

**MEMORANDUM**

To: Dennis Osgood, La Crosse County Highway Commissioner

From: John Davis, P.E., PTOE and Leah Ness, P.E.

Date: May 5, 2010

Project No.: 45-0338.00

Re: CTH OT Speed Study

County Trunk Highway OT (CTH OT) is a four lane undivided roadway that runs east/west from State Trunk Highway 35 (STH 35) to just east of the CTH OT/ Corporate Drive/Commerce Road intersection. Between the CTH OT/ Corporate Drive/Commerce Road intersection and the intersection of Southbound United States Highway 53 (USH 53), CTH OT becomes a four lane divided roadway. The divided roadway runs through the USH 53 interchange and narrows down to a two lane undivided roadway east of the Northbound USH 53 ramp terminal and comes to a stop sign control intersection with CTH SN.

The four lane roadway currently has a posted speed limit of 35 mph and the two lane roadway a posted speed limit of 45 mph. The objective of the study is to provide the County with the 85<sup>th</sup> percentile and average speeds both east and west of the CTH OT/USH 53 interchange. The 85<sup>th</sup> percentile speed is the speed in which 85 percent of the vehicles are traveling at or below. According to the *Wisconsin Statewide Speed Management Guidelines, June 2009*, the 85<sup>th</sup> percentile speed is representative of “reasonable” and “proper” speed. The posted speed is anticipated to fall between the 85<sup>th</sup> percentile speed and the average speed.

The following discusses the data collection, field investigation and findings related to the speed study conducted on CTH OT.

### Data Collection and Field Reconnaissance

#### Speed Data

Two separate study periods were used to collect traffic data on CTH OT. Nu-Metric Traffic Counting equipment was placed in the center of each lane on CTH OT to collect traffic data. The Nu-Metric equipment recorded vehicular speed, vehicle classification and traffic volume information for the study.



**FIGURE 1: Nu-Metric Traffic Counters on CTH OT Pavement**

On Tuesday, March 16, 2010, Nu-Metric equipment was placed on CTH OT 125 feet west of CTH SN/Sand Lake Road and 60 feet east of Oak Hills Drive. Vehicle classification, traffic volume, and free flow speeds were collected at the western equipment location. The eastern equipment location collected vehicular classification and traffic volumes.

An additional data collection period was taken starting Tuesday, March 23, 2010. This study collected the free flow speed of vehicles east of the CTH OT/USH 53 southbound ramp terminal. The Nu-Metric equipment was placed on CTH OT at the following locations:

- 45 MPH posted speed zone
  - Westbound Data Collection was placed 150 feet west of CTH OT/USH 53 northbound ramp terminal
  - Westbound Data Collection was placed 30 feet west of the CTH OT/USH 53 northbound ramp terminal
- 35 MPH posted speed zone
  - Westbound Data Collection was placed 10 feet west of Paula Drive
  - Eastbound Data Collection was placed 10 feet east of Paula Drive

The Exhibit 1 shows the placement of the Nu-Metric Counters and Exhibit 2 summarizes 85<sup>th</sup> percentile speed, the average speed, and the mode speed for data collected at each location. Results of the speed data collection are provided in Attachment A.

Crash Data

Crash data and the corresponding police reports were requested from the Wisconsin Traffic Operations and Safety Laboratory on the study area of CTH OT from January 2005 through December 2009. In the five year time period there were 55 crashes on CTH OT between STH 35 and CTH SN/Sand Lake Road. Of the 55 crashes, six crashes (approximately 10%) were issued “driving too fast for conditions” tickets, there were no other speed related tickets issued. Four of the six crashes involved the issuance of excessive speeding (“driving too fast for conditions”) tickets on ice or snow covered roadways. Of the two crashes that occurred on dry pavement, one was alcohol related and involved injury at a level B severity. The other was a fixed object crash where a witness reported a vehicle traveling southbound on CTH SN/S and Lake Road turned right and cornered too wide hitting signs. The motorist involved in the collision did not stop to report the incident.

