

TRAFFIC IMPACT ANALYSIS

TAKE 5 OIL CHANGE PORT ST. LUCIE, FL

PREPARED FOR:
CSC PROPERTIES, LLC

Kimley»»Horn

May 28, 2021
Revised September 29, 2021
Revised October 25, 2021
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Kimley-Horn and Associates, Inc.
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561/845-0665 TEL

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Prepared by:
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THIS IS TO CERTIFY THAT THE ENCLOSED
ENGINEERING CALCULATIONS WERE
PERFORMED BY ME OR UNDER MY
DIRECT SUPERVISION.

STEPHANIE KINLEN, P.E.
Florida Registration Number #84302
CA No. 00000696

DATE: 10/25/2021

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INTRODUCTION

The site on the northwest corner of SW Port St. Lucie Boulevard & Darwin in Port St. Lucie, Florida is proposed to be developed with 1,468 SF of quick lubrication vehicle shop uses. *Figure 1* illustrates the site location.

The project site plan is included in *Appendix A*.

Kimley-Horn and Associates, Inc. was retained to prepare a traffic impact analysis and stacking analysis for the proposed development. This document presents the methodology used and the findings of the traffic impact analysis. The analysis was conducted in accordance with St. Lucie County standards. A buildout year of 2026 was analyzed for the proposed development.



PORT ST. LUCIE BOULEVARD

DARWIN BOULEVARD



LEGEND
Site Location

FIGURE 1
SITE LOCATION
TAKE 5 OIL CHANGE



PROJECT TRAFFIC

Project traffic used in this analysis is defined as the vehicle trips expected to be generated by the project, and the distribution and assignment of that traffic over the study roadway network.

Existing and Proposed Land Uses

The site currently is currently vacant and is proposed to be developed with 1,468 SF of quick lubrication vehicle shop uses.

Trip Generation

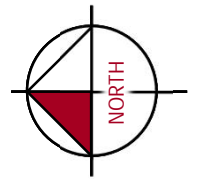
The trip generation potential for the proposed development program was calculated using trip generation rates and equations published by the Institute of Transportation Engineers' (ITE) Trip Generation Report, Tenth Edition. As indicated in *Table 1*, the proposed development is projected to generate an 102 net new external daily trips, 15 net new external AM peak hour trips (8 in, 7 out), and an additional 14 net new external PM peak hour trips (6 in, 8 out).

Table 1: Trip Generation

Land Use	Intensity	Daily Trips	AM Peak Hour			PM Peak Hour		
			Total	In	Out	Total	In	Out
Proposed Scenario								
Quick Lubrication Vehicle Shop	1,468 KSF	102	15	8	7	14	6	8
Driveway Volumes		102	15	8	7	14	6	8
<u>Land Use</u>	<u>Daily</u>	<u>AM Peak Hour of Generator</u>			<u>PM Peak Hour of Generator</u>			
Quick Lubrication Vehicle Shop	69.57 trip/KSF	T = 10.14(X) (50% in, 50% out)			T = 9.42(X) (46% in, 54% out)			

Traffic Distribution and Assignment

A projected traffic distribution plan was developed based on a review of the existing roadway distribution. Existing Annual Average Daily Traffic (AADT) was used to determine the percent distribution using each link. *Figure 2* illustrates the proposed roadway link assignment. Using these percentages, project traffic was then assigned to the surrounding roadway network projected to be in place by 2026.



LEGEND
 Site Location

Kimley»Horn

FIGURE 2
 TRIP DISTRIBUTION
 TAKE 5 OIL CHANGE

SIGNIFICANCE CALCULATIONS AND LINK ANALYSIS

The study roadway links were defined as the roadways upon which the project traffic has an impact of 5% or higher of the level of service capacity of the roadway and 1% or higher of the level of service capacity of the directly accessed roadway link. Existing traffic volumes and facility capacity was obtained from the St. Lucie County LOS Report for 2019-2020. *Tables 2a* and *2b* summarize the project percent impact as a percent of the service volume capacity for the AM peak hour and PM peak hour, respectively. As shown in *Tables 2a* and *2b*, none of the roadway links are significantly impacted by the project. Therefore, the project meets Port St. Lucie Standards with no further analysis needed.

Table 2a: AM Peak Hour Significance Calculations

ROADWAY	FROM	TO	COMMITTED NUMBER OF LANES	LOS D. GEN. SVC. VOLUME	PROJECT % ASSIGNMENT	NB/EB IN/OUT?	PROJECT TRIPS					
							TRIPS		AM PEAK HOUR		% IMPACT	
							NB/EB	SB/WB	NB/EB	SB/WB	Sig?	Sig?
Port St. Lucie Boulevard Port St. Lucie Boulevard	Tulip Boulevard Darwin Boulevard	Darwin Boulevard Gattin Boulevard	2L	920	25%	i	2	2	0.22%	No	0.22%	No
			4LD	3,020	53%	o	4	4	0.13%	No	0.13%	No
Darwin Boulevard Darwin Boulevard Darwin Boulevard	SW Du Bois Avenue Project Driveway SW Port St. Lucie Boulevard	Project Driveway SW Port St. Lucie Boulevard Tulip Boulevard	2L	880	0%	i	0	0	0.00%	No	0.00%	No
			2L	880	100%	o	7	8	0.80%	No	0.91%	No
			2L	920	22%	o	2	2	0.22%	No	0.22%	No

