Ratio(X)	0.03	0.40	0.48		0.66	0.10
Avail Cap(c_a), veh/h	568	1409	1455		477	424
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	5.5	3.1	3.4	0.0	40.8	39.2
Incr Delay (d2), s/veh	0.1	0.9	0.2	0.0	5.7	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	2.7	3.0	0.0	3.5	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	5.6	3.9	3.6	0.0	46.5	39.6
LnGrp LOS	A	A	A		D	D
Approach Vol, veh/h		582	699	A	93	
Approach Delay, s/veh		4.0	3.6		45.7	
Approach LOS		A	A		D	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		77.8		12.2		77.8
Change Period (Y+Rc), s		7.2		5.9		* 7.2
Max Green Setting (Gmax), s		52.8		24.1		* 53
Max Q Clear Time (g_c+I1), s		14.5		6.0		13.7
Green Ext Time (p_c), s		3.5		0.2		4.6
Intersection Summary						
HCM 6th Ctrl Delay			6.6			
HCM 6th LOS			A			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	0.7					
Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	39	9	15	548	652	42
Future Vol, veh/h	39	9	15	548	652	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	125	-	-	350
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	13	7	5	3	2
Mvmt Flow	42	10	16	589	701	45

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1322	701	746
Stage 1	701	-	-
Stage 2	621	-	-
Critical Hdwy	6.42	6.33	4.17
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.417	2.263
Pot Cap-1 Maneuver	173	421	840
Stage 1	492	-	-
Stage 2	536	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	170	421	840
Mov Cap-2 Maneuver	370	-	-
Stage 1	483	-	-
Stage 2	536	-	-

Approach	SE	NE	SW
HCM Control Delay, s	16	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET SELn1	SWT	SWR
Capacity (veh/h)	840	-	379	-
HCM Lane V/C Ratio	0.019	-	0.136	-
HCM Control Delay (s)	9.4	-	16	-
HCM Lane LOS	A	-	C	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-

HCM 6th Signalized Intersection Summary 20: SR 524 & Cox Rd

2019 Existing - PM

04/19/2019

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	47	46	141	32	31	26	30	381	19	114	409	75
Future Volume (veh/h)	47	46	141	32	31	26	30	381	19	114	409	75
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1856	1856	1856	1870	1796	1811	1737	1856	1870
Adj Flow Rate, veh/h	50	49	150	34	33	28	32	405	0	121	435	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	3	3	3	2	7	6	11	3	2
Cap, veh/h	171	181	433	287	274	203	334	494		286	770	
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.27	0.27	0.00	0.07	0.42	0.00
Sat Flow, veh/h	234	404	966	474	611	454	954	1796	1535	1654	1856	1585
Grp Volume(v), veh/h	249	0	0	95	0	0	32	405	0	121	435	0
Grp Sat Flow(s),veh/h/ln	1604	0	0	1539	0	0	954	1796	1535	1654	1856	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	1.7	13.9	0.0	3.2	11.8	0.0
Cycle Q Clear(g_c), s	6.3	0.0	0.0	2.1	0.0	0.0	4.3	13.9	0.0	3.2	11.8	0.0
Prop In Lane	0.20		0.60	0.36		0.29	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	785	0	0	764	0	0	334	494		286	770	
V/C Ratio(X)	0.32	0.00	0.00	0.12	0.00	0.00	0.10	0.82		0.42	0.56	
Avail Cap(c_a), veh/h	785	0	0	764	0	0	630	1051		381	1452	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	11.8	0.0	0.0	10.6	0.0	0.0	19.9	22.3	0.0	16.0	14.7	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.3	0.0	0.0	0.1	3.4	0.0	1.0	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.0	0.0	0.0	1.3	0.0	0.0	0.6	9.1	0.0	1.9	7.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.8	0.0	0.0	10.9	0.0	0.0	20.0	25.8	0.0	17.0	15.4	0.0
LnGrp LOS	B	A	A	B	A	A	C	C		B	B	
Approach Vol, veh/h	249				95		437		A		556	
Approach Delay, s/veh	12.8				10.9		25.4				15.7	
Approach LOS	B				B		C				B	
Timer - Assigned Phs	2		3		4		6		8			
Phs Duration (G+Y+Rc), s	34.0		9.2		22.6		34.0		31.8			
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5		4.5			
Max Green Setting (Gmax), s	29.5		8.5		38.5		29.5		51.5			
Max Q Clear Time (g_c+I1), s	8.3		5.2		15.9		4.1		13.8			
Green Ext Time (p_c), s	1.4		0.1		2.2		0.4		2.4			
Intersection Summary												
HCM 6th Ctrl Delay	18.0											
HCM 6th LOS	B											
Notes												

