RAMEY KEMP & ASSOCIATES, INC.
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October 11, 2019

Chris Hills, AICP, CZO
Town of Knightdale
950 Steeple Square Court
Knightdale, NC 27545
Phone: 919.217.2240
Email: chris.hills@knightdalenc.gov

Subject: Hinton Oaks Industrial – **Trip Generation Letter**
Knightdale, North Carolina

Dear Mr. Hills:

This letter provides an estimate of the updated trip generation and a comparison to the previously submitted and approved TIA for the existing Hinton Oaks Industrial facility located along Hinton Oaks Boulevard in Knightdale, North Carolina. The existing facility is approximately 262,500 square feet (s.f.) with three operational buildings and 172 employees present during a shift. The previous master plan included two (2) 120,000 s.f. buildings that are not fully operational at the time of this study. The proposed expansion is expected to add approximately 100 employees, and up to an additional 250,000 s.f. for a total square footage of 752,500 s.f. with approximately 272 employees present during a shift. Site access for the existing three-building facility is provided via five (5) site driveways along Hinton Oaks Boulevard. The expansion is expected to add two (2) additional site driveways bringing the total number of site driveways for the proposed development to seven. A Traffic Impact Analysis (TIA) was conducted for the existing Hinton Oaks Industrial facility (formerly named Knightdale Industrial Center) in July of 2014 and was updated in September of 2014. The original and updated TIA assumed an approximate 502,500 s.f. warehouse development at full build-out. Refer to the attachments for excerpts from the updated TIA. It should be noted that roadway improvements were identified and implemented based on the assumptions of trips calculated in the updated TIA conducted in September 2014.

Trip Generation

Average weekday AM and PM peak hour trips for the existing Hinton Oaks Industrial facility were estimated using traffic counts conducted by Ramey Kemp & Associates, Inc. (RKA), at the five operational site driveways in September of 2019 during weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods. It should be noted that these times are expected to capture the shift changes of the facilty. Refer to the attachments for the count data at the existing site drives. Table 1 provides the current number of trips generated from the existing facility based on the 2019 traffic count data. The table also shows trip generation rates calculated for the expansion of the facility using the trip generation data gathered from the existing facility.

Table 1: Trip Generation for Existing Hinton Oaks Industrial Facility

Land Use	Intensity	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
		Enter	Exit	Enter	Exit
Existing Hinton Oaks Industrial Facility	172 employees	74	15	28	79
Calculated Trip Generation Rates (based on 2019 traffic count data)					
AM Peak Hour Rate		**PM Peak Hour Rate**			
0.52 trips/employee		0.62 trips/employee			
Enter: 83%	Exit: 17%	Enter: 26%	Exit: 74%		

As shown in Table 1, September 2019 traffic count data estimates that the existing facility is currently generating 89 trips (74 entering and 15 exiting) during the weekday AM peak hour and 107 trips (28 entering and 79 exiting) during the weekday PM peak hour. It should be noted that the development was built-out to approximately 262,500 s.f. with 172 employees present during the shift that count data was collected.

Trip generation data for the existing facility was utilized to calculate a rate (trips per employee) for the weekday AM and PM peak hours. Illustrated in Table 1, the weekday AM peak hour is expected to generate 0.52 trips per employee for the expanded Hinton Oaks Industrial facility, with 83% of vehicles entering and 17% of vehicles exiting. The weekday PM peak hour is estimated to generate 0.62 trips per employee for the expanded facility, with 26% of vehicles entering and 74% of vehicles exiting. Table 2, below, shows the number of trips expected to be generated by the expanded facility based on the weekday AM and PM peak hour rates calculated in Table 1.

Table 2: Trip Generation for Expanded Hinton Oaks Industrial Facility

Land Use (ITE Code)	Intensity	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
		Enter	Exit	Enter	Exit
Existing Hinton Oaks Industrial Facility	172 employees	74	15	28	79
Proposed Expansion	100 employees	43	9	16	46
Expanded Hinton Oaks Industrial Facility (Total)	**272 employees**	**117**	**24**	**44**	**125**

Based on the trip generation rates calculated in Table 1, Table 2 shows that the expanded Hinton Oaks Industrial facility is expected to generate 141 total trips (117 entering and 24 exiting) during the weekday AM peak hour and 169 trips (44 entering and 125 exiting) during the weekday PM peak hour.

Table 3, below, provides a comparison of trip generation potential for the site based on the 2014 TIA trip generation (ITE *Trip Generation Manual*, 9th Edition) and trip generation data calculated for the expanded facility.

