Site-Specific Stochastic Study of Multiple Truck Presence on Highway Bridges

Peter Morales Grad. Research Assist

Mayrai Gindy Ph.D Principal Investigator

2007 UPRM – URI Summer Interchange Program

Program Coordinator

Dr. Benjamin Colucci and Dr. Jerri Paquin

Objectives

- develop MP statistics for various loading patterns and site conditions from measured WIM data

Introduction

The truck load is the most significant live load in highway structure. The designs of pavement, drainage and bridge structure have directly relation with this load. The truck weight and load distribution along the axles are restricted for states transportations agencies to maintain a safety standard of design and prolong the live cycle of the transport facilities

Truck Overloading

- What is the truck overloading?
  One or more axle load is over the agency limits.

- Why occur truck overloading?
  Occur mainly for economical

MAXIMUM WEIGHT LIMITATIONS CHART
Vehicle Not in Combination

Maximum Gross Weight in Pounds on a Group of Axles

A - Feet	B - 2 axles	C - 3 axles	D - 4 axles	E - 5 axles	F - 6 axles	G - 7 axles	H - 8 axles
4	34,000						
5	34,000						
6	34,000						
7	34,000	37,000					
7.5-8	35,000	38,500					
8.1-8.4	38,000	42,300					
9	39,000	43,000					
10	40,000*	43,500					
11		44,500					
12		45,300	55,500				
13		46,000	60,300				
14		46,500	60,800				
15		47,300	61,500				
16		48,000	62,000	64,800			
17		49,000	63,000	71,700			
18		49,500	63,500	72,200			
19		50,000	64,000	73,000			
20		51,000	65,000	73,000	73,000		
21		52,000	66,000	73,000	73,000	73,000	
22		52,900	66,500	73,000	73,000	73,000	
23		53,800	67,000	73,000	73,000	73,500	
24		54,300	68,000	73,000	73,000	74,000	
25		55,300	68,500	73,000	73,000	74,500	80,000
26		56,700	69,500	73,000	73,000	75,000	80,000
27		56,500	70,500	73,000	73,000	76,000	80,000
28		57,100	71,300	73,000	73,000	76,000	80,000
29		58,000	72,000	73,000	73,000	77,000	80,000
30		58,500	72,700	73,000	73,000	77,500	80,000
31		59,300	73,000	73,000	73,000	78,000	80,000
32		60,000**	73,000**	73,000**	73,000**	78,500	80,000**
33						79,500	
34						80,000***	

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Other Truck Overloading

Inconsistency between states load limits

Two or more State can have different loads limits

Transport of Pre-cast Structures

Heavy Hauling

4 Axle Tractor

7 Axle Trailer transporting

90 kip pre-cast structure

Special Equipment

Cranes Model GMK 5240

GVW 134 Kips

5 axles - Total spacing of 28.3 ft

MAXIMUM WEIGHT LIMITATIONS CHART
Combination of Vehicles

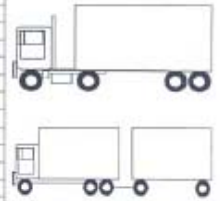
Column A - Distance in Feet between foremost and rearmost axles of a group
Column B - 2 consecutive axles of any combination of vehicles having a total of 3 or more axles
Column C - 3 consecutive axles of any combination of vehicles having a total of 4 or more axles
Column D - 4 consecutive axles of any combination of vehicles having a total of 5 or more axles
Column E - 5 consecutive axles of any combination of vehicles having a total of 6 or more axles
Column F - 6 consecutive axles of any combination of vehicles having a total of 6 or more axles
Column G - 7 consecutive axles of any combination of vehicles having a total of 7 or more axles
Column H - 8 consecutive axles of any combination of vehicles having a total of 8 or more axles

Maximum Gross Weight in Pounds on a Group of Axles

A - Feet	B - 2 axles	C - 3 axles	D - 4 axles	E - 5 axles	F - 6 axles	G - 7 axles	H - 8 axles
4	34,000						
5	34,000						
6	34,000						
7	34,000	37,000					
7.5-8	35,000	38,500					
8.1-8.4	38,000	42,000					
9	39,000	43,000					
10	40,000*	43,500	46,500				
11		44,500	49,500				
12		45,000	50,000				
13		46,000	50,500	62,500			
14		46,500	51,500	62,500			
15		47,500	52,000	62,500			
16		48,000	52,500	62,500			
17		49,000	53,500	63,200	64,000		
18		49,500	54,100	64,400	65,000		
19		50,500	55,100	65,000	65,500		
20		51,500	56,000	65,700	66,000		
21		52,200	56,800	66,900	66,900	73,000	
22		52,900	57,600	67,700	67,700	73,000	
23		53,600	58,400	68,900	68,900	73,500	
24		54,300	59,200	70,000	70,000	74,000	
25		55,000	60,000	71,000	71,000	74,500	80,000
26		55,700	60,800	72,000	72,000	75,000	80,000
27		56,500	61,600	72,800	72,800	76,000	80,000
28		57,100	62,400	73,000	73,000	76,500	80,000
29		58,000	63,200	73,000	73,000	77,000	80,000
30		58,500	64,000	73,000	73,000	77,500	80,000
31		59,500	64,000	73,000	73,000	78,000	80,000
32		60,000**	64,000	73,000	73,000	78,500	80,000**
33			64,000	73,000	74,000	79,500	
34			64,500	73,000	74,500	80,000***	
35			65,500	73,000	75,000		
* 36			66,000	73,000	75,500		
* 37			66,500	73,000	76,000		
* 38			67,500	73,000	77,000		
39			68,000	73,000	77,500		
40			68,500	73,000	78,000		
41			69,500	73,500	78,500		
42			70,000	74,500	79,000		
43			70,500	75,000	80,000		
44			71,500	75,500	80,000		
45			72,000	76,000	80,000		
46			72,500	77,000	80,000		
47			73,500	77,500	80,000		
48			74,000	78,000	80,000		
49			74,500	78,500	80,000		
50			75,500	79,500	80,000		
51			76,000****	80,000****	80,000****		