APPENDIX G

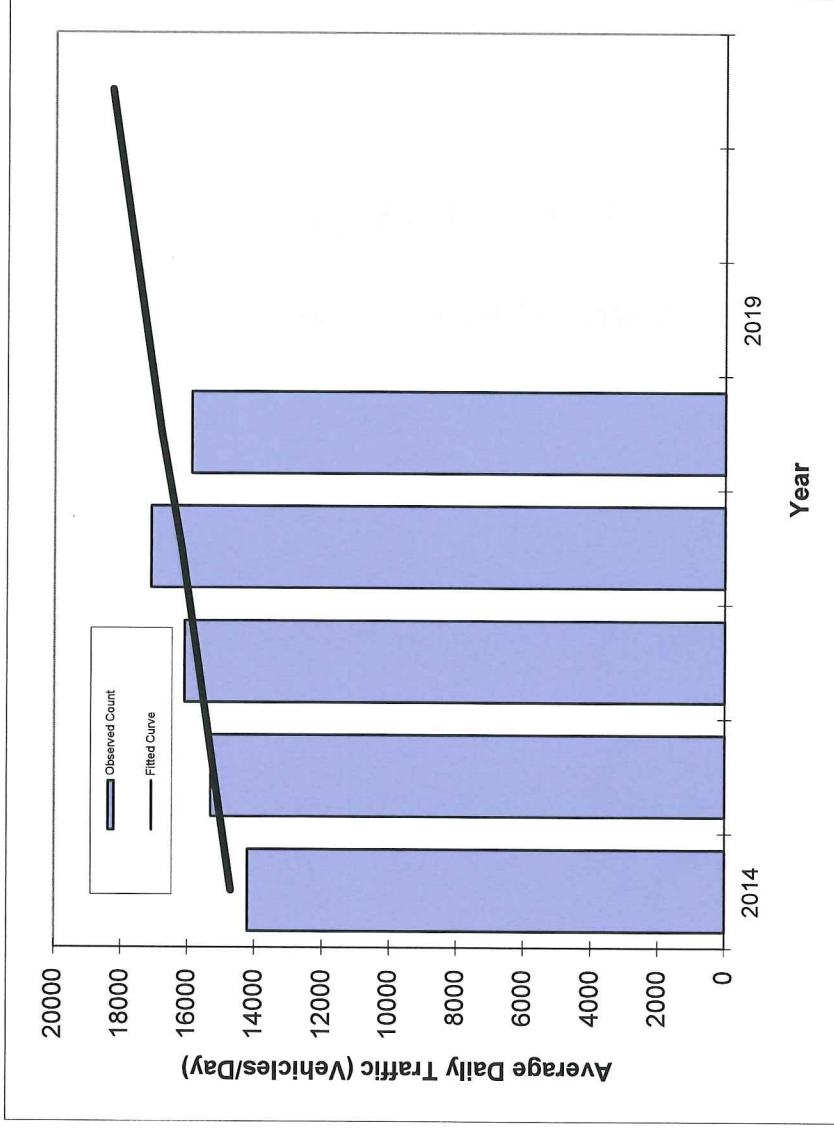
Historical Trend Analysis

Traffic Trends - V3.0

0

FIN#	439136-1
Location	2

County:	Brevard (70)
Station #:	0426
Highway:	SR 524



** Annual Trend Increase:	520
Trend R-squared:	59.19%
Trend Annual Historic Growth Rate:	3.57%
Trend Growth Rate (2018 to Design Year):	2.98%
Printed:	16-Apr-19
Straight Line Growth Option	

Year	Traffic (ADT/AADT)	
	Count*	Trend**
2014	14200	14700
2015	15300	15200
2016	16100	15700
2017	17100	16200
2018	15900	16800
2019 Opening Year Trend		
2019	N/A	17300
2020 Mid-Year Trend		
2020	N/A	17800
2021 Design Year Trend		
2021	N/A	18300
TRANPLAN Forecasts/Trends		

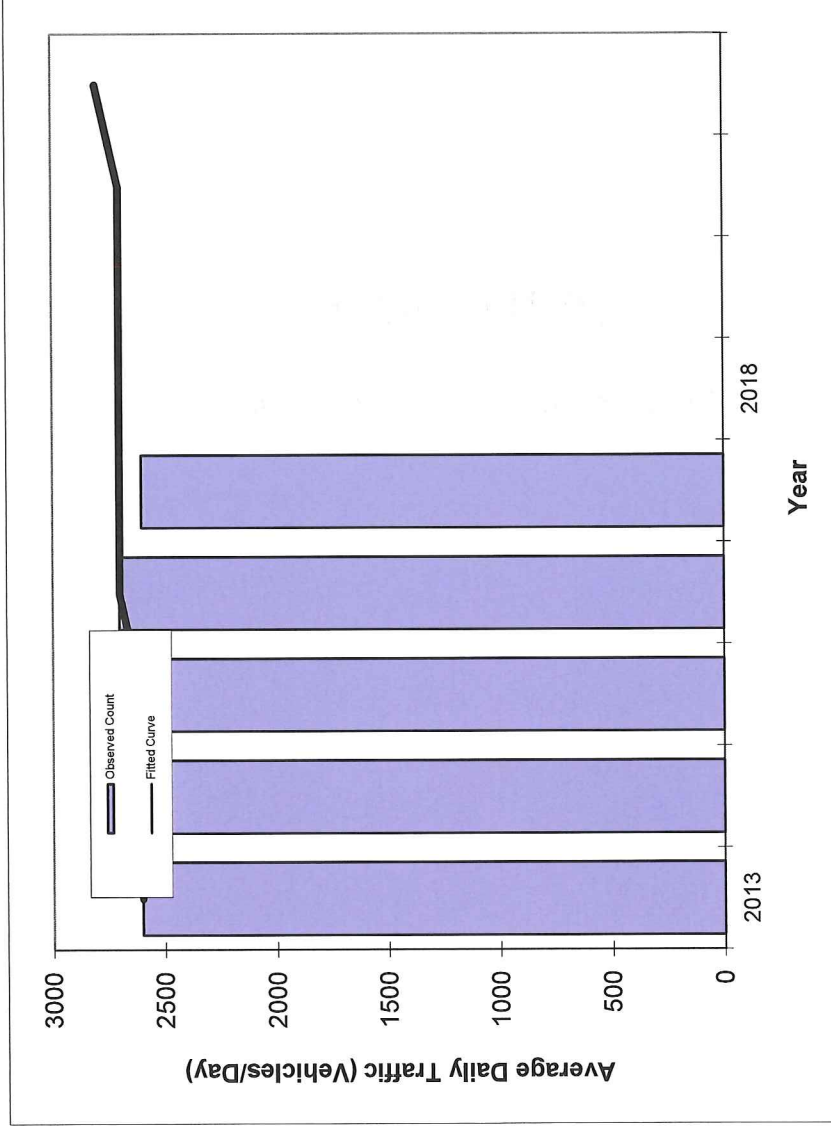
*Axle-Adjusted

Traffic Trends - V3.0

0

FIN#	439136-1
Location	2

County:	Brevard (70)
Station #:	0426
Highway:	COX Rd



** Annual Trend Increase:	20
Trend R-squared:	7.69%
Trend Annual Historic Growth Rate:	0.96%
Trend Growth Rate (2017 to Design Year):	0.93%
Printed:	18-Apr-19
Straight Line Growth Option	

Year	Traffic Count*	Trend**
2013	2600	2600
2014	2500	2600
2015	2800	2600
2016	2700	2700
2017	2600	2700
2019 Opening Year Trend		
2019	N/A	2700
2020 Mid-Year Trend		
2020	N/A	2700
2021 Design Year Trend		
2021	N/A	2800
TRANPLAN Forecasts/Trends		

