

**DRAFT**

**SIGNAL WARRANT ANALYSIS**

For

CR 44 AT APIARY ROAD

Prepared for:

LAKE COUNTY DEPARTMENT OF PUBLIC WORKS  
Work Order: 11

HNTB No. 40677-PL-011

Prepared by:



Lake Mary, Florida

May 20, 2005

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## EXECUTIVE SUMMARY

*HNTB* conducted a Traffic Signal Warrant Study at the intersection of CR 44 and Apiary Road, Lake County, Florida. Based on the results of the analysis, field observations, and engineering judgment, the following recommendations and conclusions were developed:

1. A fully actuated traffic signal should not be installed at the intersection based on the following criteria:
  - a. None of the applicable warrants are satisfied.
  - b. A crash trend that would be correctable by the installation of a traffic signal has not been identified.
  - c. Minimal delay was observed at the intersection. The installation of a traffic signal would likely increase the side street delay.
  - d. The installation of a traffic signal may lead to an increase in high-speed rear-end crashes.
2. Consideration should be given to relocating the sign and trimming the tree to the east of the intersection that hinders the northbound driver's line of sight.
3. Restripe the pavement markings at the intersection through routine maintenance.
4. Repair the broken pavement in the corners of the intersection due to large construction vehicles tracking off the roadway.

### 1. INTRODUCTION

Lake County Department of Public Works has retained *HNTB* to perform a Traffic Signal Warrant Study at CR 44 at Apiary Road in the city of Grand Island, Lake County, Florida. The analysis methods used in conducting this study are consistent with those set forth in the Manual on Uniform Traffic Control Devices (MUTCD 2003), the Manual on Uniform Traffic Studies (MUTS), and Lake County guidelines and procedures.

Figure 1-Project Location Map



## 2. EXISTING CONDITIONS

The study intersection is located in Lake County. Significant features for the intersection are summarized below:

**Table 1-Summary of Existing Conditions**

Feature	Description
<b>Main Street</b>	<ul style="list-style-type: none"> <li>CR 44</li> </ul>
<b>Side Streets</b>	<ul style="list-style-type: none"> <li>Apiary Road</li> </ul>
<b>Area Location</b>	<ul style="list-style-type: none"> <li>The intersection is located approximately 3.5 miles west of SR 19.</li> </ul>
<b>Surrounding Development</b>	<ul style="list-style-type: none"> <li>Development along CR 44 is primarily rural.</li> </ul>
<b>Land Uses at Intersections</b>	<ul style="list-style-type: none"> <li>Northeast-Vacant</li> <li>Northwest-Houses</li> <li>Southwest- Construction Site</li> <li>Southeast-Construction Site</li> </ul>
<b>Pedestrian Generators</b>	<ul style="list-style-type: none"> <li>None</li> </ul>
<b>Traffic Control</b>	<ul style="list-style-type: none"> <li>Stop sign control</li> </ul>
<b>Adjacent Signalized Intersections</b>	<ul style="list-style-type: none"> <li>CR 452 approximately 2.8 miles to the east</li> <li>CR 473 approximately 3.2 miles to the west</li> </ul>
<b>CR 44</b>	<ul style="list-style-type: none"> <li><u>Function</u>-Rural road connecting SR 44 and US 441</li> <li><u>Connectivity</u>-CR 452 to the east and CR 473 to the west</li> <li><u>Cross Section</u>-Two lane undivided rural road with open drainage</li> <li><u>Posted Speed Limit</u>- 55 mph</li> <li><u>East Approach Lanes</u>-One right turn lane and one through lane</li> <li><u>West Approach Lanes</u>- One left turn lane and one through lane</li> <li><u>Alignment</u>-Vertical curve located to the west of the intersection and a horizontal curve located to the east.</li> <li><u>Sidewalks</u>- None</li> <li><u>Utilities</u>-Power lines on the north side of CR 44 and buried fiber optic and telephone cable also on north side of CR 44</li> <li><u>Street Lighting</u>- None</li> </ul>
<b>Apiary Road</b>	<ul style="list-style-type: none"> <li><u>Function</u>-Access to private houses</li> <li><u>Connectivity</u>-CR 452 to the north</li> <li><u>Cross Section</u>-Two 11' lanes with a open drainage system</li> <li><u>Posted Speed Limit</u>-40 mph</li> <li><u>North Approach Lanes</u>-One multi-purpose lane</li> <li><u>South Approach Lanes</u>-Dirt road providing access to a construction site</li> <li><u>Alignment</u>- Skewed at the intersection.</li> <li><u>Sidewalks</u>-None</li> <li><u>Utilities</u>-Power lines on the west side</li> <li><u>Street Lighting</u>-None</li> </ul>

**Exhibit 1-North Approach Photographs**



**Looking South into the intersection along Apiary Road**



**Looking North from the intersection along Apiary Road**

**Exhibit 2-South Approach Photographs**



**Looking North into the intersection along Apiary Road**



**Looking South from the intersection along Apiary Road**

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**Exhibit 3-West Approach Photographs**



**Looking East into the intersection along CR 44**



**Looking West from the intersection along CR 44**



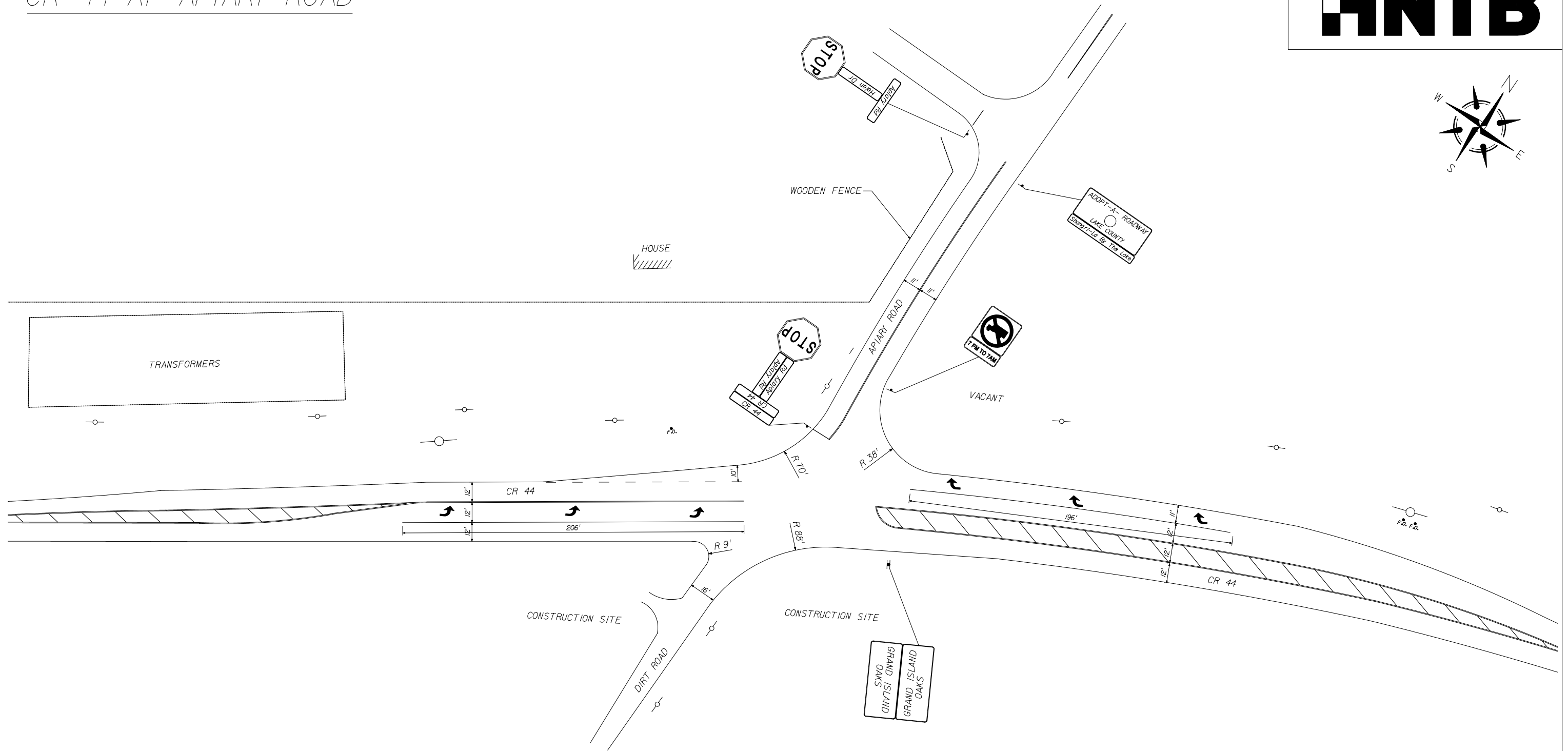
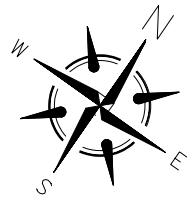
**Exhibit 4-East Approach Photographs**



**Looking West into the intersection along CR 44**

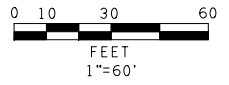


**Looking East from the intersection along CR 44**



	TREES		LIGHT POLE		DELINEATOR
	HEDGE		SIGNAL HEAD		HYDRANT
	DITCH BOTTOM INLET		MITERED END SECTION		COMBINATION POLE
	POWER POLE		FIBER OPTIC LINE		FENCE
	SIGN		CONTROLLER CABINET		GUARDRAIL
	TRAFFIC SIGNAL POLE		BUILDING		

CONDITION DIAGRAM  
LAKE COUNTY PUBLIC WORKS  
FIGURE 2



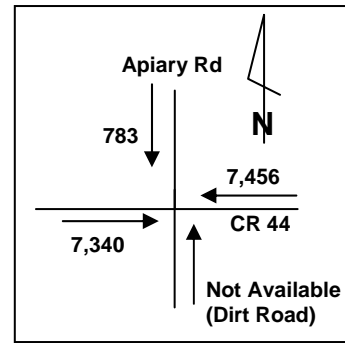
\*\*\*\*\*NAME\*\*\*\*\*  
#DATE#  
\*\*\*\*\*SITE\*\*\*\*\*  
\*\*\*\*\*DGN SPECIFICATION\*\*\*\*\*

## Traffic Volumes

Twenty-four hour machine approach counts were collected on the approaches to the intersection. These counts are summarized in the adjacent figure.

