Intersection Control Evaluation Report

CTH K Interchange

Project ID 1440-15-01
Fond du Lac - Plymouth Road
(CTH K - CTH W)
STH 23
Fond du Lac County

Prepared by:

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SAFETY	The reconstruction of the existing at-grade intersection with a jug-handle type interchange and two two-way stop controlled (TWSC) intersections will likely result in a reduction in the existing crash rate. This will be due to two factors: 1. High volume and fast moving mainline STH 23 traffic will be removed from the intersections entirely. 2. Traffic turning from STH 23 onto CTH K will be divided between two intersections. Reconstructing the intersection to operate under TWSC will not reduce the number of theoretical conflict points (32), nor will it eliminate the opportunity for "angle" type crashes as vehicles make left turning maneuvers across oncoming traffic.	The reconstruction of the existing at-grade intersection with a jug-handle type interchange and two roundabout intersections will likely result in a reduction in the existing crash rate. This will be due to the same two factors as noted in the TWSC alternative. When compared to a TWSC, roundabouts reduce the number of conflict points for an intersection to 8 (4 diverge and 4 merge, 0 crossing) and greatly lessen the opportunity for "angle" type crashes. Recent studies show that conversion to roundabout control has reduced 39% of the total crashes and 76% of the injury crashes. Roundabout crashes are also typically less severe than those occurring at other types of intersections due to lower vehicle operating speeds. The safety of the mainline will also benefit from the installation of roundabouts. The increased capacity of roundabouts (when compared to TWSC) intersections will decrease the likelihood of traffic interacting with the mainline or rear-end crashes resulting from long queues.	The current crash rate for the existing at-grade intersection (based on crash data between 2001-2005) is 0.84 crashes per million entering vehicles. An intersection crash rate of 1.5 or higher indicates a level of concern that needs to be addressed. In general, both alternatives are likely to provide a safer intersection than the current conditions. Refer to the Crash Report in Appendix G for additional crash related information on the existing intersection. This Crash Report was completed for the entire STH 23 corridor in 2007.

Intersection Control Evaluation
Factors to Analyze (Intersection of STH 23 & CTH K)

TRAFFIC VOLUMES & OPERATIONAL ANALYSIS

ALTERNATIVE CONTROL

☐ TRAFFIC SIGNAL, ANTICIPATING TRAFFIC SIGNAL
☐ ROUNDABOUT
☐ 4-WAY STOP
☒ 2-WAY STOP (TWSC)
☐ EXISTING CONTROL 2-WAY STOP

Traffic signal warrants were not met for either of the jug handle intersections with CTH K. It is anticipated that TWSC with CTH K free flowing is the likely best choice of intersection operation for this alternative. Refer to Appendix B for traffic signal warrant analysis results.

Under TWSC, both intersections will operate at a LOS A under both AM and PM design year peak hours.

CTH K &
WB STH 23 JUG HANDLE

	Delay Per Vehicle/LOS (Seconds)	
	AM Peak	**PM Peak**
NB Approach	2.7/A	8.4/A
SB Approach	0.0/A	0.0/A
EB Approach	11.3/B	13.2/B
WB Approach	NA	NA

CTH K &
WB STH 23 JUG HANDLE

	Queue Length (Feet)	
	AM Peak	**PM Peak**
NB Approach	6’	25’
SB Approach	0’	0’
EB Approach	10’	7’
WB Approach	NA	NA

CTH K &
EB STH 23 JUG HANDLE

	Delay Per Vehicle/LOS (Seconds)	
	AM Peak	**PM Peak**
NB Approach	1.8/A	1.9/A
SB Approach	1.1/A	0.6/A
EB Approach	10.8/B	15.2/B
WB Approach	10.9/B	15.1/B

ALTERNATIVE CONTROL

☐ TRAFFIC SIGNAL, ANTICIPATING TRAFFIC SIGNAL
☒ ROUNDABOUT
☐ 4-WAY STOP
☐ 2-WAY STOP (TWSC)
☐ EXISTING CONTROL 2-WAY STOP

Analysis of the traffic shows that single lane roundabouts will operate acceptably for both jug handle intersections with CTH K. Both roundabouts will have an inscribed circular diameter of 139-feet.

With a single lane roundabout, both intersections operate at LOS A under both AM and PM design year peak hours.

CTH K &
WB STH 23 JUG HANDLE

	Delay Per Vehicle/LOS (Seconds)	
	AM Peak	**PM Peak**
NB Approach	3.8/A	4.7/A
SB Approach	3.6/A	3.9/A
EB Approach	3.1/A	3.1/A
WB Approach	NA	NA

CTH K &
WB STH 23 JUG HANDLE

	Queue Length (Feet)	
	AM Peak	**PM Peak**
NB Approach	0’	20’
SB Approach	0’	0’
EB Approach	0’	0’
WB Approach	NA	NA

CTH K &
EB STH 23 JUG HANDLE

	Delay Per Vehicle/LOS (Seconds)	
	AM Peak	**PM Peak**
NB Approach	3.6/A	4.8/A
SB Approach	3.0/A	3.4/A
EB Approach	4.1/A	4.1/A
WB Approach	3.2/A	3.7/A

GENERAL COMMENTS

Traffic Patterns
The design year (2035) peak hour turning movement traffic data for the intersections is shown in Appendix A.

Vehicles using the two CTH K intersections are generally shown to follow the pattern of commuter traffic entering STH 23 westbound towards Fond du Lac during the AM peak hour; and exiting STH 23 to return to the origination point during the PM peak hour. The percentage of traffic using CTH K as a through movement and not entering or exiting STH 23 is higher by nearly 50% during the AM peak hour compared to the PM peak hour. The peak hour traffic distribution percentages are shown in Appendix A.

Traffic volumes on CTH K are higher during the PM peak hour by a factor between 50% and 75% in all cases with the exception of the SB movement at the WB jug handle intersection. The SB movement at the WB Jug handle intersection is slightly higher during the AM peak hour. Traffic volumes on the jug handle ramps and Mary Hill Drive remain relatively constant between either peak hour. There are no significant seasonal traffic volume fluctuations along STH 23 according to the continuous count recorder data sources.

Operational Analysis
Both alternatives exceed the threshold for an intersection to be considered operationally acceptable. Neither alternative is shown to have access blockage resulting from queuing.

A roundabout can have slightly higher delay when compared to a high functioning TWSC intersection.

Intersection Control Evaluation
Factors to Analyze (Intersection of STH 23 & CTH K)

<table>
<tr><th></th><th>ALTERNATIVE CONTROL
☐ TRAFFIC SIGNAL, ANTICIPATING TRAFFIC SIGNAL
☐ ROUNDABOUT
☐ 4-WAY STOP
☒ 2-WAY STOP (TWSC)
☐ EXISTING CONTROL 2-WAY STOP</th><th>ALTERNATIVE CONTROL
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☒ ROUNDABOUT
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☐ 2-WAY STOP (TWSC)
☐ EXISTING CONTROL 2-WAY STOP</th><th>GENERAL COMMENTS</th></tr>
<tr><td>TRAFFIC VOLUMES & OPERATIONAL ANALYSIS (CONT.)</td><td>CTH K &
EB STH 23 JUG HANDLE
<table><tr><th></th><th colspan="2">Queue Length (Feet)</th></tr><tr><th></th><th>AM Peak</th><th>PM Peak</th></tr><tr><td>NB Approach</td><td>2’</td><td>5’</td></tr><tr><td>SB Approach</td><td>0’</td><td>0’</td></tr><tr><td>EB Approach</td><td>28’</td><td>56’</td></tr><tr><td>WB Approach</td><td>2’</td><td>3’</td></tr></table>Refer to Appendix C for the full operational analysis results including the results by individual movement.</td><td>CTH K &
EB STH 23 JUG HANDLE
<table><tr><th></th><th colspan="2">Queue Length (Feet)</th></tr><tr><th></th><th>AM Peak</th><th>PM Peak</th></tr><tr><td>NB Approach</td><td>0’</td><td>20’</td></tr><tr><td>SB Approach</td><td>0’</td><td>0’</td></tr><tr><td>EB Approach</td><td>0’</td><td>0’</td></tr><tr><td>WB Approach</td><td>0’</td><td>0’</td></tr></table></td><td>This is due to the slower entering speeds at roundabouts compared to the free flowing mainline traffic movement for the TWSC alternative. However, roundabouts have higher capacity potential than a TWSC type intersection.

It is important to note that the methods used to analyze roundabouts and traditional intersections differ. Rodel software is used to analyze roundabout alternatives. Rodel utilizes an empirical method. Synchro software was used to analyze the TWSC alternative and utilizes a GAP acceptance method. These differences in the delay calculation will contribute to slight variations in the results.

Refer to Appendices C and D for the full results of the TWSC and roundabout operational analysis.</td></tr>
<tr><td>CONSTRUCTION COSTS</td><td>Construction Cost = $909,032

(Approx. Construction Year – 2013)

Cost estimate area includes:

1. Jug Handle Ramps from STH 23 to the intersection.
2. CTH K from 1125’ north of STH 23 to 960’ south of STH 23.
3. Mary Hill Frontage Road from the intersection to 580’ east.</td><td>Construction Cost = $1,040,558

(Approx. Construction Year – 2013)

Cost estimate area includes:

1. Jug Handle Ramps from STH 23 to the intersection.
2. CTH K from 1325’ north of STH 23 to 1265’ south of STH 23.
3. Mary Hill Frontage Road from the intersection to 500’ east.
4. Hillside Circle from CTH K to 250’ east.</td><td>These intersections will be constructed as part of the STH 23 expansion project from USH 151 – Log Tavern Road. These construction cost estimates include all major work items with the exception of earthwork and structures. The cost for earthwork and structures is expected to be nearly the same for either option and therefore was not included as part of a comparison of the two intersection alternatives.

It is important to note that these intersection construction cost estimates were calculated assuming that they are one section of a much larger overall project. These estimates would likely be higher if this interchange was constructed as a stand-alone contract. This is due to the benefits of spreading contract costs such as mobilization, earthwork, traffic control, etc. over a larger project area.

Refer to Appendix E for detailed cost estimate information and a sketch of the construction cost estimate area.</td></tr>
</table>

Intersection Control Evaluation
Factors to Analyze (Intersection of STH 23 & CTH K)

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RIGHT-OF-WAY	N/A	N/A	These intersections will be constructed with the STH 23 expansion project from USH 151 – Log Tavern Road. In general, roundabouts will require more right-of-way than a TWSC; however in the context of the overall STH 23 expansion project, the difference in right-of-way required will be negligible.
PRACTICAL FEASIBILITY	Reconstructing the intersections to operate as TWSC should be considered a feasible alternative. In the context of a larger STH 23 expansion project there are no major adverse impacts associated with this intersection alternative that would not exist without the majority of work to upgrade the mainline and construct interchanges. This alternative does have safety and future capacity concerns when compared to the roundabout alternative. However there is no reason this alternative should not be considered feasible if considered on its own merits.	Reconstructing the intersections to operate as roundabouts should be considered a feasible alternative. In the context of a larger STH 23 expansion project there are no major adverse impacts associated with this intersection alternative that would not exist without the majority of work to upgrade the mainline and construct interchanges.	

Intersection Control Evaluation
Factors to Analyze (Intersection of STH 23 & CTH K)

	ALTERNATIVE CONTROL ☐ TRAFFIC SIGNAL, ANTICIPATING TRAFFIC SIGNAL ☐ ROUNDABOUT ☐ 4-WAY STOP ☒ 2-WAY STOP (TWSC) ☐ EXISTING CONTROL 2-WAY STOP	**ALTERNATIVE CONTROL** ☐ TRAFFIC SIGNAL, ANTICIPATING TRAFFIC SIGNAL ☒ ROUNDABOUT ☐ 4-WAY STOP ☐ 2-WAY STOP (TWSC) ☐ EXISTING CONTROL 2-WAY STOP	**GENERAL COMMENTS**
OPERATIONS & MAINTENANCE COSTS	There are no operation and maintenance concerns unique to this alternative.	Operation and maintenance concerns unique to this alternative to be considered: <u>Street Lighting</u> – It is reasonable to expect that 10 - 12 street light units will be required at each of the two jug-handle intersections. Opinion of probable energy costs: Street Lighting = 15 – 250 Watt HPS Fixtures, 106 kWH/month/fixture = 1,590 kWH/month Plus 7 – 150 Watt HPS Fixtures, 61 kWH/month/fixture = 427 kWH/month Total = 2,017 kWH/month. (based on 7/8 lights (250W) within the circulating roadway and 1 light (150W) at each approach) Yearly Usage 2,017 kWH/month x 12 months = 24,204 kWH/year Yearly Cost @ $0.10/kWH = $2,420.40/year <u>Central Island Landscaping</u> – It is reasonable to expect that a greenscaped central island will require routine maintenance. A specific cost is not easily attributed without determining the exact design of the roundabout and landscaping items. <u>Pavement Marking</u> – Roundabouts will generally require more pavement marking than traditional intersections. A specific cost is not easily attributed without determining the exact design of the roundabout.	The maintenance of either alternative will include periodic pavement and other roadway infrastructure rehabilitation. The difference between the two is likely to be negligible with the exception of the specific items listed under each alternative.

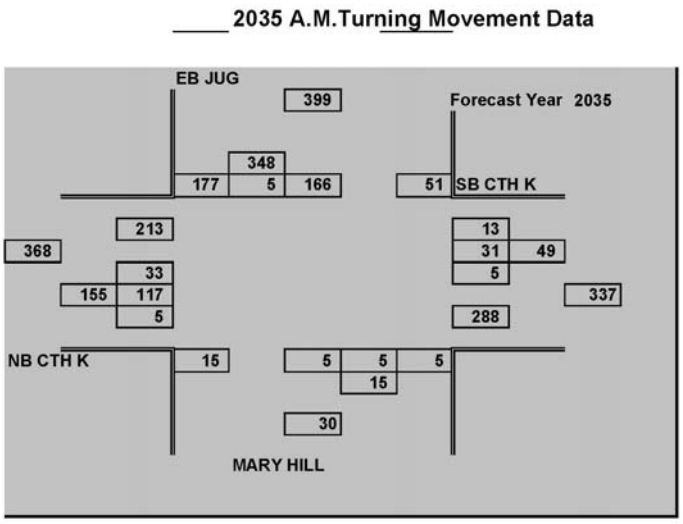
Intersection Control Evaluation
Factors to Analyze (Intersection of STH 23 & CTH K)

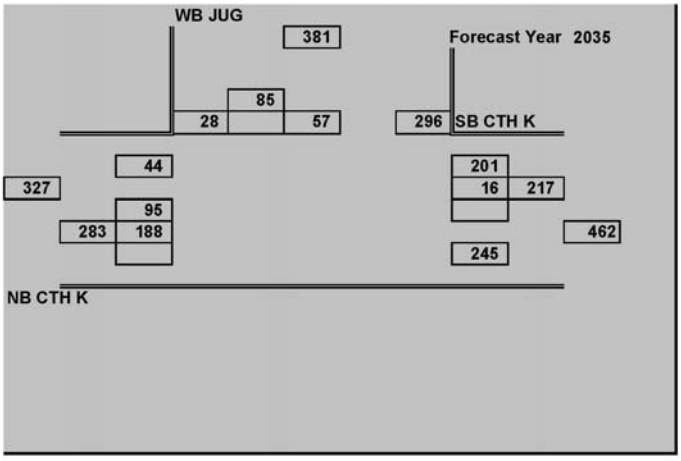
	ALTERNATIVE CONTROL ☐ TRAFFIC SIGNAL, ANTICIPATING TRAFFIC SIGNAL ☐ ROUNDABOUT ☐ 4-WAY STOP ☒ 2-WAY STOP (TWSC) ☐ EXISTING CONTROL 2-WAY STOP	**ALTERNATIVE CONTROL** ☐ TRAFFIC SIGNAL, ANTICIPATING TRAFFIC SIGNAL ☒ ROUNDABOUT ☐ 4-WAY STOP ☐ 2-WAY STOP (TWSC) ☐ EXISTING CONTROL 2-WAY STOP	**GENERAL COMMENTS**
ENVIRONMENTAL	N/A	N/A	In the context of a larger STH 23 expansion project there are no major adverse impacts associated with either intersection alternative that would not exist without the majority of work to upgrade the mainline and construct interchanges.
PED'S/BIKES	On-street bike lanes and sidewalks will be constructed for pedestrian and bicycle usage with this alternative. Pedestrians will be able to cross the intersections by use of at-grade crosswalks.	On-street bike lanes as well as sidewalk/shared use paths will be constructed for pedestrian and bicycle usage with this alternative. Pedestrians will be able to cross the intersections by use of at-grade crosswalks. Roundabouts will likely provide a safer crossing for pedestrians due to the slower entry speeds and needing to cross any one direction of traffic at a time when compared to the TWSC alternative.	
RECOMMENDATION	A TWSC intersection should be considered a viable alternative for both the east and west bound jug-handle intersections. It will operate at an acceptable level of service and can be upgraded to signalized control if traffic volumes increase to a level where warrants are met. This alternative will likely have a lower long term operation and maintenance cost, but may have higher crash potential and less capacity.	A roundabout intersection should be considered a viable alternative for both the east and west bound jug-handle intersections. It will operate at an acceptable level of service with high residual capacity beyond the design year life. This alternative will likely have a higher long term operation and maintenance cost, but may have lower crash potential and higher capacity. A roundabout type intersection is recommended at both the ramp terminals at this location. The higher long term capacity potential of this alternative is a key factor since the area is adjacent to the rapidly growing Fond du Lac area. This higher capacity potential combined with the expected safety benefits further support the use of roundabouts at this location.	Refer to Appendix F for a sketch of each intersection alternative.