*Axle-Adjusted

APPENDIX H

Intersection Volume Derivation

Table 2
Integra Cocoa
2021 Intersection Analysis Summary

SR 524 at London Blvd

AM PEAK HOUR									
			Existing Seasonally Adj.	Grown	Project		London Cove Traffic		AM Total
					In / Out	Dist.	Traffic	Project Trips	
EB									
Rate		Left	4	5			0		5
3.6%		Thru	507	561	O	51.32%	34	-30	565
		Right	0	0			0	73	103
WB									
Rate		Left	0	0			0	125	135
3.6%		Thru	371	411	I	51.32%	12	-10	413
		Right	24	26			0		26
NB									
Rate		Left	0	0			0	71	90
2.0%		Thru	0	0			0	10	10
		Right	0	0			0	128	143
SB									
Rate		Left	91	96			0		96
2.0%		Thru	0	0			0	10	10
		Right	14	15			0		15
PM PEAK HOUR									
			Existing Seasonally Adj.	Grown	Project		London Cove Traffic		PM Total
					In / Out	Dist.	Traffic	Project Trips	
EB									
Rate		Left	16	18			0		18
3.6%		Thru	531	588	O	51.32%	22	-28	582
		Right	0	0			0	51	79
WB									
Rate		Left	0	0			0	75	95
3.6%		Thru	657	728	I	51.32%	34	-20	742
		Right	111	123			0		123
NB									
Rate		Left	0	0			0	48	88
2.0%		Thru	0	0			0	7	7
		Right	0	0			0	69	97
SB									
Rate		Left	77	82			0		82
2.0%		Thru	0	0			0	7	7
		Right	10	11			0		11

SR 524 at Lance Blvd/ Project Entrance

AM PEAK HOUR									
			Existing Seasonally Adj.	Grown	Project		London Cove Traffic		AM Total
					In / Out	Dist.	Traffic	Project Trips	
EB									
Rate		Left	6	6			0		6
3.6%		Thru	550	589			0	73	662
		Right	0	0	I	48.68%	11		11
WB									
Rate		Left	0	0	I	51.32%	12		12
3.6%		Thru	387	415			0	71	486
		Right	12	13			0		13
NB									
Rate		Left	0	0	O	48.68%	33		33
2.0%		Thru	0	0			0		0
		Right	0	0	O	51.32%	34		34
SB									
Rate		Left	42	45			0		45
2.0%		Thru	0	0			0		0
		Right	16	17			0		17
PM PEAK HOUR									
			Existing Seasonally Adj.	Grown	Project		London Cove Traffic		PM Total
					In / Out	Dist.	Traffic	Project Trips	
EB									
Rate		Left	15	16			0		16
2.0%		Thru	548	570			0	51	621
		Right	0	0	I	48.68%	33		33
WB									
Rate		Left	0	0	I	51.32%	34		34
2.0%		Thru	652	678			0	48	726
		Right	42	44			0		44
NB									
Rate		Left	0	0	O	48.68%	21		21
2.0%		Thru	0	0			0		0
		Right	0	0	O	51.32%	22		22
SB									
Rate		Left	39	41			0		41
2.0%		Thru	0	0			0		0
		Right	9	9			0		9

SR 524 at Cox Road

AM PEAK HOUR							
		Existing	Grown	Project			AM
		Seasonally Adj.		In / Out	Dist.	Traffic	Total
EB							
Rate	Left	13	14			0	14
3.6%	Thru	344	369	I	32.58%	7	376
	Right	101	108			0	108
WB							
Rate	Left	116	124	O	12.09%	8	132
3.6%	Thru	281	301	O	32.58%	22	323
	Right	22	24	O	1.20%	1	25
NB							
Rate	Left	42	45			0	45
2.0%	Thru	9	10			0	10
	Right	80	86	I	12.09%	3	89
SB							
Rate	Left	68	73	I	1.20%	1	74
2.0%	Thru	47	50			0	50
	Right	37	40			0	40
PM PEAK HOUR							
		Existing	Grown	Project			PM
		Seasonally Adj.		In / Out	Dist.	Traffic	Total
EB							
Rate	Left	30	32			0	32
3.6%	Thru	381	408	I	32.58%	22	430
	Right	19	20			0	20
WB							
Rate	Left	114	122	O	12.09%	5	127
3.6%	Thru	409	438	O	32.58%	14	452
	Right	75	80	O	1.20%	1	81
NB							
Rate	Left	47	50			0	50
2.0%	Thru	46	49			0	49
	Right	141	151	I	12.09%	8	159
SB							
Rate	Left	32	34	I	1.20%	1	35
2.0%	Thru	31	33			0	33
	Right	26	28			0	28

APPENDIX I

Synchro Analysis – Future Conditions

HCM 6th Signalized Intersection Summary 3: Project Entrance/London Blvd & SR 524

2021 Buildout - AM

04/19/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	565	103	135	413	26	90	10	143	96	10	15
Future Volume (veh/h)	5	565	103	135	413	26	90	10	143	96	10	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A _{pbT})	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No				No				No			
Adj Sat Flow, veh/h/ln	1870	1752	1870	1870	1618	1767	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	5	595	108	142	435	0	95	11	151	101	11	16
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	10	2	2	19	9	2	2	2	2	2	2
Cap, veh/h	341	883	799	385	947		172	27	369	238	23	392
Arrive On Green	0.01	0.50	0.50	0.09	0.58	0.00	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1781	1752	1585	1781	1618	1497	1383	109	1493	752	95	1585
Grp Volume(v), veh/h	5	595	108	142	435	0	95	0	162	112	0	16
Grp Sat Flow(s),veh/h/ln	1781	1752	1585	1781	1618	1497	1383	0	1602	846	0	1585
Q Serve(g _s), s	0.2	33.2	4.7	0.0	19.8	0.0	8.8	0.0	11.0	10.2	0.0	1.0
Cycle Q Clear(g _c), s	0.2	33.2	4.7	0.0	19.8	0.0	29.9	0.0	11.0	21.2	0.0	1.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.93	0.90		1.00
Lane Grp Cap(c), veh/h	341	883	799	385	947		172	0	396	262	0	392
V/C Ratio(X)	0.01	0.67	0.14	0.37	0.46		0.55	0.00	0.41	0.43	0.00	0.04
Avail Cap(c _a), veh/h	414	883	799	385	947		192	0	419	280	0	415
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.7	24.2	17.2	37.1	15.3	0.0	58.5	0.0	41.0	49.4	0.0	37.2
Incr Delay (d2), s/veh	0.0	4.1	0.4	0.6	1.6	0.0	2.7	0.0	0.7	1.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.1	19.5	3.0	6.6	11.3	0.0	5.8	0.0	7.9	6.2	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.8	28.3	17.5	37.7	16.9	0.0	61.2	0.0	41.7	50.5	0.0	37.3
LnGrp LOS	C	C	B	D	B		E	A	D	D	A	D
Approach Vol, veh/h	708				577				257			
Approach Delay, s/veh	26.6				22.0				48.9			
Approach LOS	C				C				D			
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	18.8	73.0		38.2	8.3	83.5		38.2				
Change Period (Y+Rc), s	7.5	7.5		6.0	7.5	7.5		6.0				
Max Green Setting (Gmax), s	9.5	65.5		34.0	6.2	68.8		34.0				
Max Q Clear Time (g _c +I1), s	2.0	35.2		23.2	2.2	21.8		31.9				
Green Ext Time (p _c), s	0.2	3.9		0.4	0.0	2.5		0.2				
Intersection Summary												
HCM 6th Ctrl Delay	30.2											
HCM 6th LOS	C											