Eight-hour turning movement counts were performed at the intersection. The count hours extended from 7:00 AM to 9:00 AM, 10:00 AM to 12:00PM and 2:00PM to 6:00 PM. The turning movement count reveal that the peak traffic volumes on CR 44 occur from 5:00 to 6:00 PM. The peak traffic volumes on Apiary Road occur from 7:00 to 8:00 AM with 92 vph approaching the intersection southbound.

Twenty-Four Hour Volumes



The following tables summarize the minimum and maximum and distribution of turning movements at each intersection:

Table 2-Summary of Traffic Volumes and Turning Movement Percentages

MOVEMENT		NB		SB		EB		WB	
		Min	Max	Min	Max	Min	Max	Min	Max
Left	Volume	0	1	10	39	12	32	0	4
	App % Avg	20%		40%		5%		< 1%	
Through	Min - Max	0	0	0	0	370	583	369	537
	App % Avg	0%		0%		95%		96%	
Right	Min - Max	0	4	13	53	0	1	7	28
	App % Avg	80%		60%		0%		3%	
U-Turn	Min - Max	0	0	0	0	0	0	0	0
	App % Avg	0%		0%		0%		0%	

There were no pedestrians and one bicyclist observed during the count period at the intersection.

## Collision Data

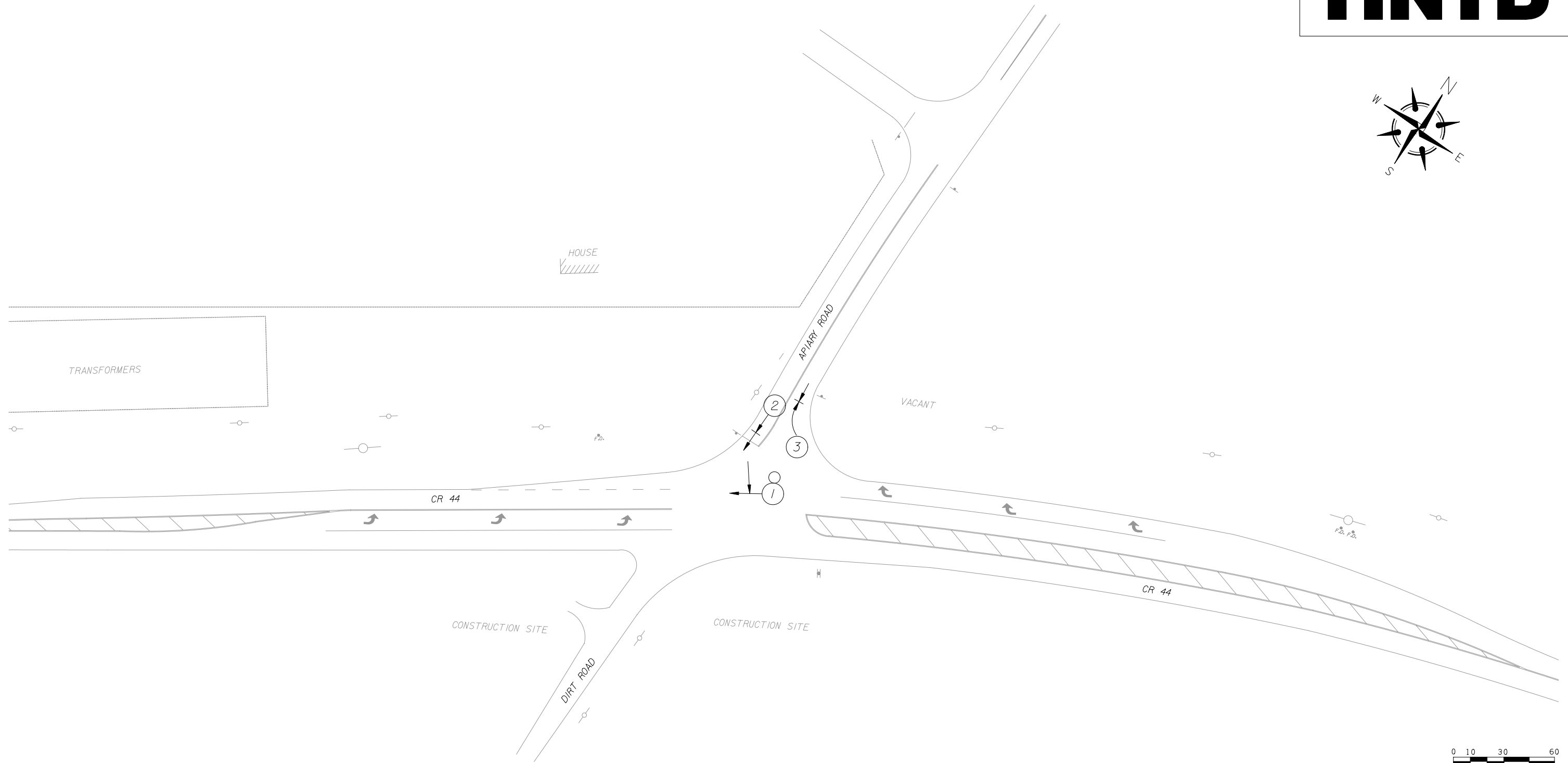
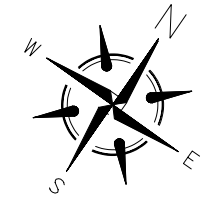
Crash data was provided by Lake County Public Works for the 27-month period ending in March 2005. Three crashes occurred at the intersection. The crashes resulted in three injuries and \$25,000 in property damage.

**Intersection Delay**

Intersection delay studies were performed for the northbound and southbound movements from Apiary Road for the morning, off-peak, and afternoon peak periods. The results of the delay studies are as follows:

**Table 3-Summary of Delay Studies**

Movement	Period	Time	Maximum Queue (Veh)	Average Delay per Vehicle (Sec)	Volume (Veh/Hr)	Total Delay (Veh-Sec)	Total Delay (Veh-Hr)
Northbound	AM	7:00-8:00	1	23	1	23	0.01
	Off	10:00-11:00	1	10	2	20	0.01
	PM	5:00-6:00	1	10	1	10	0.00
Southbound	AM	7:00-8:00	3	12	92	1,104	0.31
	Off	10:00-11:00	3	16	53	848	0.24
	PM	5:00-6:00	2	16	37	592	0.16



SYMBOLS:

- |  |                       |  |                     |  |                    |
|--|-----------------------|--|---------------------|--|--------------------|
|  | REAR-END COLLISION    |  | COLLISION W/ PED.   |  | HEAD-ON COLLISION  |
|  | SIDE SWIPE            |  | OUT OF CONTROL      |  | OVERTURNED VEHICLE |
|  | RIGHT ANGLE COLLISION |  | LEFT TURN COLLISION |  | PERSONAL INJURY    |
|  |                       |  |                     |  | FATALITY           |

COLLISION DIAGRAM  
LAKE COUNTY PUBLIC WORKS

FIGURE 3

Table 4 - Collision Summary

COLLISION SUMMARY SPOT SUMMARY																								
Section:		11050												Route:		CR 44								
Intersecting Street:		Apiary Road												County:		Lake								
Source Data:		Hard Copy Crash Reports												City:		Grand Island								
Study Period:		From 1/1/2004 to 12/31/2005												24 Months										
No.	Long or Short Form	Date and Time			Driver & Vehicle At Fault							Environment			Harmful Event					Contributing Causes				
		Date	Day	Time	DOB	Age	Alcohol / Drugs	Physical Defect	Residence	Vehicle Type	Vehicle Defect	Lighting Condition	Roadway Surface	Weather	Fatal	Injury	Most Severe Injury	Harmful Event	Property Damage	Road	Sight Obstruction	Citation Issued	Contributing Cause	
1	L	10/20/2004	Wednesday	16:15	7/16/1988	16	None	None	County of Crash	Automobile	None	Daylight	Wet	Rain	0	3	Non-Incapacitating	Angle	\$10,000	None	None	Yes	FTYROW	
2	S	11/2/2004	Tuesday	7:30	11/25/1968	36	None	None	County of Crash	Passenger Van	None	Daylight	Dry	Clear	0	0	None	Rear End	\$3,000	None	None	Yes	Careless Driving	
3	S	3/17/2005	Thursday	17:20	5/6/1983	22	None	None	County of Crash	Automobile	None	Daylight	Wet	Rain	0	0	None	Head On	\$12,000	None	Incident Weather	Yes	Improper Turn	
Total Crashes	LF Crashes	Fatal	Injury	P.D.	Rear End	Bike	Angle	Left Turn	Right Turn	Sideswipe	Backed Into	Improper lane change	Improper Backing	Followed too Closely	Left of C	All Other	Daylight	Dark (SL)	Wet	Dry	Careless Driving	Disregarded Traffic Signal	FTYROW	
3	1	0	1	3	1	0	1	0	0	0	0	0	0	0	0	0	3	0	2	1	1	0	1	
%	33%	0%	33%	100%	33%	0%	33%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	67%	33%	33%	0%	33%	
Entering Volume		15,579			Crash Rate			0.53			Safety Ratio			0.31										

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### 3. QUALITATIVE ASSESSMENT

The intersection of CR 44 and Apiary Road was observed by a registered professional engineer during the morning and afternoon peak periods to assess existing operating conditions and to determine the type of intersection traffic control that is in the best interest of the traveling public.