Appendix A

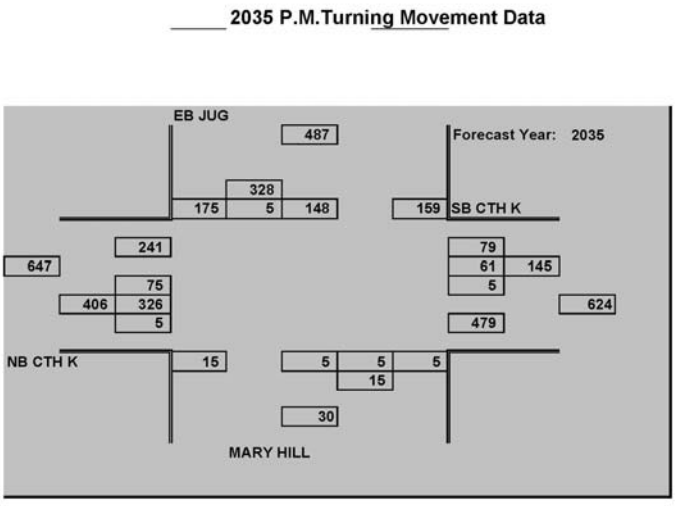
2035 Traffic Volumes & Distribution Percentages

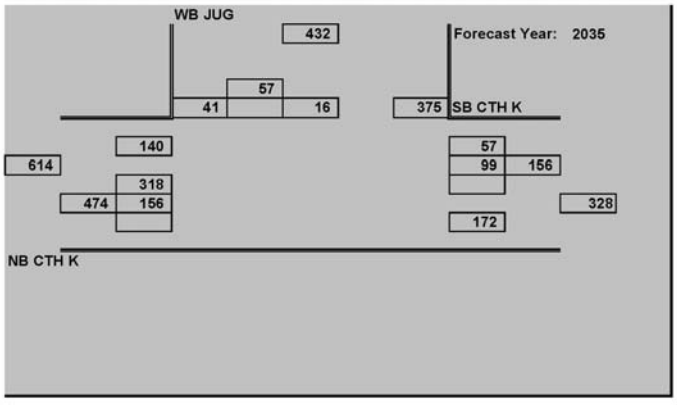
2035 AM Turning Movement Data



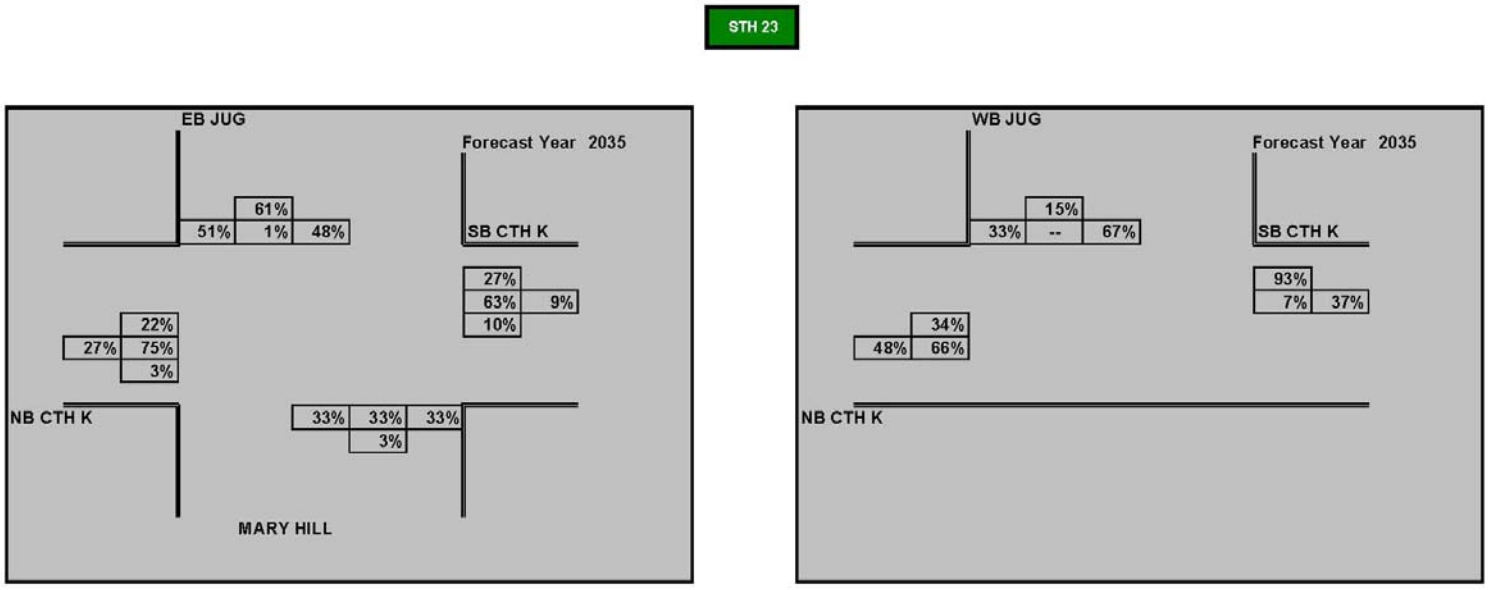


2035 PM Turning Movement Data

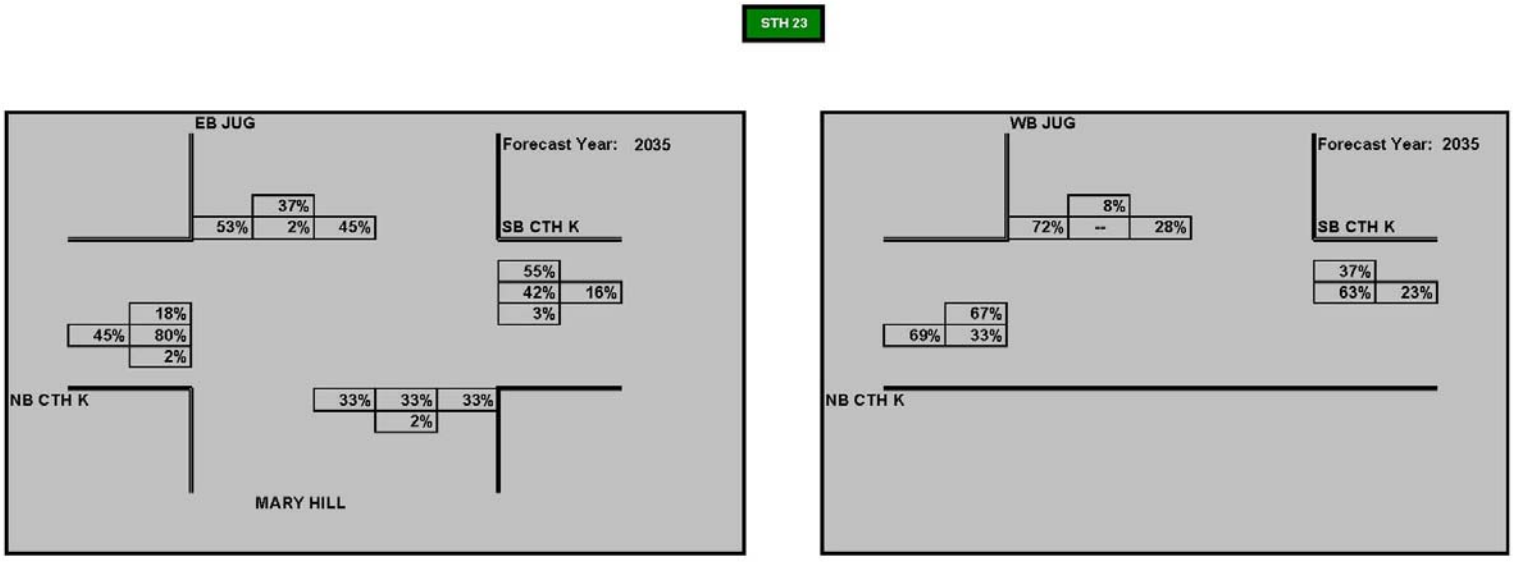




2035 AM Peak Traffic Distribution Percentages



2035 PM Peak Traffic Distribution Percentages



Appendix B

2035 Warrant Analysis Check

(8-Hour Warrant – Peak Hour Only)

INTERSECTION: STH 23 & CTH K EB Off RAMP

WARRANT 1 - EIGHT HOUR VEHICULAR VOLUME															
						100% SATISFIED		100% SATISFIED		80% SATISFIED		80% SATISFIED	
2035	Major Approaches CTH K			Minor Approach		>350 Condition A >105		>525 Condition B >53		>280 Condition A >84		>420 Condition B >42	
start time	NB	SB	Total	EB or WB		MAJOR	MINOR	MAJOR	MINOR	MAJOR	MINOR	MAJOR	MINOR
1:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
2:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
3:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
4:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
5:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
6:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
7:00	155	49	204	171	-	NOT MET	MET	NOT MET	MET	NOT MET	MET	NOT MET	MET
8:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
9:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
10:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
11:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
12:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
13:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
14:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
15:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
16:00	406	145	551	153	-	MET	MET	MET	MET	MET	MET	MET	MET
17:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
18:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
19:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
20:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
21:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
22:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
23:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
0:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
total	561	194	755	324		1 HOURS MET		1 HOURS MET		1 HOURS MET		1 HOURS MET	

WILL NOT MEET WARRANTS

INTERSECTION: STH 23 & CTH K WB Off RAMP

WARRANT 1 - EIGHT HOUR VEHICULAR VOLUME															
						100% SATISFIED		100% SATISFIED		80% SATISFIED		80% SATISFIED	
2035	Major Approaches CTH K			Minor Approach		>350 Condition A >105		>525 Condition B >53		>280 Condition A >84		>420 Condition B >42	
start time	NB	SB	Total	EB or WB		MAJOR	MINOR	MAJOR	MINOR	MAJOR	MINOR	MAJOR	MINOR
1:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
2:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
3:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
4:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
5:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
6:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
7:00	283	217	500	57	-	MET	NOT MET	NOT MET	MET			MET	MET
8:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
9:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
10:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
11:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
12:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
13:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
14:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
15:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
16:00	474	156	630	16	-	MET	NOT MET			MET	NOT MET	MET	NOT MET
17:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
18:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
19:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
20:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
21:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
22:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
23:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
0:00	0	0	0	0	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET
total	757	373	1130	73		0 HOURS MET		0 HOURS MET		0 HOURS MET		1 HOURS MET	

WILL NOT MEET WARRANTS

Appendix C

TWSC Operational Analysis Results

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	166	5	177	5	5	5	33	117	5	5	31	13
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	180	5	192	5	5	5	36	127	5	5	34	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			4									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	252	249	34	342	258	127	48			133		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	252	249	34	342	258	127	48			133		
tC, single (s)	7.2	6.6	6.2	7.2	6.6	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	73	99	81	99	99	99	98			100		
cM capacity (veh/h)	673	631	1031	480	624	915	1540			1434		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	378	16	163	5	39	14
Volume Left	180	5	36	0	5	0
Volume Right	192	5	0	5	0	14
cSH	1367	628	1540	1700	1434	1700
Volume to Capacity	0.28	0.03	0.02	0.00	0.00	0.01
Queue Length 95th (ft)	28	2	2	0	0	0
Control Delay (s)	10.8	10.9	1.8	0.0	1.1	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	10.8	10.9	1.7		0.8	
Approach LOS	B	B				

Intersection Summary				
Average Delay	7.5			
Intersection Capacity Utilization	37.4%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	5	175	5	5	5	75	326	5	5	61	79
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	161	5	190	5	5	5	82	354	5	5	66	86
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			4									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	603	600	66	692	680	354	152			360		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	603	600	66	692	680	354	152			360		
tC, single (s)	7.2	6.6	6.2	7.2	6.6	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	58	99	81	98	98	99	94			100		
cM capacity (veh/h)	380	385	989	270	346	683	1410			1182		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	357	16	436	5	72	86
Volume Left	161	5	82	0	5	0
Volume Right	190	5	0	5	0	86
cSH	815	372	1410	1700	1182	1700
Volume to Capacity	0.44	0.04	0.06	0.00	0.00	0.05
Queue Length 95th (ft)	56	3	5	0	0	0
Control Delay (s)	15.2	15.1	1.9	0.0	0.6	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	15.2	15.1	1.9		0.3	
Approach LOS	C	C				

Intersection Summary				
Average Delay	6.7			
Intersection Capacity Utilization	49.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	57	28	95	188	16	201
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	30	103	204	17	218
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	428	17	236			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	428	17	236			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	97	92			
cM capacity (veh/h)	532	1053	1314			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	92	103	204	17	218
Volume Left	62	103	0	0	0
Volume Right	30	0	0	0	218
cSH	794	1314	1700	1700	1700
Volume to Capacity	0.12	0.08	0.12	0.01	0.13
Queue Length 95th (ft)	10	6	0	0	0
Control Delay (s)	11.3	8.0	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	11.3	2.7		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	24.4%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	16	41	318	156	99	57
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	45	346	170	108	62
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	968	108	170			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	968	108	170			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	95	75			
cM capacity (veh/h)	209	938	1390			

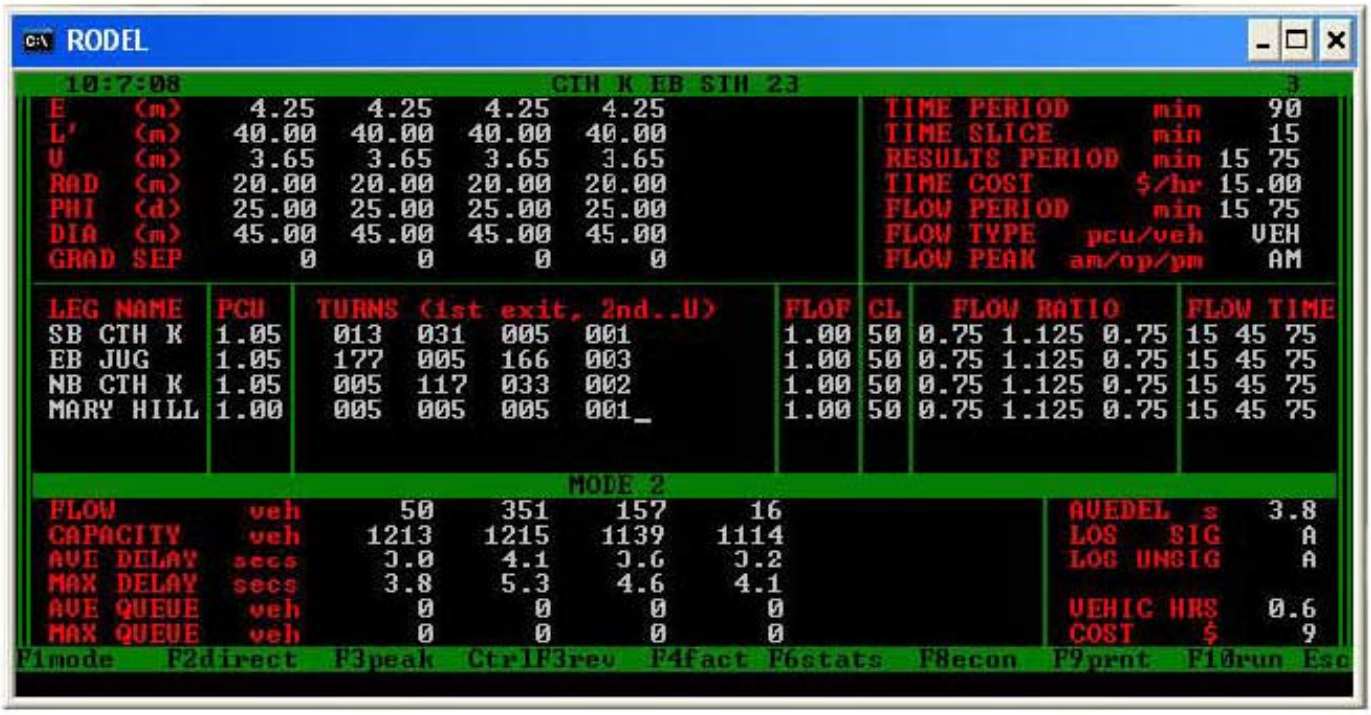
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	62	346	170	108	62
Volume Left	17	346	0	0	0
Volume Right	45	0	0	0	62
cSH	744	1390	1700	1700	1700
Volume to Capacity	0.08	0.25	0.10	0.06	0.04
Queue Length 95th (ft)	7	25	0	0	0
Control Delay (s)	13.2	8.4	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.2	5.7		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay	5.0			
Intersection Capacity Utilization	34.3%	ICU Level of Service		A
Analysis Period (min)	15			

Appendix D

Roundabout Operational Analysis Results

RODEL Results / CTH K (EAST BOUND)



RODEL

10:7:08 CTH K EB STH 23 3

E (m)	4.25	4.25	4.25	4.25
L' (m)	40.00	40.00	40.00	40.00
V (m)	3.65	3.65	3.65	3.65
RAD (m)	20.00	20.00	20.00	20.00
PHI (d)	25.00	25.00	25.00	25.00
DIA (m)	45.00	45.00	45.00	45.00
GRAD SEP	0	0	0	0

TIME PERIOD min	90
TIME SLICE min	15
RESULTS PERIOD min	15 75
TIME COST $/hr	15.00
FLOW PERIOD min	15 75
FLOW TYPE pcu/veh	VEH
FLOW PEAK am/op/pm	AM

LEG NAME	PCU	TURNS (1st exit, 2nd..U)	FLOF	CL	FLOW RATIO	FLOW TIME
SB CTH K	1.05	013 031 005 001	1.00	50	0.75 1.125 0.75	15 45 75
EB JUG	1.05	177 005 166 003	1.00	50	0.75 1.125 0.75	15 45 75
NB CTH K	1.05	005 117 033 002	1.00	50	0.75 1.125 0.75	15 45 75
MARY HILL	1.00	005 005 005 001_	1.00	50	0.75 1.125 0.75	15 45 75

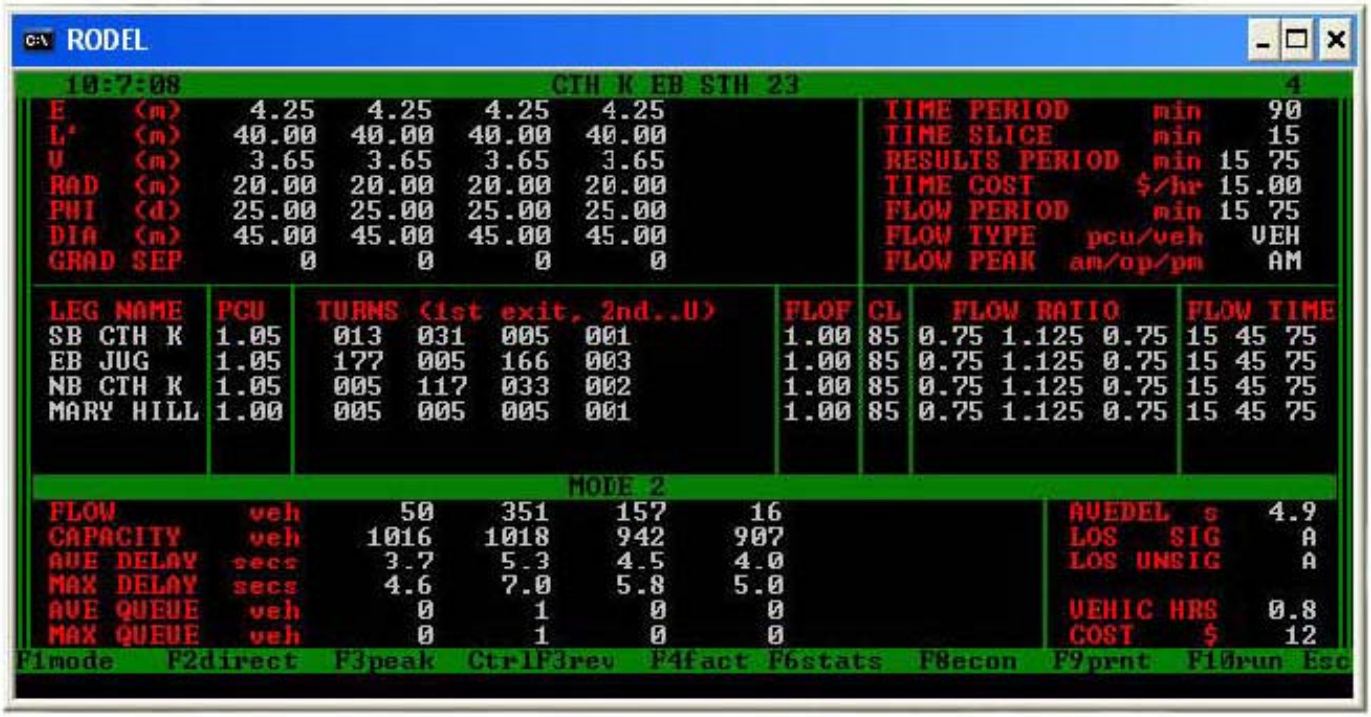
MODE 2

FLOW	veh	50	351	157	16
CAPACITY	veh	1213	1215	1139	1114
AVE DELAY	secs	3.0	4.1	3.6	3.2
MAX DELAY	secs	3.8	5.3	4.6	4.1
AVE QUEUE	veh	0	0	0	0
MAX QUEUE	veh	0	0	0	0