**TABLE 1. Speed Related Crash Types and Severity-CTH OT between STH 35 and CTH SN**

Crash Type	Property Damage Only	Injury Severity Type			Total
		C	B	A	
Run Off Road	1	0	1	0	2
Fixed Object	3	0	0	0	3
Rear End	0	1	0	0	1
<b>Total</b>	4	1	1	0	6

Crashes related to speed on CTH OT between STH 35 and CTH SN/Sand Lake Road from January 2005 to December 2009 are summarized in Exhibit 3.

## Findings

The *Manual on Uniform Traffic Control Devices* and the *Wisconsin Statewide Speed Management Guidelines* requires the proposed speed limit be set within 5 mph of the observed 85<sup>th</sup> percentile speed of free flowing traffic. The 2010 speed data collection on CTH OT resulted in the 85<sup>th</sup> percentile speeds being approximately 39 mph and 46 mph for the currently posted speed limit of 35 mph and 45 mph respectively. The percentage of traffic exceeding the posted speed limit is much higher in the 45 mph speed zone than the 35 mph speed zone. A reduction of the 45 mph speed limit to 35 mph will not meet drivers expectations based on the speed information collected based on the number of drivers currently exceeding the 45 mph speed limit.

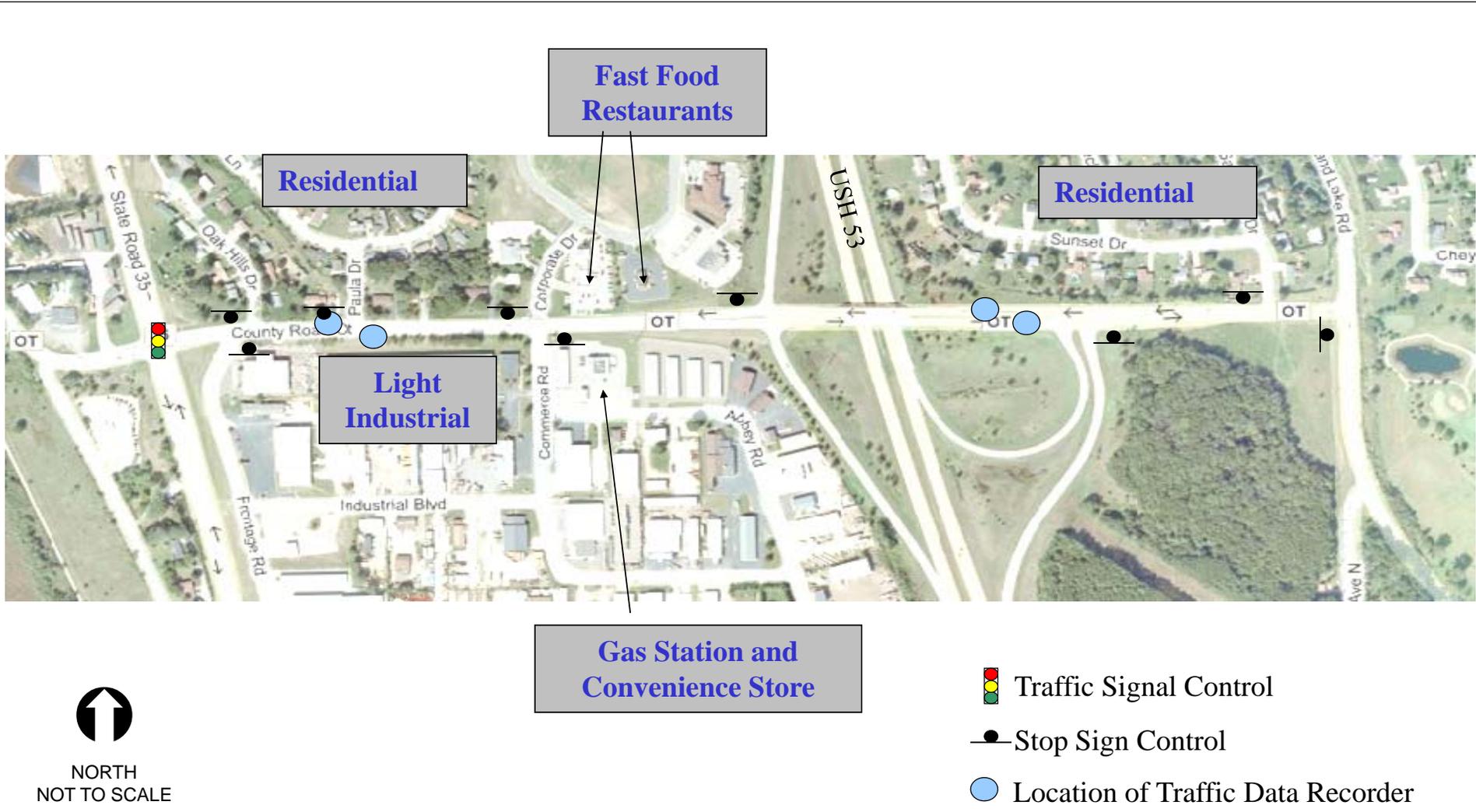
Of the collisions that have occurred on CTH OT between STH 35 and CTH SN/Sand Lake Road in the past five years, six collisions were speed related. Of the speed related crashes, four occurred during inclement weather/roadway conditions, one was alcohol related, and the other incident was a hit-and-run reported by a witness. A change in the speed limit would most likely not reduce the number of speed related crashes based on review of the five year crash data. Based on the above information, we believe the current posted speed limits meet the drivers' expectations and that they are appropriate for the CTH OT segments between STH 35 and CTH SN/Sand Lake Road. The current posted speed limits are consistent with current traffic engineering practices by the Wisconsin DOT.