Instructions: Use this chart to determine maximum gross weight in pounds, on a group of axles for a combination of vehicles, on Class 'A' highways. See examples of combination of vehicles below.

* Maximum at 10 or more feet between axles
** Maximum at 32 or more feet between axles
*** Maximum at 34 or more feet between axles
**** Maximum at 51 or more feet between axles



* 2 consecutive sets of tandem axles may impose on the highway a gross load of 34,000 pounds each if the overall distance between the first and last axles of such consecutive sets of tandem axles is 36 feet or more [§46.15(3)(ii)]

Truck Overloading by MP

- Multiple Trucks Presence (MP)- two or more trucks are travel adjacent in the road

Following

Convoy of utility trucks during Hurricane Frank in 1996
*(Courtesy of **WRAL 5**)*

Side by Side

*(Courtesy of **Comstock Images**)*

Staggered

*(Courtesy of **Marco Luethy Weblog**)*

Multiple Trucks Presence Occurrences

Construction

*(Courtesy of **I stock photo**)*

Military Activities

U.S. Army convoy in Baghdad's airport 2003
(Courtesy of www.brandonblog.homestead.com)

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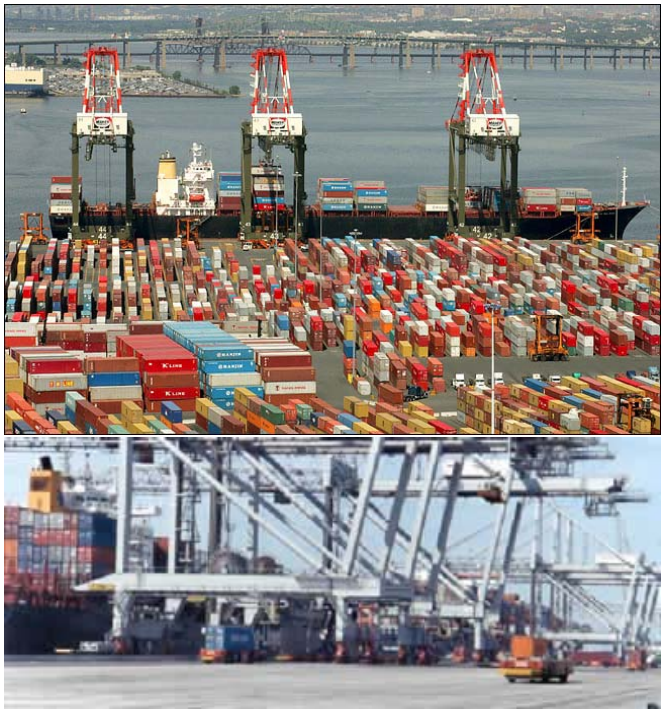
Multiple Trucks Presence

Ports



*(Courtesy of **International FHWA**)*

Industrial Zones

*(Courtesy of **international FHWA**)*

Truck Weight Sensor

- The principal three ways to determinate the weights of the heavy vehicles are:
  - One axle weight
  - One stop weight
  - Weight in motion (WIM) sensor

Truck Weight Sensor

- One axle weight
  - Advantages
    - Only needs one weight sensor
    - Some sensors are portables
    - Can be use in any axles configuration
  - Disadvantages
    - Only one axle weight is determine at a time
    - The precision depend of the site and vehicle position
    - The vehicle need to be stop

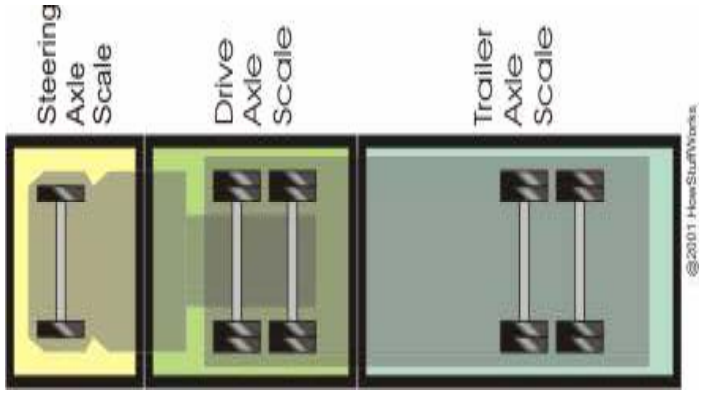
*(Courtesy of **Axle Weight Technology**)*