AVEDEL s	3.8
LOS SIG	A
LOS UNSIG	A
VEHIC HRS	0.6
COST $	9

F1mode F2direct F3peak Ctrl F3rev F4fact F6stats F8econ F9prnt F10run Esc

AM 50



RODEL

10:7:08 CTH K EB STH 23 4

E (m)	4.25	4.25	4.25	4.25
L' (m)	40.00	40.00	40.00	40.00
V (m)	3.65	3.65	3.65	3.65
RAD (m)	20.00	20.00	20.00	20.00
PHI (d)	25.00	25.00	25.00	25.00
DIA (m)	45.00	45.00	45.00	45.00
GRAD SEP	0	0	0	0

TIME PERIOD min	90
TIME SLICE min	15
RESULTS PERIOD min	15 75
TIME COST $/hr	15.00
FLOW PERIOD min	15 75
FLOW TYPE pcu/veh	VEH
FLOW PEAK am/op/pm	AM

LEG NAME	PCU	TURNS (1st exit, 2nd..U)	FLOF	CL	FLOW RATIO	FLOW TIME
SB CTH K	1.05	013 031 005 001	1.00	85	0.75 1.125 0.75	15 45 75
EB JUG	1.05	177 005 166 003	1.00	85	0.75 1.125 0.75	15 45 75
NB CTH K	1.05	005 117 033 002	1.00	85	0.75 1.125 0.75	15 45 75
MARY HILL	1.00	005 005 005 001	1.00	85	0.75 1.125 0.75	15 45 75

MODE 2

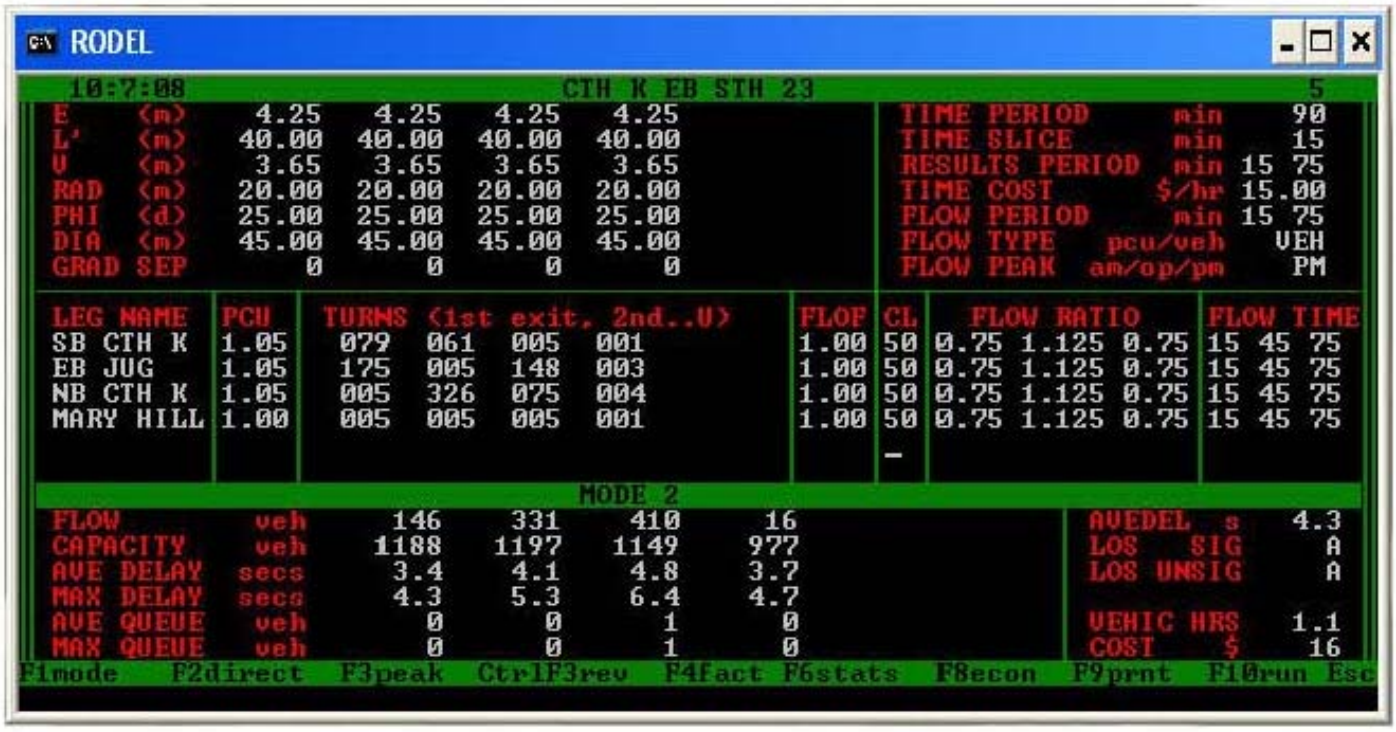
FLOW	veh	50	351	157	16
CAPACITY	veh	1016	1018	942	907
AVE DELAY	secs	3.7	5.3	4.5	4.0
MAX DELAY	secs	4.6	7.0	5.8	5.0
AVE QUEUE	veh	0	1	0	0
MAX QUEUE	veh	0	1	0	0

AVEDEL s	4.9
LOS SIG	A
LOS UNSIG	A
VEHIC HRS	0.8
COST $	12

F1mode F2direct F3peak Ctrl F3rev F4fact F6stats F8econ F9prnt F10run Esc

AM 85

RODEL Results / CTH K (EAST BOUND)



RODEL

10:7:08 — CTH K EB STH 23 — 5

E (m)	4.25	4.25	4.25	4.25
L' (m)	40.00	40.00	40.00	40.00
V (m)	3.65	3.65	3.65	3.65
RAD (m)	20.00	20.00	20.00	20.00
PHI (d)	25.00	25.00	25.00	25.00
DIA (m)	45.00	45.00	45.00	45.00
GRAD SEP	0	0	0	0

TIME PERIOD	min			90
TIME SLICE	min			15
RESULTS PERIOD	min	15	75	
TIME COST	$/hr			15.00
FLOW PERIOD	min	15	75	
FLOW TYPE	pcu/veh			VEH
FLOW PEAK	am/op/pm			PM

LEG NAME	PCU	TURNS (1st exit, 2nd..U)				FLOF	CL	FLOW RATIO			FLOW TIME		
SB CTH K	1.05	079	061	005	001	1.00	50	0.75	1.125	0.75	15	45	75
EB JUG	1.05	175	005	148	003	1.00	50	0.75	1.125	0.75	15	45	75
NB CTH K	1.05	005	326	075	004	1.00	50	0.75	1.125	0.75	15	45	75
MARY HILL	1.00	005	005	005	001	1.00	50	0.75	1.125	0.75	15	45	75

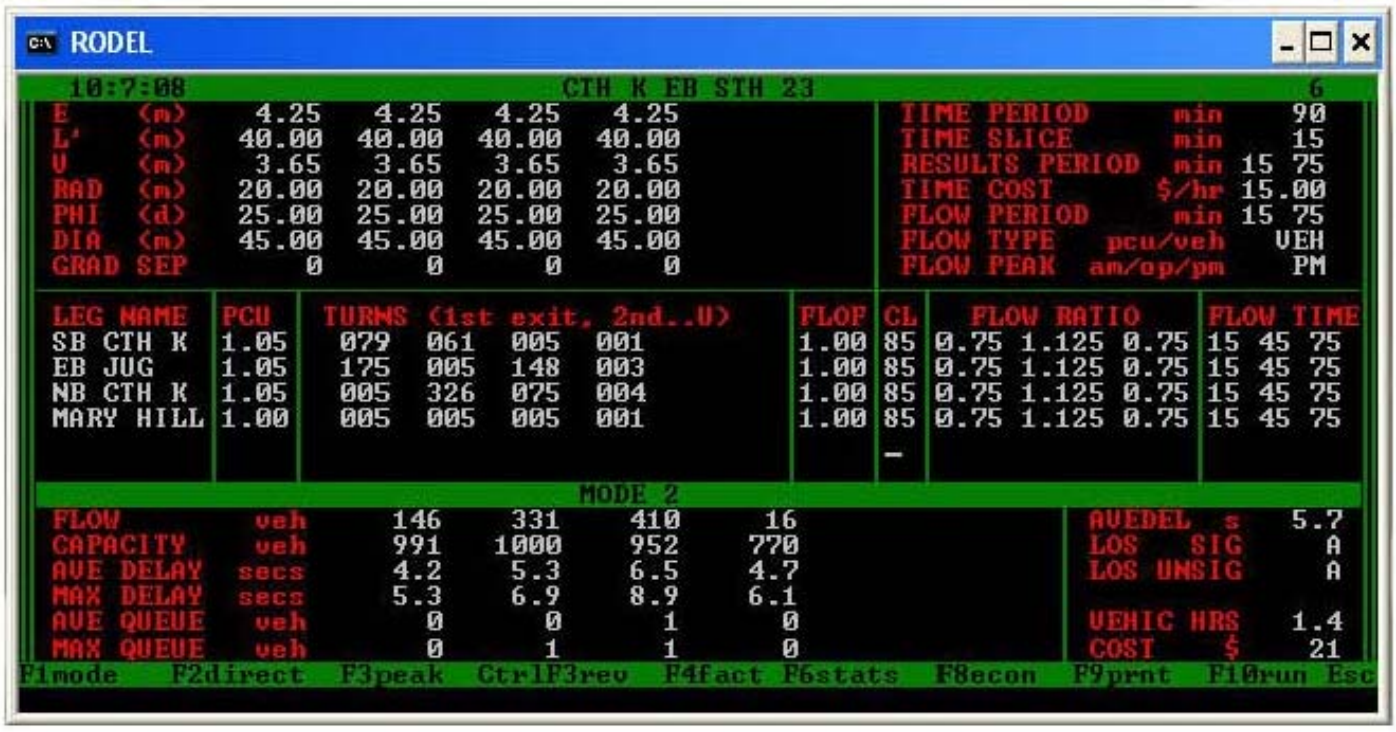
MODE 2

FLOW	veh	146	331	410	16
CAPACITY	veh	1188	1197	1149	977
AVE DELAY	secs	3.4	4.1	4.8	3.7
MAX DELAY	secs	4.3	5.3	6.4	4.7
AVE QUEUE	veh	0	0	1	0
MAX QUEUE	veh	0	0	1	0

AVEDEL	s	4.3
LOS SIG		A
LOS UNSIG		A
VEHIC HRS		1.1
COST	$	16

F1mode F2direct F3peak CtrlF3rev F4fact F6stats F8econ F9prnt F10run Esc

PM 50



RODEL

10:7:08 — CTH K EB STH 23 — 6

E (m)	4.25	4.25	4.25	4.25
L' (m)	40.00	40.00	40.00	40.00
V (m)	3.65	3.65	3.65	3.65
RAD (m)	20.00	20.00	20.00	20.00
PHI (d)	25.00	25.00	25.00	25.00
DIA (m)	45.00	45.00	45.00	45.00
GRAD SEP	0	0	0	0

TIME PERIOD	min			90
TIME SLICE	min			15
RESULTS PERIOD	min	15	75	
TIME COST	$/hr			15.00
FLOW PERIOD	min	15	75	
FLOW TYPE	pcu/veh			VEH
FLOW PEAK	am/op/pm			PM

LEG NAME	PCU	TURNS (1st exit, 2nd..U)				FLOF	CL	FLOW RATIO			FLOW TIME		
SB CTH K	1.05	079	061	005	001	1.00	85	0.75	1.125	0.75	15	45	75
EB JUG	1.05	175	005	148	003	1.00	85	0.75	1.125	0.75	15	45	75
NB CTH K	1.05	005	326	075	004	1.00	85	0.75	1.125	0.75	15	45	75
MARY HILL	1.00	005	005	005	001	1.00	85	0.75	1.125	0.75	15	45	75

MODE 2

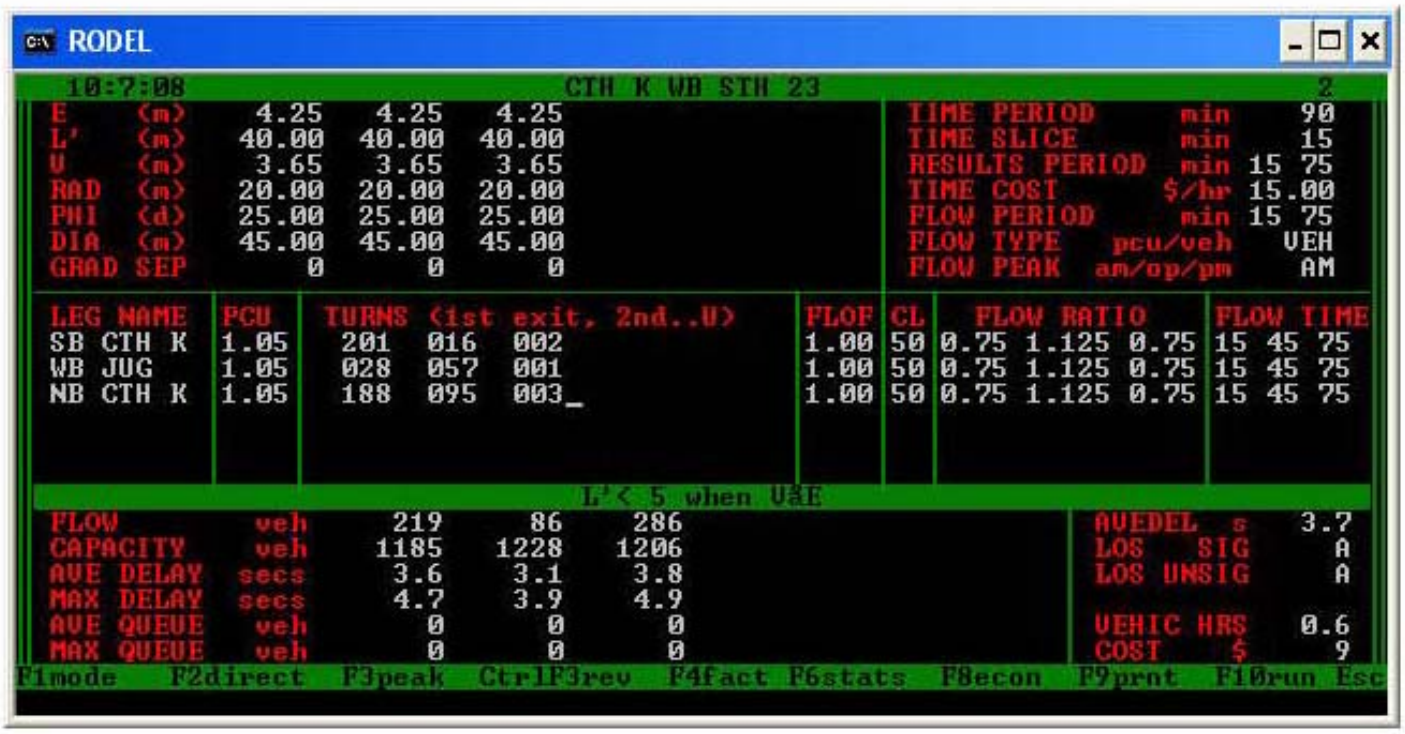
FLOW	veh	146	331	410	16
CAPACITY	veh	991	1000	952	770
AVE DELAY	secs	4.2	5.3	6.5	4.7
MAX DELAY	secs	5.3	6.9	8.9	6.1
AVE QUEUE	veh	0	0	1	0
MAX QUEUE	veh	0	1	1	0

AVEDEL	s	5.7
LOS SIG		A
LOS UNSIG		A
VEHIC HRS		1.4
COST	$	21

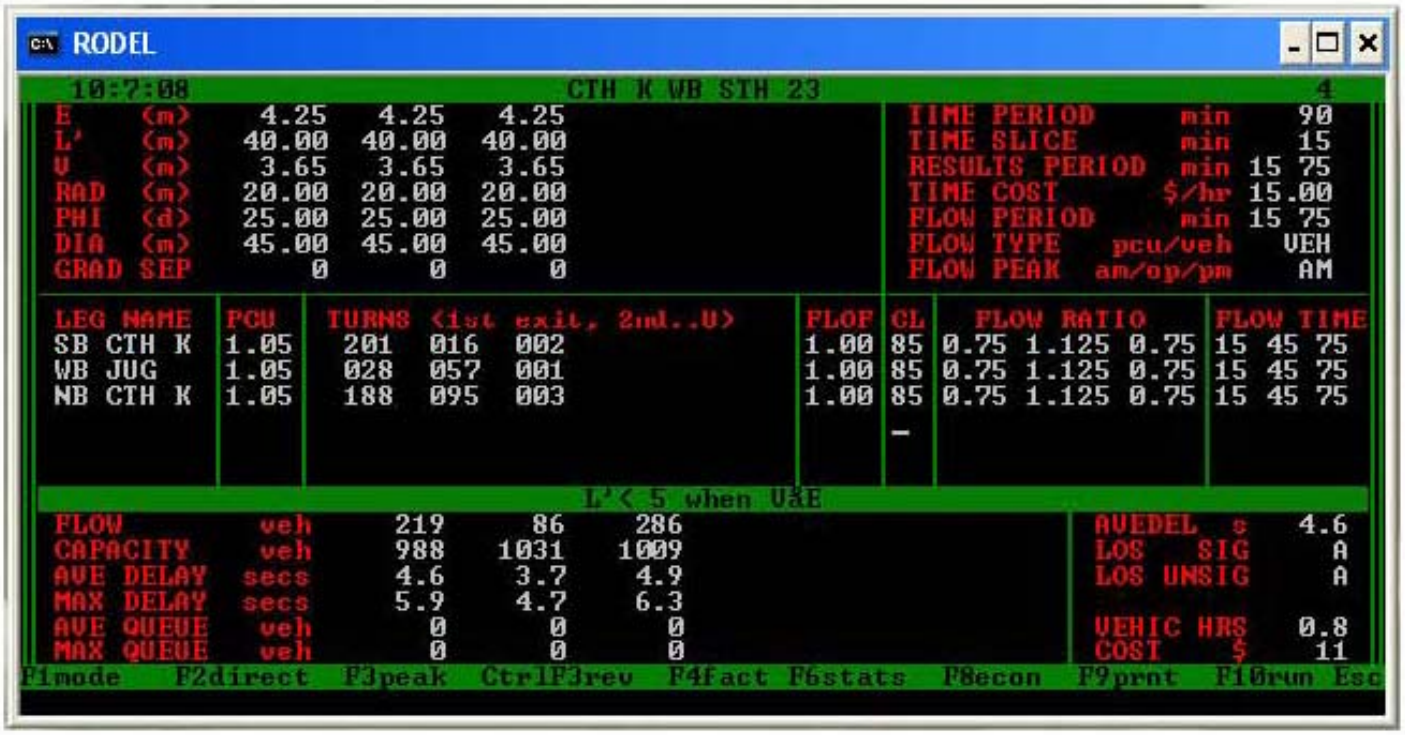
F1mode F2direct F3peak CtrlF3rev F4fact F6stats F8econ F9prnt F10run Esc