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
18: SR 524 & Project Entrance/Lance Blvd

2021 Buildout - AM

04/19/2019

Intersection												
Int Delay, s/veh	2.5											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↔			↔		↔	↔	↔	↔	↔	↔
Traffic Vol, veh/h	45	0	17	33	0	34	6	662	11	12	486	13
Future Vol, veh/h	45	0	17	33	0	34	6	662	11	12	486	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	125	-	450	450	-	350
Veh in Median Storage, #	-	2	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	92	92	95	95
Heavy Vehicles, %	2	2	6	2	2	2	2	7	2	2	15	2
Mvmt Flow	47	0	18	35	0	36	6	697	12	13	512	14

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1271	1259	512	1263	1261	697	526	0	0	709	0	0
Stage 1	538	538	-	709	709	-	-	-	-	-	-	-
Stage 2	733	721	-	554	552	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.26	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.354	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	145	171	554	147	170	441	1041	-	-	890	-	-
Stage 1	527	522	-	425	437	-	-	-	-	-	-	-
Stage 2	412	432	-	517	515	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	131	167	554	140	166	441	1041	-	-	890	-	-
Mov Cap-2 Maneuver	305	340	-	140	166	-	-	-	-	-	-	-
Stage 1	524	514	-	422	434	-	-	-	-	-	-	-
Stage 2	376	429	-	493	507	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	17.7	29.9	0.1	0.2
HCM LOS	C	D		

Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1041	-	-	214	348	890	-
HCM Lane V/C Ratio	0.006	-	-	0.33	0.188	0.015	-
HCM Control Delay (s)	8.5	-	-	29.9	17.7	9.1	-
HCM Lane LOS	A	-	-	D	C	A	-
HCM 95th %tile Q(veh)	0	-	-	1.4	0.7	0	-

HCM 6th Signalized Intersection Summary 20: SR 524 & Cox Rd

2021 Buildout - AM
04/19/2019

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	45	10	89	74	50	40	14	376	108	132	323	25
Future Volume (veh/h)	45	10	89	74	50	40	14	376	108	132	323	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1737	1737	1737	1826	1826	1826	1870	1752	1841	1856	1633	1870
Adj Flow Rate, veh/h	47	11	94	78	53	42	15	396	0	139	340	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	11	11	11	5	5	5	2	10	4	3	18	2
Cap, veh/h	246	77	430	373	249	179	337	466		275	650	
Arrive On Green	0.49	0.49	0.49	0.49	0.49	0.49	0.27	0.27	0.00	0.08	0.40	0.00
Sat Flow, veh/h	383	156	874	628	506	364	1040	1752	1560	1767	1633	1585
Grp Volume(v), veh/h	152	0	0	173	0	0	15	396	0	139	340	0
Grp Sat Flow(s),veh/h/ln	1413	0	0	1498	0	0	1040	1752	1560	1767	1633	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.9	17.6	0.0	4.4	13.0	0.0
Cycle Q Clear(g_c), s	4.5	0.0	0.0	4.5	0.0	0.0	3.1	17.6	0.0	4.4	13.0	0.0
Prop In Lane	0.31		0.62	0.45		0.24	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	753	0	0	801	0	0	337	466		275	650	
V/C Ratio(X)	0.20	0.00	0.00	0.22	0.00	0.00	0.04	0.85		0.51	0.52	
Avail Cap(c_a), veh/h	753	0	0	801	0	0	838	1310		450	1599	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	11.7	0.0	0.0	11.7	0.0	0.0	24.1	28.6	0.0	20.6	18.8	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.6	0.0	0.0	0.1	4.4	0.0	1.4	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.7	0.0	0.0	3.0	0.0	0.0	0.4	11.5	0.0	3.0	7.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.3	0.0	0.0	12.4	0.0	0.0	24.2	33.1	0.0	22.0	19.5	0.0
LnGrp LOS	B	A	A	B	A	A	C	C		C	B	
Approach Vol, veh/h	152			173			411			479		
Approach Delay, s/veh	12.3			12.4			32.7			20.2		
Approach LOS	B			B			C			C		
Timer - Assigned Phs	2		3	4		6		8				
Phs Duration (G+Y+Rc), s	45.0		10.8	26.4		45.0		37.2				
Change Period (Y+Rc), s	4.5		4.5	4.5		4.5		4.5				
Max Green Setting (Gmax), s	40.5		14.5	61.5		40.5		80.5				
Max Q Clear Time (g_c+I1), s	6.5		6.4	19.6		6.5		15.0				
Green Ext Time (p_c), s	0.9		0.2	2.2		1.0		1.9				
Intersection Summary												
HCM 6th Ctrl Delay	22.3											
HCM 6th LOS	C											

Notes

Unsignalized Delay for [NER, SWR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary 3: Project Entrance/London Blvd & SR 524