*(Courtesy of **Axle Weight Technology**)*

Truck Weight Sensor

- One stop weight (Weight Station)
  - Advantages
    - All the axles weights are determinate at the same time
  - Disadvantages
    - Need multiples weight sensor
    - Sensor need to be placed with the same axles configuration of the truck
    - The vehicle need to be stop

*(Courtesy of **How stuff work**)*



*(Courtesy of **How stuff work**)*

Truck Weight Sensor

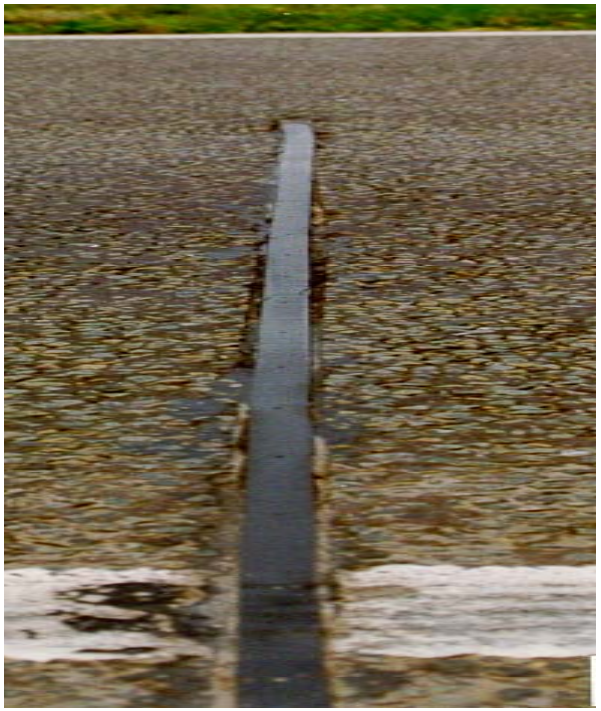
- Weight in motion (WIM) sensor
  - Advantages
    - Data collected and stored
      - weight of each axle
      - spacing between axles
      - number of vehicles
      - Speed
    - Vehicle not need to be stop
  - Disadvantages
    - Need continuo calibration
    - Data need to be processed
    - Fixed location

*(Courtesy of **International Road Dynamics Inc**)*

Truck Weight Sensor

- Weight in motion (WIM) sensor

Bending plate **Load cell** **Piezoelectric**



(Courtesy of ***Quality Control Procedures for Weigh-in-Motion data FHWA)***

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WIM Calibration

Hardware Calibration

- Multiples pass over the sensor with knowing factors:
  - Speed
  - Axles Load
  - Spacing of Axles
- *References*
  - *Long Term Pavement Performance (LTPP)*
  - *California DOT*
  - *Traffic Monitoring Guide*
  - *ASTM 1318*