PM 85

RODEL Results / CTH K (WEST BOUND)

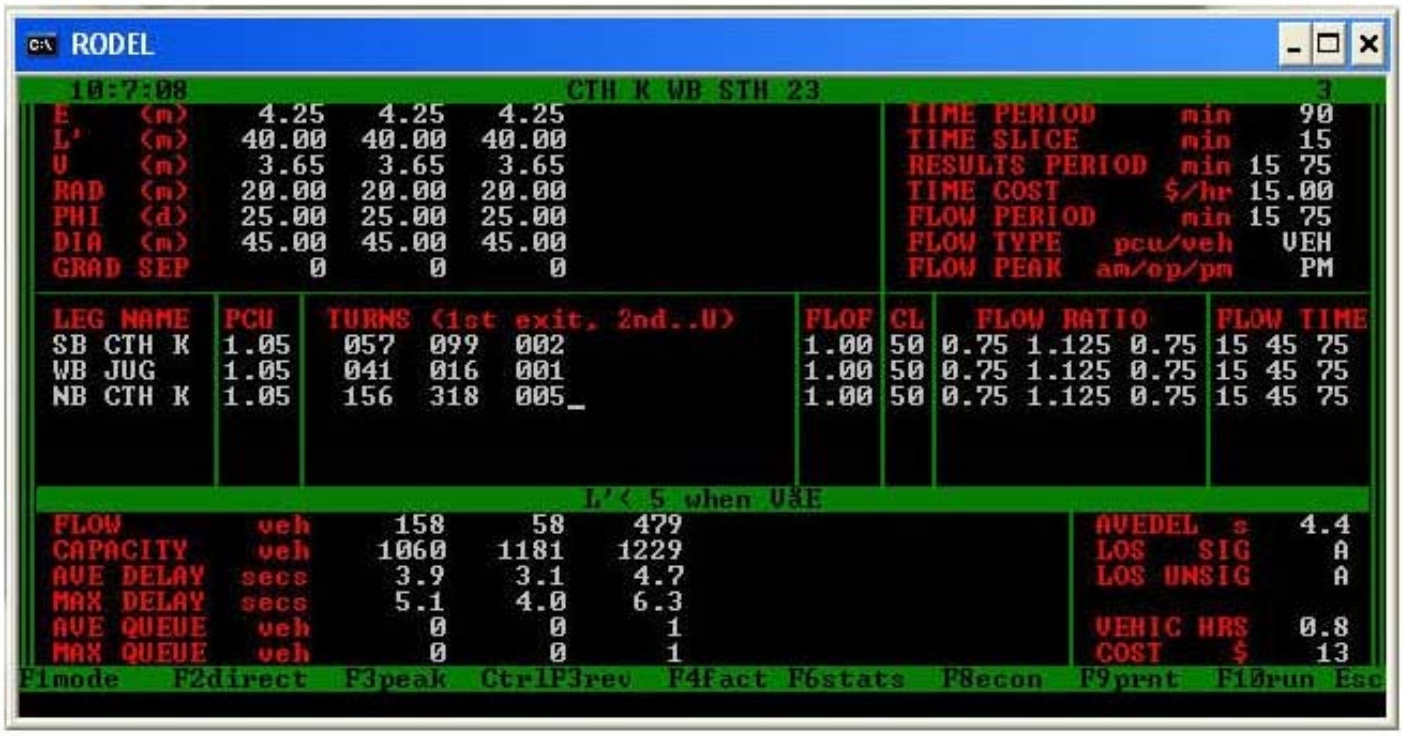


AM 50



AM 85

RODEL Results / CTH K (WEST BOUND)



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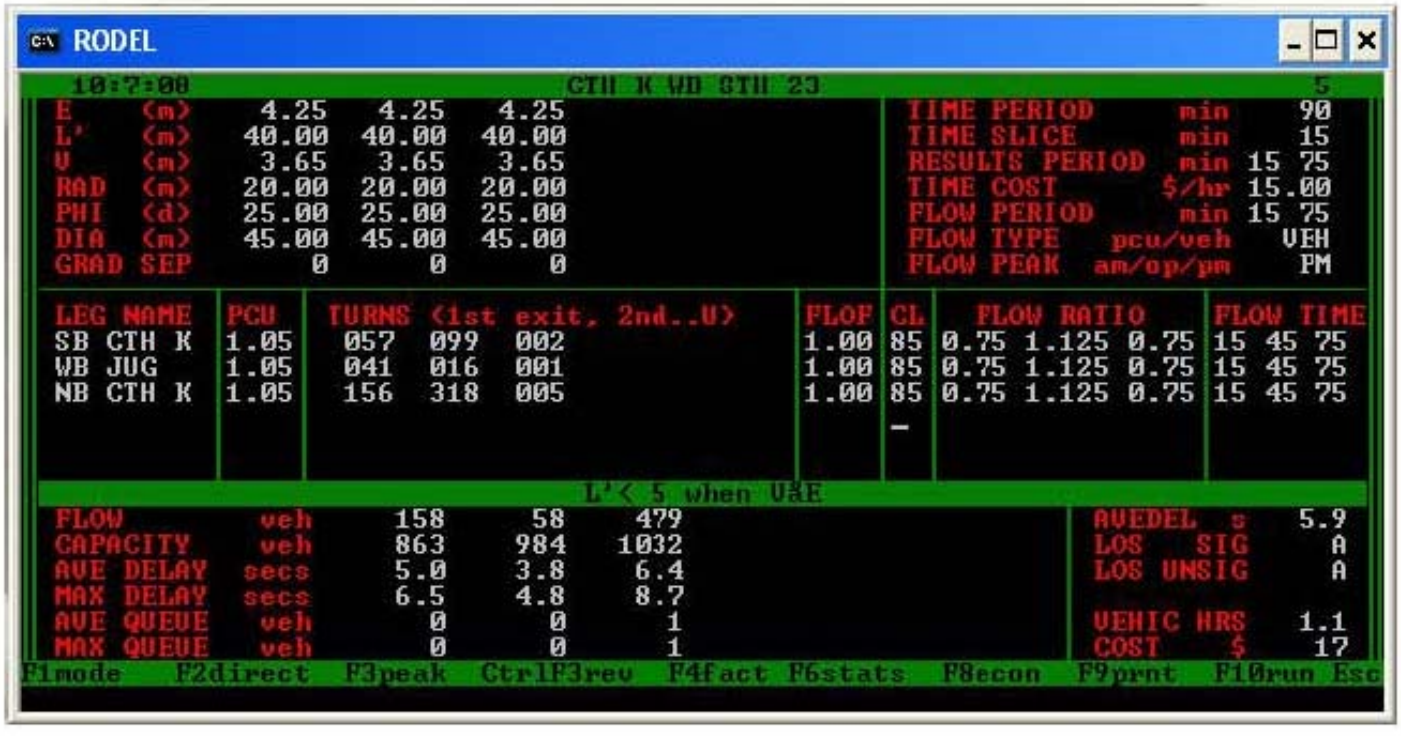


PM 85

Appendix E

Cost Estimates

STH 23 PROJECT 1440-15-01
COST ESTIMATE FOR:

STH 23 & CTH K - ROUNDABOUT ALTERNATIVE

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	CONCRETE PAVEMENT 8-INCH	SY	4626	$35.00	$161,910
2	HMA PAVEMENT TYPE E-0.3	TON	3038	$50.00	$151,900
3	HMA PAVEMENT TYPE E-1	TON	196	$65.00	$12,740
4	ASPHALTIC MATERIAL	TON	194	$450.00	$87,300
5	TACK COAT	GAL	350	$2.50	$875
6	BASE AGGREGATE DENSE 3/4-INCH	TON	570	$12.50	$7,125
7	BASE AGGREGATE DENSE 1 1/4-INCH	TON	17128	$10.00	$171,280
8	CONCRETE SIDEWALK	SF	17624	$3.00	$52,872
9	CONCRETE CURB & GUTTER 30-INCH	LF	7077	$10.50	$74,309
10	CONCRETE CURB & GUTTER 36-INCH	LF	2050	$12.00	$24,600
11	CONCRETE TRUCK APRON	SY	575	$55.00	$31,625
12	DRAINAGE ITEMS	LS	15% Of Items 1 - 11		$116,480
13	LANDSCAPING ITEMS	LS	2% Of Items 1 - 11		$15,531
14	EROSION CONTROL ITEMS	LS	2% Of Items 1 - 11		$15,531
15	PAVEMENT MARKING ITEMS	LS	3% Of Items 1 - 11		$23,296
16	SIGNING ITEMS	LS	2% Of Items 1 - 11		$15,531
17	LIGHTING ITEMS	LS	10% Of Items 1 - 11		$77,654
				GRAND TOTAL COST	**$1,040,558**

STH 23 & CTH K - TWO WAY STOP CONTROL ALTERNATIVE

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	CONCRETE PAVEMENT 8-INCH	SY	5332	$35.00	$186,620
2	HMA PAVEMENT TYPE E-0.3	TON	3532	$50.00	$176,600
3	HMA PAVEMENT TYPE E-1	TON	211	$65.00	$13,715
4	ASPHALTIC MATERIAL	TON	225	$450.00	$101,250
5	TACK COAT	GAL	405	$2.50	$1,013
6	BASE AGGREGATE DENSE 3/4-INCH	TON	629	$12.50	$7,863
7	BASE AGGREGATE DENSE 1 1/4-INCH	TON	17771	$10.00	$177,710
8	CONCRETE SIDEWALK	SF	0	$3.00	$0
9	CONCRETE CURB & GUTTER 30-INCH	LF	4129	$10.50	$43,355
10	CONCRETE CURB & GUTTER 36-INCH	LF	3082	$12.00	$36,984
11	DRAINAGE ITEMS	LS	15% Of Items 1 - 10		$111,766
12	LANDSCAPING ITEMS	LS	2% Of Items 1 - 10		$14,902
13	EROSION CONTROL ITEMS	LS	2% Of Items 1 - 10		$14,902
14	PAVEMENT MARKING ITEMS	LS	2% Of Items 1 - 10		$14,902
15	SIGNING ITEMS	LS	1% Of Items 1 - 10		$7,451
16	LIGHTING ITEMS	LS	0% Of Items 1 - 10		$0
				GRAND TOTAL COST	**$909,032**

PROJECT NO: 1440-15-71	HWY: STH 23	COUNTY: FOND DU LAC	CTH K - TWSC COST ESTIMATE AREA	SHEET	E

FILE NAME : G:\WDOT3\WD300421\Traffic\INTERSECTION CONTROL EVALUATION\twsc option.dgn PLOT DATE : 1/16/2009 PLOT BY : KL Engineering PLOT NAME : PLOT SCALE :

2

2

STH 23 (EXPRESSWAY NOT SHOWN)

MARY HILL FRONTAGE ROAD

HILLSIDE CIRCLE

HILLSIDE CIR.

TERRE DR.

SUMAC CT.

BELLEVUE BLVD.

CTH K

JUG HANDLE RAMPS

JUG HANDLE RAMPS

STH 23

N

1" = 200'

PROJECT NO: 1440-15-71	HWY: STH 23	COUNTY: FOND DU LAC	CTH K - ROUNDABOUT COST ESTIMATE AREA	SHEET	E

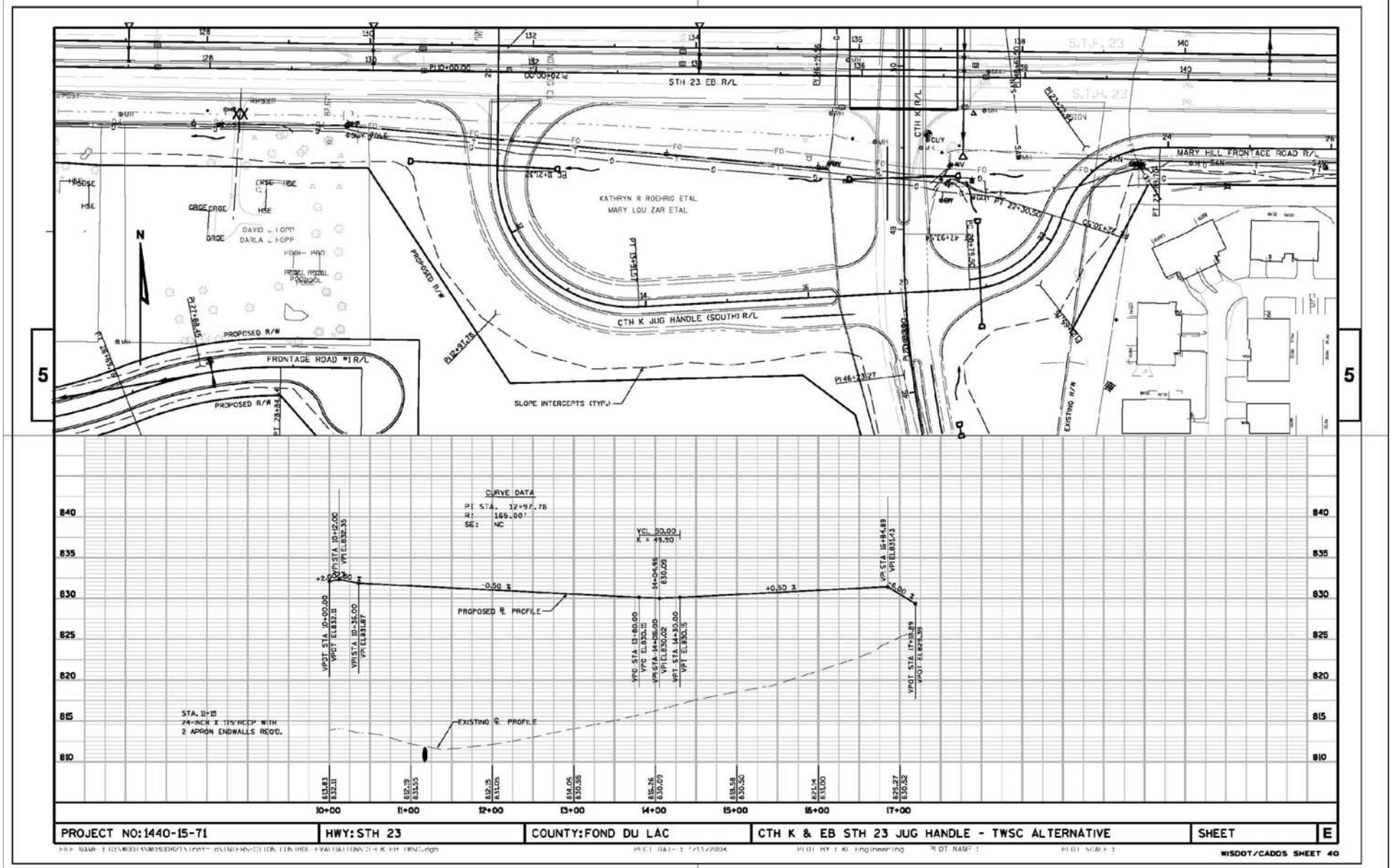
FILE NAME : G:\WDOT3\WD300421\Traffic\INTERSECTION CONTROL EVALUATION\twsc option.dgn PLOT DATE : 1/16/2009 PLOT BY : KL Engineering PLOT NAME : PLOT SCALE :

WISDOT/CADDS SHEET 42

Appendix F

Sketch of Alternatives

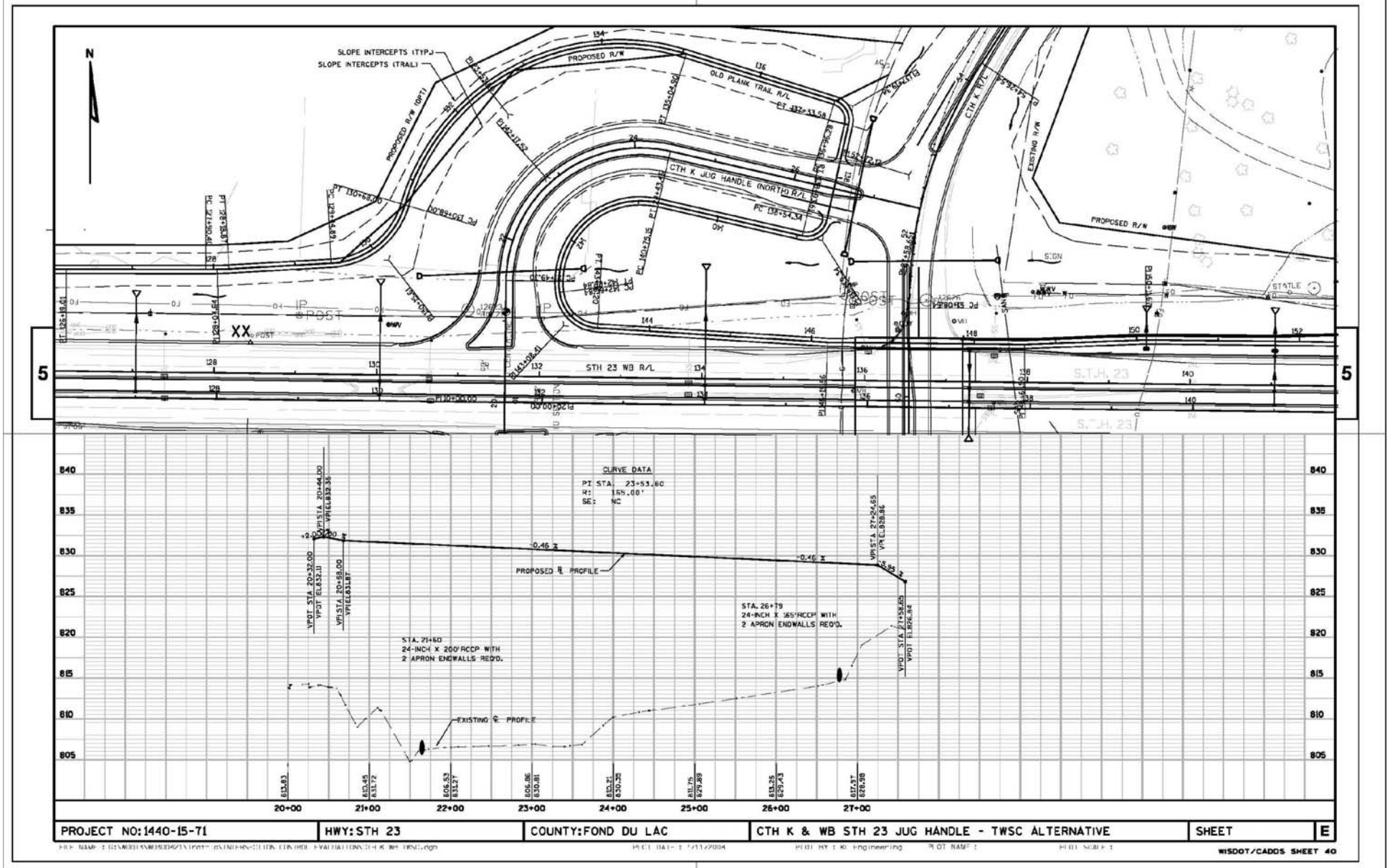
CTH K & EB STH 23 JUB HANDLE - TWSC ALTERNATIVE