Table 2b: PM Peak Hour Significance Calculations

ROADWAY	FROM	TO	COMMITTED NUMBER OF LANES	LOS D GEN. SVC. VOLUME	PROJECT % ASSIGNMENT	NB/EB IN/OUT?	PROJECT TRIPS					
							TRIPS			% IMPACT		
							NB/EB	SB/WB	NB/EB	NB/EB	SB/WB	Sig?
Port St. Lucie Boulevard	Tulip Boulevard	Darwin Boulevard	2L	920	25%	i	2	2	0.22%	No	No	No
Port St. Lucie Boulevard	Darwin Boulevard	Gatlin Boulevard	4LD	3,020	53%	o	4	3	0.13%	No	No	No
Darwin Boulevard	SW Du Bois Avenue	Project Driveway	2L	880	0%	i	0	0	0.00%	No	No	No
Darwin Boulevard	Project Driveway	SW Port St. Lucie Boule	2L	880	100%	o	8	6	0.91%	No	No	No
Darwin Boulevard	SW Port St. Lucie Boul	Tulip Boulevard	2L	920	22%	o	2	1	0.22%	No	No	No

SITE CIRCULATION AND TURN LANE REQUIREMENTS

Access to the site is proposed to be provided via one full-access driveway on Darwin Boulevard. Vehicles will enter the site via Darwin Boulevard and then drive around the building to the north side of the site in order to enter the service bays. Once service is completed, the vehicles will drive through the bays and exit via the Darwin Boulevard Driveway on the south side of the site. Based on a review of the distribution of traffic to and from the site, project traffic volumes were projected at the subject driveway connections. These volumes are shown in *Figure 3*. Based on a review of these volumes, no ingress turn lanes are projected to be needed at the site entrance.

Site Queuing and Stacking Analysis

The potential queuing on site was analyzed using methodology based on a Poisson arrival assumption. This methodology determines the probability that adequate storage is provided given an arrival rate:

$$P(n) = \frac{(\lambda\Delta)^n e^{-\lambda\Delta}}{n!}$$

Where:

Δ = analysis period or average wait time to enter development;

λ = expect inbound arrival rate of vehicles; and

n = average number of vehicles arriving during the analysis period.

Based on trip generation information provided regarding other quick lube sites, it was assumed that the service bays would accommodate 8 vehicles per hour. Therefore, $\lambda = 0.0022$ vehicles per second (i.e. 8 vehicles per hour divided by 3,600 seconds per hour). It was also assumed that on average it will take 15 minutes or less to process the queued vehicles ($\Delta = 900$ seconds).

The average number of vehicles arriving at the drive-up service bays during the analysis period is equal to $n = \lambda * \Delta = 1.98$ vehicles.

Based on the proposed site plan, the length of the queuing line in the drive-up service bays can accommodate 7 vehicles before conflicting with parking spaces on site (3 vehicles in the service bays, 3 vehicles immediately behind the service bays, and 1 vehicle queued up on the north side of the side. If the storage capacity is equal to N , then N should be large enough such that $P(n < N)$ is equal to or greater than the desired level of confidence of 0.95. To verify the probability $P(n < N)$ is equal to the desired level of confidence, the following applies:

$$P(n \leq 7) = e^{-\lambda\Delta}(\lambda\Delta)^n/n! = (1.98^7) * e^{-1.98}/7! = 0.00327$$

Therefore, it is not expected that the drive-up service bay area will have a queue longer than 7 vehicles over 99 percent of the time. Thus, providing 7 vehicles of queuing space will be adequate to serve the site and impose minimum adverse impact on the onsite or adjacent street traffic operation.

Additionally, the potential queuing on site was also analyzed using methodology outlined in Chapter 8 – Drive-In Facilities of the Institute of Transportation Engineer's (ITE) *Transportation and Land Development*. The storage length which has the potential to be exceeded x percent of the time is given by the equation:

$$M = \frac{\ln P(x > M) - \ln Q_M}{\ln \rho} - 1 * (L)$$

Where:

M = storage length which is exceeded x percent of the time;

P(x > M) = probability that storage length is exceeded;

Q_M= relationship between queue length, number of channels, and utilization factor; when N= 1, Q_M= 1;

N = number of service channels;

ρ= q / N * Q = utilization factor;

q = demand rate on the system (vehicles per hour);