## Measures to Enhance Motorist Compliance

As the posted speed limit on CTH OT has been found to be appropriate, there are measures that can be taken to enhance the voluntary compliance of motorists to observe the posted speed limits. The following lists potential measures that could be implemented on CTH OT in a ranked order based on impact on system, practicality, and feasibility:

- Replace current 35 MPH speed limit signs with oversized speed limit signs
  - Two sign locations
    - East of STH 35 indicating speeds for eastbound travel
    - West of the USH 53 interchange indicating speeds for westbound travel
  - Approximate cost \$700.00
- Reduce lane width or number of lanes on CTH OT (Incorporation of Two-way left-turn lane, pavement markings, etc.)
  - Direct reference of the intersection study for CTH OT with Corporate Drive and Commerce Road
  - Approximate cost for pavement marking removal and pavement marking is \$10,500.00
- Incorporate a speed feedback sign
  - Two signs located at current 35 MPH speed limit sign locations
    - East of STH 35 indicating speeds for eastbound travel
    - West of the USH 53 interchange indicating speeds for westbound travel
  - Approximate cost \$12,000.00
- Increase law enforcement
  - Time and cost will varies depending on availability of department budgets

The implementation of these measures, individually or in combination with one another have proven to be successful in other communities in enhancing the compliance of motorists in traveling at or about the posted speed limit.



CTH OT Vehicle Spot Speed Study  
 CTH SN to STH 35  
 La Crosse County, Wisconsin  
 April 2010

Exhibit 1  
 CTH OT Speed Study  
 Data Collection Locations



**Westbound CTH OT**

- 85<sup>th</sup> Percentile Speed: 39.5 MPH
- Average Speed: 34 MPH
- Mode Speed: 31 MPH
- 6.7% vehicles exceeded the posted speed limit