PROJECT NO: 1440-15-71	HWY: STH 23	COUNTY: FOND DU LAC	CTH K & EB STH 23 JUG HANDLE - TWSC ALTERNATIVE	SHEET	E

WISDOT/CADDS SHEET 40

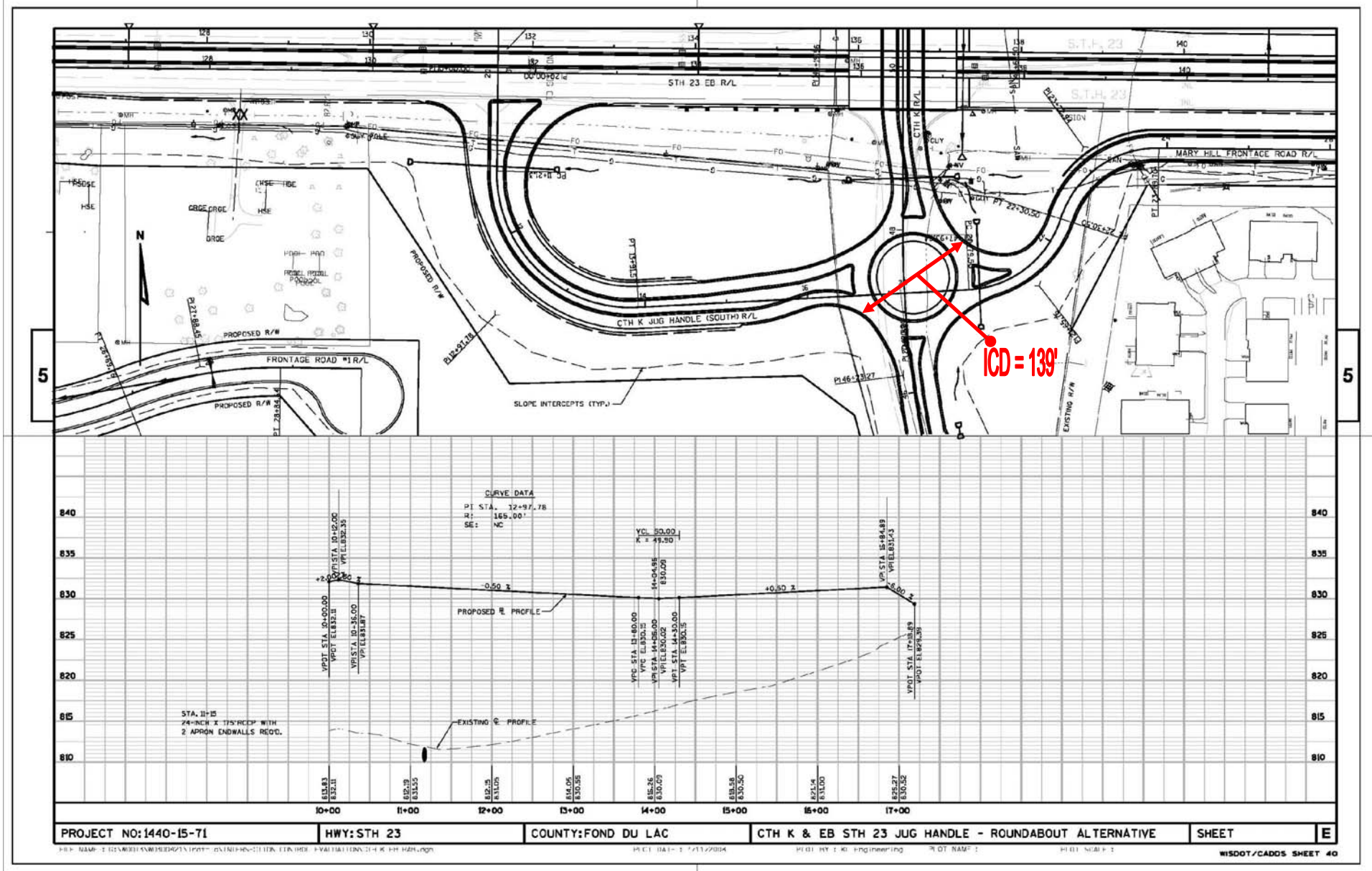
CTH K & WB STH 23 JUB HANDLE - TWSC ALTERNATIVE



PROJECT NO: 1440-15-71	HWY: STH 23	COUNTY: FOND DU LAC	CTH K & WB STH 23 JUG HANDLE - TWSC ALTERNATIVE	SHEET	E

WISDOT/CADDS SHEET 40

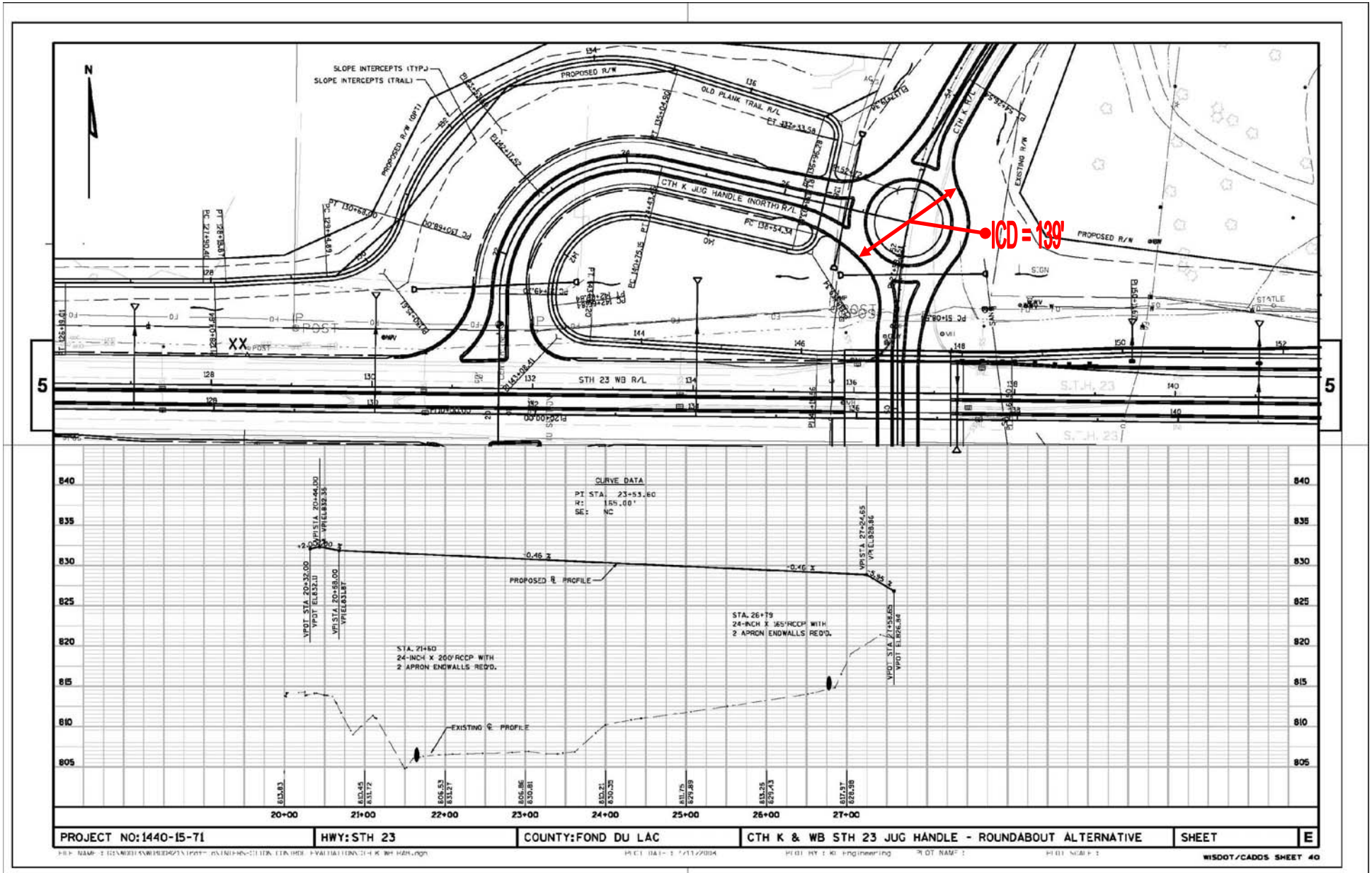
CTH K & EB STH 23 JUB HANDLE - ROUNDABOUT ALTERNATIVE



PROJECT NO: 1440-15-71	HWY: STH 23	COUNTY: FOND DU LAC	CTH K & EB STH 23 JUG HANDLE - ROUNDABOUT ALTERNATIVE	SHEET	E

WISDOT/CADDS SHEET 40

CTH K & WB STH 23 JUB HANDLE - ROUNDABOUT ALTERNATIVE



Appendix G

STH 23 Corridor Crash Report

Crash Report

Project ID 1440-15-01
Fond du Lac - Plymouth Road
(CTH K - CTH W)
STH 23
Fond du Lac County

Prepared by:

5950 Seminole Centre Court Suite 200
Madison, WI 53711

June, 2007

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Appendix

I. Introduction

The proposed project begins at USH 151 and proceeds easterly approximately 8.3 miles to Log Tavern Road.

This report summarizes crash data for STH 23 from USH 151 to Log Tavern Road. The corridor was divided into 3 segments to correlate crashes with AADT. The segments included the 0.7 mile segment from the Northbound ramps of USH 151 to CTH K which is a primarily four lane divided rural section (posted speed from 35 mph to 45mph), the 1.3 mile segment from CTH K to the CTH UU which is primarily a four lane divided rural section (posted speed 55 mph) and the 6.3 mile segment from CTH UU to Log Tavern Road which is a two lane undivided rural section (posted speed of 55 mph). See Appendix A for Project Location Map.

II. Traffic and Crash Data

Annual Daily Traffic (AADT)

Year 2000 AADT's from the Wisconsin Highway Traffic Volume Data and Traffic Counts for 2006 provided by WisDOT were used to interpolate AADT's for the years 2001 - 2005; using the equation F=P(1+i)^n where F is the future year, P is the present year's AADT, i is the growth rate and n is the number of years from the present year. Table 1 shows the AADT's for the period from 2001-2005. See Appendix B for AADT computations and Appendix C for Wisconsin Highway Traffic Volume Data maps.

Table 1: AADT's

SEGMENT	FROM	TO	2001	2002	2003	2004	2005
1	USH 151	CTH K	13600	13600	13600	13600	13600
2	CTH K	CTH UU	10395	10593	10795	11001	11211
3	CTH UU	LOG TAVERN RD	8181	8263	8346	8430	8515

Vehicle Miles Traveled (VMT)

Vehicles miles traveled is a measure of the number of vehicles and the distance that was traveled by those vehicles. The VMT is used to compute a crash rate. Table 2 summarizes the vehicle miles traveled in millions and was computed using the following:

VMT = (AADT x 365 days x LENGTH)/1,000,000

Table 2: VMT in Millions

	LENGTH	2001	2002	2003	2004	2005
SEGMENT 1	0.70 MILES	3.5	3.5	3.5	3.5	3.5
SEGMENT 2	1.26 MILES	4.8	4.9	5.0	5.1	5.2
SEGMENT 3	6.29 MILES	18.8	19.0	19.2	19.3	19.5

Total Crashes

The crash data provided by WisDOT includes crashes from 2001 thru 2005 that occurred on the State Trunk Highway System. The database includes crashes involving $1,000 or more damage to any one vehicle, an injury of fatality, and $200 or more in damage to government property such as traffic sign's or guard rail. Table 3 summarizes the crashes by segment according to crash severity.

Table 3: Total # of Crashes

Segment Number	Total # of Crashes	Property Damage	Crash With Injury	Crash With Fatality
Segment 1	28	14	14	0
Segment 2	21	10	11	0
Segment 3	53	25	28	0
Project Totals	**102**	**49**	**53**	**0**

Intersection and Non-Intersection Related crashes

The crash data that was used for this analysis identifies the crashes that are intersection related and those that are not related to intersections. "Intersection Related" is defined in the Law Enforcement Officer's Instruction Manual for Completing the Wisconsin Motor Vehicle Crash Report Form (MV4000) as the following:

""Intersection Related" crashes are crashes which result from an activity, behavior, or traffic control which affects a unit's movement in relation to an intersection; whether or not the point of origin or first harmful event occurred within the intersection"

Intersection Related Crashes

Each intersection along the corridor was analyzed to determine the number, type and severity of crashes that occurred. The number of crashes at the intersections accounted for 43 percent of the total crashes through the corridor and 49 percent of injury crashes. Segment 1 accounts for 50 percent of intersection related crashes.

Table 4 summarizes crash data by crash severity and crash type for each intersection. Figure 1 shows the percentage of intersection related crashes at each intersection. Figure 2 shows the breakdown of the collision type for intersection related crashes.

Table 4: Intersection Crash Summary

	TOTAL	PROP. DAMAGE	INJURIES	FATALITIES	ANGLE	UNKNOWN	HEAD-ON	FIXED-OBJ.	REAR-END	SIDESWIPE - SAME DIR.	SIDE SWIPE OPP. DIR.
SEGMENT 1											
COUNTY ROAD K	20	9	11	0	13	0	1	3	2	0	1
WISCONSIN AMERICAN	2	1	1	0	2	0	0	0	0	0	0
SEGMENT 2											
UU	6	2	4	0	3	0	0	1	2	0	0
HILLTOP DR	1	0	1	0	1	0	0	0	0	0	0
WHISPERING SPRINGS BLVD	1	0	1	0	0	0	0	0	1	0	0
SEGMENT 3											
SEVEN HILLS RD	2	0	2	0	1	0	0	0	1	0	0
POPLAR RD	1	0	1	0	0	0	0	0	1	0	0
COUNTY ROAD W	9	5	4	0	2	1	0	0	4	2	0
HINN RD	0	0	0	0	0	0	0	0	0	0	0
RICHARDS RD	1	1	0	0	0	0	0	0	0	1	0
LOG TAVERN RD	0	0	0	0	0	0	0	0	0	0	0
TAFT RD	0	0	0	0	0	0	0	0	0	0	0
TOWER RD.	1	0	1	0	0	0	0	0	1	0	0
TOTALS	44	18	24	0	22	1	2	4	12	3	1

Figure 1: Percentage of Crashes at Intersections

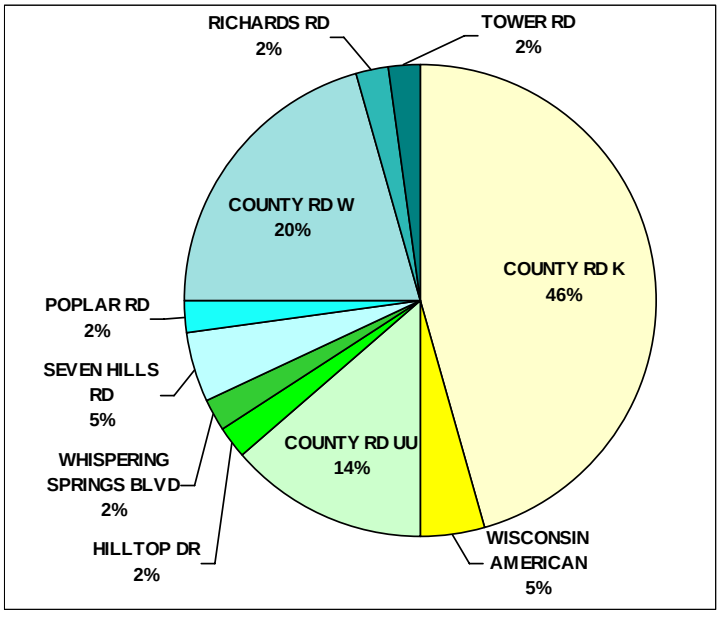
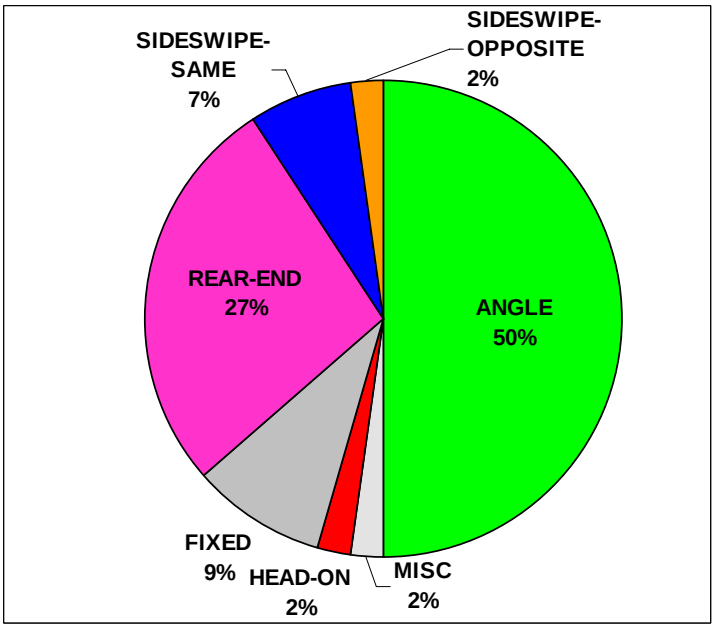


Figure 2: Collision Type at Intersections



Non-Intersection Related Crashes

Non-Intersection related crashes were classified into segments of the roadway in which they occurred. Non-Intersection related crashes accounted for 66 percent of the total crashes. Collisions with fixed objects accounted for 43 percent of the non-intersection related crashes. 54 percent of these crashes occurred while it was snowing or raining.

See Appendix D for map of non-intersection related crashes locations. Table 5 summarizes crashes based on severity and crash type. Figure 3 shows the percentage of crashes per Segment. Figure 4 shows the collision type percentage for non-intersection related crashes.