(Courtesy of ***Quality Control Procedures for Weigh-in-Motion data FHWA)***

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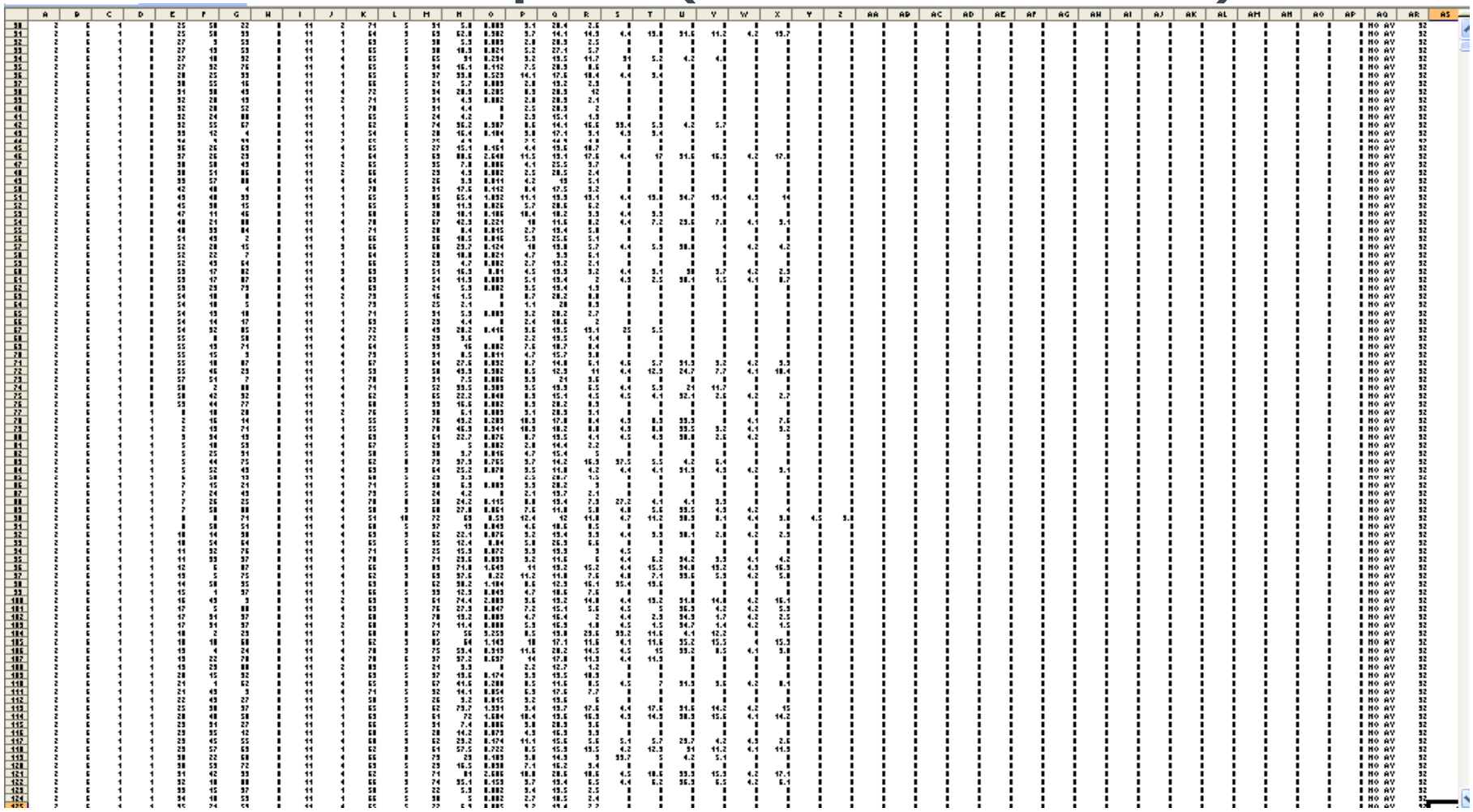
WIM Calibration

Software Calibration

- Monitoring of Data
  (Typically of FHWA class 9)
  - Spacing in tandem
  - GVW
  - Steering axle weight
  - Traffic volumes

*(Courtesy of **How stuff work**)*

WIM Data Output (0206ASCI.022)