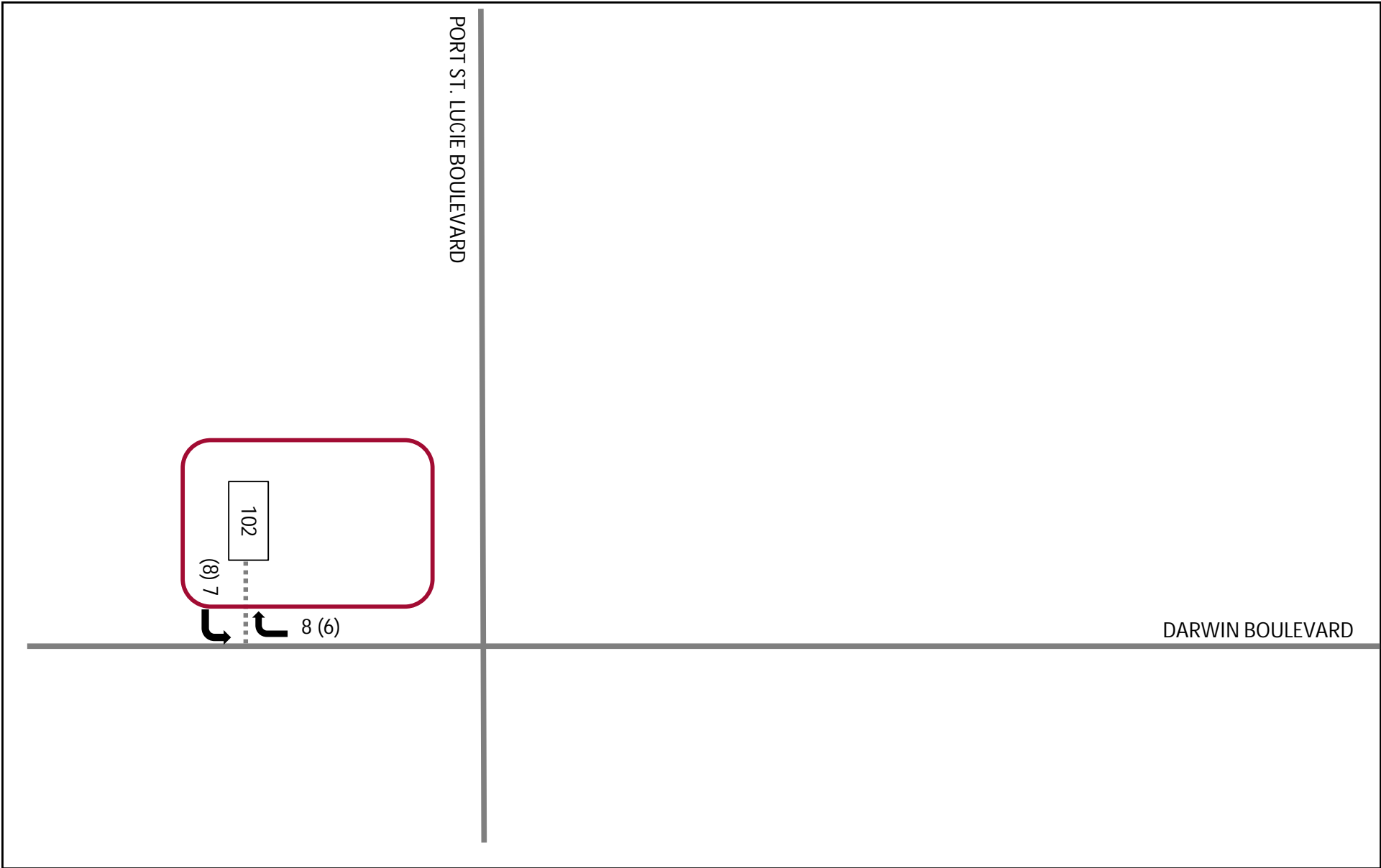
Q = service rate per channel (vehicles per hour); and

L = average length of one vehicle (feet).

As previously stated, the length of the drive-up service bay area can accommodate approximately 7 vehicles at a time. The storage length was calculated so that it would be adequate 95% of the time (P = 0.05). Thus:

$$M = \frac{\ln P(x > M) - \ln Q_M}{\ln \rho} - 1 * (L) = M = \frac{\ln(0.05) - \ln(0.4335)}{\ln(0.6667)} - 1 * (25) = 100 \text{ feet}$$

Therefore, it is expected that the drive-up service bay area will have a queue of 100 feet or less (less than four vehicle lengths) 95 percent of the time. Thus, providing seven vehicle lengths of queuing space will be adequate to serve the site and impose minimum adverse impact on the onsite or adjacent street traffic operations.



LEGEND

XX AM Peak Trips

(XX) PM Peak Trips

XX Daily Trips

FIGURE 3
PROJECT DRIVEWAY VOLUMES
TAKE 5 OIL CHANGE



CONCLUSION

The site on the northwest corner of SW Port St. Lucie Boulevard & Darwin in Port St. Lucie, Florida is proposed to be developed with 1,468 SF of quick lubrication vehicle shop uses. The proposed buildout date is the end of 2026.

Based on the results of the traffic impact analysis, the project traffic does not significantly impact the surrounding roadway network and the site meets the

Access to the site is proposed to be provided via one full-access driveway on Darwin Boulevard. Vehicles will enter the site via Darwin Boulevard and then drive around the building to the north side of the site in order to enter the service bays. Once service is completed, the vehicles will drive through the bays and exit via the Darwin Boulevard Driveway on the south side of the site. Based on a review of the driveway volumes, no ingress turn lanes are projected to be needed at the site entrance.

Based on a review of the site queuing provided, the site queues, including the vehicles in the service bays, will not exceed four vehicles 95% of the time. Thus, providing seven vehicle lengths of queuing space will be adequate to serve the site and impose minimum adverse impact on the onsite or adjacent street traffic operations.

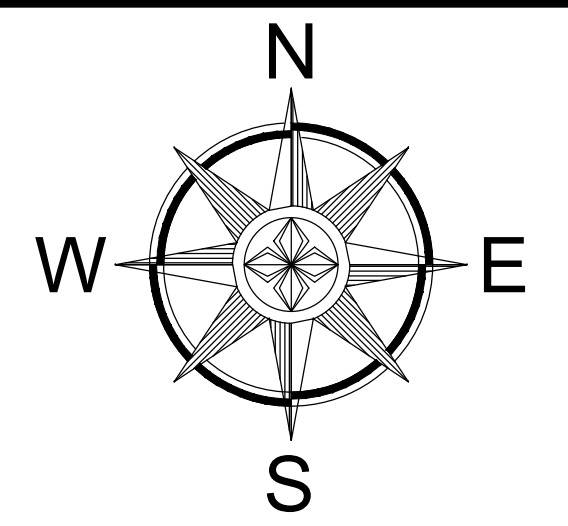
APPENDIX A: SITE PLAN

SECTION 18 TOWNSHIP 37 S RANGE 40 E

SPECIAL EXCEPTION USE APPLICATION
3100 SW PORT ST. LUCIE BOULEVARD
PORT ST. LUCIE, ST. LUCIE COUNTY, FLORIDA 34953

EXISTING TREE LEGEND

-
-
-



PROJECT LOCATION MAP

N.T.S.