***Request:*** A request was made to change the intersection control from stop sign control to traffic signal control. Vehicle operations and safety are the primary areas of interest in determining the need for a change in intersection traffic control.

***Operations:*** Operations include the efficiency of operation and interaction of motor vehicles, pedestrians, and bicycles at the intersection. Following are the field observations relating to these factors:

- Traffic on CR 44 is characterized by moderate volumes (15,000 vpd), high travel speeds, and significant gaps between platoons of vehicles. As such, the delay and queuing for motorists entering CR 44 is minor.
- Minimal queuing and delay was observed on the southbound approach during the morning, off peak, and afternoon peak periods. The delay studies indicate a maximum vehicle queue of 3 vehicles. Average delay for the approach was less than 16secs/veh during each of the peak periods.
- Minimal queuing on the northbound approach was also observed. The traffic volumes on this approach are minimal and averaged approximately 2 vehicles/hour. A significant construction effort is underway along the south approach and it is likely that the traffic on this approach will likely increase after the construction has concluded.
- Vehicles on CR 44 appear to be traveling at or above the posted 55 MPH speed limit.
- The westbound approach of the intersection is located within the limits of a horizontal curve. The line of sight for southbound drivers was unobstructed by the curve and was measured to exceed 1,000 feet which meets the FDOT sight distance criteria for passenger, single-unit, and combination vehicles (Index 546). However, the line of sight from the northbound approach was measured to be 650 feet. This meets the criteria for passenger vehicles, but does not meet the single unit or combination vehicle criteria. Additionally, a sign and tree partially obstruct the line of sight from the northbound approach. ***Consideration should be given to relocating the sign and trimming the tree to improve the northbound driver's line of sight to the curve.***
- A vertical curve is located a few hundred feet west of the intersection. The line of sight from both the northbound and southbound approaches was measured to exceed 1,000 feet to the west. This exceeds the FDOT criteria for line of sight.
- The side street approaches are slightly skewed as they intersect CR 44. On occasion, an eastbound left turn vehicle would complete a wide turn on Apiary Road as a result of the skewed approach. However, no conflicts were observed as a result of the wide turns.

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**Safety:** Vehicle, pedestrian, and bicycle safety at the intersection are assessed through review of crash reports, identification of significant crash trends, then correlation to field conditions. Following are the observations relating to the safety of the intersection.

- According to the information provided by Lake County Public Works, three crashes occurred at the intersection during the three-year period.
- The first crash was an angle crash. A southbound 16 year-old driver failed to yield the right-of-way to a westbound driver. The crash occurred in daylight and on wet pavement. The crash resulted in three injuries.
- The second crash was a rear end crash between two southbound vehicles. The crash occurred during daylight and under dry pavement conditions. The crash did not result in injury.
- The third crash was a head-on crash between a southbound vehicle and a westbound right turn vehicle. The westbound driver completed a wide turn and struck the southbound vehicle. The crash occurred on dry pavement during daylight hours. No injuries were reported.
- The angle crash is considered correctable through the installation of traffic signal control at the intersection.

**Maintenance:** In addition to observing operational and safety conditions, correctible maintenance items are also identified during the field review. Following is a summary of maintenance items observed at the intersection.

- The pavement markings at the intersection were observed to be in fair to poor condition. Portions of the double yellow striping on the north approach and turn arrows on the mainline have become worn. ***The pavement markings at the intersection should be reapplied the next time routine maintenance is being performed at the intersection.***
- Large construction trucks were observed tracking off the roadway to complete the eastbound right turn movement. Broken pavement and a drop-off condition has developed as a result of this maneuver (see picture below). ***Consideration should be given to repairing the intersection radii after the construction has been completed along the south approach.***





## 4. SIGNAL WARRANT ANALYSIS

The traffic volumes and geometric conditions at the intersection of CR 44 at Apiary Road were compared with the warrants for the installation of traffic signals contained in the Manual on Uniform Traffic Control Devices (MUTCD-2003) and Manual on Uniform Traffic Studies (MUTS).

For the purposes of the Signal Warrant Analysis, CR 44 is considered the major street and Apiary Road the minor street. Based on the posted speed limit of 55 mph, the 70 percent volume criterion was applied to the analysis. The side street right turn movements were used in the warrants as the right turn vehicles were delayed by the left turn vehicles. The following table summarizes the volumes used:

The following table summarizes the results of the warrant analysis during the study hours:

**Table 5-Summary of Signal Warrant Analysis**

Warrant		Applicable	Satisfied	Comments
1A	Minimum Vehicular Volume	Yes	No	The side street traffic volumes do not meet the 100% requirements of this warrant.
1B	Interruption of Continuous Traffic	Yes	No	The side street traffic volumes do not meet the 100% or 80% requirements of this warrant.
2	Four Hour Vehicular Volume	Yes	No	The side street traffic volumes do not meet the requirements of this warrant.
3A	Peak Hour Delay	No	No	This warrant is not satisfied by the level of delay experienced by motorists on the side street.
3B	Peak Hour Volume	No	Yes	The peak hour volume satisfies the warrant; however, an unusual traffic condition justifying the use of the warrant does not exist.
4	Pedestrian Volume	Yes	No	The pedestrian volumes do not satisfy this warrant.
5	School Crossing	No	No	This warrant is not applicable, as no school zone exists at the intersection.
6	Coordinated Signal System	No	No	This warrant is not applicable as this intersection is not within a coordinated signal system.
7	Crash Experience	Yes	No	This warrant is not satisfied as there were not at least five crashes potentially correctable by a traffic signal that occurred within the 12-month study period.
8	Roadway Network	No	No	This warrant is not applicable, as this intersection is not considered to be part of a coordinated network.

# TRAFFIC SIGNAL WARRANT SUMMARY

City: Unincorporated  
County: LAKE

Engineer: SG  
Date: May 20, 2005

Major Street: CR 44  
Minor Street: Apiary Road

Lanes: 1 Critical Approach Speed: 55  
Lanes: 1

**Volume Level Criteria**

- 1. Is the critical speed of major street traffic > 70 km/h (40 mph) ?  Yes  No
  - 2. Is the intersection in a built-up area of isolated community of <10,000 population?  Yes  No
- If Question 1 or 2 above is answered "Yes", then use "70%" volume level  70%  100%

**WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME**

Applicable:  Yes  No  
Satisfied:  Yes  No

Warrant 1 is satisfied if Condition A or Condition B is "100%" satisfied.  
Warrant is also satisfied if both Condition A and Condition B are "80%" satisfied.

**Condition A - Minimum Vehicular Volume**

100% Satisfied:  Yes  No  
80% / 56% Satisfied:  Yes  No

(volumes in veh/hr)	Minimum Requirements (80% Shown in Brackets)				Eight Highest Hours							
	1		2 or more		700	800	1000	1100	1400	1500	1600	1700
	100%	70%	100%	70%								
Both Approaches on Major Street	500 (400)	350 (280)*	600 (480)	420 (336)*	983	1,008	773	803	829	969	1,058	1,110
Highest Approach on Minor Street	150 (120)	105 (84)*	200 (160)	140 (112)*	92	35	53	31	37	36	33	37

Record 8 highest hours and the corresponding volumes in boxes provided. Condition is 100% satisfied if the minimum volumes are met for eight hours. Condition is (80%) / (56%)\* satisfied if parenthetical volumes are met for eight hours.

**Condition B - Interruption of Continuous Traffic**

Applicable:  Yes  No  
Excessive Delay/Conflict:  Yes  No  
100% Satisfied:  Yes  No  
80% / 56% Satisfied:  Yes  No

Condition B is intended for application where the traffic volume is so heavy that traffic on the minor street suffers excessive delay or conflict.

(volumes in veh/hr)	Minimum Requirements (80% Shown in Brackets) {56% Shown in Brackets}				Eight Highest Hours							
	1		2 or more		700	800	1000	1100	1400	1500	1600	1700
	100%	70%	100%	70%								
Both Approaches on Major Street	750 (600)	525 (420)*	900 (720)	630 (504)*	983	1,008	773	803	829	969	1,058	1,110
Highest Approach on Minor Street	75 (60)	53 (42)*	100 (80)	70 (56)*	92	35	53	31	37	36	33	37

Record 8 highest hours and the corresponding volumes in boxes provided. Condition is 100% satisfied if the minimum volumes are met for eight hours. Condition is (80%) / (56%)\* satisfied if parenthetical volumes are met for eight hours.

