

AASHTO Technology Implementation Group
Nomination of Technology Ready for Implementation
2005 NOMINATIONS DUE BY FRIDAY, SEPTEMBER 9, 2005

Sponsoring DOT	1. Sponsoring DOT (State): Michigan
Primary Technical Contact	2. Name: William Tansil Organization: Michigan Department of Transportation Address: P. O. Box 30050 City: Lansing State: Michigan Zipcode: 48909 E-mail: tansilw@Michigan.gov Phone: 517-335-2639 Fax: 517-373-9255
Technology Description	3. Name of Technology: Truck Weight Information System
	4. Briefly describe the technology. Michigan Department of Transportation connected the dots between MDOT's Weigh Station and Pavement Design programs, State Police/Motor Carrier Division's truck weight enforcement activities with MDOT's Traffic Monitoring System's Truck Weight Data Collection program. This is supported by the development of the Truck Weight Information System (TWIS) to assist with a shift from traditional weight enforcement strategies and provide the ability to analyze pavement design strategies. The TWIS is a computer application that provides analysis and access to MDOT's truck weight data resource. By providing this linkage, MDOT will be better aligned to develop, maintain, and protect its highway assets.
	5. Briefly describe the history of its development. Michigan is a national leader in weigh in motion data collection. Since the early 1990's, Michigan participated in the Strategic Highway Research Program, contributing data toward a national pavement performance quality effort. Instrumentation quality evolved over the years with exceptional reliability achieved in some of the harshest environments. MDOT decided to develop a system to support its highway design and weight enforcement efforts through the use of this weigh-in-motion truck weight data. Processing and storing the huge volume of truck weight data was stymied prior to this effort. MDOT's Bureau of Transportation Planning assembled a team to design the Truck Weight Information System (TWIS) in January of 2001. Three major objectives were identified: 1. Make truck weight information available to users. 2. Provide analysis on overweight trucks. 3. Provide analysis for pavement design. A demonstration version of the TWIS was launched in November 2002. This demonstration version is now being field tested by MDOT staff as well as State Police, Motor Carrier Division enforcement staff.

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State of Development	<p>6. For how long and in approximately how many applications has your organization used this technology?</p> <p>A demonstration version of the TWIS was launched in November 2002. The Truck Weight Information System enabled MDOT to improve its highway protection strategies by using the truck weight data collected at over 40 sites around the state. The system supports the processes/functions of the following business areas:</p> <p><u>Provide Truck Weight Data</u> – Provides the ability to handle large amounts of data for processing, validation, and storage. The system is currently importing around one million individual truck weight records per week. To date, there are about 150 million detailed truck records in the system. Once in the corporate database, the information is accessible for analysis by TWIS, as well as other programs/processes.</p> <p><u>Provide Overweight Analysis and Reports</u> – Provides a tool to conduct overweight analysis used by planning and enforcement in identifying incidences of overweight trucks, including their frequency, magnitude, speed, time of day, and type of violation (single axle, tandem axle, and gross overweight). This tool allows the enforcement agencies to identify and “target” the most damaging overweight locations, measure enforcement performance, and monitor the system with regards to other weight enforcement issues.</p> <p><u>Analyze Truck Loads</u>– For design purposes, it is necessary to estimate the cumulative number of 18-kip equivalent single axle loads for the design period of the pavement structure under consideration. Truck traffic is the essential information required to calculate Equivalent Single Axle Load (ESAL). This information is critical to assist with recommendations on pavement design and pavement management. The system provides the ability to perform “what if” scenarios measuring the impact using different pavement design opportunities as well as verification of ESAL predictions over the design period thus assisting with the pavement design validation</p> <p>The TWIS provides for modeling the impact of truck weights on the roadway and provides the flexibility to create different scenarios for pavement design analysis. When assets are designed and built to accommodate these “real life” loads, monitoring the proper system usage with regards to truck weights is necessary to maintain the road’s life expectancy.</p>												
	<p>7. What additional development is necessary to enable routine deployment of the technology?</p> <p>Identify additional site locations and monitoring opportunities.</p>												
	<p>8. Have other organizations used this technology? If so, please list organization names and contacts.</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Organization</th> <th style="text-align: left;">Name</th> <th style="text-align: left;">Phone</th> <th style="text-align: left;">E-mail</th> </tr> </thead> <tbody> <tr> <td>Michigan State Police</td> <td>Captain Robert</td> <td>517-336-</td> <td>powersr@michigan.gov</td> </tr> <tr> <td>Motor Carrier Division</td> <td>Powers</td> <td>6447</td> <td></td> </tr> </tbody> </table>	Organization	Name	Phone	E-mail	Michigan State Police	Captain Robert	517-336-	powersr@michigan.gov	Motor Carrier Division	Powers	6447	
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Potential for Payoff	<p>9. What benefits has your organization realized from using this technology? Include cost savings, safety improvements, transportation efficiency or effectiveness, environmental benefits, or other advantages over other existing technologies.</p> <p>The cost to develop and launch the TWIS (less than \$250,000) is offset by the significant savings realized by abandonment of only one weigh station upgrade project amounting to \$3 million. Maintenance and staffing costs amounting to thousands of dollars annually have been saved at the 5 closed weigh station sites.</p> <p>State Police, Motor Carrier Division can now assign staff to target violators based upon actual documented truck weights collected by site, day of the week and time of day. Tracking the results of weight enforcement operations is also a time and cost saving benefit for enforcement staff. Comparing data from a year ago or even last week is useful for measuring performance of various enforcement techniques.</p> <p>Enforcement staff can target certain unique truck configurations that are prone to being overweight. For example, very few 5 axle semi combinations, traveling during the daytime on the Interstate system are likely to be overweight; on the other hand, 11 axle multi trailer combinations, traveling at night, off the Interstate system are very likely to be significantly overweight. These severely overloaded vehicles cause damage to pavement and bridge infrastructure. Inefficient enforcement creates an uneven playing field between legal and illegal motor carriers.</p> <p>Closing weigh stations eliminates the time wasted by legal motor carriers waiting in queues to enter the weigh station. Shippers and carriers assign a value to increases in travel time, ranging from \$25 to almost \$200 per hour, depending on the product carried. While it is rare for an individual motor carrier to wait more than a few minutes in line, the accumulated time of all vehicles waiting at all weigh stations at all times is significant.</p>
Implementation Potential	<p>10. Please describe what actions another transportation agency would need to take to adopt this technology.</p> <p>Creation of an Oracle database, use of software developed by MDOT.</p> <p>11. What is the estimated cost, effort, and length of time required for procurement or adoption by another transportation agency?</p> <p>Unknown.</p> <p>12. What organization(s) currently supply and provide technical support for this technology?</p> <p>Michigan Department of Information Technology (DIT) has staff assigned to maintain computer applications for the Michigan Department of Transportation. This project, along with others, is assigned to one staff person for system maintenance. Also, DIT has resources assigned that perform MDOT's data base operations.</p> <p>13. Please describe any legal, regulatory, social, intellectual property, or other issues that could affect ease of implementation.</p> <p>Most states are engaged in WIM data collection activities. Analysis and use of the data for a variety of purposes should be attractive to most states.</p>
Willingness to Champion	<p>14. Is the sponsoring DOT willing to promote this technology to other states, if partially supported by the AASHTO Task Force on Technology Implementation? X Yes <input type="checkbox"/> No</p>
Date Submitted	<p>15. Date: September 9, 2005</p>