**Eastbound CTH OT**

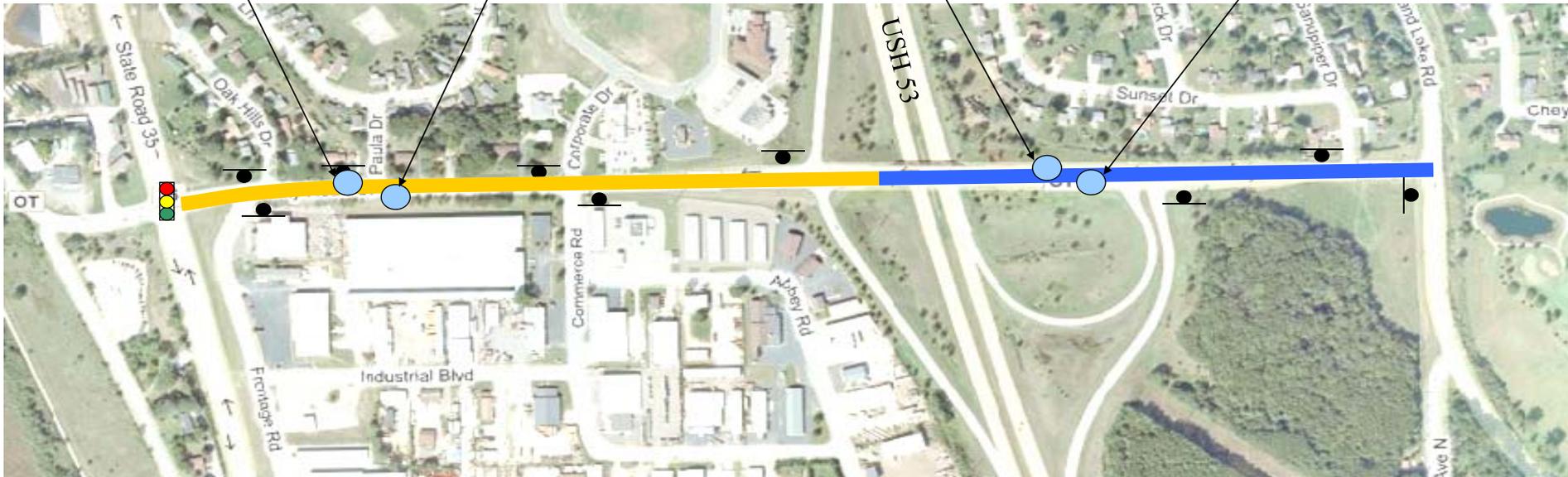
- 85<sup>th</sup> Percentile Speed: 38.8 MPH
- Average Speed: 34 MPH
- Mode Speed: 31 MPH
- 5.5% vehicles exceeded the posted speed limit

**Westbound CTH OT**

- 85<sup>th</sup> Percentile Speed: 45.1 MPH
- Average Speed: 38 MPH
- Mode Speed: 31 MPH
- 31.2% vehicles exceeded the posted speed limit

**Eastbound CTH OT**

- 85<sup>th</sup> Percentile Speed: 46.0 MPH
- Average Speed: 41 MPH
- Mode Speed: 36 MPH
- 48.8% vehicles exceeded the posted speed limit