# TRAFFIC SIGNAL WARRANT SUMMARY

City: Unincorporated  
County: LAKE

Engineer: SG  
Date: May 20, 2005

Major Street: CR 44  
Minor Street: Apiary Road

Lanes: 1 Critical Approach Speed: 55  
Lanes: 1

**Volume Level Criteria**

- 1. Is the critical speed of major street traffic > 70 km/h (40 mph) ?  Yes  No
  - 2. Is the intersection in a built-up area of isolated community of <10,000 population?  Yes  No
- If Question 1 or 2 above is answered "Yes", then use "70%" volume level  70%  100%

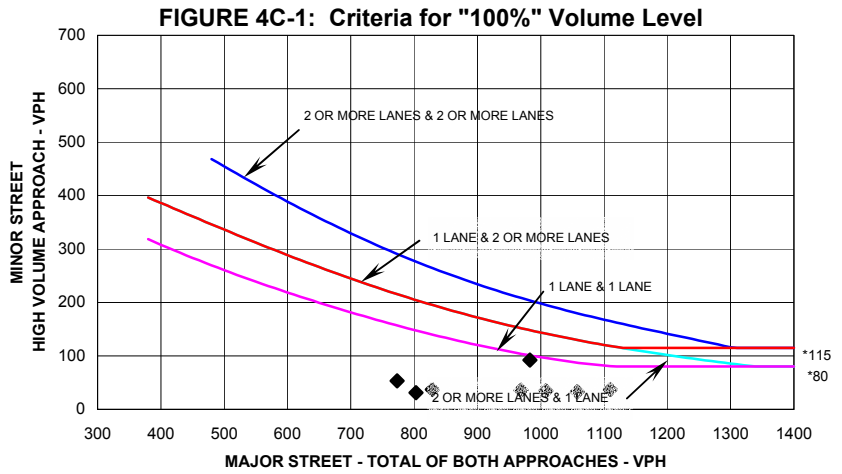
**WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME**

*If all four points lie above the appropriate line, then the warrant is satisfied.*

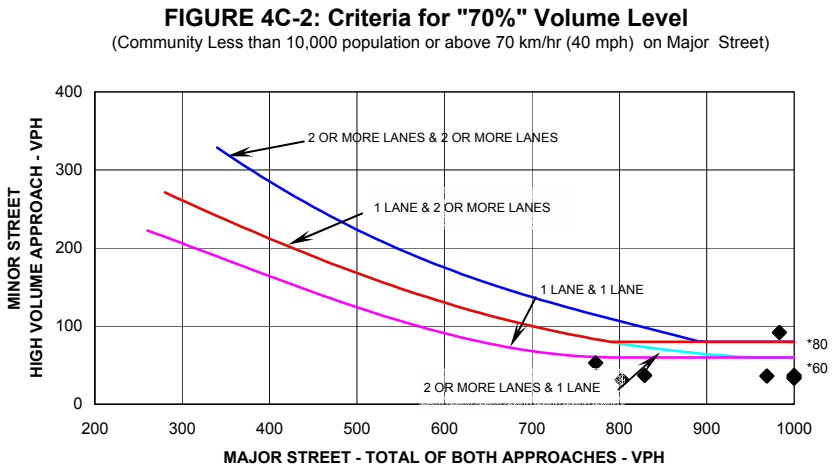
Applicable:  Yes  No  
Satisfied:  Yes  No

*Plot four volume combinations on the applicable figure below.*

Warranting Volumes			Met	
Hour	Major Street	Minor Street	100%	70%
700	983	92		<input checked="" type="checkbox"/>
800	1,008	35		
1000	773	53		
1100	803	31		
1400	829	37		
1500	969	36		
1600	1,058	33		
1700	1,110	37		



\* Note: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume threshold for a minor street approach with one lane.



\* Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume threshold for a minor street approach with one lane.

# TRAFFIC SIGNAL WARRANT SUMMARY

City: Unincorporated  
 County: LAKE

Engineer: SG  
 Date: May 20, 2005

Major Street: CR 44  
 Minor Street: Apiary Road

Lanes: 1 Critical Approach Speed: 55  
 Lanes: 1

### Volume Level Criteria

- 1. Is the critical speed of major street traffic > 70 km/h (40 mph) ?  Yes  No
  - 2. Is the intersection in a built-up area of isolated community of <10,000 population?  Yes  No
- If Question 1 or 2 above is answered "Yes", then use "70%" volume level  70%  100%

### WARRANT 3 - PEAK HOUR

If all three criteria are fulfilled or the plotted point lies above the appropriate line, then the warrant is satisfied.

Applicable:  Yes  No  
 Satisfied:  Yes  No

Unusual condition justifying use of warrant:

N/A

Record hour when criteria are fulfilled and the corresponding delay or volume in boxes provided.

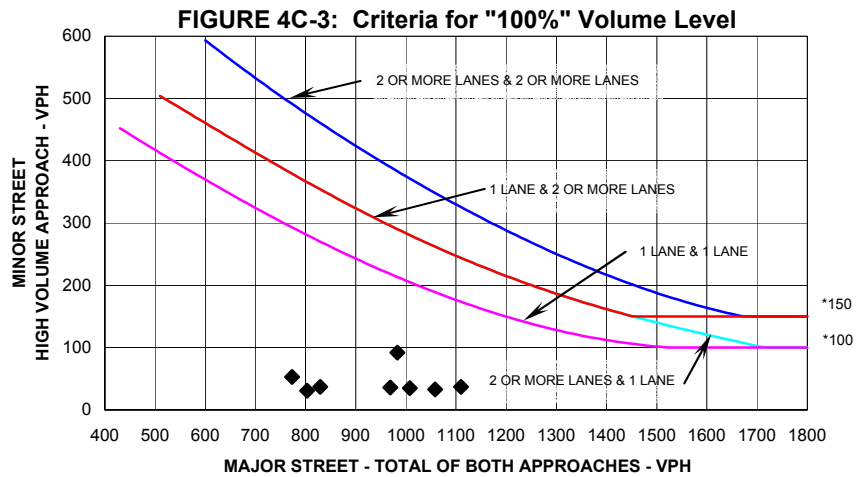
Warranting Volumes			100%	70%
700	983	92		<input checked="" type="checkbox"/>
800	1,008	35		
1000	773	53		
1100	803	31		
1400	829	37		
1500	969	36		
1600	1,058	33		
1700	1,110	37		

1. Delay on Minor Approach *(vehicle-hours)		
Approach Lanes	1	2
Delay Criteria*	4.0	5.0
Delay*	0.3	0.0
Fulfilled?:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

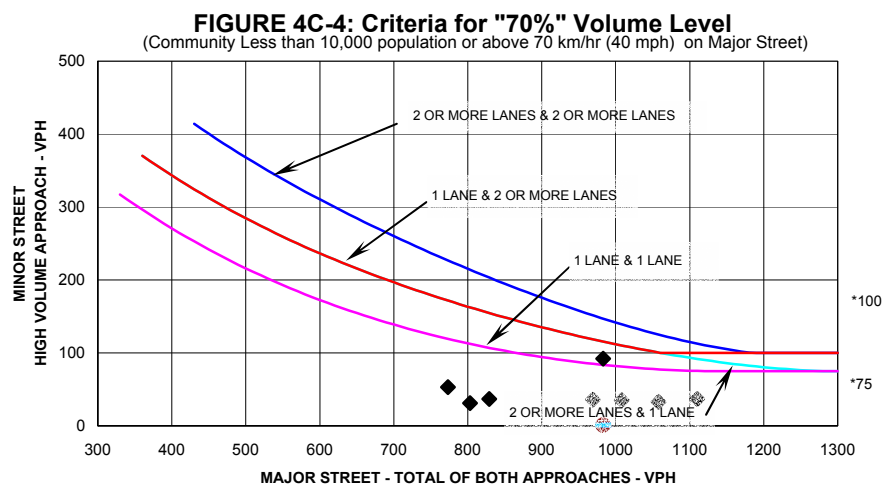
2. Volume on Minor Approach *(vehicles per hour)		
Approach Lanes	1	2
Volume Criteria*	100	150
Volume*	92	0
Fulfilled?:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

3. Total Entering Volume *(vehicles per hour)		
No. of Approaches	3	4
Volume Criteria*	650	800
Volume*	0	983
Fulfilled?:	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Plot volume combination on the applicable figure below.



\* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume threshold for a minor street approach with one lane.



\* Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume threshold for a minor street approach with one lane.

**Exhibit 8**

## TRAFFIC SIGNAL WARRANT SUMMARY

City: Unincorporated  
County: LAKE

Engineer: SG  
Date: May 20, 2005

Major Street: CR 44  
Minor Street: Apiary Road

Lanes: 1 Critical Approach Speed: 55  
Lanes: 1

**WARRANT 4 - PEDESTRIAN VOLUME**

*Record hours where criteria are fulfilled and the corresponding volume or gap frequency in the boxes provided. The warrant is satisfied if condition 1 or 2 is fulfilled and condition 3 is fulfilled.*

Applicable:  Yes  No  
Satisfied:  Yes  No

Criteria	Hour	Pedestrian Volume	Pedestrian Gaps	Fulfilled?	
				Yes	No
1. Pedestrian volume crossing the major street is 100 ped/hr or more for each of any four hours <u>and</u> there are less than 60 gaps per hour in the major street traffic stream of adequate length.	1500	0	0		
	1600	0	0		
	1700	0	0		
	1800	0	0		<input checked="" type="checkbox"/>
2. Pedestrian volume crossing the major street is 190 ped/hr or more for any one hour <u>and</u> there are less than 60 gaps per hour in the major street traffic stream of adequate length.	700	0	0		<input checked="" type="checkbox"/>
3. The nearest traffic signal along the major street is located more than 90 m (300 ft) away, or the nearest signal is within 90 m (300 ft) but the proposed traffic signal will not restrict the progressive movement of traffic.				<input checked="" type="checkbox"/>	