2021 Buildout - PM
04/19/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	582	79	95	742	123	88	7	97	82	7	11
Future Volume (veh/h)	18	582	79	95	742	123	88	7	97	82	7	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No				No				No			
Adj Sat Flow, veh/h/ln	1870	1796	1870	1870	1856	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	19	613	83	100	781	0	93	7	102	86	7	12
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	7	2	2	3	2	2	2	2	2	2	2
Cap, veh/h	211	956	844	442	1141		173	21	307	232	17	324
Arrive On Green	0.02	0.53	0.53	0.10	0.61	0.00	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1781	1796	1585	1781	1856	1585	1393	103	1498	873	82	1585
Grp Volume(v), veh/h	19	613	83	100	781	0	93	0	109	93	0	12
Grp Sat Flow(s),veh/h/ln	1781	1796	1585	1781	1856	1585	1393	0	1601	955	0	1585
Q Serve(g_s), s	0.7	31.5	3.4	0.0	36.4	0.0	8.5	0.0	7.6	8.2	0.0	0.8
Cycle Q Clear(g_c), s	0.7	31.5	3.4	0.0	36.4	0.0	24.2	0.0	7.6	15.7	0.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.94	0.92		1.00
Lane Grp Cap(c), veh/h	211	956	844	442	1141		173	0	328	249	0	324
V/C Ratio(X)	0.09	0.64	0.10	0.23	0.68		0.54	0.00	0.33	0.37	0.00	0.04
Avail Cap(c_a), veh/h	261	956	844	442	1141		246	0	411	318	0	407
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.9	21.6	15.0	29.2	16.7	0.0	58.4	0.0	44.1	50.5	0.0	41.4
Incr Delay (d2), s/veh	0.2	3.3	0.2	0.3	3.3	0.0	2.6	0.0	0.6	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.5	18.7	2.1	3.9	20.6	0.0	5.6	0.0	5.5	5.1	0.0	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.1	24.9	15.2	29.5	20.0	0.0	61.0	0.0	44.7	51.4	0.0	41.5
LnGrp LOS	C	C	B	C	C		E	A	D	D	A	D
Approach Vol, veh/h	715				881				202			
Approach Delay, s/veh	23.7				21.1				52.2			
Approach LOS	C				C				D			
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	20.7	76.7		32.6	10.0	87.4		32.6				
Change Period (Y+Rc), s	7.5	7.5		6.0	7.5	7.5		6.0				
Max Green Setting (Gmax), s	6.4	69.2		33.4	6.2	69.4		33.4				
Max Q Clear Time (g_c+I1), s	2.0	33.5		17.7	2.7	38.4		26.2				
Green Ext Time (p_c), s	0.1	4.0		0.4	0.0	5.3		0.5				
Intersection Summary												
HCM 6th Ctrl Delay	27.0											
HCM 6th LOS	C											
Notes												

HCM 6th TWSC
18: SR 524 & Project Entrance/Lance Blvd

2021 Buildout - PM
04/19/2019

Intersection												
Int Delay, s/veh	2.1											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↗	↗	↗	↗	↗	↗
Traffic Vol, veh/h	41	0	9	21	0	22	16	621	33	34	726	44
Future Vol, veh/h	41	0	9	21	0	22	16	621	33	34	726	44
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	125	-	450	450	-	350
Veh in Median Storage, #	-	2	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	92	92	95	95
Heavy Vehicles, %	2	2	13	2	2	2	7	5	2	2	3	2
Mvmt Flow	43	0	9	22	0	23	17	654	36	37	764	46

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1556	1562	764	1554	1572	654	810	0	0	690	0	0
Stage 1	838	838	-	688	688	-	-	-	-	-	-	-
Stage 2	718	724	-	866	884	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.33	7.12	6.52	6.22	4.17	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.417	3.518	4.018	3.318	2.263	-	-	2.218	-	-
Pot Cap-1 Maneuver	92	112	387	92	110	467	794	-	-	905	-	-
Stage 1	361	382	-	436	447	-	-	-	-	-	-	-
Stage 2	420	430	-	348	363	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	83	105	387	86	103	467	794	-	-	905	-	-
Mov Cap-2 Maneuver	250	270	-	86	103	-	-	-	-	-	-	-
Stage 1	353	366	-	427	438	-	-	-	-	-	-	-
Stage 2	391	421	-	326	348	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	21.8	39.7	0.2	0.4
HCM LOS	C	E		

Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	794	-	-	148	267	905	-
HCM Lane V/C Ratio	0.021	-	-	0.306	0.197	0.041	-
HCM Control Delay (s)	9.6	-	-	39.7	21.8	9.1	-
HCM Lane LOS	A	-	-	E	C	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.2	0.7	0.1	-

HCM 6th Signalized Intersection Summary 20: SR 524 & Cox Rd

2021 Buildout - PM

04/19/2019

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	50	49	159	35	33	28	32	430	20	127	452	81
Future Volume (veh/h)	50	49	159	35	33	28	32	430	20	127	452	81
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1856	1856	1856	1870	1796	1811	1737	1856	1870
Adj Flow Rate, veh/h	53	52	167	37	35	29	34	453	0	134	476	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	3	3	3	2	7	6	11	3	2
Cap, veh/h	168	177	470	294	275	207	281	525		252	776	
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.29	0.29	0.00	0.08	0.42	0.00
Sat Flow, veh/h	248	368	980	497	572	430	918	1796	1535	1654	1856	1585
Grp Volume(v), veh/h	272	0	0	101	0	0	34	453	0	134	476	0
Grp Sat Flow(s),veh/h/ln	1595	0	0	1499	0	0	918	1796	1535	1654	1856	1585
Q Serve(g_s), s	0.7	0.0	0.0	0.0	0.0	0.0	2.7	21.1	0.0	4.8	17.8	0.0
Cycle Q Clear(g_c), s	8.9	0.0	0.0	2.8	0.0	0.0	9.3	21.1	0.0	4.8	17.8	0.0
Prop In Lane	0.19		0.61	0.37		0.29	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	815	0	0	775	0	0	281	525		252	776	
V/C Ratio(X)	0.33	0.00	0.00	0.13	0.00	0.00	0.12	0.86		0.53	0.61	
Avail Cap(c_a), veh/h	815	0	0	775	0	0	640	1228		380	1646	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	14.3	0.0	0.0	12.7	0.0	0.0	28.1	29.7	0.0	21.5	20.2	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.3	0.0	0.0	0.2	4.4	0.0	1.7	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.0	0.0	0.0	1.9	0.0	0.0	1.0	13.6	0.0	3.1	11.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.4	0.0	0.0	13.0	0.0	0.0	28.3	34.0	0.0	23.2	20.9	0.0
LnGrp LOS	B	A	A	B	A	A	C	C		C	C	
Approach Vol, veh/h	272				101		487		A		610	
Approach Delay, s/veh	15.4				13.0		33.6				21.4	
Approach LOS	B				B		C				C	
Timer - Assigned Phs	2		3		4		6		8			
Phs Duration (G+Y+Rc), s	47.0		11.2		30.4		47.0		41.5			
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5		4.5			
Max Green Setting (Gmax), s	42.5		13.5		60.5		42.5		78.5			
Max Q Clear Time (g_c+I1), s	10.9		6.8		23.1		4.8		19.8			
Green Ext Time (p_c), s	1.7		0.2		2.7		0.5		2.7			
Intersection Summary												
HCM 6th Ctrl Delay			23.8									
HCM 6th LOS			C									

APPENDIX J

NCHRP Report 457 Data

can also indirectly reduce the delay to the left-turn or through movements by lessening their need to compete for service with the right-turn movement.