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16. Please include image(s) of sketches or photographs, if available X Image(s) are attached.*

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AASHTO CONTACT	MARTY VITALE ADMINISTRATIVE COORDINATOR FOR ENGINEERING AASHTO	PHONE: 202.624.5862 FAX: 202.624.5469 mvitale@ashto.org
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Station - Truck(s) Data Detail

Retrieve Completed Data Available from: 12/30/2002 to 08/31/2005

County: Kent Station: 9759 Road Name: 300 FTE. OF EASTERY AVE, CUTLERVILLE Location: M-6
 Direction: All Lane: All Truck Ent: 6,071 From: 08/01/2005 To: 08/01/2005

Direction	Lane	Class	Year	Month	Day	Hour	Mins	Secs	Speed	Total Wgt	Axle #	A Axle Wgt	A B Axle Spac	B Axle Wgt	B C Axle Spac	C Axle Wgt	C D Axle Spac	D
East	1	5	5	8	1	0	0	42	70	9.3	2	5.1	11.6	4.2	-	0	0	0
East	1	8	5	8	1	0	19	38	58	59.2	4	9.3	13.6	13.9	33	8	4.2	4.2
East	1	5	5	8	1	0	40	31	60	18.3	2	6.2	13.6	12	-	0	0	0
East	1	9	5	8	1	0	41	22	61	50.3	5	11	17.5	5.3	4.4	8.8	31.3	0
East	1	5	5	8	1	0	50	10	70	8.1	2	4.2	12.9	3.8	-	0	0	0
East	1	9	5	8	1	1	41	39	60	59.3	5	4.3	11.9	3.1	4.3	8.3	33	33
East	1	9	5	8	1	2	13	42	61	59.2	5	11	11.8	13.8	4	14.8	35.7	0
East	1	6	5	8	1	2	35	43	46	23.4	3	10.1	13.9	7	3.5	6.3	0	0
East	1	5	5	8	1	3	21	32	76	8.4	2	4.3	3.5	3.7	-	0	0	0
East	1	6	5	8	1	3	35	24	58	31.3	3	11.5	17	11.5	4.2	9.3	0	0
East	1	5	5	8	1	3	40	46	60	12.1	2	4.2	11.9	7.8	-	0	0	0
East	1	5	5	8	1	3	41	11	68	12.3	2	3.3	11.7	3.5	-	0	0	0
East	1	9	5	8	1	4	10	27	58	52.2	5	11.1	17.4	13.2	4.2	12.5	34.2	0
East	1	5	5	8	1	4	21	33	63	18.7	2	7.1	22.1	11.6	-	0	0	0
East	1	9	5	8	1	4	34	17	58	73	5	10.7	17	14.3	4.2	14.7	31.7	0
East	1	9	5	8	1	4	35	58	55	56.2	5	10.7	17	14.4	4.2	14.2	31.9	0
East	1	9	5	8	1	4	40	56	56	59.3	5	11.3	17.4	14.9	4.4	14.3	34.9	0