Table 3: Trip Generation Comparison

Land Use (ITE Code)	Intensity	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
		Enter	Exit	Enter	Exit
Expanded Hinton Oaks Industrial Facility	272 employees	117	24	44	125
Original TIA – Hinton Oaks Industrial Facility at Full Build-Out	502,500 s.f.	158	42	42	125
Difference		**-41**	**-18**	**+2**	**0**

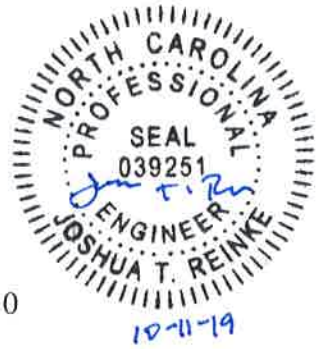
As shown in Table 3, based on the ITE *Trip Generation Manual*, 9th Edition, the updated TIA estimated that the proposed Hinton Oaks Industrial facility at full build-out was expected to generate 200 trips (158 entering and 42 exiting) during the weekday AM peak hour and 167 trips (42 entering and 125 exiting) during the weekday PM peak hour. The expanded Hinton Oaks Industrial facility is expected to generate a fewer number of trips during the weekday AM peak hour and a slightly greater number of trips in the weekday PM peak hour, compared to the number of trips calculated in the updated TIA. There are expected to be 59 fewer trips (41 entering and 18 exiting) during the weekday AM peak hour and 2 more trips (2 entering and 0 exiting) during the weekday PM peak hour.

Findings and Summary

The calculations provided in this letter are estimations of the trip generation potential for the expanded Hinton Oaks Industrial facility based on traffic count data conducted in September of 2019. Trips generated from the expanded facility were then compared to the trip generation data calculated (using the ITE *Trip Generation Manual*, 9th Edition) in the 2014 TIA for the proposed development at full build-out. Based on the trip generation results, it is expected that the expanded Hinton Oaks Industrial facility will generate fewer trips than what was calculated for the proposed facility at full build-out in the updated TIA during the weekday AM peak hour and only 2 additional trips during the weekday PM peak hour. The improvements identified in the updated TIA are expected to sufficiently handle the existing facility with the proposed expansion.

If you should have any questions, please feel free to contact me at (919) 872-5115

Sincerely,
RAMEY KEMP & ASSOCIATES, INC.



Joshua Reinke, P.E.
Transportation Manager
NC Corporate License # C-0910

Attachments: Excerpts from Original TIA
Count Data

UPDATED TRAFFIC IMPACT ANALYSIS

FOR THE

Knightdale Industrial Center

LOCATED
IN
Knightdale, NORTH CAROLINA

Prepared For:
Sam Bartton
PO Box 190
Knightdale, NC 27545

Prepared By:
Ramey Kemp & Associates, Inc.
5808 Faringdon Place, Suite 100
Raleigh, NC 27609
NC Corporate License # C-0910

September 2014

RKA Project #14118

5. TRIP GENERATION

The proposed development is expected to consist of 502,500 sq. ft. at ultimate build-out (2023). Average weekday daily, weekday AM peak hour, weekday PM peak hour, and Saturday peak hour trips for the proposed development were estimated utilizing methodology contained within the ITE *Trip Generation* Manual, 9th Edition. Table 2 provides a detailed summary of the trip generation potential for the site.

Table 2
Site Trip Generation (Interim Build Out/Ultimate Build Out)

Land Use (ITE Code)	Size	Unit	24 Hour Volumes (Weekday/Saturday)	AM Peak Hour Trips		PM Peak Hour Trips		Saturday Peak Hour Trips	
				Enter	Exit	Enter	Exit	Enter	Exit
Warehousing (150)	502.5	Th. Sq. Ft	1,980/620	158	42	42	125	40	25

The full build-out is estimated to generate approximately 1,980 weekday daily trips and 620 Saturday daily trips, with 200 new trips (158 entering and 42 exiting) during the weekday AM peak hour, 167 new trips (42 entering and 125 exiting) during the weekday PM peak hour, and 65 new trips (40 entering and 25 exiting) during the Saturday peak hour.

11. RECOMMENDATIONS

Based on the findings of this study, specific geometric and traffic control improvements have been identified at study intersections. The improvements are summarized below and are illustrated in Figure 10.

Knightdale Boulevard (US 64) and Hinton Oaks Boulevard

- Provide signal timing adjustments better accommodate the future traffic patterns and reduce queuing for the eastbound left-turn lane. It should be noted that the signal timing adjustments are not needed to maintain an overall LOS D for the combined (2023) conditions, but are needed due to the expected background increase in traffic for the eastbound left-turn movement and the additional site traffic for this movement. It should be noted that if the background traffic volumes continue to grow as expected, signal timings along the Knightdale Boulevard corridor will likely need to be retimed to best accommodate the future traffic volumes by the build-out year (2023).