LEGAL DESCRIPTION

TRACT "B", CUMBERLAND FARMS AT DARWIN AND PORT ST. LUCIE, ACCORDING TO THE PLAT THEREOF, AS RECORDED IN PLAT BOOK 72, PAGE(S) 14, OF THE PUBLIC RECORDS OF ST. LUCIE COUNTY, FLORIDA.

TOGETHER WITH:

A PORTION OF THE SOUTH HALF OF SW BIANCA AVENUE (A 60.00 FOOT RIGHT-OF-WAY) LYING EAST OF THE EAST RIGHT-OF-WAY OF SOUTHWEST BRIGGS STREET AND WEST OF THE WEST RIGHT-OF-WAY OF SOUTHWEST PORT ST. LUCIE BOULEVARD ACCORDING TO THE PLAT OF PORT ST. LUCIE SECTION SIXTEEN, AS RECORDED IN THE PLAT BOOK 13, PAGE 7, PUBLIC RECORDS OF ST. LUCIE COUNTY, FLORIDA, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGIN AT THE INTERSECTION OF THE EAST RIGHT-OF-WAY LINE OF SOUTHWEST BRIGGS STREET (A 60.00 FOOT RIGHT-OF-WAY) AND THE SOUTH RIGHT-OF-WAY LINE OF SOUTHWEST BIANCA AVENUE (A 60.00 FOOT RIGHT-OF-WAY), SAID POINT BEING ON A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 25.00 FEET AND A CENTRAL ANGLE OF 90°00'00". A RADIAL LINE TO SAID POINT BEARS NORTH 90°00'00" WEST, THENCE NORTHEASTERLY ALONG THE ARC OF SAID CURVE, AN ARC DISTANCE OF 39.27 FEET; THENCE SOUTH 90°00'00" WEST, A DISTANCE OF 25.00 FEET TO A POINT ON THE EAST RIGHT-OF-WAY LINE OF SOUTHWEST BRIGGS STREET; THENCE SOUTH 00°00'00" EAST ALONG THE EAST RIGHT-OF-WAY OF SOUTHWEST BRIGGS STREET, A DISTANCE OF 25.00 FEET TO THE POINT OF BEGINNING.

TOGETHER WITH:

A PORTION OF THE SOUTH HALF OF SW BIANCA AVENUE (A 60.00 FOOT RIGHT-OF-WAY) LYING EAST OF THE EAST RIGHT-OF-WAY OF SOUTHWEST BRIGGS STREET AND WEST OF THE WEST RIGHT-OF-WAY OF SOUTHWEST PORT ST. LUCIE BOULEVARD ACCORDING TO THE PLAT OF PORT ST. LUCIE SECTION SIXTEEN, AS RECORDED IN THE PLAT BOOK 13, PAGE 7, PUBLIC RECORDS OF ST. LUCIE COUNTY, FLORIDA, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE INTERSECTION OF THE EAST RIGHT-OF-WAY LINE OF SOUTHWEST BRIGGS STREET (A 60.00 FOOT RIGHT-OF-WAY) AND THE SOUTH RIGHT-OF-WAY LINE OF SOUTHWEST BIANCA AVENUE (A 60.00 FOOT RIGHT-OF-WAY), SAID POINT BEING ON A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 25.00 FEET AND A CENTRAL ANGLE OF 90°00'00". A RADIAL LINE TO SAID POINT BEARS NORTH 90°00'00" WEST, THENCE NORTHEASTERLY ALONG THE ARC OF SAID CURVE, AN ARC DISTANCE OF 39.27 FEET; THENCE NORTH 90°00'00" EAST ALONG THE SOUTH LINE OF SOUTHWEST BIANCA AVENUE, A DISTANCE OF 200.00 FEET TO THE POINT OF BEGINNING BEING A POINT OF CURVATURE OF A CURVE CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 25.00 FEET AND A CENTRAL ANGLE OF 90°00'00". THENCE CONTINUE SOUTHEASTERLY THROUGH THE ARC OF SAID CURVE, AN ARC DISTANCE OF 39.27 FEET TO THE SOUTHEAST CORNER OF SOUTHWEST BIANCA AVENUE AND THE INTERSECTION OF THE WEST RIGHT-OF-WAY OF SOUTHWEST PORT SAINT LUCIE BOULEVARD (A 100.00 FOOT RIGHT-OF-WAY); THENCE NORTH 00°00'00" EAST ALONG THE WEST RIGHT-OF-WAY OF SOUTHWEST PORT SAINT LUCIE BOULEVARD, A DISTANCE OF 25.00 FEET; THENCE NORTH 90°00'00" WEST, A DISTANCE OF 25.00 FEET TO THE POINT OF BEGINNING.

CONTAINING 0.70 ACRES, MORE OR LESS.