NORTH  
NOT TO SCALE

Traffic Signal Control

35 MPH Posted Speed

Stop Sign Control

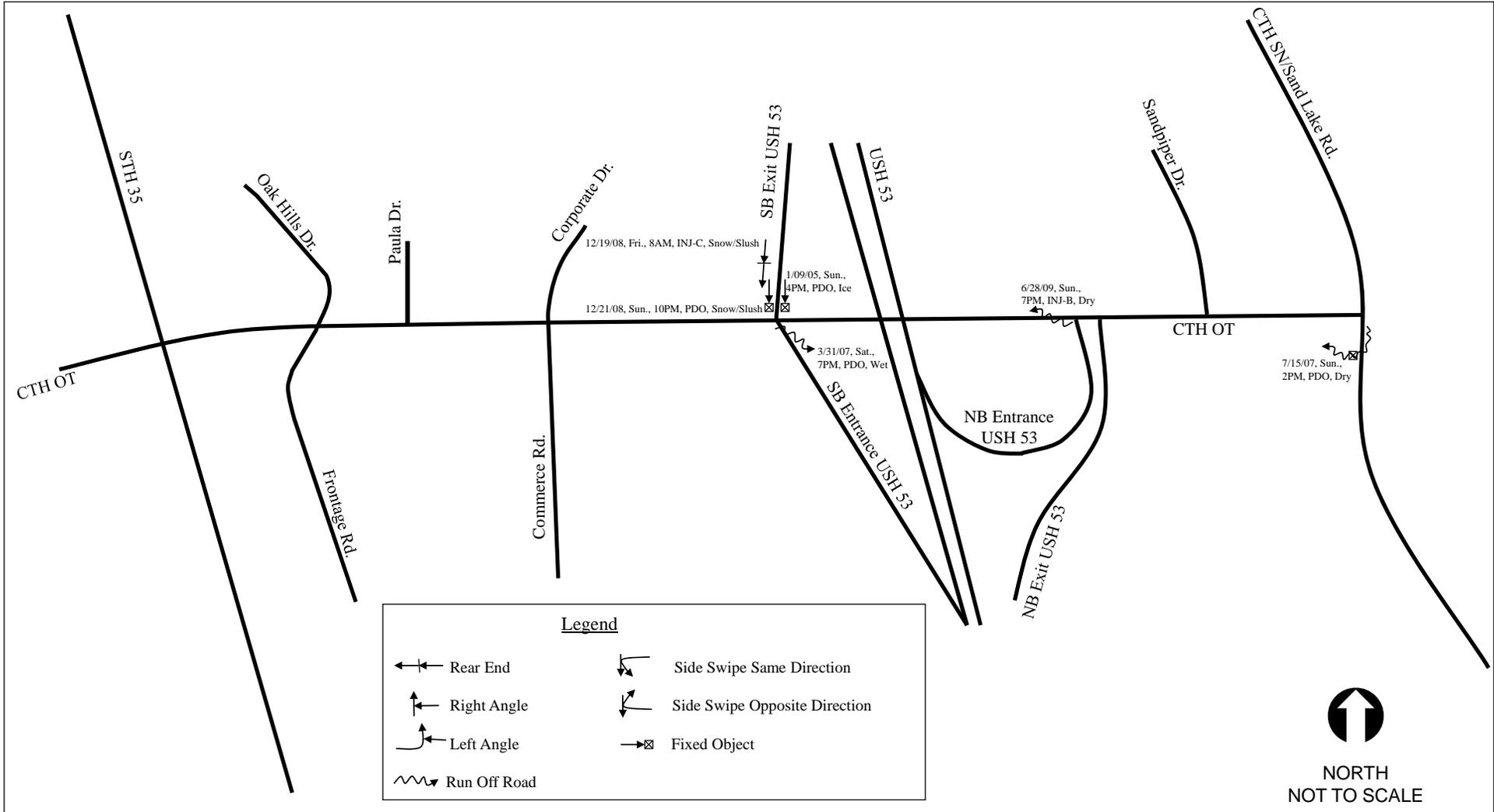
45 MPH Posted Speed

Location of Traffic Data Recorder

CTH OT Vehicle Spot Speed Study  
CTH SN to STH 35  
La Crosse County, Wisconsin  
April 2010

Exhibit 2  
CTH OT Speed Study  
Data Summary at Collection Locations





CTH OT Vehicle Spot Speed Study  
 CTH SN to STH 35  
 La Crosse County, Wisconsin  
 April 2010

Exhibit 3  
 CTH OT Segment Crash Diagram  
 2005-2009 Speed Related Crashes



**ATTACHMENT A**  
**Speed Data**

**Nu-Metrics Traffic Analyzer Study  
Computer Generated Summary Report  
City: Holmen/Onalaska  
Street: CTH OT**

A study of vehicle traffic was conducted with HI-STAR unit number 8784. The study was done in the Driving lane at CTH OT in Holmen/Onalaska, WI in La Crosse county. The study began on Mar/16/2010 at 12:00:00 PM and concluded on Mar/18/2010 at 12:00:00 PM, lasting a total of 48.00 hours. Traffic statistics were recorded in 60 minute time periods. The total recorded volume showed 4462 vehicles passed through the location with a peak volume of 225 on Mar/17/2010 at [17:00-18:00] and a minimum volume of 3 on Mar/17/2010 at [03:00-04:00]. The AADT count for this study was 2,231.

**SPEED**

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 31 - 36 MPH range or lower. The average speed for all classified vehicles was 33 MPH with 5.72% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.28 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 31MPH and the 85th percentile was 38.70 MPH.

< to 10	11 to 15	16 to 20	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50	51 to 55	56 to 60	61 to 65	66 to 70	71 to 75	76 to >				
0	10	28	213	1071	1849	867	185	30	12	6	5	3	2	2				

CHART 1

**CLASSIFICATION**

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 4135 which represents 97 percent of the total classified vehicles. The number of Vans & Pickups in the study was 85 which represents 2 percent of the total classified vehicles. The number of Busses & Trucks in the study was 40 which represents 1 percent of the total classified vehicles. The number of Tractor Trailers in the study was 23 which represents 1 percent of the total classified vehicles.