**WARRANT 5 - SCHOOL CROSSING**

*Record hours where criteria are fulfilled and the corresponding volume or gap frequency in the boxes provided. The warrant is satisfied if all three of the criteria are fulfilled.*

Applicable:  Yes  No  
Satisfied:  Yes  No

Criteria			Fulfilled?	
	Yes	No	Yes	No
1. There are a minimum of 20 students crossing the major street during the highest crossing hour.	Students: 0	Hour: 0		<input checked="" type="checkbox"/>
2. There are fewer adequate gaps in the major street traffic stream during the period when the children are using the crossing than the number of minutes in the same period.	Minutes: 0	Gaps: 0		<input checked="" type="checkbox"/>
3. The nearest traffic signal along the major street is located more than 90 m (300 ft) away, or the nearest signal is within 90 m (300 ft) but the proposed traffic signal will not restrict the progressive movement of traffic.			<input checked="" type="checkbox"/>	

**WARRANT 6 - COORDINATED SIGNAL SYSTEM**

*Indicate if the criteria are fulfilled in the boxes provided. The warrant is satisfied if either criterion is fulfilled. This warrant should not be applied when the resulting signal spacing would be less than 300 m (1,000 ft).*

Applicable:  Yes  No  
Satisfied:  Yes  No

Criteria	Fulfilled?	
	Yes	No
1. On a one-way street or a street that has traffic predominately in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.		<input checked="" type="checkbox"/>
2. On a two-way street, adjacent signals do not provide the necessary degree of platooning, and the proposed and adjacent signals will collectively provide a progressive operation.		<input checked="" type="checkbox"/>

Source: Revised from NCHRP Report 457



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## 5. BENEFIT/COST ANALYSIS

According to the Highway Safety Improvement Program Guidelines issued by the Florida Department of Transportation, the intersection improvements should be based upon the results of a benefit-cost analysis. The purpose of this analysis is to determine the benefit of the improvements versus the cost of installing new signal.

A Benefit cost analysis was performed using the collisions provided by Lake County and the forms from the FDOT Safety Office. Only long form crash reports are used in the benefit-cost analysis. According to the Segment Based Crash Rate Statistics produced in March 2004, the cost per collision for a rural 2-lane undivided section ranges from \$210,776 (without injury) to \$250,900 (with injury). Since the angle crash (which is the only long form crash) resulted in injuries, the "with injury" figure was used. Although providing new signal at the intersection is not warranted, cost of installing a new signal has been provided for informational purposes.

Form 511, from the Safety Office, has been completed and indicates a Benefit/Cost ratio of 11.0. The completed Form 511 has been included on the following page. A construction estimate has been included in the Appendix.

Exhibit 10 - Form 511

FORM 511-09

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
SAFETY OFFICE ANNUAL BENEFIT COST ANALYSIS

1. SUBMITTED BY **HNTB Corp** WPA NO. \_\_\_\_\_ 5. SAFETY PRIORITY \_\_\_\_\_  
 2. DATE SUBMITTED **05/20/05** ENV. STUDY \_\_\_\_\_  
 3. PROJECT NO. \_\_\_\_\_ SKID (ID) \_\_\_\_\_  
 4. ALTERNATIVE NO. **Install Traffic Signal** SN \_\_\_\_\_ SPEED \_\_\_\_\_

6. DISTRICT \_\_\_\_\_ COUNTY **Lake** SECTION **N/A** COUNTY RD **44**

7. BEGIN MILE POST \_\_\_\_\_ END MILE POST \_\_\_\_\_ LENGTH **N/A** NODE \_\_\_\_\_ N/A \_\_\_\_\_

8. DESCRIPTION OF LOCATION/FACILITY TYPE  
 CR 44 is a two-lane undivided roadway running east/west through Lake County.

9. CAUSE OF ACCIDENT PROBLEMS (LIST AND DISCUSS)  
 The cross street vehicles were violating the right of way of main street vehicles.

10. PROPOSED IMPROVEMENTS (LIST AND DISCUSS):  
 Install fully-actuated traffic signal at the intersection.

YEAR	2003	2004	AVG
11. NO OF CRASHES	0	1	0.5
12. NO. CRASHES POTENTIALLY REDUCED BY PROJECT	0.0	0.9	0.4

14. CRASH INFORMATION FOR FACILITY	
COST/CRASH	\$210,776
CRASH CLEANUP	\$100
INTEREST RATE	7%

TYPE	2003	2004	RF	RED
Angle Collisions		1	88%	0.9
Left Turn Collisions				0.0
Head On				0.0
Sideswipe				0.0
Rear End				0.0
Right Turn				0.0
Pedestrian				0.0
Bicycle				0.0
Hit Sign/Post				0.0
Hit Utility Pole				0.0
Hit Guardrail				0.0
Hit Conc Barrier				0.0
Hit Br/Pier Abut				0.0
Fixed Object				0.0
Ran off Road				0.0
Overtuned				0.0
Other				0.0
Other				0.0
Night				0.0
TOTAL	0	1	0	0.9

15. ANNUAL COST OF IMPROVEMENTS				
TYPE	COST	LIFE	CRF	AN'L COST
A. R-O-W	\$ -	20	0.0944	\$0
B. PECEI	\$ 20,000	20	0.0944	\$1,888
C. STRUC	\$ -	20	0.0944	\$0
D. RDWY	\$ -	20	0.0944	\$0
E. SIGNS	\$ -	10	0.1424	\$0
F. SIGNALS	\$ 70,132	20	0.0944	\$6,620
G. SUBTOT	\$90,132			\$8,508
H. CHANGE IN MAINT				\$0
I. CRASH CLEANUP				(\$44)
J. TOTAL				\$8,464

16. BENEFIT	\$92,741
17. BENEFIT / COST	11.0

PREPARED BY: **JSS** APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

COMMENTS/CRASH REDUCTION METHOD:  
 A reduction factor of 88% was applied to the angle crash that would have been potentially corrected by the installation of a signal.

HIGH CRASH LISTINGS:

Year	2001	2002	2003
Begin MP	--	--	--
End MP	--	--	--



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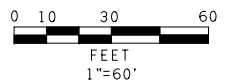
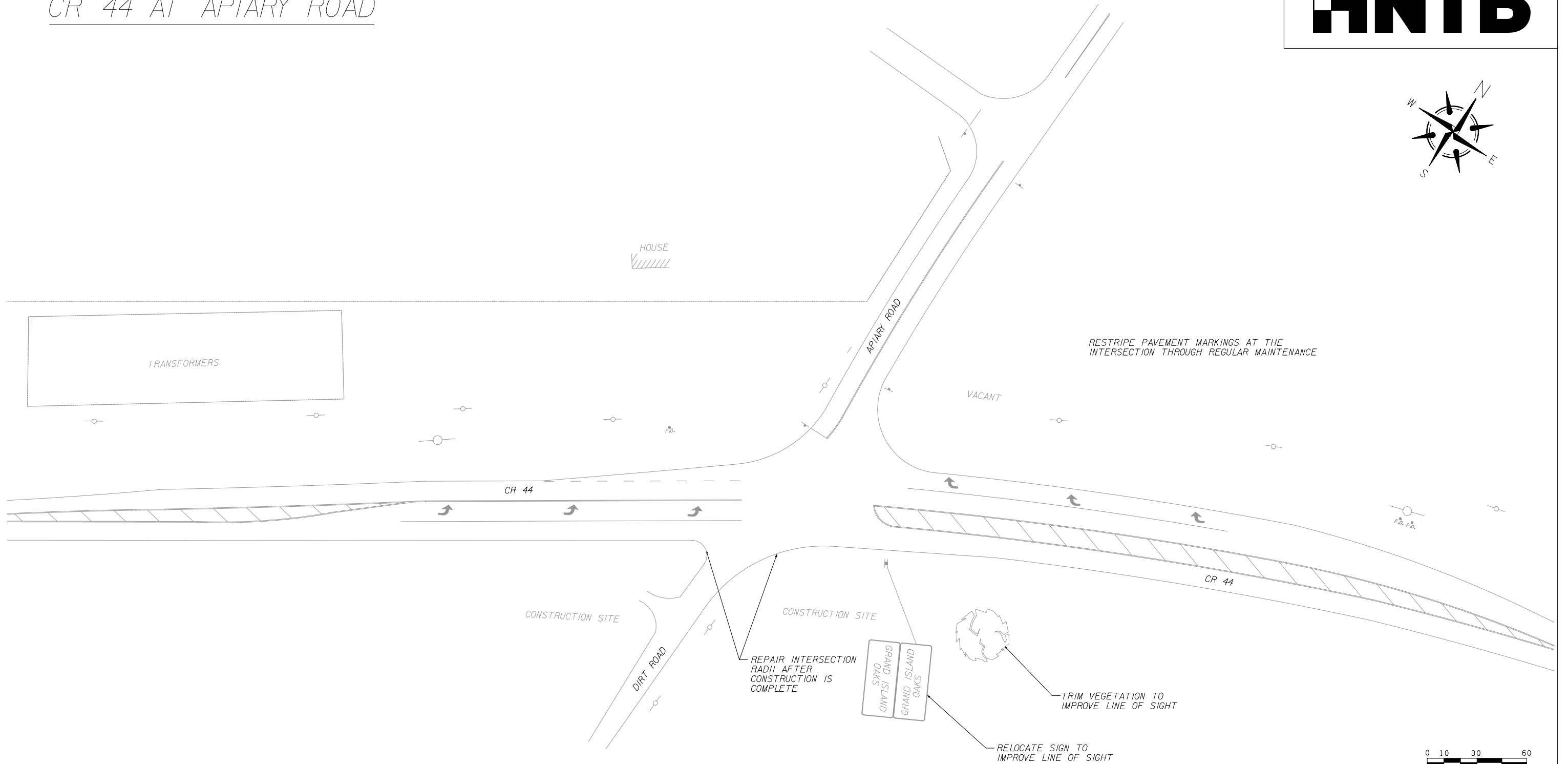
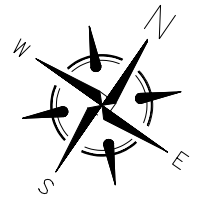
## 6. RECOMMENDATIONS

Based on the results of the Signal Warrant Analysis, field observations, and engineering judgment, the following recommendations were developed:

1. A fully actuated traffic signal should not be installed at the intersection based on the following criteria:
  - a. None of the applicable warrants are satisfied.
  - b. A crash trend that would be correctable by the installation of a traffic signal has not been identified.
  - c. Minimal delay was observed at the intersection. The installation of a traffic signal would likely increase the side street delay.
  - d. The installation of a traffic signal may lead to an increase in high-speed rear-end crashes.
2. Consideration should be given to relocating the sign and trimming the tree to the east of the intersection that hinders the northbound driver's line of sight.
3. Restripe the pavement markings at the intersection through routine maintenance.
4. Repair the broken pavement in the corners of the intersection at south approach due to large construction vehicles tracking off the roadway.