CONCEPT PLAN NOTES

1. PRIOR TO CONSTRUCTION COMMENCEMENT THE CONTRACTOR SHALL NOTIFY THE CITY OF PORT ST. LUCIE ENGINEERING DEPARTMENT, UTILITY DEPARTMENT AND THE ENGINEER OF RECORD AND SCHEDULE A PER-CONSTRUCTION MEETING.
2. THE SITE WORK FOR THIS PROJECT SHALL COMPLY WITH THE CITY OF PORT ST. LUCIE LAND DEVELOPMENT REGULATIONS (LDR).
3. ALL PEDESTRIAN ROUTES, SIDEWALKS AND ACCESSIBILITY RAMPS, HANDICAPPED PARKING SPACES, ACCESSIBILITY SIGNS AND SYMBOLS SHALL BE CONSTRUCTED IN STRICT CONFORMANCE WITH THE AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG) AND THE FLORIDA ACCESSIBILITY CODE FOR BUILDING CONSTRUCTION (FACBC), LATEST EDITIONS.
4. ALL POINTS AND MONUMENTS SHALL BE SURVEYED UPON MOBILIZATION TO VERIFY THEIR ACCURACY. ANY DISCREPANCIES DISCOVERED MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER IN WRITING PRIOR TO CONSTRUCTION.
5. MONUMENTS AND OTHER SURVEY CONTROL POINTS SHALL BE PROTECTED FROM DAMAGE AND DISTURBANCE. IF ANY CONTROL POINTS ARE DAMAGED OR DISTURBED, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE ENGINEER AND REPLACE THE CONTROL POINTS TO THEIR ORIGINAL CONDITION AT HIS OWN EXPENSE.
6. CONTRACTOR SHALL REFER TO THE ARCHITECTURAL PLANS FOR PRECISE BUILDING DIMENSIONS AND EXACT UTILITIES POINT OF CONNECTION.
7. ALL PROPOSED PARKING/DRIVE AREAS TO BE CURBED WITH FDOT TYPE 'D' CURB, UNLESS SPECIFIED OTHERWISE. ALL CURB RAMPS SHALL BE CONSTRUCTED AND TEXTURED PER FDOT INDEX NO. 522-002. MINIMUM CURB RADIUS IS THREE (3) FEET, UNLESS OTHERWISE NOTED. EXACT RADII DIMENSIONS ARE SPECIFIED IN SHEET C-4.1.
8. BUILDING SIGNAGE SHALL BE PERMITTED BY THE OWNER'S SIGN CONTRACTOR UNDER SEPARATE APPLICATION.
9. ALL SIGNS AND PAVEMENT MARKINGS SHALL ADHERE TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
10. ALL STOP SIGNS SHALL BE HIGH INTENSITY RETRO-REFLECTIVE GRADE.
11. ALL PAVEMENT MARKINGS IN THE RIGHT-OF-WAY SHALL BE THERMOPLASTIC. CONTRACTOR SHALL PROVIDE TEMPORARY WORK ZONE PAINTED PAVEMENT MARKINGS FOR MAINTENANCE OF TRAFFIC IN CONSTRUCTION AREAS IN CONFORMITY WITH THE FDOT STANDARD PLANS. THE WORK ZONE PAVEMENT MARKINGS SHALL BE MAINTAINED AND RE-STRIPPED AS NEEDED UNTIL FINAL PAVEMENT MARKINGS ARE APPLIED.
12. ALL PARKING SPACES WITH EXCEPTION OF THE HANDICAPPED PARKING SPACES SHALL BE STRIPED IN WHITE, RETRO-REFLECTIVE TRAFFIC PAINT AND BE IN ACCORDANCE WITH THE FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT) STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION.
13. PARKING STALL DIMENSIONS SHOWN ARE FROM CENTERLINE TO CENTERLINE.
14. ALL PROPOSED AND EXISTING BUILDINGS SHALL HAVE A MINIMUM OF 6" HIGH NUMERICAL ADDRESS POSTED ON THE BUILDING FACADE IN A READILY VISIBLE LOCATION.
15. PROPOSED WATER AND SEWER SERVICE TO BE PROVIDED BY CITY OF PORT ST. LUCIE PUBLIC UTILITY SYSTEMS. ALL UTILITIES MUST BE PLACED UNDERGROUND PURSUANT TO THE CITY OF PORT ST. LUCIE LAND DEVELOPMENT REGULATIONS (LDR). THE CONTRACTOR SHALL FIELD LOCATE ALL EXISTING UNDERGROUND UTILITIES, APPURTENANCES AND STRUCTURES PRIOR TO CONSTRUCTION.
16. ALL EASEMENTS AS REQUIRED SHALL BE RECORDED AS SEPARATE INSTRUMENTS.
17. ALL EXTERIOR LIGHTING SHALL BE ARRANGED TO SHIELD OR DEFLECT THE LIGHT FROM ADJOINING PROPERTIES AND PUBLIC STREETS, CUT-OFF LIGHTING SHALL BE USED IN THE PARKING LOT.
18. DEVELOPMENT SHALL COMPLY WITH THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT REQUIREMENTS. ANY ABANDONED WELLS FOUND ON SITE SHALL BE PLUGGED PURSUANT TO DEPARTMENT OF HEALTH AND SOUTH FLORIDA WATER MANAGEMENT DISTRICT REGULATIONS.
19. THE PROPERTY OWNER, CONTRACTOR, AND AUTHORIZED REPRESENTATIVES SHALL PROVIDE PICKUP, REMOVAL AND DISPOSAL OF LITTER WITHIN THE PROJECT LIMITS AND SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE AREA FROM THE EDGE OF PAVEMENT TO THE PROPERTY LINE WITHIN THE CITY'S RIGHT-OF-WAY IN ACCORDANCE WITH CITY CODE, SECTION 41.09 (3).