Table 5: Non-Intersection Collision Types by Segment

SEGMENT	TOTAL	PROP DAMAGE	INJURY	FATAL	ANGLE	HEAD-ON	FIXED OBJECT	REAR-END	SIDE SWIPE SAME	SIDE SWIPE OPPOSITE
1	6	3	3	0	1	0	2	4	1	0
2	13	8	5	0	2	2	4	4	1	0
3	39	19	20	0	3	5	21	4	3	1
TOTALS	**58**	**30**	**28**	**0**	**6**	**7**	**25**	**12**	**5**	**1**

Figure 3: Percentage of Non-Intersection crashes by segment

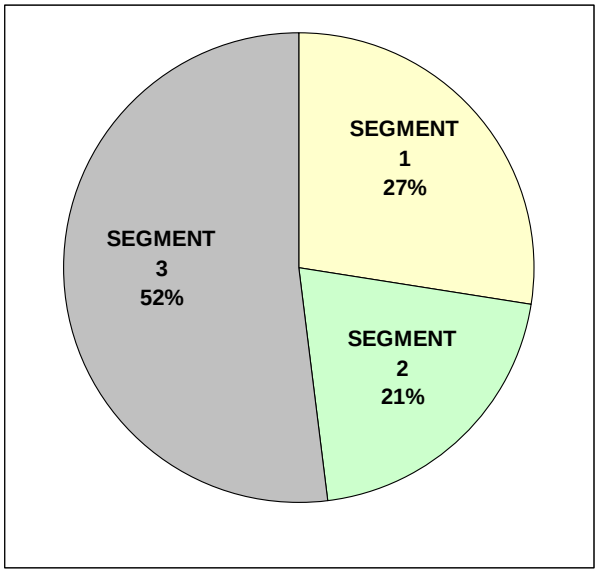
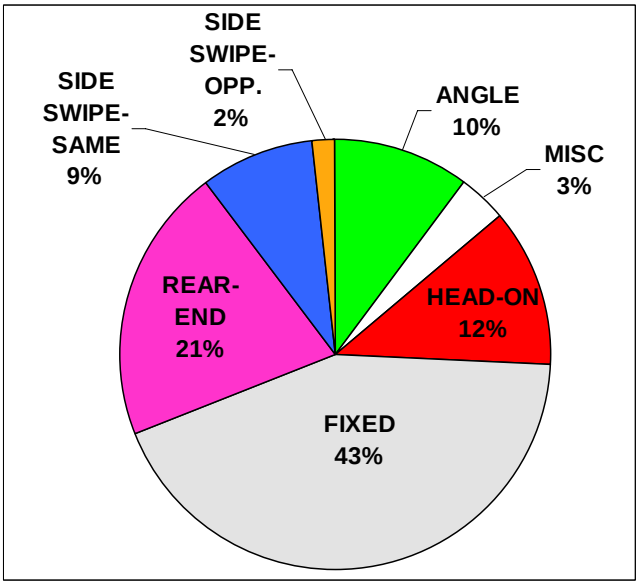


Figure 4: Collision Types for Non-Intersection Related Crashes



III. Crash Rates

Crash rates for each segment were computed for total number of crashes, crashes resulting in an injury and crashes resulting in a fatality. These rates were then compared to the statewide crash rate for comparable rural State trunk highways. The statewide crash rate is expressed as number of crashes per hundred million vehicle miles traveled. Crash rates were computed by dividing the total number of crashes by the VMT. Table 6 summarizes the crash rates by year, segment and severity of crash. Values above the statewide average are underlined and bold.

Table 6: Crash Rates Comparison to Statewide Average for Rural STH

	TOTAL			INJURY			FATALITY		
YEAR	STATE	SEG2	SEG3	STATE	SEG2	SEG3	STATE	SEG2	SEG3
2001	104	42	53	42	42	27	2	0	0
2002	106	61	37	42	41	21	2	0	0
2003	117	80	89	46	40	**52**	2	0	0
2004	121	**138**	67	47	**59**	31	2	0	0
2005	115	97	31	43	39	15	2	0	0
AVG	113	84	55	44	**44**	29	2	0	0

There was a significant decrease in the accident rates between 2003 and 2004.

Segment 1 is a 0.7 mile segment that is includes an interchange in a semi-urban area. There are no statewide averages for a segment of this type. Due to this and its length being less than one mile, which is considered the minimum length appropriate for comparison, this segment was not included in this section of the report.

IV. Conclusion

There were 102 crashes along STH 23 from 2001 thru 2005. Crashes involving property damage accounted for 47 percent of the total while crashes resulting in personal injury accounted for 53 percent. There were no fatalities during this time period. A review of the database (minus deer related crashes) indicated the following:

- Segment 3, the longest segment, was responsible for 51 percent of the total number of crashes, 74 percent of which were non-intersection related.
- Intersection related crashes accounted for 44 percent of the total crashes, 52 percent of those were angle type crashes.
- Non-intersection related crashes that were not from a collision with a fixed object are concentrated near the intersections and driveways. See Appendix D for map showing non-intersection related crash locations.

SEGMENT 1

- There were 28 crashes (29 percent of total) during the study period.
- 80 percent of crashes were intersection related crashes, 71 percent of which occurred near the County Road K intersection.
- 43 percent of the crashes were angle type crashes at the County Road K intersection.
- 2001-2003 the segment averaged 9 crashes per year, after 2003 the segment only averaged 1.5 crashes.

SEGMENT 2

- There were 21 crashes (20 percent of total) during the study period.
- 48 percent of crashes in Segment 2 occurred near the County Road UU intersection.
- 2001-2003 the segment averaged 3 crashes per year, after 2003, 6 crashes.
- In 2004 the segment had crashes rates higher than the statewide average for crashes and crashes with injury.

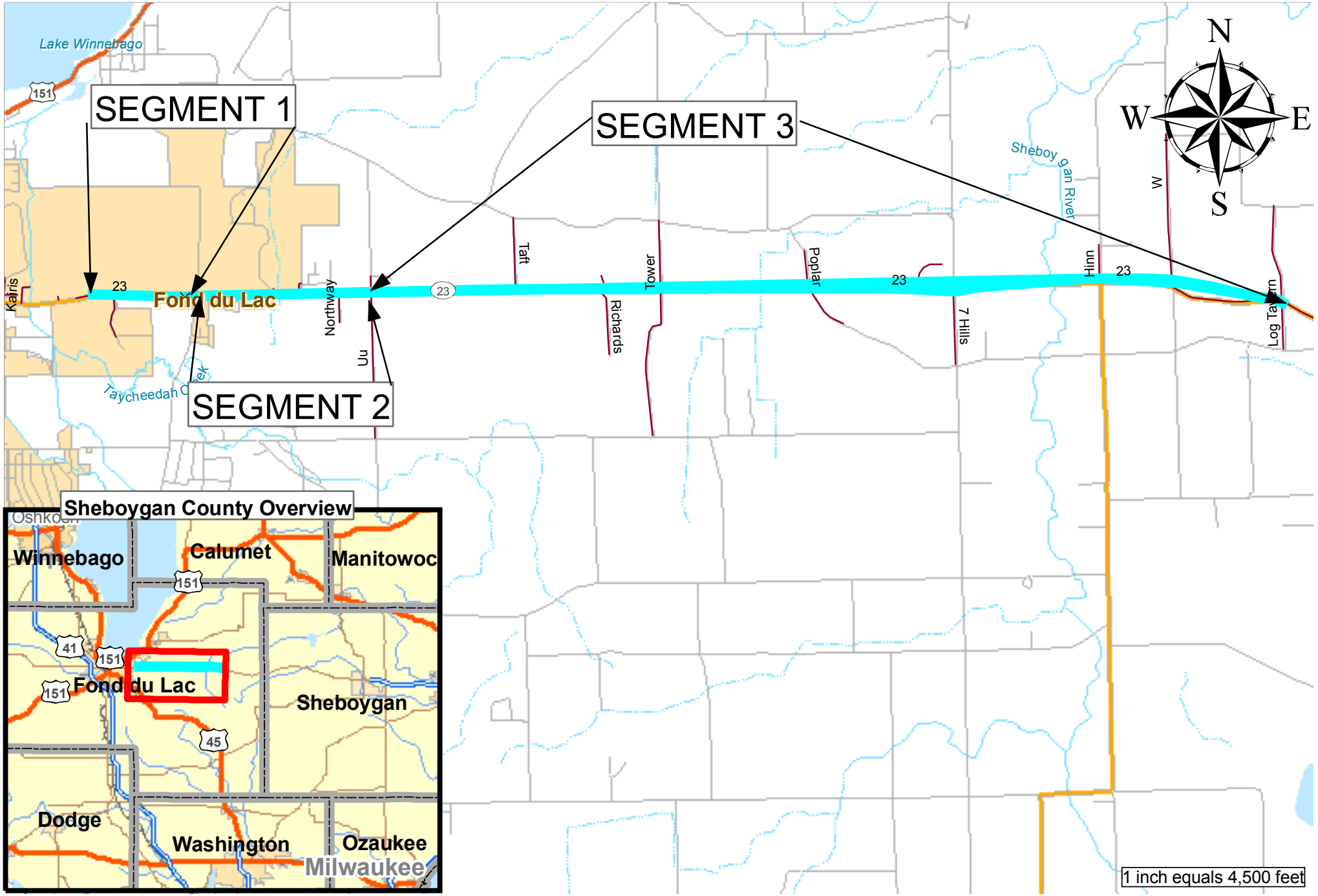
SEGMENT 3

- There were 53 crashes (51 percent of total) during the study period.
- 40 percent of crashes were with fixed objects such as signs, the ditch, light poles or trees.
- 9 crashes occurred at the County Road W intersection, four of which were rear-end type crashes.
- In 2003 the injury crash rate was higher than the statewide average.

APPENDIX A

PROJECT LOCATION MAP

Project Location Map



APPENDIX B

AADT & CRASH RATE COMPUTATIONS

AADT & Crash Rate Computations

ADT CALCULATOR

KNOWN TRAFFIC	151-K	K-UU	UU-LOG TAVERN	
START YEAR	*2000*	*2000*	*2000*	FROM TRAFFIC COUNTS BOOK 2002
ADT	13600	10200	8100	
END YEAR	*2006*	*2006*	*2006*	FROM TRAFFIC COUNTS COMPLETED IN 2006
ADT	13600	11425	8600	
GROWTH RATE =	0.00%	1.91%	1.00%	

F=P(1+i)^n

ADT PROJECTIONS

MILLION VEHICLE MILES (MVM) = (ADT x 365 x LENGTH)/1,000,000

151-CTH K 0.70 MILES

YEAR	2001	2002	2003	2004	2005
ADT	13600	13600	13600	13600	13600
MVM	3.5	3.5	3.5	3.5	3.5
TOTAL	143.5	315.6	258.2	28.7	57.4
INJ	86.1	172.1	143.5	0.0	28.7
FATL	0.0	0.0	0.0	0.0	0.0

CTH K - CTH UU 1.26 MILES

YEAR	2001	2002	2003	2004	2005
ADT	10395	10593	10795	11001	11211
MVM	4.8	4.9	5.0	5.1	5.2
TOTAL	41.7	61.4	80.3	137.9	96.6
INJ	41.7	40.9	40.1	59.1	38.7
FATL	0.0	0.0	0.0	0.0	0.0

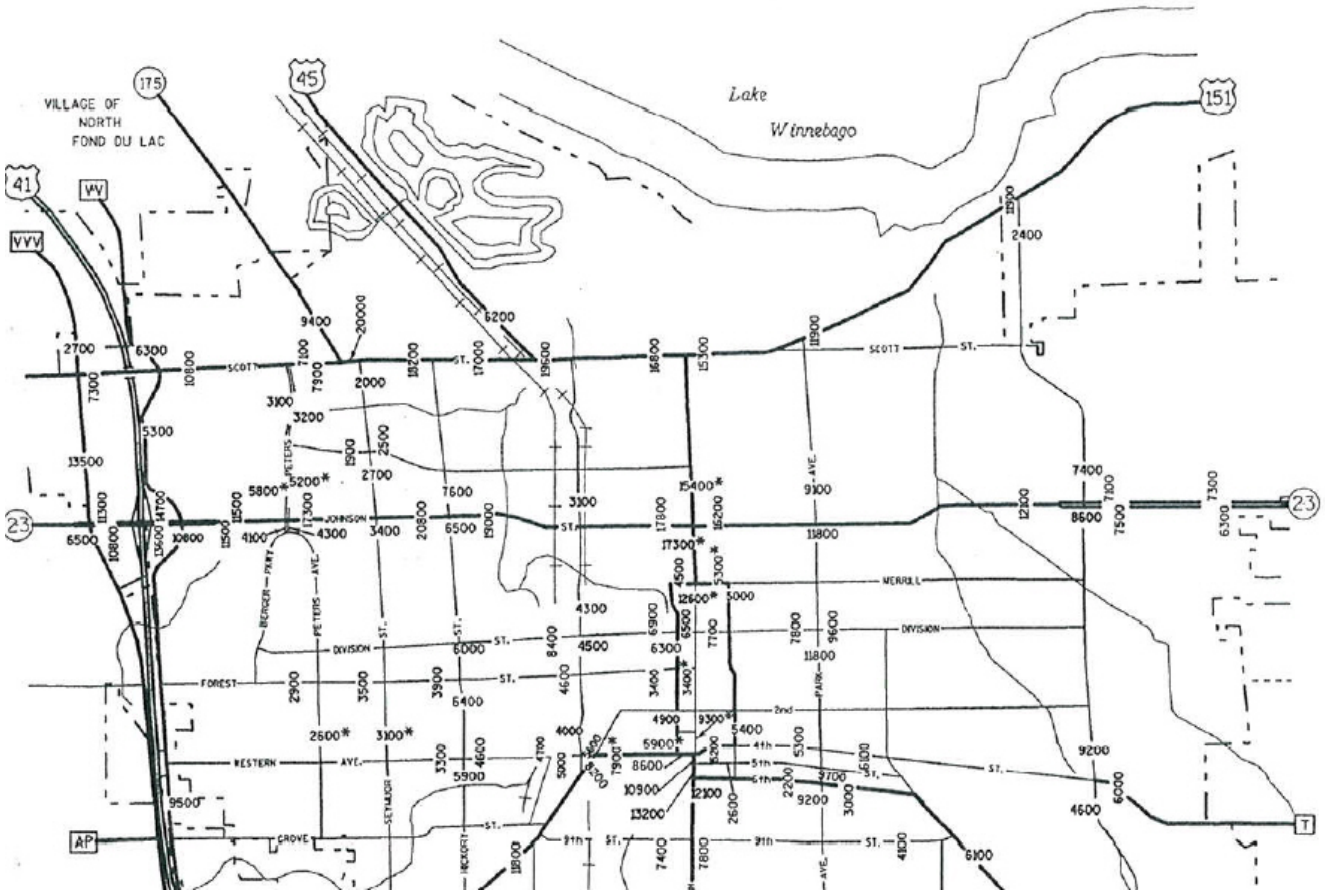
UU-LOG TAVERN 6.29 MILES

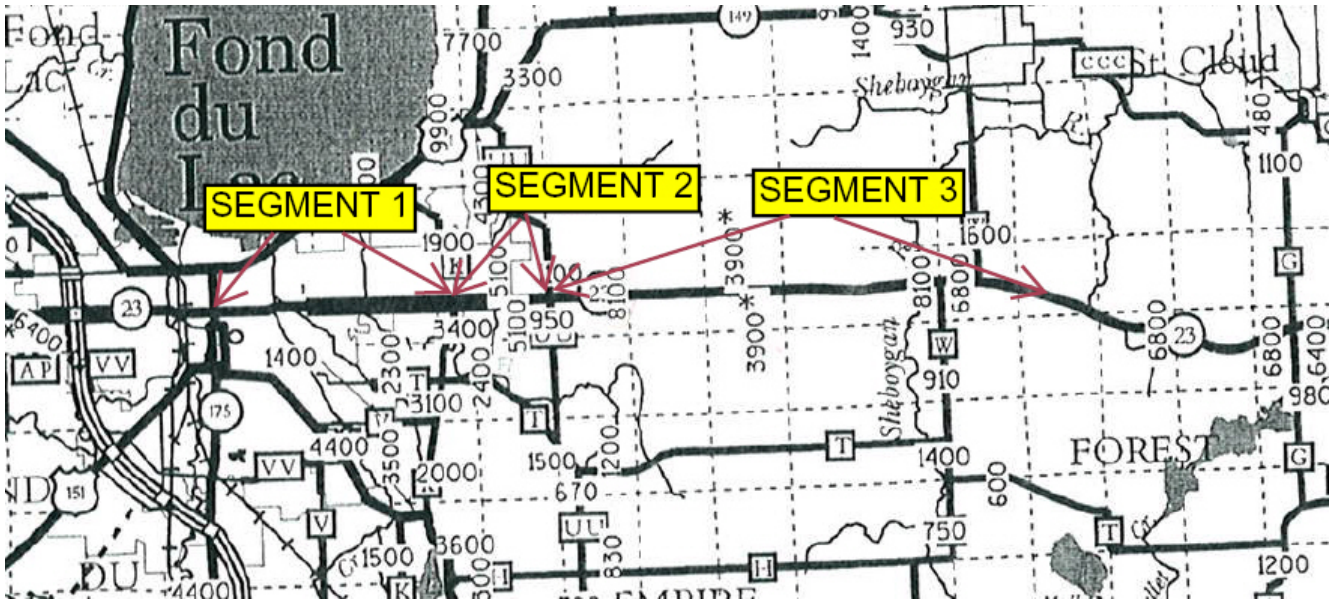
YEAR	2001	2002	2003	2004	2005
ADT	8181	8263	8346	8430	8515
MVM	18.8	19.0	19.2	19.3	19.5
TOTAL	53.3	36.9	88.7	67.2	30.7
INJ	26.6	21.1	52.2	31.0	15.4
FATL	0.0	0.0	0.0	0.0	0.0

APPENDIX C

WISCONSIN TRAFFIC VOLUME DATA

From 2002 Wisconsin Traffic Counts





From Wisconsin Department of Transportation

TRAFFIC FORECAST REPORT

PROJECT ID(S): 1440-13-00
ROUTE(S): STH 23

REGION/COUNTY(IES): Northeast Fond du Lac Co.
LOCATION: USH 151 to CTH "UU"
COMPLETED: February 16, 2006

Traffic Forecasting Section; Bureau of State Highway Programs; Division of Transportation Investment Management

Developed by: Bill Gavinski
Phone: (608) 266-3976
FAX #: (608) 2367-0294
E-Mail ID:william.gavinski@dot.state.wi.us

Design Values (%'s)

ROUTE(S):	STH 23		
Design Volume(s):			
K100	10.2		
K30	11.2		
P(PHV)	14.2		
T(DHV)	9.3		
T(PHV)	7.3		
D (Dsgn hr)	55-45		

Truck Class %'s

Truck Class	Seg. 1	Seg 2.	Seg. 3
2D	3.4		
3AX	2.0		
2S1+2S2	2.3		
3-S2	5.5		
DBL-BTM	0.7		
TOTAL	13.9%		

Specify Last Count & Forecast Years:
"000" Last Traffic Count
(000) 2015 AADT
-000- 2025 AADT
000 20235AADT

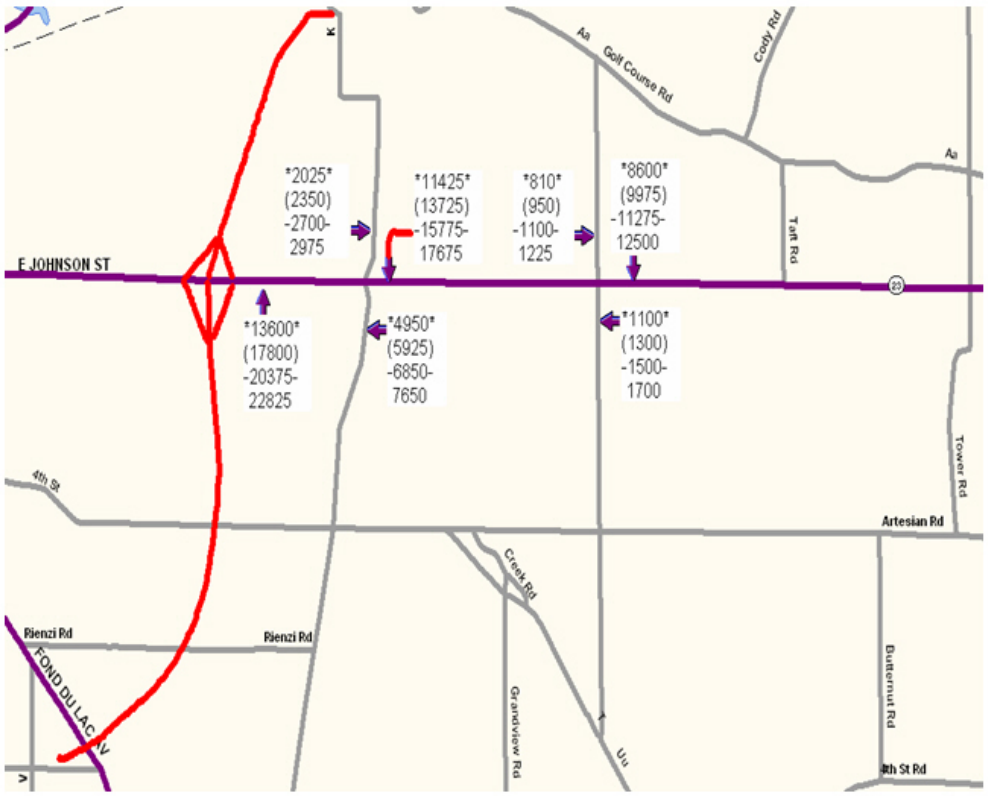
Notes on the Forecast:

1. Mainline volumes were forecasted using historical traffic count data from the coverage count stations located in or adjacent to the project area. The Fond du Lac urban transportation model was used to forecast traffic and diversions due to highway facility modifications.