< to 16	17 to 23	24 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to >											
3575	560	85	40	16	5	2	0											

CHART 2

**HEADWAY**

During the peak traffic period, on Mar/17/2010 at [17:00-18:00] the average headway between vehicles was 15.929 seconds. During the slowest traffic period, on Mar/17/2010 at [03:00-04:00] the average headway between vehicles was 900 seconds.

**WEATHER**

The roadway surface temperature over the period of the study varied between 42.00 and 85.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

**Nu-Metrics Traffic Analyzer Study  
Computer Generated Summary Report  
City: Holmen/Onalaska  
Street: CTH OT**

A study of vehicle traffic was conducted with HI-STAR unit number 4894. The study was done in the Driving lane at CTH OT in Holmen/Onalaska, WI in La Crosse county. The study began on Mar/17/2010 at 08:00:00 AM and concluded on Mar/18/2010 at 04:00:00 PM, lasting a total of 32.00 hours. Traffic statistics were recorded in 60 minute time periods. The total recorded volume showed 3058 vehicles passed through the location with a peak volume of 246 on Mar/18/2010 at [07:00-08:00] and a minimum volume of 4 on Mar/18/2010 at [01:00-02:00]. The AADT count for this study was 2,294.

**SPEED**

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 31 - 36 MPH range or lower. The average speed for all classified vehicles was 34 MPH with 5.39% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.27 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 31MPH and the 85th percentile was 38.82 MPH.

< to 10	11 to 15	16 to 20	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50	51 to 55	56 to 60	61 to 65	66 to 70	71 to 75	76 to >				
0	9	22	128	578	1173	582	110	14	9	2	0	2	1	4				

CHART 1

**CLASSIFICATION**

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 2517 which represents 96 percent of the total classified vehicles. The number of Vans & Pickups in the study was 71 which represents 3 percent of the total classified vehicles. The number of Busses & Trucks in the study was 31 which represents 1 percent of the total classified vehicles. The number of Tractor Trailers in the study was 15 which represents 1 percent of the total classified vehicles.

< to 16	17 to 23	24 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to >											
2228	289	71	31	10	2	3	0											

CHART 2

**HEADWAY**

During the peak traffic period, on Mar/18/2010 at [07:00-08:00] the average headway between vehicles was 14.575 seconds. During the slowest traffic period, on Mar/18/2010 at [01:00-02:00] the average headway between vehicles was 720 seconds.

**WEATHER**

The roadway surface temperature over the period of the study varied between 42.00 and 95.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

**Nu-Metrics Traffic Analyzer Study  
Computer Generated Summary Report  
City: Holmen/Onalaska  
Street: CTH OT**

A study of vehicle traffic was conducted with HI-STAR unit number 4943. The study was done in the Driving lane at CTH OT in Holmen/Onalaska, WI in La Crosse county. The study began on Mar/16/2010 at 12:00:00 PM and concluded on Mar/18/2010 at 12:00:00 PM, lasting a total of 48.00 hours. Traffic statistics were recorded in 60 minute time periods. The total recorded volume showed 3358 vehicles passed through the location with a peak volume of 155 on Mar/16/2010 at [16:00-17:00] and a minimum volume of 2 on Mar/17/2010 at [01:00-02:00]. The AADT count for this study was 1,679.

**SPEED**

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 31 - 36 MPH range or lower. The average speed for all classified vehicles was 34 MPH with 5.80% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.21 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 31MPH and the 85th percentile was 39.25 MPH.

<	11	16	21	26	31	36	41	46	51	56	61	66	71	76				
to	to	to	to	to	to	to	to	to	to	to	to	to	to	to				
10	15	20	25	30	35	40	45	50	55	60	65	70	75	>				
0	6	24	115	642	1423	857	149	18	11	4	3	2	1	1				

CHART 1

**CLASSIFICATION**

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 3180 which represents 98 percent of the total classified vehicles. The number of Vans & Pickups in the study was 44 which represents 1 percent of the total classified vehicles. The number of Busses & Trucks in the study was 23 which represents 1 percent of the total classified vehicles. The number of Tractor Trailers in the study was 9 which represents 0 percent of the total classified vehicles.