One disadvantage of adding a lane to the minor-road approach is that it may require reallocating the existing pavement or widening of the approach cross section. Sometimes the pavement width needed for the additional lane is available within the existing roadway cross section. In this instance, the only impact is a reallocation of the paved surface through modification of the pavement markings. However, in downtown settings this reallocation may require the removal of some curb parking stalls and can affect adjacent business significantly. Occasionally, the cross section must be widened to provide for the additional lane. If the needed lane width can be provided within the available right-of-way, the cost may be limited to that of construction. However, if additional right-of-way is needed, the costs of acquiring this property in urban settings can be high.

Guidance. The literature does not offer guidance regarding conditions where a second approach lane would benefit from the operation of a minor-road approach. However, the procedures in Chapter 17 of the *Highway Capacity Manual 2000* (15) can be used to identify major- and minor-road volume combinations that would benefit operationally from the provision of a second approach lane or bay. Bonneson and Fontaine (20) developed Figure 2-4 using these procedures and an assumed upper limit of 0.7 for the shared-lane, minor-road volume-to-capacity ratio.

Application. Figure 2-4 indicates the conditions that may justify the use of two approach lanes. Use of the information in this figure requires two types of data:

1. Major-road approach volume for the peak hour of the average day and
2. Minor-road turn movement volume for the peak hour of the average day (used to compute right-turn percentage).

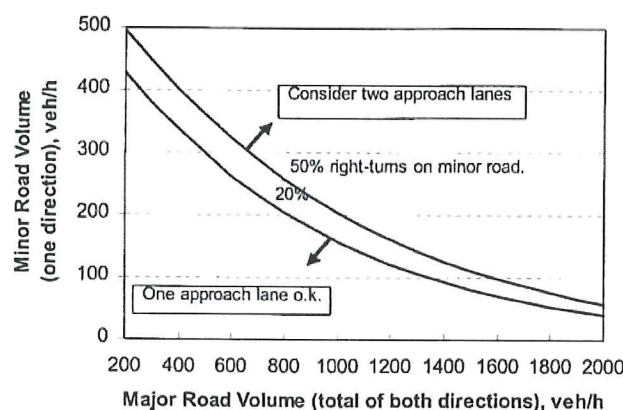


Figure 2-4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

Figure 2-4 would be used once for each minor-road approach to the intersection. The appropriate trend line would be identified on the basis of the percentage of right-turns on the subject minor-road approach. If the volume combination for the major and minor roads intersects above or to the right of this trend line, a second traffic lane should be considered for the subject minor-road approach. If a bay is selected for addition to the intersection, it should be long enough to store vehicles 95 percent of the time (i.e., the bay should not overflow more than 5 percent of the time). Techniques for estimating the 95th percentile storage length are provided in the section, [Increase the Length of the Turn Bay](#).

Add a Left-Turn Bay on the Major Road

Introduction. Provision of a left-turn bay on the major road to a two-way stop-controlled intersection can significantly improve operations and safety at the intersection. A left-turn bay effectively separates those vehicles that are slowing or stopped to turn from those vehicles in through traffic lanes. This separation minimizes turn-related crashes and eliminates unnecessary delay to through vehicles. Data reported by Neuman (21) indicate that the crash rate for unsignalized intersections can be reduced by 35 to 75 percent through the provision of a left-turn bay.

One disadvantage of adding a bay to the major-road approach is that it may require reallocating the existing pavement or widening of the approach cross section. Sometimes the pavement width needed for the additional lane is available within the existing roadway cross section. However, in downtown settings this reallocation may require the removal of some curb parking stalls and can affect adjacent business significantly. Occasionally, the cross section must be widened to provide for the turn bay. If the needed width can be provided within the available right-of-way, the cost may be limited to that of construction. However, if additional right-of-way is needed, the costs of acquiring this property in urban settings can be high.

Guidance. Neuman (21) suggests that the following guidelines should be used to determine when to provide a left-turn bay on the major road of a two-way stop-controlled intersection:

1. A left-turn lane should be considered at any median crossover on a divided, high-speed road.
2. A left-turn lane should be provided on the unstopped approach of a high-speed rural highway when it intersects with other arterials or collectors.
3. A left-turn lane is recommended on the unstopped approach of any intersection when the combination of intersection volumes intersect above or to the right of the appropriate trend line shown in Figure 2-5.