PROJECT INFORMATION

OWNER:
JAMES J. McGLONE JR.
2582 SW HINCHMAN STREET
PORT ST. LUCIE, FLORIDA 34984
EMAIL: ENSENBEACHREALTY@HOTMAIL.COM

DEVELOPER:
CSC PROPERTIES, LLC
5785 ULMERTON ROAD, SUITE 200
CLEARWATER, FLORIDA 33760
TEL: (727) 446-3444
FAX: (727) 346-1253
EMAIL: JAKE@CSCPROPERTIES.COM

ENGINEER:
HIGH POINT ENGINEERING, INC.
5300 W. CYPRESS STREET, SUITE 282
TAMPA, FLORIDA 33607
TEL: (813) 644-8333
FAX: (813) 644-7000
EMAIL: BGRAJALES@HPE-FL.COM

SURVEYOR:
ENGINEERING, DESIGN & CONSTRUCTION, INC.
10250 VILLAGE PARKWAY, SUITE 201
PORT ST. LUCIE, FLORIDA 34987
TEL: (772) 462-2455
EMAIL: FLINTSCOTT@EDC-INC.COM

ARCHITECT:
CHILDREY ROBINSON ASSOCIATES
1212 KENILWORTH AVENUE
CHARLOTTE, NORTH CAROLINA 28204
TEL: (704) 370-8000
FAX: (704) 370-6006
EMAIL: BILL@CHILDREYROBINSON.COM

LANDSCAPE:
DARK MOSS, LLC
400 N. TAMPA STREET, SUITE 1040
TAMPA, FLORIDA 33602
TEL: (813) 532-3440
FAX: (813) 532-3440
EMAIL: RICK@DARKMOSS.COM

EXISTING ON-SITE TREES TO BE REMOVED

QUANTITY	KEY	COMMON NAME
1		12" OAK
1		15" OAK
2		18" OAK
1		12" PALM
1		16" PALM
2		18" PALM
1		24" PALM
1		6" PINE
7		8" PINE
2		10" PINE
4		12" PINE
2		16" PINE
2		18" PINE
1		20" PINE
2		24" PINE

LANDSCAPE NOTES

1. EXISTING CURB, ASPHALT AND BASE TO BE DEMOLISHED WITHIN THE CANOPY OF TREES TO REMAIN SHALL BE REMOVED BY HAND UNDER THE SUPERVISION OF AN ISA CERTIFIED ARBORIST.
2. ANY BRAZILIAN PEPPER SPECIMEN OR ANY NUISANCE TREES SPECIES (DEFINED AS TREE SPECIES LISTED IN THE FLORIDA EXOTIC PEST TREE COUNCIL'S LIST OF INVASIVE SPECIES - LATEST EDITION) FOUND ON SITE SHALL BE REMOVED DURING CONSTRUCTION.
3. THE DEVELOPER SHALL INSTALL AND MAINTAIN AT ALL TIMES PROTECTIVE TREE BARRICADES AROUND TREES TO REMAIN. NO FILL MATERIAL SHALL BE PLACED ON THE ROOTS OF EXISTING TREES BEING PRESERVED.

DEWATERING NOTE

GROUND WATER IS PRESENT ON THIS SITE. DEWATERING IS ANTICIPATED FOR THE CONSTRUCTION OF THIS PROJECT AND CONTRACTOR'S BID SHALL INCLUDE DEWATERING, EARTHWORK AND GRADING REQUIRES ADEQUATE SURFACE DRAINAGE AND GROUND WATER MANAGEMENT TO PREVENT SOIL EROSION AND CONTROL MOISTURE OF SOILS. THE CONTRACTOR IS FULLY RESPONSIBLE WHEN USING THIS INFORMATION AND SHALL CONDUCT STUDIES, TESTS AND SURVEYS AS DEEMED NECESSARY TO MAKE THEIR OWN DETERMINATION AS TO THE ACTUAL DEPTH OF THE GROUND WATER AND TO SELECT THE ALLOWED METHOD OF DEWATERING PRIOR TO BIDDING THE WORK.

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED DIMENSION
- EXISTING DIMENSION
- TRAFFIC SIGN
- PAVEMENT MARKING
- EXISTING CONCRETE PAVEMENT / PAD / SIDEWALK
- PROPOSED CONCRETE PAVEMENT / PAD / SIDEWALK
- PROPOSED ASPHALTIC PAVEMENT

PROJECT NUMBER: P21-031
PSLUSD PROJECT NUMBER: 11-985-00

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY BRALUIO GRAJALES, PE ON THE DATE ADJACENT TO THE SEAL.

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58262 BRALUIO GRAJALES
FL Registration No. Professional Engineer
COPY OF THIS PLAN IS NOT VALID UNLESS SIGNED, SEALED AND DATED BY THE PROFESSIONAL ENGINEER.