Hinton Oaks Boulevard and Target Driveway

- While, it is not likely that this intersection will have sustained traffic volumes that would warrant a traffic signal due to the relatively low thru traffic volumes on Hinton Oaks Boulevard at site build-out, it is recommended that a traffic signal warrant be conducted when the delays become significant on the minor street approaches.

Hinton Oaks Boulevard and Site Driveways # 1 - # 7

- Provide one (1) ingress lane and one (1) egress lane for all site driveways.
- Provide appropriate stop sign control for the minor street approaches for all site driveways.

It should be noted that the extension of Hinton Oaks Boulevard will need to be constructed to meet the Town standards.

N

SITE

Site Drive #7

Site Drive #6

Site Drive #5

Site Drive #4

Site Drive #3

Site Drive #2

Site Drive #1

Target Driveway

165'

TWLTL

200'

300'

340'

170'

300'

200'

350'

150'

Hinton Oaks Boulevard

Knightdale Boulevard (NC 64)

1

Ramp B

Knightdale Blvd.

500'

515'

Northbound Ramp

Northbound Ramp

I-540 Northbound

I-540 Southbound

Ramp B

Southbound Ramp A

Southbound Ramp A

SITE

LEGEND

Signalized Intersection

Unsignalized Intersection

X' Existing Lane with Storage

X' Recommended Lane with Storage

Phasing/Signal Timing Improvements - Needed for Queue Reduction, Not for LOS D

RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Industrial Center
Knightdale, North Carolina

Recomended Lanes

Scale: Not to Scale | Figure 10

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File Name : Hinton Oaks Industrial Site Driveways
Site Code : 00090419
Start Date : 9/4/2019
Page No : 1

Groups Printed- Cars and Trucks

	Hinton Oaks Boulevard From North					From East					Hinton Oaks Boulevard From South					From West							
Start Time	Right	Thru	Left	TRKS	App. Total	Right	Thru	Left	TRKS	App. Total	Right	Thru	Left	TRKS	App. Total	Right	Thru	Left	TRKS	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	2	0	0	2	0	0	0	0	0	0	29	0	1	29	0	0	0	0	0	1	31	32
07:15 AM	0	5	0	0	5	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	17	17
07:30 AM	0	2	0	0	2	0	0	0	0	0	0	20	0	2	20	0	0	0	0	0	2	22	24
07:45 AM	0	6	0	0	6	0	0	0	0	0	0	13	0	0	13	0	0	0	0	0	0	19	19
Total	0	15	0	0	15	0	0	0	0	0	0	74	0	3	74	0	0	0	0	0	3	89	92
08:00 AM	0	5	0	0	5	0	0	0	0	0	0	18	0	0	18	0	0	0	0	0	0	23	23
08:15 AM	0	7	0	1	7	0	0	0	0	0	0	9	0	1	9	0	0	0	0	0	2	16	18
08:30 AM	0	12	0	2	12	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	2	23	25
*** BREAK ***																							
Total	0	24	0	3	24	0	0	0	0	0	0	38	0	1	38	0	0	0	0	0	4	62	66
*** BREAK ***																							
04:00 PM	0	28	0	2	28	0	0	0	0	0	0	6	0	2	6	0	0	0	0	0	4	34	38
04:15 PM	0	8	0	0	8	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	16	16
04:30 PM	0	28	0	1	28	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	1	33	34
04:45 PM	0	15	0	0	15	0	0	0	0	0	0	9	0	2	9	0	0	0	0	0	2	24	26
Total	0	79	0	3	79	0	0	0	0	0	0	28	0	4	28	0	0	0	0	0	7	107	114
05:00 PM	0	17	0	2	17	0	0	0	0	0	0	6	0	1	6	0	0	0	0	0	3	23	26
05:15 PM	0	10	0	5	10	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	5	13	18
05:30 PM	0	27	0	1	27	0	0	0	0	0	0	5	0	3	5	0	0	0	0	0	4	32	36
05:45 PM	0	15	0	2	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	15	17
Total	0	69	0	10	69	0	0	0	0	0	0	14	0	4	14	0	0	0	0	0	14	83	97
Grand Total	0	187	0	16	187	0	0	0	0	0	0	154	0	12	154	0	0	0	0	0	28	341	369
Apprch %	0	100	0			0	0	0			0	100	0			0	0	0					
Total %	0	54.8	0		54.8	0	0	0		0	0	45.2	0		45.2	0	0	0		0	7.6	92.4	