A conceptual improvement diagram has been developed to further depict the recommended improvements.

CR 44 AT APIARY ROAD



SYMBOLS:

	TREES		LIGHT POLE		DELINEATOR
	HEDGE		SIGNAL HEAD		HYDRANT
	DITCH BOTTOM INLET		MITERED END SECTION		COMBINATION POLE
	POWER POLE		SIGNAL POLE		FENCE
	SIGN		CONTROLLER CABINET		GUARDRAIL
	TRAFFIC SIGNAL POLE		BUILDING		

CONCEPTUAL IMPROVEMENTS  
LAKE COUNTY PUBLIC WORKS

FIGURE 4

**APPENDIX**

## ANNUAL COST OF IMPROVEMENTS

CR 44 at APIARY ROAD

Install Traffic Signal

PAY ITEM	ROADWAY CONSTRUCTION:	QUANTITY	UNIT	UNIT PRICE	COST
630-1-12	CONDUIT, UNDERGROUND	700	LF	\$ 3.59	\$ 2,513.00
630-1-14	CONDUIT, UNDERGROUND JACKED	165	LF	\$ 14.03	\$ 2,314.95
632-7-1	SIGNAL CABLE	1	PI	\$ 2,433.08	\$ 2,433.08
634-4-112	SPAN WIRE ASSEMBLY	1	PI	\$ 1,060.94	\$ 1,060.94
635-1-11	PULL BOX	8	EA	\$ 240.88	\$ 1,927.04
639-1-12	ELECTRICAL POWER SERVICE (OVERHEAD)	1	AS	\$ 838.38	\$ 838.38
639-2-1	ELECTRICAL SERVICE WIRE	15	LF	\$ 1.57	\$ 23.55
641-16-150	CONCRETE STRAIN POLES	2	EA	\$ 4,287.50	\$ 8,575.00
650-51-313	TRAFFIC SIGNAL (3-SECTION, LED)	8	AS	\$ 721.31	\$ 5,770.48
660-1-106	INDUCTIVE LOOP DETECTOR TYPE 6	5	EA	\$ 274.64	\$ 1,373.20
660-2-102	LOOP ASSEMBLY TYPE B	2	AS	\$ 544.98	\$ 1,089.96
660-2-106	LOOP ASSEMBLY TYPE F	2	AS	\$ 662.70	\$ 1,325.40
663-74-12	INFRARED DETECTOR (FOR DIRT ROAD)	1	AS	\$ 2,838.00	\$ 2,838.00
670-5-110	ACTUATED SOLID STATE CONTROLLER ASSEMBLY	1	AS	\$ 12,500.00	\$ 12,500.00
699-1-1	INTERNALLY ILLUMINATED STREET NAME SIGN	4	EA	\$ 1,709.42	\$ 6,837.68
700-46-11	REMOVE SINGLE POST SIGN	2	AS	\$ 14.74	\$ 29.48
710-90	PAVEMENT MARKINGS	1	LS	\$ 500.00	\$ 500.00
	CONSTRUCTION COST TOTAL				\$ 51,950.14
	MAINTENANCE OF TRAFFIC/MOBILIZATION ==>			15% OF ALL CONSTRUCTION COSTS =	\$ 7,792.52
	INCLUDE 20% CONTINGENCY ==>				\$ 10,390.03
	SUBTOTAL:				\$ 70,132.69
	PECEI ==>				\$ 20,000.00
	TOTAL==>				\$ 90,132.69

## Harmful Events & Contributing Causes

### CR 44 at Apiary Road

#### All Crashes

Harmful Event			Injuries, Fatalities, & Property Damage		
Rear End	1	33%	Total Number of Crashes		3
Head On	1	33%	Total Property Damage		\$25,000
Angle	1	33%	Total Number of Injuries		3
Left Turn	0	0%	Total Number of Injury Crashes	1	33%
Right Turn	0	0%	Total Number of Fatalities		0
Sideswipe	0	0%	Total Number of Fatal Crashes		0      0%
			<b>Most Severe Injury per Crash</b>		
Backed Into	0	0%	None	2	
Parked Car	0	0%	Possible	0	
Collision with MV Other Road	0	0%	Non-Incapacitating	1	
Pedestrian	0	0%	Incapacitating	0	
Bike	0	0%	Fatal (Within 90 Days)	0	
Bike (Bike Lane)	0	0%			
Moped	0	0%	<b>Driver Contributing Cause</b>		
Train	0	0%	No Improper Driving	0	0%
Animal	0	0%	Careless Driving	1	33%
Hit Sign/Sign Post	0	0%	FTYROW	1	33%
Hit Utility Pole	0	0%	Improper Backing	0	0%
Hit Guardrail	0	0%	Improper Lane Change	0	0%
Hit Fence	0	0%	Improper Turn	1	33%
Hit Concrete Barrier Wall	0	0%	Alcohol-Under Influence	0	0%
Hit Bridge/Pier/Abutment	0	0%	Drugs-Under Influence	0	0%
Hit Tree/Shrub	0	0%	Alcohol/Drugs-Under Influence	0	0%
Hit Const Barricd/Sign/BrdgPier/Abutt	0	0%	Followed Too Closely	0	0%
Traffic Gate	0	0%	Disregarded Traffic Signal	0	0%
Crash Attenuator	0	0%	Exceed Safe Speed Limit	0	0%
Fixed Object Above Road	0	0%	Disregarded Stop Sign	0	0%
Other Fixed Object	0	0%	Failed to Maintain Equipment / Vehicle	0	0%
Moveable Object	0	0%	Improper Passing	0	0%
Ran Into Ditch/Culvert	0	0%	Drove Left of Center	0	0%
Ran Off Road Into Water	0	0%	Exceeded Stated Safe Speed Limit	0	0%
Overtuned	0	0%	Obstructing Traffic	0	0%
Occupant Fell From Vehicle	0	0%	Improper Load	0	0%
Trac/Trailer Jackknifed	0	0%	Disregarded Other Traffic	0	0%
Fire	0	0%	Driving Wrong Side/Way	0	0%
Explosion	0	0%	All Others	0	0%
Unknown	0	0%	Unknown	0	0%
Total			Total		
3      100%			3      100%		
<b>Sight Obstruction</b>			<b>Road Contributing Causes</b>		
None	2	67%	None	3	100%
Inclement Weather	1	33%	Obstruction	0	0%
Parked / Stopped Vehicle	0	0%	Repair / Construction	0	0%
Trees / Crops / Bushes	0	0%	Loose Materials	0	0%
Load On Vehicle	0	0%	Shoulder Defect	0	0%
Building / Fixed Object	0	0%	Holes / Ruts / Bad Edge	0	0%
Signs / Billboards	0	0%	Standing Water	0	0%
Fog	0	0%	Worn / Polished Surface	0	0%
Smoke	0	0%	Unknown	0	0%
Glare	0	0%			
Unknown	0	0%			
Total			Total		
3      100%			3      100%		

**Time, Date, & Driving Environment**  
**CR 44 at Apiary Road**  
**All Crashes**

Month of Year			Crashes per Year			Hour of Day		
January	0	0%				0:00	0	0%
February	0	0%				1:00	0	0%
March	1	33%				2:00	0	0%
April	0	0%				3:00	0	0%
May	0	0%				4:00	0	0%
June	0	0%				5:00	0	0%
July	0	0%				6:00	0	0%
August	0	0%				7:00	1	33%
September	0	0%				8:00	0	0%
October	1	33%				9:00	0	0%
November	1	33%				10:00	0	0%
December	0	0%				11:00	0	0%
						12:00	0	0%
						13:00	0	0%
						14:00	0	0%
						15:00	0	0%
						16:00	1	33%
						17:00	1	33%
						18:00	0	0%
						19:00	0	0%
						20:00	0	0%
						21:00	0	0%
						22:00	0	0%
						23:00	0	0%
						Unknown	0	0%
<b>Total</b>	<b>3</b>	<b>100%</b>	<b>Total</b>	<b>3</b>	<b>100%</b>	<b>Total</b>	<b>3</b>	<b>100%</b>
Weather			Lighting Conditions					
Clear	1	33%	Daylight	3	100%			
Cloudy	0	0%	Dusk	0	0%			
Rain	2	67%	Dawn	0	0%			
Fog	0	0%	Dark (SL)	0	0%			
Unknown	0	0%	Dark (No SL)	0	0%			
<b>Total</b>	<b>3</b>	<b>100%</b>	Unknown	0	0%			
Roadway Conditions								
Wet	2	67%						
Dry	1	33%						
Unknown	0	0%						
<b>Total</b>	<b>3</b>	<b>100%</b>	<b>Total</b>	<b>3</b>	<b>100%</b>	<b>Total</b>	<b>3</b>	<b>100%</b>