CONCEPTUAL SITE PLAN
TAKE 5 OIL CHANGE
3100 SW PORT ST. LUCIE BOULEVARD
PORT ST. LUCIE, FLORIDA 34953

HPE
HIGH POINT ENGINEERING
Certificate of Authorization No. 30275
Tel: (813) 644-8333
Fax: (813) 644-7000
5300 W. Cypress Street, Suite 282
Tampa, Florida 33607
LAND PLANNING - CIVIL ENGINEERING - GEOTECHNICAL ENGINEERING

PROJECT NO.	ISSUE DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DATE	DESCRIPTION	REVISIONS
21-001-CSC	04/17/21	KP	KP	BG	BG			

SHEET:
C-4.1

QUEUEING ANALYSIS
Drive Through Operations

ITE Transportation and Land Development, Chapter 8

Location [Take 5 Oil Change](#)

Storage = $((\ln P(x>M) - \ln Q_m) / \ln \rho) - 1$ x Average Length of Vehicle

- M = queue length which is exceeded p percent of the time
- N = number of service channels (drive in positions)
- Q = service rate per channel (vehicles per hour)
- ρ = demand rate/service rate = q/NQ = utilization factor
- q = demand rate on the system (vehicles per hour)
- Q_m = tabled values of the relationship between queue length, number of channels and utilization factor (if $n = 1$, $Q_m = p$)

Where:

- Service time per car = 900.0 sec
- $P(x > M)$ = 5 percent = .05
- 25 ft/veh = Average Length of Veh including spacing between front bumper to front bumper
- Storage Lanes (N) = 3

- Step 1: $Q =$ 4 services per hour
- Step 2: $q =$ 8 vehicles per hour
- Step 3: $\rho =$ 0.6667 q/NQ
- Step 4: $Q_m =$ 0.4335 from Q_m values from Table 8-11
- Step 5: Calculate acceptable probability of Queue, M,
(i.e. $P(x > M) = 0.05$)

$$\begin{aligned}
 M = \text{Storage} &= \Rightarrow \frac{[\ln(0.05) - \ln(Q_m)]}{\ln(\rho)} - 1 \\
 &= \Rightarrow \frac{-2.996 - -0.836}{-0.405} - 1 \\
 &= \Rightarrow 4.3267 \text{ Cars} \\
 \text{Say} & \quad 5 \text{ Cars} \\
 \Rightarrow & \quad 100 \text{ Feet}
 \end{aligned}$$

**APPENDIX B: ST. LUCIE COUNTY 2019/2020 ROADWAY LOS
INVENTORY REPORT**



Traffic Counts and Level of Service Report
Fall/Winter 2019/2020

Roadway Name	Location	STATION ID	AADT	Last Count Year	Pk Hr Service Capacity	AM Pk Hr Pk Dir			PM Pk Hr Pk Dir		
						Volume	LOS	V/C	Volume	LOS	V/C
COUNTRY CLUB DR	ST LUCIE WEST BLVD to CALIFORNIA BLVD	725	8,300	2019	1,710	535	C	0.695	489	C	0.635
CROSSTOWN PKWY	COMMERCE CENTER DR to I-95	650	16,233	2016	3,170	1,008	C	0.326	865	C	0.280
CROSSTOWN PKWY	I-95 to CALIFORNIA BLVD	651	24,500	2020	3,170	1,290	C	0.417	1,244	C	0.403
CROSSTOWN PKWY	CALIFORNIA BLVD to CASHMERE BLVD	652	25,000	2020	3,170	1,299	C	0.420	1,395	C	0.451
CROSSTOWN PKWY	CASHMERE BLVD to CAMEO BLVD	653	26,500	2019	3,170	1,256	C	0.406	1,307	C	0.423
CROSSTOWN PKWY	CAMEO BLVD to BAYSHORE BLVD	654	30,500	2019	3,170	1,502	C	0.486	1,556	C	0.504
CROSSTOWN PKWY	BAYSHORE BLVD to AIROSO BLVD	655	25,000	2020	3,170	1,320	C	0.427	1,384	C	0.448
CROSSTOWN PKWY	AIROSO BLVD to SANDIA DR	656	5,400	2016	3,170	348	C	0.113	297	C	0.096
CROSSTOWN PKWY	SANDIA DR to MANTH LN	657	6,400	2016	3,170	344	C	0.111	360	C	0.117
CROSSTOWN PKWY	FLORESTA DR to US 1	66	25,500	2019	3,170	1,967	C	0.637	1,723	C	0.558
CROSSROADS PKWY	OKEECHOBEE RD to KINGS HWY	649	2,142	2017	790	108	C	0.277	107	C	0.274
DARWIN BLVD	BECKER RD to PAAR DR	235	7,298	2018	630	728	F	1.156	642	F	1.019
DARWIN BLVD	PAAR DR to TULIP BLVD	235	7,298	2018	920	728	C	0.837	642	C	0.738
DARWIN BLVD	TULIP BLVD to PORT ST LUCIE BLVD	659	13,500	2019	920	673	C	0.774	708	C	0.814
DEL RIO BLVD	PORT ST LUCIE BLVD to CALIFORNIA BLVD	311	8,100	2019	920	633	C	0.728	570	C	0.655
DEL RIO BLVD	CALIFORNIA BLVD to CASHMERE BLVD	660	8,400	2019	880	512	C	0.617	508	C	0.612
DEL RIO BLVD	CASHMERE BLVD to CALIFORNIA BLVD	661	4,800	2017	880	281	C	0.339	294	C	0.354
DELAWARE AVE	HARTMAN RD to 33RD ST	662	1,667	2016	600	259	C	0.863	208	C	0.693
DELAWARE AVE	33RD ST to 25TH ST	500	3,118	2017	1,710	207	C	0.269	237	C	0.308
DELAWARE AVE	25TH ST to OKEECHOBEE RD	948526	2,700	2019	1,220	124	C	0.17	124	C	0.17
DELAWARE AVE	OKEECHOBEE RD to 13TH ST	663	12,000	2020	790	657	D	0.832	611	D	0.773
DELAWARE AVE	13TH ST to 10TH ST	664	7,402	2017	750	497	D	0.663	411	D	0.548
DELAWARE AVE	10TH ST to 7TH ST	664	7,402	2017	600	497	D	0.828	411	D	0.685
DELAWARE AVE	7TH ST to US 1	665	7,200	2020	750	390	D	0.520	402	D	0.536
EAST TORINO PKWY	CASHMERE BLVD to TORINO PKWY	710	11,500	2020	830	716	C	0.918	653	C	0.837