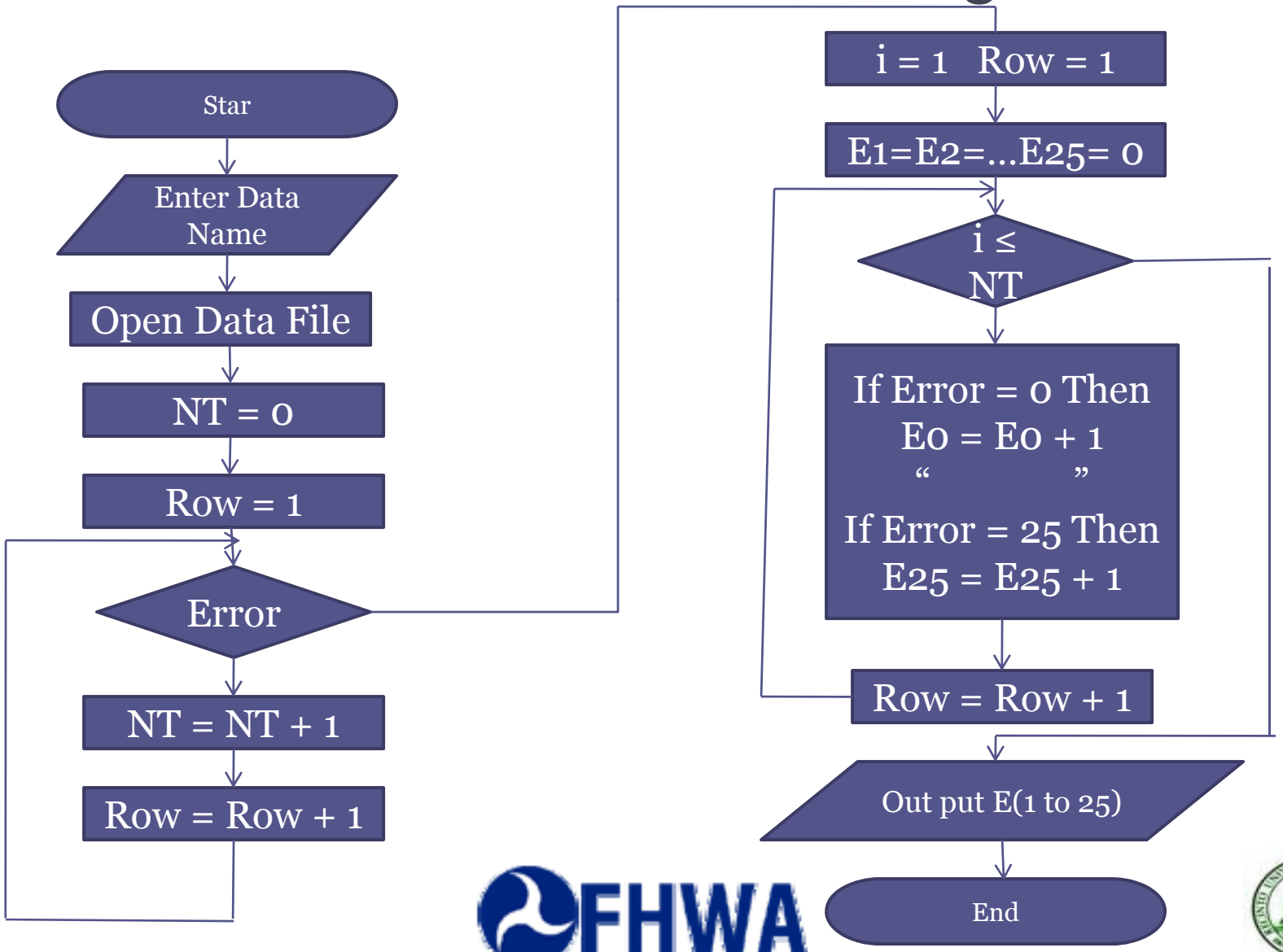


WIM Data Output

Column	Column #	Parameter	Units
A	1	**YR**	
B	2	**MO**	
C	3	**DY**	
D	4	**HR**	
E	5	**MN**	
F	6	**SEC**	
G	7	**HSEC**	
H	8	**ERR**	
I	9	**RCD**	
J	10	**LN**	
K	11	**SP**	*mph*
L	12	**CL**	
M	13	**LE**	*feet*
N	14	**GVW**	*kips*
O	15	**ESAL**	
P	16	**AXW(1)**	*kips*
Q	17	**AXS(1)**	*feet*
R	18	**AXW(2)**	*kips*
S	19	**AXS(2)**	*feet*
T	20	**AXW(3)**	*kips*
U	21	**AXS(3)**	*feet*
V	22	**AXW(4)**	*kips*

Column	Column #	Parameter	Units
W	23	**AXS(4)**	*feet*
X	24	**AXW(5)**	*kips*
Y	25	**AXS(5)**	*feet*
Z	26	**AXW(6)**	*kips*
AA	27	**AXS(6)**	*feet*
AB	28	**AXW(7)**	*kips*
AC	29	**AXS(7)**	*feet*
AD	30	**AXW(8)**	*kips*
AE	31	**AXS(8)**	*feet*
AF	32	**AXW(9)**	*kips*
AG	33	**AXS(9)**	*feet*
AH	34	**AXW(10)**	*kips*
AI	35	**AXS(10)**	*feet*
AJ	36	**AXW(11)**	*kips*
AK	37	**AXS(11)**	*feet*
AL	38	**AXW(12)**	*kips*
AM	39	**AXS(12)**	*feet*
AN	40	**AXW(13)**	*kips*
AO	41	**AXS(13)**	*feet*
AP	42	**AXW(14)**	*kips*
AQ	43	**AVI**	
AR	44	**TEMP**	

Flowcharts Data check Program



WIM Data Quality Output 022

Calibrate June 8, 2002

Error Codes for All Lanes |			
Filename	0205ASCI .022	**Message**	**(E)rror or (W)arning?**
Total No. of Trucks	43556		
E0	42614	Good vehicle	
E1	0	Axle on sensor too long	**Error**
E2	0	Sample queue overflow	**Error**
E3	0	Axle queue overflow	**Error**
E4	0	Upstream loop only	**Error**
E5	0	Vehicle too fast	**Error**
E6	0	Unequal axle count	N/A
E7	0	Downstream loop only	**Error**
E8	0	Upstream loop bounce	**Error**
E9	0	Maximum number of axles exceeded	**Error**
E10	0	Zero axles detected	**Error**
E11	0	One axle detected	**Error**
E12	0	Vehicle too slow	**Error**
E13	0	Axle sensors in wrong order	**Error**
E14	0	Loops in wrong order	**Error**
E15	0	Offscale hit	N/A
E16	0	Offscale hit	Warning
E17	0	Overheight	Warning
E18	17	Significant speed change	Warning
E19	0	Significant weight difference	Warning
E20	0	Vehicle headway too short	**Error**
E21	615	Unequal axles detected	Warning
E22	0	Wrong lane	Warning
E23	310	Tailgaiting	Warning
E24	0	Onscale missed	Warning
E25	0	Safety (random)	N/A
No. of Errors =	0		
No. of Warnings =	942		
% Errors =	0%		
% Warnings =	2.2%		
% Good Vehicle =	97.8%		