## Driver & Vehicle At-Fault

### CR 44 at Apiary Road

#### All Crashes

Driver					
Driver Age			Residence (Driver)		
15-19	1	33%	County of Crash	3	100%
20-24	1	33%	Elsewhere in State	0	0%
25-39	1	33%	Non-Resident of State	0	0%
40-59	0	0%	Foreign	0	0%
60-79	0	0%	Unknown	0	0%
Unknown	0	0%			0%
<b>Total</b>	<b>3</b>	<b>100%</b>	<b>Total</b>	<b>3</b>	<b>100%</b>
Alcohol / Drug Use			Driver Physical Defects		
None	3	100%	None	3	100%
Alcohol-Under Influence	0	0%	Eyesight	0	0%
Drugs-Under Influence	0	0%	Fatigue/Asleep	0	0%
Alcohol/Drugs Under Influence	0	0%	Hearing	0	0%
Had Been Drinking	0	0%	Illness	0	0%
Pending BAC	0	0%	Seizure, Epilepsy, Blackout	0	0%
Unknown	0	0%	Unknown	0	0%
<b>Total</b>	<b>3</b>	<b>100%</b>	<b>Total</b>	<b>3</b>	<b>100%</b>
Vehicle					
Vehicle Type			Vehicle Defect		
Automobile	2	67%	None	3	100%
Passenger Van	1	33%	Defective Brakes	0	0%
Light Truck	0	0%	Worn / Smooth Tires	0	0%
Medium Truck	0	0%	Defective / Improper Lights	0	0%
Heavy Truck	0	0%	Puncture / Blowout	0	0%
Truck Tractor	0	0%	Steering Failure	0	0%
Motor Home	0	0%	Windshield Wipers	0	0%
Bus	0	0%	Equipment / Vehicle Defect	0	0%
Bicycle	0	0%	Unknown	0	0%
Motorcycle	0	0%			
Moped	0	0%			
All Terrain Vehicle	0	0%			
Train	0	0%			
Other	0	0%			
Unknown	0	0%			
<b>Total</b>	<b>3</b>	<b>100%</b>	<b>Total</b>	<b>3</b>	<b>100%</b>

## 24 HOUR MACHINE APPROACH COUNTS

LOCATION: CR 44 AT APIARY ROAD  
 CITY: GRAND ISLAND  
 COUNTY: LAKE  
 DATE: MAY 2, 2005  
 N/S STREET: APIARY ROAD  
 E/W STREET: CR 44

TIME	NB	SB	N/S TOTAL	EB	WB	E/W TOTAL	GRAND TOTAL
BEGIN							
12:00 AM		3	3	32	38	70	73
1:00		2	2	15	20	35	37
2:00		1	1	13	22	35	36
3:00		4	4	12	24	36	40
4:00		4	4	46	61	107	111
5:00		18	18	108	139	247	265
6:00		43	43	344	435	779	822
7:00		88	88	492	586	1078	1166
8:00		62	62	454	561	1015	1077
9:00		39	39	377	425	802	841
10:00		51	51	410	418	828	879
11:00		52	52	406	428	834	886
12:00 PM		40	40	411	441	852	892
1:00		40	40	459	444	903	943
2:00		46	46	471	463	934	980
3:00		72	72	607	554	1161	1233
4:00		46	46	644	579	1223	1269
5:00		57	57	687	616	1303	1360
6:00		41	41	465	407	872	913
7:00		27	27	324	269	593	620
8:00		21	21	250	236	486	507
9:00		15	15	160	148	308	323
10:00		8	8	90	95	185	193
11:00		3	3	63	47	110	113
<b>TOTAL</b>	<b>0</b>	<b>783</b>	<b>783</b>	<b>7340</b>	<b>7456</b>	<b>14796</b>	<b>15579</b>



TURNING MOVEMENT COUNT  
 NORTH STREET: APIARY ROAD  
 SOUTH STREET: DIRT ACCESS ROAD  
 CR 44 AT APIARY ROAD  
 ALL VEHICLES

DATE: 5/4/2005  
 EAST STREET: CR 44  
 WEST STREET: CR 44  
 TIME: 7-9AM,10-12PM,2-6PM  
 BY: JN

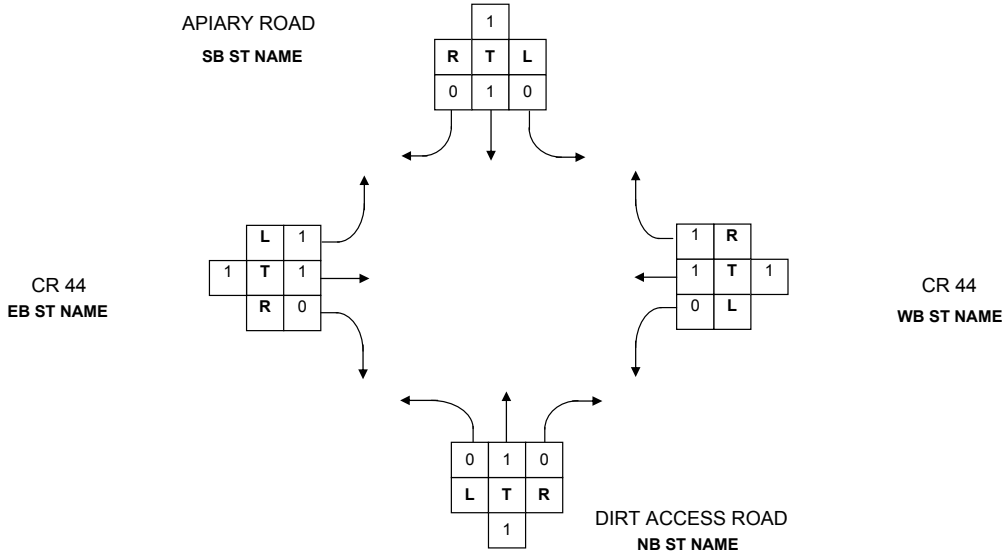
START TIME	NORTHBOUND					SOUTHBOUND					NS TOTAL	EASTBOUND					WESTBOUND					EW TOTAL	GRAND TOTAL
	LEFT	THRU	RIGHT	U-TURN	TOTAL	LEFT	THRU	RIGHT	U-TURN	TOTAL		LEFT	THRU	RIGHT	U-TURN	TOTAL	LEFT	THRU	RIGHT	U-TURN	TOTAL		
7:00	0	0	0	0	0	9	0	10	0	19	19	3	98	0	0	101	1	102	4	0	107	208	227
7:15	0	0	1	0	1	7	0	17	0	24	25	1	100	0	0	101	1	138	3	0	142	243	268
7:30	0	0	0	0	0	12	0	12	0	24	24	7	118	0	0	125	0	144	5	0	149	274	298
7:45	0	0	0	0	0	11	0	14	0	25	25	1	122	0	0	123	1	131	3	0	135	258	283
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>39</b>	<b>0</b>	<b>53</b>	<b>0</b>	<b>92</b>	<b>93</b>	<b>12</b>	<b>438</b>	<b>0</b>	<b>0</b>	<b>450</b>	<b>3</b>	<b>515</b>	<b>15</b>	<b>0</b>	<b>533</b>	<b>983</b>	<b>1,076</b>
8:00	0	0	3	0	3	2	0	8	0	10	13	1	107	0	0	108	0	160	4	0	164	272	285
8:15	0	0	1	0	1	4	0	6	0	10	11	7	107	0	0	114	0	138	3	0	141	255	266
8:30	0	0	0	0	0	2	0	6	0	8	8	8	115	0	0	123	1	125	3	0	129	252	260
8:45	0	0	0	0	0	2	0	5	0	7	7	6	107	0	0	113	0	114	2	0	116	229	236
<b>Total</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>10</b>	<b>0</b>	<b>25</b>	<b>0</b>	<b>35</b>	<b>39</b>	<b>22</b>	<b>436</b>	<b>0</b>	<b>0</b>	<b>458</b>	<b>1</b>	<b>537</b>	<b>12</b>	<b>0</b>	<b>550</b>	<b>1,008</b>	<b>1,047</b>
10:00	0	0	0	0	0	3	0	6	0	9	9	5	102	0	0	107	0	85	2	0	87	194	203
10:15	0	0	1	0	1	5	0	14	0	19	20	4	79	0	0	83	1	89	2	0	92	175	195
10:30	0	0	0	0	0	7	0	5	0	12	12	6	104	0	0	110	0	100	1	0	101	211	223
10:45	0	0	1	0	1	5	0	8	0	13	14	10	85	0	0	95	1	95	2	0	98	193	207
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>20</b>	<b>0</b>	<b>33</b>	<b>0</b>	<b>53</b>	<b>55</b>	<b>25</b>	<b>370</b>	<b>0</b>	<b>0</b>	<b>395</b>	<b>2</b>	<b>369</b>	<b>7</b>	<b>0</b>	<b>378</b>	<b>773</b>	<b>828</b>
11:00	0	0	1	0	1	3	0	4	0	7	8	2	106	0	0	108	2	83	3	0	88	196	204
11:15	0	0	0	0	0	4	0	3	0	7	7	4	99	1	0	104	0	117	5	0	122	226	233
11:30	1	0	0	0	1	4	0	3	0	7	8	0	83	0	0	83	0	82	9	0	91	174	182
11:45	0	0	1	0	1	3	0	7	0	10	11	7	93	0	0	100	1	103	3	0	107	207	218
<b>Total</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>14</b>	<b>0</b>	<b>17</b>	<b>0</b>	<b>31</b>	<b>34</b>	<b>13</b>	<b>381</b>	<b>1</b>	<b>0</b>	<b>395</b>	<b>3</b>	<b>385</b>	<b>20</b>	<b>0</b>	<b>408</b>	<b>803</b>	<b>837</b>
14:00	0	0	1	0	1	2	0	3	0	5	6	6	99	0	0	105	0	88	3	0	91	196	202
14:15	0	0	0	0	0	5	0	12	0	17	17	7	110	0	0	117	1	101	5	0	107	224	241
14:30	1	0	1	0	2	3	0	3	0	6	8	5	94	0	0	99	0	96	3	0	99	198	206
14:45	0	0	0	0	0	3	0	6	0	9	9	4	123	0	0	127	0	84	0	0	84	211	220
<b>Total</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>13</b>	<b>0</b>	<b>24</b>	<b>0</b>	<b>37</b>	<b>40</b>	<b>22</b>	<b>426</b>	<b>0</b>	<b>0</b>	<b>448</b>	<b>1</b>	<b>369</b>	<b>11</b>	<b>0</b>	<b>381</b>	<b>829</b>	<b>869</b>
15:00	1	0	0	0	1	1	0	8	0	9	10	4	119	0	0	123	1	123	2	0	126	249	259
15:15	0	0	2	0	2	3	0	5	0	8	10	6	105	0	0	111	0	112	3	0	115	226	236
15:30	0	0	0	0	0	5	0	8	0	13	13	6	101	0	0	107	1	123	5	0	129	236	249
15:45	0	0	1	0	1	3	0	3	0	6	7	11	127	0	0	138	0	111	9	0	120	258	265
<b>Total</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>4</b>	<b>12</b>	<b>0</b>	<b>24</b>	<b>0</b>	<b>36</b>	<b>40</b>	<b>27</b>	<b>452</b>	<b>0</b>	<b>0</b>	<b>479</b>	<b>2</b>	<b>469</b>	<b>19</b>	<b>0</b>	<b>490</b>	<b>969</b>	<b>1,009</b>
16:00	0	0	0	0	0	10	0	2	0	12	12	12	140	0	0	152	0	121	2	0	123	275	287
16:15	0	0	0	0	0	1	0	8	0	9	9	3	112	0	0	115	1	114	4	0	119	234	243
16:30	0	0	0	0	0	2	0	2	0	4	4	6	132	0	0	138	2	123	4	0	129	267	271
16:45	0	0	2	0	2	7	0	1	0	8	10	11	138	0	0	149	1	126	6	0	133	282	292
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>20</b>	<b>0</b>	<b>13</b>	<b>0</b>	<b>33</b>	<b>35</b>	<b>32</b>	<b>522</b>	<b>0</b>	<b>0</b>	<b>554</b>	<b>4</b>	<b>484</b>	<b>16</b>	<b>0</b>	<b>504</b>	<b>1,058</b>	<b>1,093</b>
17:00	0	0	0	0	0	1	0	6	0	7	7	8	153	1	0	162	0	132	11	0	143	305	312
17:15	0	0	0	0	0	3	0	5	0	8	8	13	152	0	0	165	0	118	3	0	121	286	294
17:30	1	0	0	0	1	8	0	7	0	15	16	5	160	0	0	165	0	121	8	0	129	294	310
17:45	0	0	0	0	0	2	0	5	0	7	7	6	118	0	0	124	0	95	6	0	101	225	232
<b>Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>14</b>	<b>0</b>	<b>23</b>	<b>0</b>	<b>37</b>	<b>38</b>	<b>32</b>	<b>583</b>	<b>1</b>	<b>0</b>	<b>616</b>	<b>0</b>	<b>466</b>	<b>28</b>	<b>0</b>	<b>494</b>	<b>1,110</b>	<b>1,148</b>