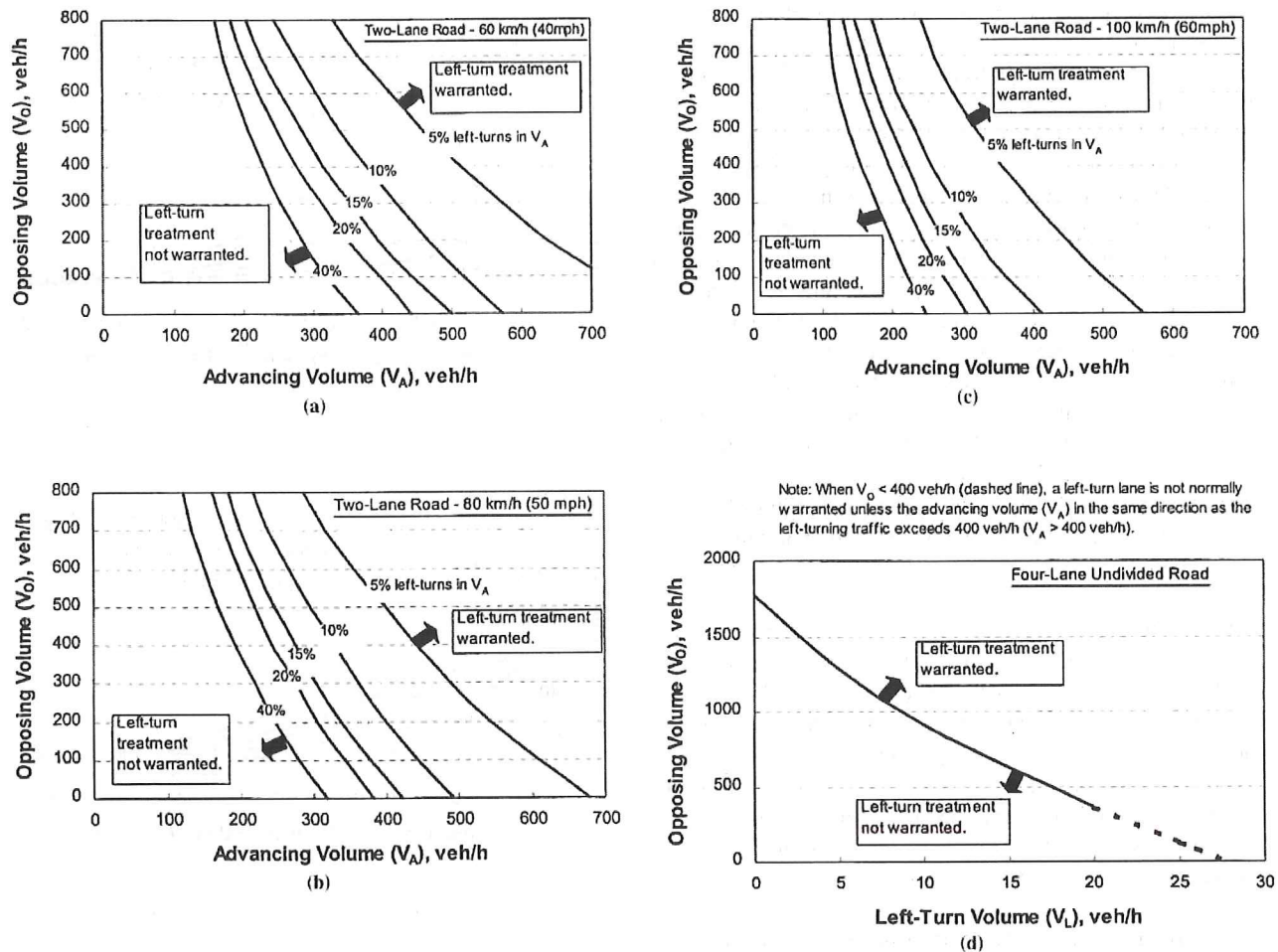


Figure 2-5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

Application. The guidance stated in the preceding section defines the conditions that may justify the provision of a left-turn bay. Application of this guidance requires two types of data:

1. Major-road turn movement volume for the peak hour of the average day and
2. Major-road 85th percentile speed (posted speed can be substituted if data are unavailable).

Use of Figure 2-5 requires determination of the opposing volume, the advancing volume, and the operating speed. The opposing volume should include only the right-turn and through movements on the approach across from (and heading in the opposite direction of) the subject major-road approach. The advancing volume should include the left-turn, right-turn, and through movements on the subject approach. The operating speed can be estimated as the 85th percentile speed. If the operating speed does not coincide with 60, 80, or 100 km/h (i.e., 40, 50, or 60 mph), then interpolation can

be used or, as a more conservative approach, the operating speed can be rounded up to the nearest speed for which a figure is provided.

In application, Figure 2-5 is used once for each major-road approach to the intersection. The appropriate trend line is identified on the basis of the percentage of left-turns on the subject major-road approach. If the advancing and opposing volume combination intersects above or to the right of this trend line, a left-turn bay should be considered for the subject approach. If a bay is included at the intersection, it should be long enough to store left-turn vehicles 99.5 percent of the time (i.e., the bay should not overflow more than 0.5 percent of the time). Techniques for estimating this storage length are provided in the section, [Increase the Length of the Turn Bay](#).

Add a Right-Turn Bay on the Major Road

Introduction. Provision of a right-turn bay on the major road to a two-way stop-controlled intersection can signifi-

cantly improve operations and safety at the intersection. A right-turn bay effectively separates those vehicles that are slowing or stopped to turn from those vehicles in the through traffic lanes. This separation minimizes turn-related collisions (e.g., angle, rear-end, and same-direction-sideswipe) and eliminates unnecessary delay to through vehicles.

One disadvantage of adding a bay to the major-road approach is that it may require reallocating the existing pavement or widening of the approach cross section. Sometimes the pavement width needed for the additional lane is available within the existing roadway cross section. However, in downtown settings this reallocation may require the removal of some curb parking stalls and can affect adjacent business significantly. Occasionally, the cross section must be widened to provide for the turn bay. If the needed width can be provided within the available right-of-way, the cost may be limited to that of construction. However, if additional right-of-way is needed, the costs of acquiring this property in urban settings can be high.

Guidance. Hasan and Stokes (22) developed guidelines for determining when to provide a right-turn bay on the major road of a two-way stop-controlled intersection. These guidelines were based on an evaluation of the operating and collision costs associated with the right-turn maneuver relative to the cost of constructing a right-turn bay. The operating costs included those of road-user fuel and delay. Separate guidelines were developed for two-lane and four-lane roadways. These guidelines are shown in Figure 2-6.

Application. The guidance described in the preceding section defines conditions that may justify the provision of a right-turn bay. Application of this guidance requires two types of data:

1. Major-road turn movement volume for the peak hour of the average day and
2. Major-road 85th percentile speed (posted speed can be substituted if data are unavailable).

Figure 2-6 should be consulted once for each major-road approach. If the combination of major-road approach volume and right-turn volume intersects above or to the right of the trend line corresponding to the major-road operating speed, then a right-turn bay is a viable alternative.

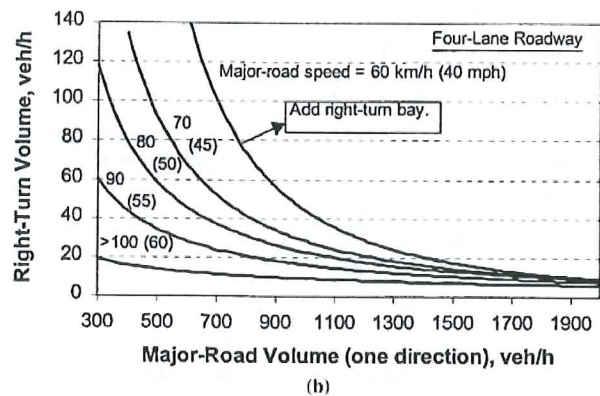
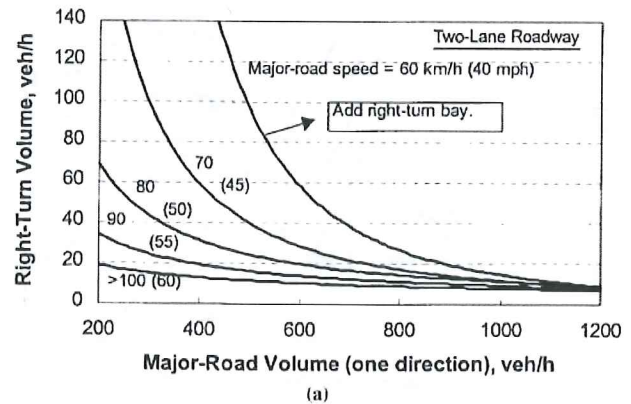