Error Codes for All Lanes |			
Filename	0206ASCI .022	**Message**	**(E)rror or (W)arning?**
Total No. of Trucks	43404		
E0	42763	Good vehicle	
E1	0	Axle on sensor too long	**Error**
E2	0	Sample queue overflow	**Error**
E3	0	Axle queue overflow	**Error**
E4	0	Upstream loop only	**Error**
E5	0	Vehicle too fast	**Error**
E6	0	Unequal axle count	N/A
E7	0	Downstream loop only	**Error**
E8	0	Upstream loop bounce	**Error**
E9	0	Maximum number of axles exceeded	**Error**
E10	0	Zero axles detected	**Error**
E11	0	One axle detected	**Error**
E12	0	Vehicle too slow	**Error**
E13	0	Axle sensors in wrong order	**Error**
E14	0	Loops in wrong order	**Error**
E15	0	Offscale hit	N/A
E16	0	Offscale hit	Warning
E17	0	Overheight	Warning
E18	17	Significant speed change	Warning
E19	0	Significant weight difference	Warning
E20	0	Vehicle headway too short	**Error**
E21	342	Unequal axles detected	Warning
E22	0	Wrong lane	Warning
E23	282	Tailgaiting	Warning
E24	0	Onscale missed	Warning
E25	0	Safety (random)	N/A
No. of Errors =	0		
No. of Warnings =	641		
% Errors =	0%		
% Warnings =	1.5%		
% Good Vehicle =	98.5%		

Error Codes for All Lanes |			
Filename	0207ASCI .022	**Message**	**(E)rror or (W)arning?**
Total No. of Trucks	38886		
E0	38562	Good vehicle	
E1	0	Axle on sensor too long	**Error**
E2	0	Sample queue overflow	**Error**
E3	0	Axle queue overflow	**Error**
E4	0	Upstream loop only	**Error**
E5	0	Vehicle too fast	**Error**
E6	0	Unequal axle count	N/A
E7	0	Downstream loop only	**Error**
E8	0	Upstream loop bounce	**Error**
E9	0	Maximum number of axles exceeded	**Error**
E10	0	Zero axles detected	**Error**
E11	0	One axle detected	**Error**
E12	0	Vehicle too slow	**Error**
E13	0	Axle sensors in wrong order	**Error**
E14	0	Loops in wrong order	**Error**
E15	0	Offscale hit	N/A
E16	0	Offscale hit	Warning
E17	0	Overheight	Warning
E18	3	Significant speed change	Warning
E19	0	Significant weight difference	Warning
E20	0	Vehicle headway too short	**Error**
E21	44	Unequal axles detected	Warning
E22	0	Wrong lane	Warning
E23	277	Tailgaiting	Warning
E24	0	Onscale missed	Warning
E25	0	Safety (random)	N/A
No. of Errors =	0		
No. of Warnings =	324		
% Errors =	0%		
% Warnings =	0.8%		
% Good Vehicle =	99.2%		

WIM Data Quality Output 022

Calibrate June 8, 2002

Message	(E)rror or (W)arning?	Error Code By Lane	Name	0205ASCI.022	36%	13%	18%	34%	0%	0%
			Total No. of Trucks	43556	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6
Good vehicle		E0			15529	5485	7574	14026	0	0
Axle on sensor too long	Error	E1			0	0	0	0	0	0
Sample queue overflow	Error	E2			0	0	0	0	0	0
Axle queue overflow	Error	E3			0	0	0	0	0	0
Upstream loop only	Error	E4			0	0	0	0	0	0
Vehicle too fast	Error	E5			0	0	0	0	0	0
Unequal axle count	N/A	E6			0	0	0	0	0	0
Downstream loop only	Error	E7			0	0	0	0	0	0
Upstream loop bounce	Error	E8			0	0	0	0	0	0
Maximum number of axles exceeded	Error	E9			0	0	0	0	0	0
Zero axles detected	Error	E10			0	0	0	0	0	0
One axle detected	Error	E11			0	0	0	0	0	0
Vehicle too slow	Error	E12			0	0	0	0	0	0
Axle sensors in wrong order	Error	E13			0	0	0	0	0	0
Loops in wrong order	Error	E14			0	0	0	0	0	0
Offscale hit	N/A	E15			0	0	0	0	0	0
Offscale hit	Warning	E16			0	0	0	0	0	0
Overheight	Warning	E17			0	0	0	0	0	0
Significant speed change	Warning	E18			1	0	0	16	0	0
Significant weight difference	Warning	E19			0	0	0	0	0	0
Vehicle headway too short	Error	E20			0	0	0	0	0	0
Unequal axles detected	Warning	E21			0	0	0	615	0	0
Wrong lane	Warning	E22			0	0	0	0	0	0
Tailgaiting	Warning	E23			60	95	116	39	0	0
Onscale missed	Warning	E24			0	0	0	0	0	0
Safety (random)	N/A	E25			0	0	0	0	0	0
		No. of Errors =			0	0	0	0	0	0
		No. of Warnings =			61	95	116	670	0	0
		% Errors =			0%	0%	0%	0%	0%	0%
		% Warnings =			0.1%	0.2%	0.3%	1.5%	0.0%	0.0%
		% E0 by Lane =			99.6%	98.3%	98.5%	95.4%	-	-
		%E0 Total=			35.7%	12.6%	17.4%	32.2%	0.0%	0.0%