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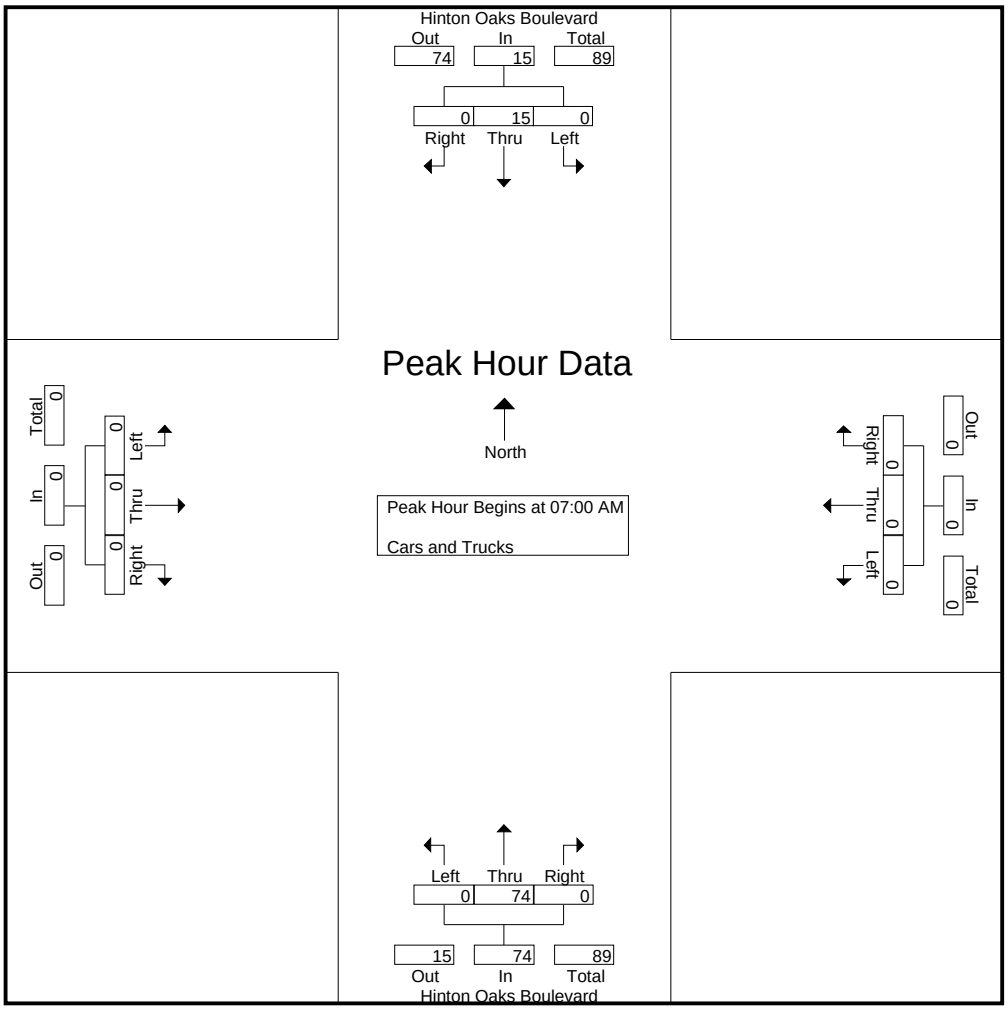
File Name : Hinton Oaks Industrial Site Driveways
Site Code : 00090419
Start Date : 9/4/2019
Page No : 2

	Hinton Oaks Boulevard From North				From East				Hinton Oaks Boulevard From South				From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	2	0	2	0	0	0	0	0	29	0	29	0	0	0	0	31
07:15 AM	0	5	0	5	0	0	0	0	0	12	0	12	0	0	0	0	17
07:30 AM	0	2	0	2	0	0	0	0	0	20	0	20	0	0	0	0	22
07:45 AM	0	6	0	6	0	0	0	0	0	13	0	13	0	0	0	0	19
Total Volume	0	15	0	15	0	0	0	0	0	74	0	74	0	0	0	0	89
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.625	.000	.625	.000	.000	.000	.000	.000	.638	.000	.638	.000	.000	.000	.000	.718



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Page No : 3

	Hinton Oaks Boulevard From North				From East				Hinton Oaks Boulevard From South				From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	28	0	28	0	0	0	0	0	6	0	6	0	0	0	0	34
04:15 PM	0	8	0	8	0	0	0	0	0	8	0	8	0	0	0	0	16
04:30 PM	0	28	0	28	0	0	0	0	0	5	0	5	0	0	0	0	33
04:45 PM	0	15	0	15	0	0	0	0	0	9	0	9	0	0	0	0	24
Total Volume	0	79	0	79	0	0	0	0	0	28	0	28	0	0	0	0	107
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.705	.000	.705	.000	.000	.000	.000	.000	.778	.000	.778	.000	.000	.000	.000	.787