Figure 2-6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

Increase Length of Turn Bay

Introduction. Turn bay length can affect the safety and operation of the intersection approach significantly. This effect becomes more negative as the frequency with which vehicles exceed the available storage increases. Also, for unstopped approaches, this effect becomes more negative as more of the turning vehicle's deceleration occurs in the through lane, prior to the bay. The need to provide adequate storage length, deceleration length, or both is dependent on the type of approach control used and whether the vehicle is turning left or right. Table 2-13 identifies the appropriate bay

TABLE 2-13 Turn-bay length components at unsignalized intersections

Approach Control	Length Components	
	Left-Turn Bay	Right-Turn Bay
Unstopped	Storage Length + Deceleration Length	Deceleration Length
Stopped	Storage Length	Storage Length

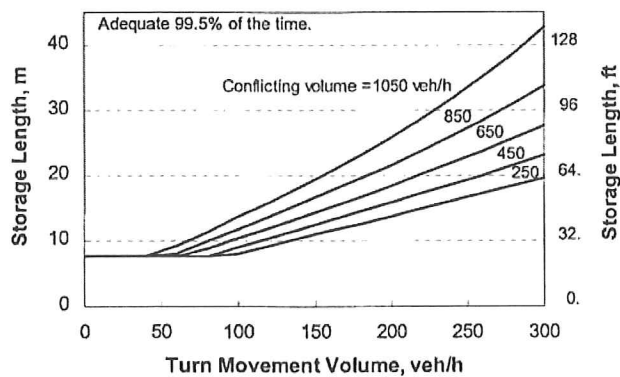


Figure 2-7. Guideline for determining if the bay storage length for an unstopped approach is adequate.

length components for typical combinations of approach control and turn movement.

Guidance. A turn bay should be long enough to store waiting vehicles almost all of the time and, in doing so, prevent conflict between the through and turning movements. A bay equal in length to the 95th percentile queue (which allows for a 5-percent probability of overflow) is typically used for most stop- or signal-controlled approaches. A bay length corresponding to a 0.5-percent probability of overflow is recommended by Harmelink (23) for unstopped approaches in recognition of the greater speed differential between through and turning movements.

Figures 2-7 and 2-8 illustrate the combination of volume and storage length that limit overflows to 0.5 and 5 percent, respectively. The trends in these figures are based on the queue length equation reported by Harmelink (23). The capacity needed for this equation was estimated using the procedures in Chapter 17 of the *Highway Capacity Manual 2000* (15). The development of Figures 2-7 and 2-8 is described elsewhere by Bonneson and Fontaine (20). A practical minimum storage length of 8 m (25 ft) is reflected in both figures.

As indicated in Table 2-13, a bay on the unstopped approach to an intersection should also provide sufficient length for the turning vehicle to decelerate once it is clear of the adjacent through traffic lane. A report by Koepke (24) provides an indication of the bay length needed for turn vehicle deceleration. However, the lengths cited by Koepke include both deceleration length and bay taper length. Subtraction of the taper length [estimated at 35 m (120 ft)] from the reported lengths leaves a conservative estimate of the length of full-width turn bay needed to facilitate the deceleration process. This length is shown in Figure 2-9.

Application. The guidelines described in the preceding section can be used to determine when turn-bay length may

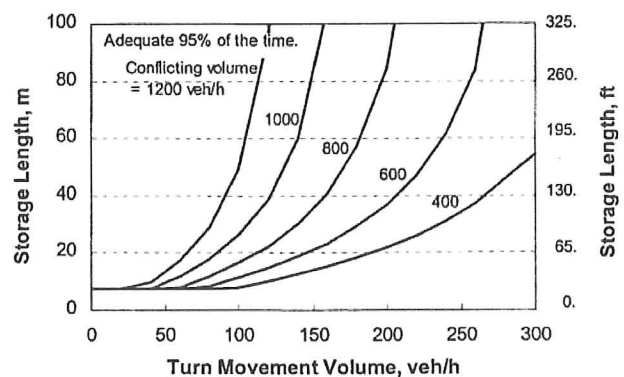


Figure 2-8. Guideline for determining if the bay storage length for a stopped approach is adequate.

need to be increased to minimize operational or safety problems associated with short turn bays. Application of this guideline requires three types of data:

1. Major- and minor-road turn movement volumes for the peak hour of the average day;
2. Major-road 85th percentile speed (posted speed can be substituted if data are unavailable); and
3. Major- and minor-road bay lengths (taper length should be excluded).

In application, each turn movement is considered separately. Table 2-13 is consulted first to determine if storage length, deceleration length, or both should be provided within the bay for the subject approach. Next, Figures 2-7, 2-8, and 2-9 are consulted. The subject movement volume and conflicting volumes should be used to determine the minimum length(s) needed from the appropriate figure(s). The operat-

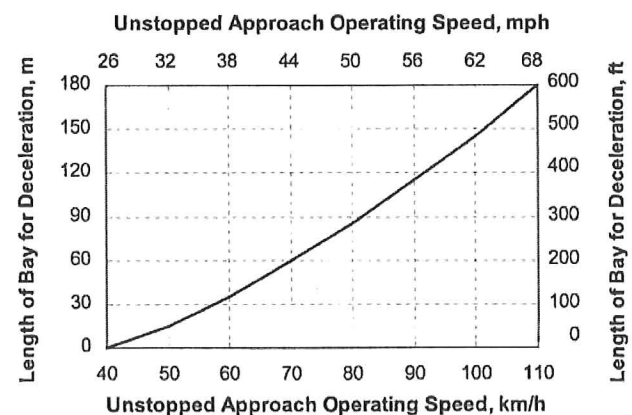


Figure 2-9. Guideline for determining if the deceleration length component of a bay is adequate.