Error Code By Lane	Name	0206ASCI.022	38%	13%	15%	34%	0%	0%
	Total No. of Trucks	43404	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6
E0			16558	5505	6277	14423	0	0
E1			0	0	0	0	0	0
E2			0	0	0	0	0	0
E3			0	0	0	0	0	0
E4			0	0	0	0	0	0
E5			0	0	0	0	0	0
E6			0	0	0	0	0	0
E7			0	0	0	0	0	0
E8			0	0	0	0	0	0
E9			0	0	0	0	0	0
E10			0	0	0	0	0	0
E11			0	0	0	0	0	0
E12			0	0	0	0	0	0
E13			0	0	0	0	0	0
E14			0	0	0	0	0	0
E15			0	0	0	0	0	0
E16			0	0	0	0	0	0
E17			0	0	0	0	0	0
E18			2	1	0	14	0	0
E19			0	0	0	0	0	0
E20			0	0	0	0	0	0
E21			0	0	1	341	0	0
E22			0	0	0	0	0	0
E23			65	106	72	39	0	0
E24			0	0	0	0	0	0
E25			0	0	0	0	0	0
No. of Errors =			0	0	0	0	0	0
No. of Warnings =			67	107	73	394	0	0
% Errors =			0%	0%	0%	0%	0%	0%
% Warnings =			0.2%	0.2%	0.2%	0.9%	0.0%	0.0%
% E0 by Lane =			99.6%	98.1%	98.9%	97.3%	-	-
%E0 Total=			38.1%	12.7%	14.5%	33.2%	0.0%	0.0%

Error Code By Lane	Name	0207ASCI.022	38%	13%	15%	35%	0%	0%
	Total No. of Trucks	38886	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6
E0			14770	4787	5580	13425	0	0
E1			0	0	0	0	0	0
E2			0	0	0	0	0	0
E3			0	0	0	0	0	0
E4			0	0	0	0	0	0
E5			0	0	0	0	0	0
E6			0	0	0	0	0	0
E7			0	0	0	0	0	0
E8			0	0	0	0	0	0
E9			0	0	0	0	0	0
E10			0	0	0	0	0	0
E11			0	0	0	0	0	0
E12			0	0	0	0	0	0
E13			0	0	0	0	0	0
E14			0	0	0	0	0	0
E15			0	0	0	0	0	0
E16			0	0	0	0	0	0
E17			0	0	0	0	0	0
E18			0	0	0	3	0	0
E19			0	0	0	0	0	0
E20			0	0	0	0	0	0
E21			0	0	1	43	0	0
E22			0	0	0	0	0	0
E23			61	93	81	42	0	0
E24			0	0	0	0	0	0
E25			0	0	0	0	0	0
No. of Errors =			0	0	0	0	0	0
No. of Warnings =			61	93	82	88	0	0
% Errors =			0%	0%	0%	0%	0%	0%
% Warnings =			0.2%	0.2%	0.2%	0.2%	0.0%	0.0%
% E0 by Lane =			99.6%	98.1%	98.6%	99.3%	-	-
%E0 Total=			38.0%	12.3%	14.3%	34.5%	0.0%	0.0%

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WIM Data Quality Output 022

Calibrate June 8, 2002

Speed | Error 0| First Month						
Filename						
Lane	1	2	3	4	5	6
Minimum (mph)	44.466	52.916	53.233	46.931476	0	0
Maximum (mph)	74.68	78.753	76.769	90.520334	0	0
Average (mph)	59.224	64.408	64.105	59.07766894	#DIV/0!	#DIV/0!
Standard Deviation (mph)	3.129	3.1888	3.1636	3.450517795	#DIV/0!	#DIV/0!
COV (%)	5%	5%	5%	6%	#DIV/0!	#DIV/0!

Speed | Error 0| Second Month						
Filename						
Lane	1	2	3	4	5	6
Minimum (mph)	47.699	46.164	24.397	47.368944	0	0
Maximum (mph)	72.657	76.794	77.959	70.148096	0	0
Average (mph)	59.173	63.821	63.643	59.22063169	#DIV/0!	#DIV/0!
Standard Deviation (mph)	2.8173	3.3746	3.9154	3.144920097	#DIV/0!	#DIV/0!
COV (%)	5%	5%	6%	5%	#DIV/0!	#DIV/0!

Speed | Error 0| Third Month						
Filename						
Lane	1	2	3	4	5	6
Minimum (mph)	45	56	29	40	0	0
Maximum (mph)	70	80	73	70	0	0
Average (mph)	59	64	64	60	#DIV/0!	#DIV/0!
Standard Deviation (mph)	2.8908	2.8217	3.7219	2.954334277	#DIV/0!	#DIV/0!
COV (%)	5%	4%	6%	5%	#DIV/0!	#DIV/0!