* Note: A six digit number in the "STATION ID" column identifies segment counted by FDOT

* Volumes shown were adjusted using FDOT Seasonal Factors

* AADT = Annual Average Daily Traffic (volumes for both directions where applicable)

* Counts with an ID format of 6 digits have data extracted from FDOT count stations.

Traffic Counts and Level of Service Report
Fall/Winter 2019/2020

Roadway Name	Location	STATION ID	AADT	Last Count Year	Pk Hr Service Capacity	AM Pk Hr Pk Dir			PM Pk Hr Pk Dir		
						Volume	LOS	V/C	Volume	LOS	V/C
ORANGE AVE	7TH ST to US 1	945134	6,700	2019	300	427	D	0.712	380	D	0.633
ORANGE AVE	US 1 to 2ND ST	945133	3,600	2019	300	229	C	0.763	224	C	0.747
ORANGE AVE	2ND ST to INDIAN RIVER DR	945133	3,600	2019	370	229	C	0.619	224	C	0.605
PARR DR	PORT ST LUCIE BLVD to DARWIN BLVD	209	1,108	2016	700	81	C	0.123	71	C	0.108
PARR DR	DARWIN BLVD to TULIP BLVD	723	1,900	2019	540	167	C	0.619	126	C	0.467
PARR DR	SAVONA BLVD to PORT ST LUCIE BLVD	209	1,108	2016	700	81	C	0.123	71	C	0.108
PARR DR	ROSSER BLVD to SAVONA BLVD	209	1,108	2016	630	81	C	0.135	71	C	0.118
PEACOCK BLVD	CALIFORNIA BLVD to CASHMERE BLVD	693	4,717	2017	630	408	C	0.680	340	C	0.567
PEACOCK BLVD	UNIVERSITY BLVD to CALIFORNIA BLVD	694	10,000	2019	920	746	C	0.857	634	C	0.729
PEACOCK BLVD	ST LUCIE WEST BLVD to UNIVERSITY BLVD	948514	18,000	2019	2,100	831	C	0.435	831	C	0.435
PETERSON RD	BENT CREEK DR to HARTMAN RD	695	1,183	2017	540	94	C	0.348	80	C	0.296
PICOS RD	CAMPBELL RD to KINGS HWY	696	1,333	2017	540	92	C	0.341	86	C	0.319
PORT ST LUCIE BLVD	MARTIN C.L. to BECKER RD	948519	15,200	2019	920	701	C	0.845	701	C	0.845
PORT ST LUCIE BLVD	BECKER RD to PAAR DR	948519	15,200	2019	920	701	C	0.845	701	C	0.845
PORT ST LUCIE BLVD	PAAR DR to TULIP BLVD	948519	15,200	2019	700	701	C	0.845	701	C	0.845
PORT ST LUCIE BLVD	TULIP BLVD to DARWIN BLVD	948519	15,200	2019	920	701	C	0.845	701	C	0.845
PORT ST LUCIE BLVD	DARWIN BLVD to GATLIN BLVD	697	32,000	2019	3,020	1,720	C	0.585	1,731	C	0.589
PORT ST LUCIE BLVD	GATLIN BLVD to DEL RIO BLVD	698	38,000	2019	3,170	2,215	C	0.717	1,957	C	0.633
PORT ST LUCIE BLVD	DEL RIO BLVD to CAMEO BLVD	945074	49,500	2019	3,170	3,310	F	1.044	3,004	C	0.972
PORT ST LUCIE BLVD	CAMEO BLVD to FLORIDA'S TURNPIKE	945074	49,500	2019	3,020	3,310	F	1.096	3,004	D	0.995
PORT ST LUCIE BLVD	FLORIDA'S TURNPIKE to BAYSHORE BLVD	945074	49,500	2019	3,170	3,310	F	1.044	3,004	C	0.972
PORT ST LUCIE BLVD	BAYSHORE BLVD to AIROSO BLVD	945073	47,500	2019	3,020	3,002	D	0.994	2,974	D	0.985
PORT ST LUCIE BLVD	AIROSO BLVD to FLORESTA DR	940780	51,500	2019	3,020	3,170	F	1.050	2,778	C	0.945
PORT ST LUCIE BLVD	FLORESTA DR to VETERANS MEMORIAL PKWY	940778	59,500	2019	3,020	4,264	F	1.412	3,180	F	1.053
PORT ST LUCIE BLVD	VETERANS MEMORIAL PKWY to MORNINGSIDE BLVD	940776	35,500	2019	3,020	2,137	C	0.727	1,895	C	0.645

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