<	17	24	30	40	50	60	70											
to	to	to	to	to	to	to	to											
16	23	29	39	49	59	69	>											
2832	348	44	23	7	1	1	0											

CHART 2

**HEADWAY**

During the peak traffic period, on Mar/16/2010 at [16:00-17:00] the average headway between vehicles was 23.077 seconds. During the slowest traffic period, on Mar/17/2010 at [01:00-02:00] the average headway between vehicles was 1200 seconds.

**WEATHER**

The roadway surface temperature over the period of the study varied between 42.00 and 85.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

**Nu-Metrics Traffic Analyzer Study  
Computer Generated Summary Report  
City: Holmen/Onalaska  
Street: CTH OT**

A study of vehicle traffic was conducted with HI-STAR unit number 4893. The study was done in the Driving lane at CTH OT in Holmen/Onalaska, WI in La Crosse county. The study began on Mar/17/2010 at 08:00:00 AM and concluded on Mar/18/2010 at 04:00:00 PM, lasting a total of 32.00 hours. Traffic statistics were recorded in 60 minute time periods. The total recorded volume showed 1870 vehicles passed through the location with a peak volume of 146 on Mar/17/2010 at [17:00-18:00] and a minimum volume of 2 on Mar/18/2010 at [04:00-05:00]. The AADT count for this study was 1,403.

**SPEED**

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 31 - 36 MPH range or lower. The average speed for all classified vehicles was 34 MPH with 7.56% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.30 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 31MPH and the 85th percentile was 39.17 MPH.

< to 10	11 to 15	16 to 20	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50	51 to 55	56 to 60	61 to 65	66 to 70	71 to 75	76 to >				
0	4	24	81	397	675	336	92	15	8	4	1	2	1	1				

CHART 1

**CLASSIFICATION**

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 1611 which represents 98 percent of the total classified vehicles. The number of Vans & Pickups in the study was 16 which represents 1 percent of the total classified vehicles. The number of Busses & Trucks in the study was 7 which represents 0 percent of the total classified vehicles. The number of Tractor Trailers in the study was 7 which represents 0 percent of the total classified vehicles.

< to 16	17 to 23	24 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to >											
1425	186	16	7	5	0	2	0											

CHART 2

**HEADWAY**

During the peak traffic period, on Mar/17/2010 at [17:00-18:00] the average headway between vehicles was 24.49 seconds. During the slowest traffic period, on Mar/18/2010 at [04:00-05:00] the average headway between vehicles was 1200 seconds.

**WEATHER**

The roadway surface temperature over the period of the study varied between 42.00 and 89.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

**Nu-Metrics Traffic Analyzer Study  
 Computer Generated Summary Report  
 City: Holmen/Onalaska  
 Street: CTH OT**

A study of vehicle traffic was conducted with HI-STAR unit number 4943. The study was done in the Driving lane on CTH OT in Holmen/Onalaska, WI in La Crosse county. The study began on 03/23/2010 at 06:00 AM and concluded on 03/25/2010 at 06:00 AM, lasting a total of 48 hours. Data was recorded in 60 minute time periods. The total recorded volume of traffic showed 3,500 vehicles passed through the location with a peak volume of 208 on 03/24/2010 at 05:00 PM and a minimum volume of 1 on 03/23/2010 at 06:00 AM. The AADT Count for this study was 1,750.

**SPEED**

Chart 1 lists the values of the speed bins and the total traffic volume for each bin.

**Chart 1**

0	11	16	21	26	31	36	41	46	51	56	61	66	71	76
to	to	to	to	to	to	to	to	to	to	to	to	to	to	>
10	15	20	25	30	35	40	45	50	55	60	65	70	75	
0	13	12	29	75	418	1187	1154	386	75	24	9	2	3	2

At least half of the vehicles were traveling in the 36 - 40 mph range or a lower speed. The average speed for all classified vehicles was 41 mph with 48.8 percent exceeding the posted speed of 45 mph. The HI-STAR found 3.39 percent of the total vehicles were traveling in excess of 55 mph. The mode speed for this traffic study was 36 mph and the 85th percentile was 45.97 mph.