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WIM Data Quality Output 022

Calibrate June 8, 2002

ADTT | Lane 1 Error 0 | FIRST MONTH																								
DAY	HR00	HR01	HR02	HR03	HR04	HR05	HR06	HR07	HR08	HR09	HR10	HR11	HR12	HR13	HR14	HR15	HR16	HR17	HR18	HR19	HR20	HR21	HR22	HR23
1	9	8	5	4	14	27	48	41	65	59	5	44	63	43	53	55	29	34	25	17	6	6	4	1
2	6	6	4	1	15	2	43	52	57	72	56	46	48	55	5	29	3	24	2	13	8	6		6
3	7	4	1	11	21	29	42	49	56	45	49	49	52	45	51	48	43	26	14	16	1	3	5	5
4	4	6	1	5	9	14	19	26	24	24	26	25	21	18	13	14	12	15	7	8	8	2	3	
5	1	2	3	5	6	3	6	9	9	11	12	17	12	13	1	1	19	18	11	14	9	8	6	6
6	8	4	9	1	17	24	45	48	48	55	5	43	48	55	56	52	29	22	21	18	11	9	4	2
7	4	6	4	8	2	23	54	53	53	46	71	44	42	59	57	37	46	3	19	16	11	7	3	6
8	6	4	7	5	14	29	47	47	65	47	54	54	6	58	47	47	43	32	22	18	14	5	4	8
9																								
10	3	5	9	8	11	22	49	38	56	58	61	49	45	48	55	5	43	3	2	14	12	7	5	4
11	3	2	5	8	7	1	18	19	22	27	24	22	28	25	19	15	21	16	15	1	8	9	2	2
12	4	6	4	4	7	3	4	9	11	13	11	16	16	14	5	6	18	9	8	7	4	5	4	4
13	2	2	1	6	16	28	3	43	57	51	52	45	49	39	56	33	23	24	16	11	7	6	5	4
14	3	6	3	8	16	18	55	49	49	51	49	51	51	53	49	37	28	24	17	17	1	9	8	8
15	8	2	7	1	18	21	46	5	51	56	44	58	43	58	4	52	4	34	21	13	9	8	6	4
16	11	5	5	7	19	26	53	65	65	68	45	55	58	53	63	4	36	35	16	13	8	14	7	6
17	8	5	8	8	18	29	43	45	58	54	59	56	49	6	5	36	43	21	26	17	15	4	4	4
18	1	3	3	2	5	5	15	19	22	22	21	27	23	24	19	2	12	1	11	12	6	5	4	4
19	2	2	3	5	8		7	3	13	15	1	12	13	12	18	21	19	6	7	13	7	8	2	3
20	1	8	7	9	15	26	45	51	59	57	48	47	41	53	51	4	3	22	14	13	8	7	6	3
21	3	4	5	3	2	29	55	47	63	58	52	54	55	5	53	5	28	23	11	17	13	5	4	3
22	6	5	5	5	16	2	41	43	61	54	52	5	57	47	44	54	37	36	28	14	12	9	4	3
23	3	9	3	7	11	29	45	5	57	53	55	45	61	46	53	45	46	36	15	24	16	9	6	3
24	4	7	6	6	11	27	41	45	57	58	41	55	47	43	5	39	3	4	24	19	14	7	5	4
25	3	5	4	4	3	12	14	27	18	2	22	25	18	24	18	14	17	1	1	1	5	7	5	1
26	1	3	4	5	4	3	6	7	8	15	12	9	17	13	1	11	13	11	5	8	2	3	3	5
27		4	4	4	7	9	8	5	4	14	12	1	2	12	14	16	16	11	14	9	6	8	3	4
28																								
29	2	1	9	7	11	23	46	44	56	51	51	51	42	56	57	49	36	28	14	18	1	8	8	4
30	3	6	5	6	14	23	49	52	56	49	33	56	47	43	57	49	48	42	23	2	24	9	9	5
31																								
Average	4.296296	4.643	4.7857	5.4643	11.321	18.037	33.821	33.7857	43.5714	42.321	36.535714	37.893	37.6429	36.4286	33.179	27.86	25.64	20.036	14.61	12.964	8.7857	6.8929	4.778	4.148
ADTT	509																							

LANE	1		2		3		4		5		6	
	LNADTT	#DAY	LNADTT	#DAY	LNADTT	#DAY	LNADTT	#DAY	LNADTT	#DAY	LNADTT	#DAY
Month 1	509	28	183	23	249	24	454	27	-	-	-	-
Month 2	497	30	175	24	198	26	455	30	-	-	-	-
Month 1	482	28	172	22	187	25	431	28	-	-	-	-

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Futures task

- Evaluation of the rest sites good Data
- Determination of MP for various loading patterns, site conditions and zones
- Apply these patterns for future codes revisions and designs

Conclusion

- All the states and transportation agencies need to be uniformity in the weights limits and others limiting factors.
- The WIM sensor data is a revolutionary tools for research and analysis traffic patterns. For these reasons must to be calibrate to obtain quality data.

Acknowledgements

- URI Transportation Center
- UPRM Transportation Center
- Eisenhower Fellowships
- FHWA
- Dr. Gindy
- Dr. Benjamin Colucci
- Dr. Jerri Paquin