Selection Criteria... Filter... Sort... Save As... Export to Excel... Print... Help... Cancel... Close



Single Tandem and Gross Summary

Date Available from: 12/30/2002 to 08/31/2005

Single axle overweight summary | Tandem axle overweight summary | Gross overweight summary | Print: overweight summary

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County: Kent | Stations: 9759 | Locations: 50 FT E. OF EASTER WAVE, CLT_BRVLLC | Road Name: M5E | Lane: A1 | Hour: A1 | To: A1

Count Date	Direction	Lane	Class	Asle #	Hour	Trucks Wgh	# of Pass	Encl Wgt	% Encl Wgt	Over 5	Over 5%	Over 10	Over 10%	Over 20	Over 20%	Over 30	Over 30%	Over 50	
08/03/2005	East	1	5	2	8	17	34	1	2.94	1	2.94	1	2.94	0	0	-	0	0	0
08/02/2005	East	1	5	2	11	16	32	1	3.13	1	3.13	1	3.13	1	3.13	-	0	0	0
08/04/2005	East	1	5	2	11	11	22	1	4.55	1	4.55	1	4.55	0	0	-	0	0	0
08/02/2005	East	1	5	2	11	14	28	1	3.57	0	-	-	-	0	0	-	0	0	0
08/04/2005	East	1	6	3	4	2	4	1	16.67	1	16.67	1	16.67	0	0	-	0	0	0
08/03/2005	East	1	6	3	6	4	12	1	8.33	0	-	-	-	0	0	-	0	0	0
08/01/2005	East	1	6	3	7	6	12	1	5.56	1	5.56	1	5.56	0	0	-	0	0	0
08/03/2005	East	1	6	3	9	7	21	1	4.76	0	-	-	-	0	0	-	0	0	0
08/04/2005	East	1	6	3	9	3	6	1	11.11	0	-	-	-	0	0	-	0	0	0
08/01/2005	East	1	6	3	12	3	6	1	11.11	1	11.11	1	11.11	0	0	-	0	0	0
08/03/2005	East	1	6	3	13	7	21	1	4.76	1	4.76	1	4.76	1	4.76	-	0	0	0
08/02/2005	East	1	7	5	6	1	6	3	60	3	60	3	60	3	50	2	40	0	0
08/01/2005	East	1	7	5	7	1	6	2	40	2	40	2	40	1	20	-	0	0	0
08/03/2005	East	1	7	5	7	1	6	2	40	2	40	2	40	2	40	-	0	0	0
08/02/2005	East	1	7	5	8	1	6	3	60	2	40	2	40	2	40	2	40	2	40
08/03/2005	East	1	7	5	8	3	18	4	26.67	4	26.67	4	26.67	3	20	3	20	3	20

Selection Criteria... Show Detail... Filter... Sort... Save As... Export to Excel... Print... Help... Close

ESAL Analysis - Accumulating ESAL (Using Default SN,D,PT)

Location: **300 FTE OF EASTERN AVE, CUTLERVILLE** Road Name: **M-6** From: **08/01/2005** To: **08/03/2005**

Accumulating ESAL Summary (Buses Included)

Count Date	County	Station	Direction	Lane	Prmt Type	SN/D	PT	Acc ESAL Buses	Truck Cnt Buses	ESAL % Buses	Avg ESAL Buses	Acc ESAL 2nd	Truck Cnt 2nd	ESAL
05/01/2005	Kent	9759	East	Rgd	1:4	2 5	3 6181	3 6181	2	.26	0 3015	15 6958	208	208
05/02/2005	Kent	9759	East	Rgd	1:4	2 5	3 7067	3 7067	12	.123	0 3155	24 8629	223	223
05/03/2005	Kent	9759	East	Rgd	1:4	2 5	3 7182	3 7182	12	.16	0 3099	36 8042	234	234
05/01/2005	Kent	9759	East	2 Rgd	1:4	2 5	3 2442	3 2442	17	.16	0 1908	116 4268	610	610
05/02/2005	Kent	9759	East	2 Rgd	1:4	2 5	7 0452	7 0452	22	.24	0 3202	100 417	611	611
05/03/2005	Kent	9759	East	2 Rgd	1:4	2 5	12 4078	12 4078	13	.30	0 6893	106 1918	599	599
05/01/2005	Kent	9759	East	3 Rgd	1:4	2 5	4 566	4 566	3	23.35	2 283	2 567	109	109
05/02/2005	Kent	9759	East	3 Rgd	1:4	2 5	0	0	1	.20	0	6 4527	109	109
05/03/2005	Kent	9759	East	3 Rgd	1:4	2 5	0 3668	0 3668	1	.19	0 3668	2 8891	109	109
Total								88 7427	95	0 53	3 4507	401 3578	3 673	