**CLASSIFICATION**

Chart 2 lists the values of the eight classification bins and the total traffic volume accumulated for each bin.

**Chart 2**

0	17	24	30	40	50	60	70
to	to	to	to	to	to	to	>
16	23	29	39	49	59	69	
2920	369	32	50	6	5	5	2

Most of the vehicles classified during the study were Passenger Cars. The number of Passenger Cars in the study was 3,289 which represents 97.00 percent of the total classified vehicles. The number of Small Trucks in the study was 32 which represents 0.90 percent of the total classified vehicles. The number of Trucks/Buses in the study was 56 which represents 1.70 percent of the total classified vehicles. The number of Tractor Trailers in the study was 12 which represents 0.40 percent of the total classified vehicles.

**HEADWAY**

During the peak time period, on 03/24/2010 at 05:00 PM the average headway between the vehicles was 17.22 seconds. The slowest traffic period was on 03/23/2010 at 06:00 AM. During this slowest period, the average headway was 1800.0 seconds.

**WEATHER**

The roadway surface temperature over the period of the study varied between 41 and 85 degrees Fahrenheit. The HI-STAR determined that the roadway surface was Dry 100.00 percent of the time.

**Nu-Metrics Traffic Analyzer Study  
Computer Generated Summary Report  
City: Holmen/Onalaska  
Street: CTH OT**

A study of vehicle traffic was conducted with HI-STAR unit number 8681. The study was done in the Driving lane on CTH OT in Holmen/Onalaska, WI in La Crosse county. The study began on 03/23/2010 at 06:00 AM and concluded on 03/25/2010 at 06:00 AM, lasting a total of 48 hours. Data was recorded in 60 minute time periods. The total recorded volume of traffic showed 9,849 vehicles passed through the location with a peak volume of 476 on 03/24/2010 at 07:00 AM and a minimum volume of 2 on 03/23/2010 at 06:00 AM. The AADT Count for this study was 4,925.

**SPEED**

Chart 1 lists the values of the speed bins and the total traffic volume for each bin.

**Chart 1**

0	11	16	21	26	31	36	41	46	51	56	61	66	71	76
to	to	to	to	to	to	to	to	to	to	to	to	to	to	>
10	15	20	25	30	35	40	45	50	55	60	65	70	75	
0	56	121	238	1124	2589	2243	1827	741	214	57	22	14	9	6

At least half of the vehicles were traveling in the 36 - 40 mph range or a lower speed. The average speed for all classified vehicles was 38 mph with 31.2 percent exceeding the posted speed of 45 mph. The HI-STAR found 3.48 percent of the total vehicles were traveling in excess of 55 mph. The mode speed for this traffic study was 31 mph and the 85th percentile was 45.11 mph.

**CLASSIFICATION**

Chart 2 lists the values of the eight classification bins and the total traffic volume accumulated for each bin.

**Chart 2**

0	17	24	30	40	50	60	70
to	to	to	to	to	to	to	>
16	23	29	39	49	59	69	
8040	963	121	102	19	9	6	1

Most of the vehicles classified during the study were Passenger Cars. The number of Passenger Cars in the study was 9,003 which represents 97.20 percent of the total classified vehicles. The number of Small Trucks in the study was 121 which represents 1.30 percent of the total classified vehicles. The number of Trucks/Buses in the study was 121 which represents 1.30 percent of the total classified vehicles. The number of Tractor Trailers in the study was 16 which represents 0.20 percent of the total classified vehicles.

**HEADWAY**

During the peak time period, on 03/24/2010 at 07:00 AM the average headway between the vehicles was 7.55 seconds. The slowest traffic period was on 03/23/2010 at 06:00 AM. During this slowest period, the average headway was 1200.0 seconds.

**WEATHER**

The roadway surface temperature over the period of the study varied between 41 and 83 degrees Fahrenheit. The HI-STAR determined that the roadway surface was Dry 100.00 percent of the time.