2. Truck classification is based upon the vehicle classification stlocated on STH 23 (Sta# 206104).

3. Design data based upon similar highway facilities which have similar traffic volumes.

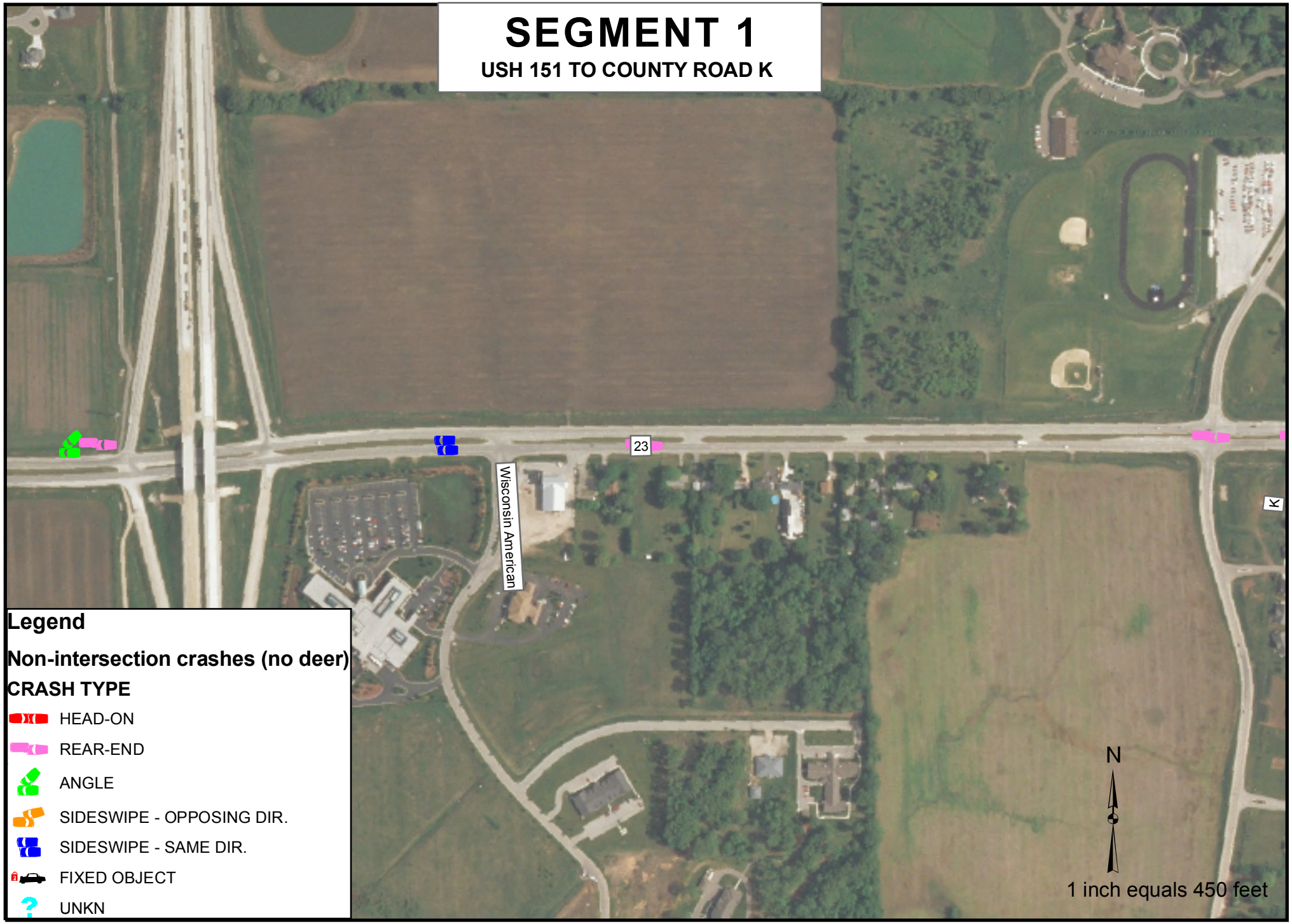
4. It is assumed that there will be some new traffic generators located along this highway facility during the forecast period.



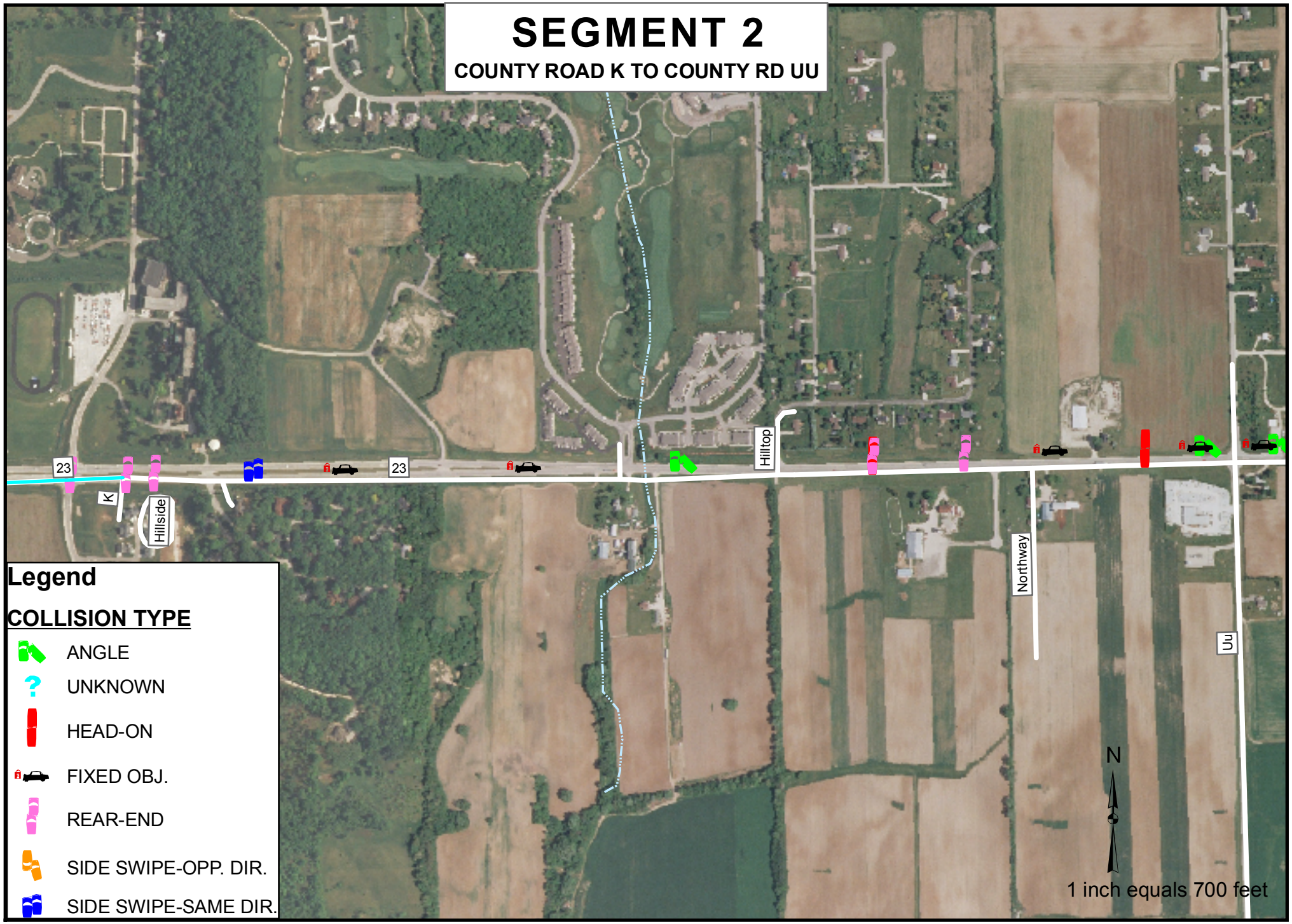
APPENDIX D

CRASH MAPS

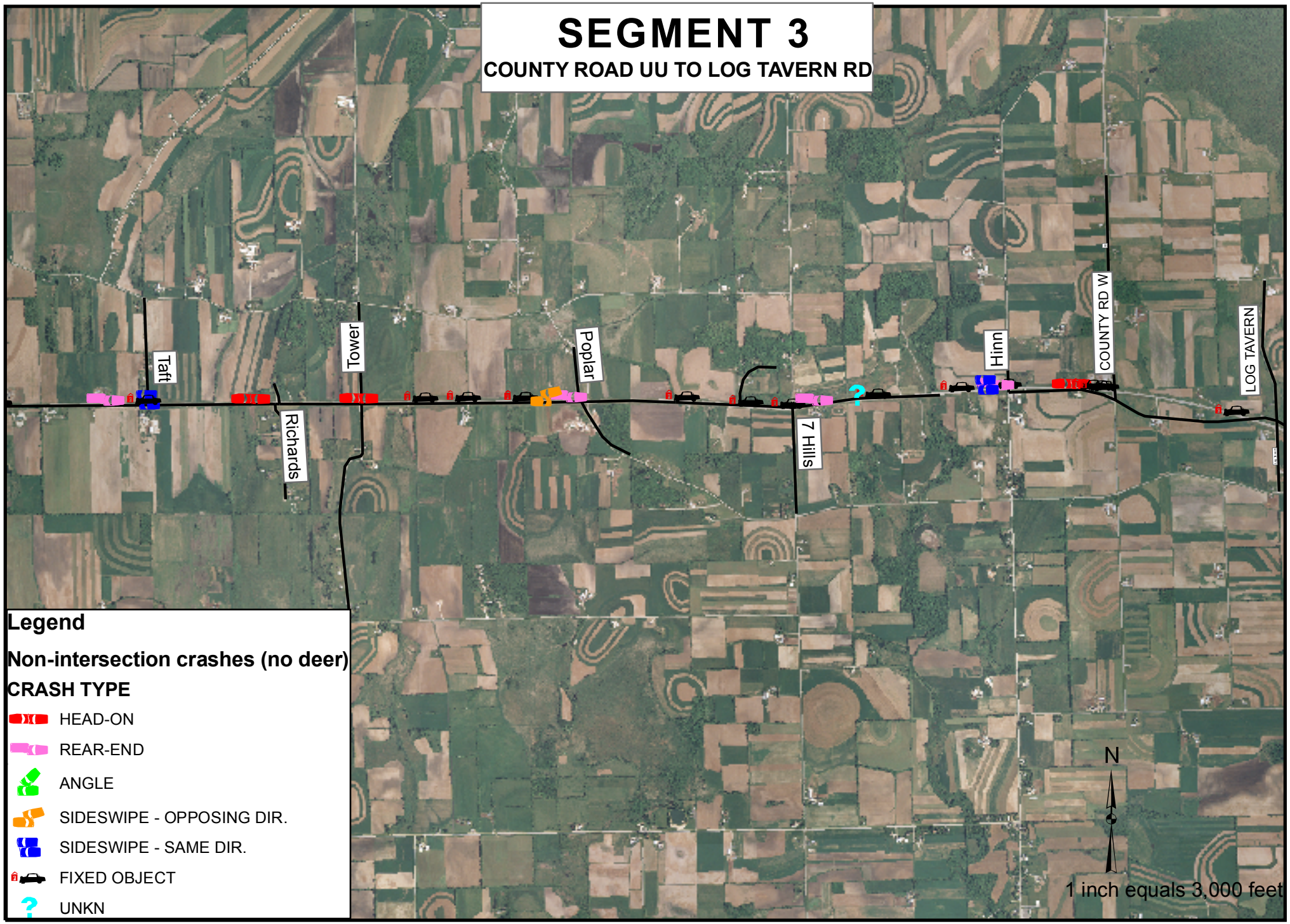
STH 23 NON-INTERSECTION RELATED CRASHES



STH 23 NON-INTERSECTION RELATED CRASHES



STH 23 NON-INTERSECTION RELATED CRASHES



APPENDIX E

INTERSECTION RELATED CRASH DATA

SEGMENT #	INT_NAME	RLTNRDWY	ONHWY	ONHWYDIR	INTDIR	INTDIS	ACCDLOC	ALCFLAG	ROADCOND	WTHRCOND	LGTCOND	ACCDSVR	TOTINJ	TOTFATL	ACCDTYPE	MNRCOLL	TOTVEH	DRVRPC1A	POSTSPD1	AGE1	DRVRPC2A	POSTSPD2	AGE2	MCFLNMBR	COLLSN_TYPE	REAR	HEAD	ANGL	SSOP	SSS	FIXED	MISC	WEATH	ACTIONS	Year
1	K	ON	23	E		0	I					INJ	4	0		ANGL	3		45	59	FTY	35	85	01442041312	ANGL	-	-	1	-	-	-	-	-	EB GO STR |SB GO STR	2001
1	K	ON	23	E		0	I			CLDY		INJ	2	0		HEAD	2	FTY	35	17		45	19	01351520285	HEAD	-	1	-	-	-	-	-	-	EB LT TRN |WB GO STR	2001
1	K	ON	23	W		0	I					INJ	1	0		ANGL	2	FTY	55	31		45	53	01512360441	ANGL	-	-	1	-	-	-	-	-	NB GO STR |WB GO STR	2001
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							I					PD	13												INT.	1	-	13	1	-	3	-	4		

SEGMENT #	INT_NAME	RLTNRDWY	ONHWY	ONHWYDIR	INTDIR	INTDIS	ACCDLOC	ALCFLAG	ROADCOND	WTHRCOND	LGTCOND	ACCDSVR	TOTINJ	TOTFATL	ACCDTYPE	MNRCOLL	TOTVEH	DRVRPC1A	POSTSPD1	AGE1	DRVRPC2A	POSTSPD2	AGE2	MCFLNMBR	COLLSN_TYPE	REAR	HEAD	ANGL	SSOP	SSS	FIXED	MISC	WEATH	ACTIONS	Year
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2	UU	ON	23	E		0	/		WET	CLDY		INJ	3	0		ANGL	2	FTY	55	23		55	71	02050181034	ANGL	-	-	1	-	-	-	-	1	NB GO STR |EB GO STR	2002
2	UU	ON	23	E		0	/		WET	CLDY		INJ	2	0		ANGL	2	FTY	55	18		55	22	03160910632	ANGL	-	-	1	-	-	-	-	1	NB LT TRN |EB GO STR	2003
2	UU	RTSH	23	E	W	1	/					PD	0	0	DITCH	NO C	1	ID	55	28		.	.	03462580144	FIXED	-	-	-	-	-	1	-	-	WB GO STR HIT DITCH |	2003
2	UU	ON	23	E		0	/					PD	0	0		ANGL	2		55	61	FTY	55	49	05000840529	ANGL	-	-	1	-	-	-	-	-	EB GO STR |NB GO STR	2005
2	UU	ON	23	E		0	/		WET	SNOW		INJ	1	0		REAR	2	FTC	55	17		55	16	05003611286	REAR	1	-	-	-	-	-	-	1	EB GO STR |EB LT TRN	2005
2	WHISPERING SPRI	ON	23	E	E	1	/					INJ	2	0		REAR	2	FTC	45	40		45	53	05002270241	REAR	1	-	-	-	-	-	-	-	EB GO STR |EB STOPED	2005
							I					PD	10												INT.	3	-	4	-	-	1	-	3		

SEGMENT #	INT_NAME	RLTNRDWY	ONHWY	ONHWYDIR	INTDIR	INTDIS	ACCDLOC	ALCFLAG	ROADCOND	WTHRCOND	LGTCOND	ACCDSVR	TOTINJ	TOTFATL	ACCDTYPE	MNRCOLL	TOTVEH	DRVRPC1A	POSTSPD1	AGE1	DRVRPC2A	POSTSPD2	AGE2	MCFLNMBR	COLLSN_TYPE	REAR	HEAD	ANGL	SSOP	SSS	FIXED	MISC	WEATH	ACTIONS	Year
3	POPLAR RD	ON	23	E	E	2	/		SNOW	SNOW		INJ	1	0		REAR	2		55	22	FTC	55	16	04060272265	REAR	1	-	-	-	-	-	-	1	WB SL/ST |WB GO STR	2004
3	RICHARDS RD	ON	23	E		0	/	Y	WET	RAIN	DARK	PD	0	0		SSS	2		55	33	IO	55	33	01733460506	SSS	-	-	-	-	1	-	-	1	WB LT TRN |WB OVT LT	2001
3	SEVEN HILLS RD	SHLD	23	E		0	/		WET			INJ	1	0		REAR	2	ID	55	28	FTC	55	53	03060341783	REAR	1	-	-	-	-	-	-	1	EB OTHER |EB OVT RT	2003
3	SEVEN HILLS RD	ON	23	E	E	1	I					INJ	1	0		ANGL	2	ID	55	48		55	56	04632641620	ANGL	-	-	1	-	-	-	-	-	EB OVT RT |WB GO STR	2004
3	TOWER RD	ON	23	E		0	/			CLDY		INJ	3	0		REAR	3	ID	55	22		55	44	01251141023	REAR	1	-	-	-	-	-	-	-	EB GO STR |EB STOPED	2001
3	W	ON	23	E	W	5	/		SNOW	WIND		INJ	1	0		REAR	2	FTY	55	27		55	30	01060231698	REAR	1	-	-	-	-	-	-	1	WB GO STR |WB GO STR	2001
3	W	ON	23	E		0	/			CLDY		PD	0	0		NO C	3	IT	55	43		55	71	01241070574	MISC	-	-	-	-	-	-	1	-	WB LT TRN |WB GO STR	2001
3	W	ON	23	E		0	/		WET	RAIN		INJ	1	0		REAR	2		55	32	TFC	55	71	03351951301	REAR	1	-	-	-	-	-	-	1	EB LT TRN |EB LT TRN	2003
3	W	ON	23	E	E	20	/					INJ	1	0		REAR	2	FTC	55	46		55	79	03281560575	REAR	1	-	-	-	-	-	-	-	EB GO STR |EB SL/ST	2003
3	W	ON	W	E		0	/			CLDY	DUSK	INJ	1	0		REAR	2	UB	55	17		55	26	03281560577	REAR	1	-	-	-	-	-	-	-	SB BACKNG |SB STOPED	2003
3	W	ON	23	E		0	/					PD	0	0		ANGL	2	FTY	55	18		55	17	03542930965	ANGL	-	-	1	-	-	-	-	-	SB GO STR |WB SL/ST	2003
3	W	ON	23	E		0	/					PD	0	0		ANGL	2	FTY	55	56		55	25	03462580154	ANGL	-	-	1	-	-	-	-	-	EB LT TRN |EB GO STR	2003
3	W	ON	23	E		0	/				LIGT	PD	0	0		SSS	2	IT	55	16		55	48	03351951369	SSS	-	-	-	-	1	-	-	-	WB LT TRN |WB GO STR	2003
3	W	ON	23	E		0	/			CLDY		PD	0	0		SSS	2	IT	55	48		55	38	05002100580	SSS	-	-	-	-	1	-	-	-	NB RT TRN |WB GO STR	2005
							I					PD	25												INT.	7	-	3	-	3	-	1	5		