FLORIDA DEPARTMENT OF TRANSPORTATION

SUMMARY OF VEHICLE MOVEMENTS

SECTION 11050 CITY Grand Island COUNTY Lake  
 STATE ROUTE CR 44 INTERSECTING ROUTE Apiary Road  
 OBSERVER JN DATE 5/4/2005 MILEPOST N/A  
 WEATHER Fair ROAD CONDITION Good  
 REMARKS None

FORM COMPLETED BY GP DATE 05/20/05



TIME BEGIN/END	NORTHBOUND					SOUTHBOUND					TOTAL N/S	EASTBOUND					WESTBOUND					TOTAL E/W
	L	T	R	U	TOT	L	T	R	U	TOT		L	T	R	U	TOT	L	T	R	U	TOT	
4 - 5																						
5 - 6																						
6 - 7																						
7 - 8	0	0	1	0	1	39	0	53	0	92	93	12	438	0	0	450	3	515	15	0	533	983
8 - 9	0	0	4	0	4	10	0	25	0	35	39	22	436	0	0	458	1	537	12	0	550	1,008
9 - 10																						
10 - 11	0	0	2	0	2	20	0	33	0	53	55	25	370	0	0	395	2	369	7	0	378	773
11 - 12	1	0	2	0	3	14	0	17	0	31	34	13	381	1	0	395	3	385	20	0	408	803
12 - 1																						
1 - 2																						
2 - 3	1	0	2	0	3	13	0	24	0	37	40	22	426	0	0	448	1	369	11	0	381	829
3 - 4	1	0	3	0	4	12	0	24	0	36	40	27	452	0	0	479	2	469	19	0	490	969
4 - 5	0	0	2	0	2	20	0	13	0	33	35	32	522	0	0	554	4	484	16	0	504	1,058
5 - 6	1	0	0	0	1	14	0	23	0	37	38	32	583	1	0	616	0	466	28	0	494	1,110
6 - 7																						
7 - 8																						
8 - 9																						
9 - 10																						
10 - 11																						
11 - 12																						
<b>TOTAL</b>	<b>4</b>	<b>0</b>	<b>16</b>	<b>0</b>	<b>20</b>	<b>142</b>	<b>0</b>	<b>212</b>	<b>0</b>	<b>354</b>	<b>374</b>	<b>185</b>	<b>3,608</b>	<b>2</b>	<b>0</b>	<b>3,795</b>	<b>16</b>	<b>3,594</b>	<b>128</b>	<b>0</b>	<b>3,738</b>	<b>7,533</b>

Percentage	20%	0%	80%	0%		40%	0%	60%	0%			5%	95%	0%	0%		0%	96%	3%	0%		
Maximum	1	0	4	0		39	0	53	0			32	583	1	0		4	537	28	0		
Minimum	0	0	0	0		10	0	13	0			12	370	0	0		0	369	7	0		

FLORIDA DEPARTMENT OF TRANSPORTATION

PEDESTRIAN MOVEMENT SUMMARY

SECTION 11050  
 STATE ROUTE CR 44  
 OBSERVER JN

CITY Grand Island  
 INTERSECTING ROUTE Apiary Road  
 DATE 5/4/2005

COUNTY Lake  
 MILEPOST N/A

REMARKS

FORM COMPLETED BY GP DATE 05/20/05

APIARY ROAD  
 SB ST NAME

7-8	8-9	10-11	11-12	2-3	3-4	4-5	5-6	Total
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0



7-8	0	0	0
8-9	0	0	0
10-11	0	0	0
11-12	0	0	0
2-3	0	0	0
3-4	0	0	0
4-5	0	0	0
5-6	0	0	0
Total	0	0	0

CR 44  
 EB ST NAME

CR 44  
 WB ST NAME

7-8	0	0	0
8-9	0	0	0
10-11	0	0	0
11-12	0	0	0
2-3	0	0	0
3-4	0	0	0
4-5	0	0	0
5-6	0	0	0
Total	0	0	0

7-8	8-9	10-11	11-12	2-3	3-4	4-5	5-6	Total
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

DIRT ACCESS ROAD  
 NB ST NAME

FLORIDA DEPARTMENT OF TRANSPORTATION

BICYCLE MOVEMENT SUMMARY

SECTION 11050  
 STATE ROUTE CR 44  
 OBSERVER JN

CITY Grand Island  
 INTERSECTING ROUTE Apiary Road  
 DATE 5/4/2005

COUNTY Lake  
 MILEPOST N/A

REMARKS

FORM COMPLETED BY GP

DATE 05/20/05

APIARY ROAD  
 SB ST NAME

7-8	8-9	10-11	11-12	2-3	3-4	4-5	5-6	Total
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0



7-8	1	0	1
8-9	0	0	0
10-11	0	0	0
11-12	0	0	0
2-3	0	0	0
3-4	0	0	0
4-5	0	0	0
5-6	0	0	0
Total	1	0	1

CR 44  
 EB ST NAME

CR 44  
 WB ST NAME

7-8	0	0	0
8-9	0	0	0
10-11	0	0	0
11-12	0	0	0
2-3	0	0	0
3-4	0	0	0
4-5	0	0	0
5-6	0	0	0
Total	0	0	0

7-8	8-9	10-11	11-12	2-3	3-4	4-5	5-6	Total
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

DIRT ACCESS ROAD  
 NB ST NAME