APPENDIX F

NON-INTERSECTION RELATED CRASH DATA

SEGMENT #	INT_NAME	RLTNRDWY	ONHWY	ONHWYDIR	INTDIR	INTDIS	ACCDLOC	ALCFLAG	ROADCOND	WTHRCOND	LGTCOND	ACCDSVR	TOTINJ	TOTFATL	ACCDTYPE	MNRCOLL	TOTVEH	DRVRPC1A	POSTSPD1	AGE1	DRVRPC2A	POSTSPD2	AGE2	MCFLNMBR	COLLSN_TYPE	REAR	HEAD	ANGL	SSOP	SSS	FIXED	MISC	WEATH	ACTIONS	Year
1	K	ON	23	W	W	6	N			CLDY	DARK	INJ	1	0		REAR	2	FTC	45	17		45	16	02351760307	REAR	1	-	-	-	-	-	-	-	WB GO STR |WB SL/ST	2002
1	WISCONSIN AMERI	ON	23	E	W	30	N					INJ	1	0		ANGL	2		45	58	FTY	77	24	02613191505	ANGL	-	-	1	-	-	-	-	-	EB GO STR |NB GO STR	2002
1	WISCONSIN AMERI	ON	23	W	W	6	N					PD	0	0		REAR	2	ID	45	41		45	16	03020090350	REAR	1	-	-	-	-	-	-	-	WB GO STR |WB STOPED	2002
1	WISCONSIN AMERI	ON	23	E	E	9	N			CLDY		PD	0	0		REAR	2	FTC	45	47		45	42	02542800202	REAR	1	-	-	-	-	-	-	-	EB GO STR |EB RT TRN	2002
1	WISCONSIN AMERI	BLNK	23	E	W	4	N		BLNK	BLNK		PD	0	0		SSS	2	ID	3	36		35	16	03362020530	SSS	-	-	-	-	1	-	-	-	WB CHG LN |WB GO STR	2003
1	WISCONSIN AMERI	ON	23	E	W	28	N					INJ	1	0		REAR	2	ID	45	42		45	60	03301670194	REAR	1	-	-	-	-	-	-	-	EB GO STR |EB SL/ST	2003
							N																		NON-INT	4	-	1	-	1	-	-	-		

SEGMENT #	INT_NAME	RLTNRDWY	ONHWY	ONHWYDIR	INTDIR	INTDIS	ACCDLOC	ALCFLAG	ROADCOND	WTHRCOND	LGTCOND	ACCDSVR	TOTINJ	TOTFATL	ACCDTYPE	MNRCOLL	TOTVEH	DRVRPC1A	POSTSPD1	AGE1	DRVRPC2A	POSTSPD2	AGE2	MCFLNMBR	COLLSN_TYPE	REAR	HEAD	ANGL	SSOP	SSS	FIXED	MISC	WEATH	ACTIONS	Year
2	HILLTOP DR	ON	23	E	E	40	N					INJ	2	0		REAR	2		55	16	ID	55	57	01321380148	REAR	1	-	-	-	-	-	-	-	EB SL/ST |EB GO STR	2001
2	HILLTOP DR	ON	23	E	E	10	N	Y				INJ	1	0		HEAD	2		55	32	DC	55	65	04662780502	HEAD	-	1	-	-	-	-	-	-	WB BACKNG |WB GO STR	2004
2	HILLTOP DR	ON	23	E	E	20	N		SNOW	SNOW		INJ	3	0		REAR	2	FVC	45	19		45	21	04110470845	REAR	1	-	-	-	-	-	-	1	WB GO STR |?B GO STR	2004
2	HILLTOP DR	ON	23	E	E	10	N					PD	0	0		REAR	2	ID	55	21		55	43	05002000717	REAR	1	-	-	-	-	-	-	-	WB GO STR |WB STOPED	2005
2	K	ON	23	E	E	30	N				DARK	PD	0	0	OBNFX	NO C	1		45	23		.	.	02663510434	FIXED	-	-	-	-	-	1	-	-	WB GO STR HIT OBNFX |	2002
2	K	RTSH	23	E	E	50	N		ICE	SNOW	DARK	PD	0	0	OVRTRN	NO C	1		45	34		.	.	04003520180	FIXED	-	-	-	-	-	1	-	-	EB GO STR HIT OVRTRN |	2004
2	K	ON	23	E	E	20	N					PD	0	0		SSS	2	IO	45	56		45	59	04251050134	SSS	-	-	-	-	1	-	-	1	WB NPASZN |WB GO STR	2004
2	K	ON	23	W	E	9	N		ICE	SLET	DARK	PD	0	0		REAR	2	TFC	45	43		45	47	05000280356	REAR	1	-	-	-	-	-	-	1	WB GO STR |WB GO STR	2005
2	UU	ON	23	E	W	3	N		ICE	SNOW	DARK	INJ	2	0		ANGL	2		55	48	TFC	55	57	02221020545	ANGL	-	-	1	-	-	-	-	1	WB GO STR |EB GO STR	2002
2	UU	RTSH	23	E	W	4	N		ICE	CLDY		INJ	1	0	DITCH	NO C	1	TFC	55	23		.	.	03211150199	FIXED	-	-	-	-	-	1	-	1	EB GO STR HIT DITCH |	2003
2	UU	RTSH	23	E	W	20	N		SNOW	SNOW		PD	0	0	EMBKMT	NO C	1	TFC	55	58		.	.	04010051741	FIXED	-	-	-	-	-	1	-	1	WB GO STR HIT EMBKMT |	2003
2	UU	ON	23	E	W	10	N		SNOW	WIND		PD	0	0		HEAD	2	TFC	55	17		55	25	04110480477	HEAD	-	1	-	-	-	-	-	1	WB GO STR |EB GO STR	2004
2	WHISPERING SPRI	ON	23	E	E	10	N				DARK	PD	0	0		ANGL	2	ID	45	18		45	49	04582430915	ANGL	-	-	1	-	-	-	-	-	WB GO STR |WB GO STR	2004
							N																		NON-INT	4	2	2	-	1	4	-	7		

SEGMENT #	INT_NAME	RLTNRDWY	ONHWY	ONHWYDIR	INTDIR	INTDIS	ACCDLOC	ALCFLAG	ROADCOND	WTHRCOND	LGTCOND	ACCDSVR	TOTINJ	TOTFATL	ACCDTYPE	MNRCOLL	TOTVEH	DRVRPC1A	POSTSPD1	AGE1	DRVRPC2A	POSTSPD2	AGE2	MCFLNMBR	COLLSN_TYPE	REAR	HEAD	ANGL	SSOP	SSS	FIXED	MISC	WEATH	ACTIONS	Year
3	HINN RD	ON	23	E	W	20	N			CLDY		INJ	1	0	DITCH	NO C	1	ID	55	46		.	.	02482460414	FIXED	-	-	-	-	-	1	-	-	WB GO STR HIT DITCH |	2002
3	LOG TAVERN RD	RTSH	23	E	W	30	N		ICE	SLET		INJ	1	0	TFSIGN	NO C	1	FVC	55	50		.	.	01170720166	FIXED	-	-	-	-	-	1	-	1	WB GO STR HIT TFSIGN |	2001
3	LOG TAVERN RD	RTSH	23	E	W	20	N	Y				INJ	1	0	OVRTRN	NO C	1	FVC	55	25		.	.	03120691918	FIXED	-	-	-	-	-	1	-	-	EB GO STR HIT OVRTRN |	2003
3	POPLAR RD	ON	23	E	W	10	N			CLDY	DUSK	INJ	2	0		REAR	5		55	34	FVC	55	27	01663190959	REAR	1	-	-	-	-	-	-	-	EB STOPED |EB SL/ST	2001
3	POPLAR RD	ON	23	E	W	30	N			XWIND		PD	0	0	OBNFX	NO C	2		55	44		55	21	01251140904	FIXED	-	-	-	-	-	1	-	-	EB GO STR HIT OBNFX |WB GO STR	2001
3	POPLAR RD	RTSH	23	E	E	10	N		ICE	SLET		INJ	1	0	DITCH	NO C	1	TFC	55	23		.	.	03030170438	FIXED	-	-	-	-	-	1	-	1	WB GO STR HIT DITCH |	2003
3	POPLAR RD	RTSH	23	E	W	30	N		SNOW	SNOW		PD	0	0	EMBKMT	NO C	1	TFC	55	53		.	.	04200860191	FIXED	-	-	-	-	-	1	-	1	WB GO STR HIT EMBKMT |	2004
3	POPLAR RD	ON	23	E	W	20	N			CLDY		INJ	1	0		SSOP	2		55	19	FVC	55	18	04451910406	SSOP	-	-	-	1	-	-	-	-	EB GO STR |WB GO STR	2004
3	RICHARDS RD	ON	23	E	W	10	N		ICE	CLDY	DARK	INJ	2	0		HEAD	2	TFC	55	45		55	55	03663430880	HEAD	-	1	-	-	-	-	-	1	EB GO STR |WB GO STR	2003
3	SEVEN HILLS RD	ON	23	E	W	10	N	Y			DARK	INJ	2	0		HEAD	2	IO	55	22		55	52	02532770811	HEAD	-	1	-	-	-	-	-	-	WB OVT LT |EB GO STR	2002
3	SEVEN HILLS RD	ON	23	E	E	40	N		WET	CLDY		INJ	2	0	OVRTRN	NO C	1	TFC	110	97		.	.	02351750169	FIXED	-	-	-	-	-	1	-	1	WB GO STR HIT OVRTRN |	2002
3	SEVEN HILLS RD	ON	23	E	W	1	N			CLDY		PD	0	0	OT ANM	NO C	1		55	27		.	.	02291440151	FIXED	-	-	-	-	-	1	-	-	WB GO STR HIT OT ANML |	2002
3	SEVEN HILLS RD	ON	23	E	E	10	N		ICE		DARK	INJ	1	0		REAR	2		55	56	TFC	55	0	04823480652	REAR	1	-	-	-	-	-	-	1	EB GO STR |EB GO STR	2004
3	SEVEN HILLS RD	ON	23	E	W	50	N			CLDY		INJ	1	0	OTH NC	NO C	2		55	33		55	47	05002710227	FIXED	-	-	-	-	-	1	-	-	EB GO STR HIT OTH NC |WB GO STR	2005
3	SEVEN HILLS RD	ON	23	E	E	30	N		SNOW	SNOW	DARK	INJ	2	0		NO C	5	FVC	55	19	FVC	55	67	05000810617	MISC	-	-	-	-	-	-	1	1	WB GO STR |EB GO STR	2005
3	TAFT RD	ON	23	E	W	10	N		ICE	SNOW	DARK	PD	0	0		SSS	2		55	43	FTY	55	31	03070381451	SSS	-	-	-	-	1	-	-	1	EB GO STR |EB LT TRN	2003
3	TAFT RD	ON	23	E	W	20	N					PD	0	0	MAILBOX	REAR	2		55	17	ID	55	17	04391660287	REAR	1	-	-	-	-	-	-	-	EB STOPED HIT MAILBOX |EB SL/ST	2004
3	TAFT RD	ON	23	E	W	20	N					INJ	1	0		REAR	2	FTC	55	44		55	55	04512151347	REAR	1	-	-	-	-	-	-	-	WB SL/ST |WB SL/ST	2004
3	TOWER RD	ON	23	E	E	50	N					PD	0	0	FIRE	NO C	1		55	49		.	.	01431930687	FIXED	-	-	-	-	-	1	-	-	WB GO STR HIT FIRE |	2001
3	TOWER RD	ON	23	E	E	30	N				DARK	PD	0	0	OBNFX	NO C	3		55	37		55	23	02200950425	FIXED	-	-	-	-	-	1	-	-	WB GO STR HIT OBNFX |WB GO STR	2002
3	UU	ON	23	E	E	20	N				DARK	INJ	1	0		SSS	2		55	39		55	22	02653432657	SSS	-	-	-	-	1	-	-	-	EB LT TRN |EB OVT LT	2002
3	UU	ON	23	E	E	10	N		SNOW	SNOW		INJ	1	0		ANGL	2	TFC	55	20	TFC	55	32	04010051696	ANGL	-	-	1	-	-	-	-	1	WB GO STR |WB GO STR	2003
3	UU	ON	23	E	E	15	N		WET			INJ	1	0		REAR	2	FTC	55	17		55	41	03160870065	REAR	1	-	-	-	-	-	-	1	WB GO STR |WB SL/ST	2003
3	UU	RTSH	23	E	E	15	N		SNOW	SNOW		INJ	1	0	OT PST	NO C	1	TFC	55	19		.	.	03100580893	FIXED	-	-	-	-	-	1	-	1	WB GO STR HIT OT PST |	2003
3	UU	ON	23	E	E	5	N			CLDY	DARK	PD	0	0		ANGL	2	FTY	55	33		55	23	03673500448	ANGL	-	-	1	-	-	-	-	-	EB MERGNG |WB GO STR	2003
3	UU	LTSH	23	E	E	100	N		ICE	SNOW		PD	0	0	TREE	NO C	1		0	42		.	.	03663430696	FIXED	-	-	-	-	-	1	-	1	?B BLNK HIT TREE |	2003
3	UU	ON	23	E	E	10	N			CLDY	DARK	PD	0	0	OT ANM	NO C	1		55	30		.	.	04733061602	FIXED	-	-	-	-	-	1	-	-	EB GO STR HIT OT ANML |	2004
3	UU	LTSH	23	E	E	30	N	Y				PD	0	0	MAILBOX	NO C	1	DC	55	65		.	.	04682850559	FIXED	-	-	-	-	-	1	-	-	WB GO STR HIT MAILBOX |	2004
3	UU	RTSH	23	E	E	3	N				DARK	PD	0	0	CULVRT	NO C	1	ID	55	18		.	.	04421800849	FIXED	-	-	-	-	-	1	-	-	EB GO STR HIT CULVRT |	2004
3	UU	ON	23	E	E	10	N			CLDY		INJ	2	0		ANGL	2	ID	55	73	ID	110	83	04451910378	ANGL	-	-	1	-	-	-	-	-	EB LT TRN |WB GO STR	2004
3	UU	RTSH	23	E	E	20	N		SNOW	SNOW	DAWN	PD	0	0	UTPOLE	NO C	1	TFC	55	32		.	.	05000600467	FIXED	-	-	-	-	-	1	-	1	EB GO STR HIT UTPOLE |	2005
3	UU	LTSH	23	E	E	10	N		SNOW	SNOW	DARK	INJ	2	0	TREE	NO C	1	LOC	55	19		.	.	05000671340	FIXED	-	-	-	-	-	1	-	1	EB GO STR HIT TREE |	2005
3	W	ON	23	E	W	20	N					INJ	3	0		HEAD	3		55	16		55	39	01512351265	HEAD	-	1	-	-	-	-	-	-	WB GO STR |EB GO STR	2001
3	W	PLOT	23	E	W	10	N				DUSK	PD	0	0		NO C	3		55	57	FTY	55	17	01633060204	MISC	-	-	-	-	-	-	1	-	WB GO STR |EB RT TRN	2001
3	W	ON	23	E	W	6	N		SNOW	SNOW	LIGT	PD	0	0		REAR	2	FTY	55	41		55	17	02100422272	REAR	1	-	-	-	-	-	-	1	WB RT TRN |WB GO STR	2002
3	W	ON	23	E	E	10	N		SNOW	WIND		PD	0	0		SSS	2	TFC	55	24		55	45	03140790111	SSS	-	-	-	-	1	-	-	1	WB OVT LT |WB GO STR	2003
3	W	LTSH	23	E	W	10	N		SNOW	SNOW		PD	0	0	DITCH	NO C	1	FVC	55	24		.	.	04200860179	FIXED	-	-	-	-	-	1	-	1	EB GO STR HIT DITCH |	2004
3	W	RTSH	23	E	W	4	N		SNOW	SNOW		PD	0	0	TFSIGN	NO C	1	TFC	55	25		.	.	04130550402	FIXED	-	-	-	-	-	1	-	1	WB GO STR HIT TFSIGN |	2004
3	W	LTSH	23	E	W	6	N		SNOW	SNOW	DARK	PD	0	0	TFSIGN	NO C	1	FTC	55	20		.	.	05000770385	FIXED	-	-	-	-	-	1	-	1	EB GO STR HIT TFSIGN |	2005
							N																		NON-INT	6	3	3	1	3	21	2	19		

INTERSECTION LOCATION - STH 23 EB & WB JUB HANDLE & CTH K

Project ID - 1440-15-70
Intersection Location – STH 23 EB & WB Jug Handle & CTH K

Factor	**ALTERNATIVE CONTROL** ☐ TRAFFIC SIGNAL, ☐ ANTICIPATING TRAFFIC SIGNAL ☐ ROUNDABOUT ☐ 4-WAY STOP ☒ 2-WAY STOP ☐ EXISTING CONTROL		**ALTERNATIVE CONTROL** ☐ TRAFFIC SIGNAL, ☐ ANTICIPATING TRAFFIC SIGNAL ☒ ROUNDABOUT ☐ 4-WAY STOP ☐ 2-WAY STOP ☐ EXISTING CONTROL	
Safety				
Operational Analysis				
Construction Cost				
Right-of-Way				
Practical Feasibility				
Operation & Maintenance Cost				
Environmental				
Pedestrian and Bicycles				
Recommendation				
Responsibility	PIP Team	PDS Team	PIP Team	PDS Team