

WIM System Field Calibration and Validation Handout Guide - Revised

Minnesota, SPS-5
SHRP ID – 270500

Validation Date: April 26, 2011



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1 Site Information

Site ID:	270500	State:	Minnesota
LTPP Region:	North Cental	Configuration:	Loop-Quartz -Quartz-Loop
Controller Type:	iSINC	Sensor Type:	Quartz Piezo
Power:	AC	Communication:	Landline
Class Scheme:	LTPP Mar 06	CPU type/setup:	iSINC

2 Contact Information

Agency	Contact	Position	Phone	E-Mail
FHWA	Debbie Walker	COTR	202 493-3068	deborah.walker@dot.gov
FHWA	William Lohr	FHWA Division	651-291-6122	william.lohr@dot.gov
RSC	Frank Meyer	Project Manager	716-632-0804	fmeyer@stantec.com
MNDOT	Benjamin Timerson	LTPP Coord.	651-296-0217	benjamin.timerson@state.mn.us
MNDOT	Ben Worel	LTPP contact	651-779-5522	ben.worel@dot.state.mn.us
MNDOT	Graig Gilbertson	LTPP contact	218-755-6543	grraig.gilbertson@dot.state.mn.us
MNDOT	Mark Novak	Traffic Contact	651-296-2607	mark.novak@dot.state.mn.us
ARA	Dean Wolf	Task Leader	717-512-6638	dwolf@ara.com
ARA	Olga Selezneva	Project Manager	410-540-9949	oselezneva@ara.com

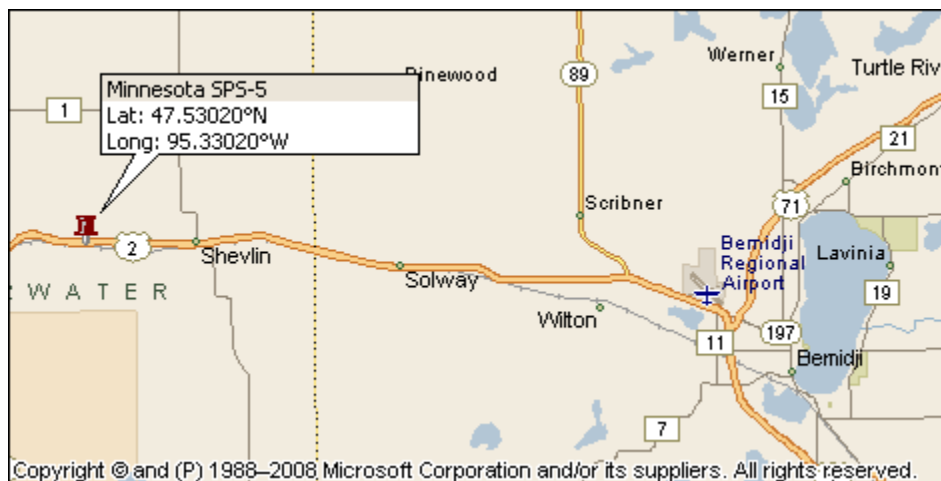
3 Schedule of Events

Date	Event	Location	Start Time
4/25/11	Travel	Bemidji, MN	TBD
4/26/11	Test Truck Weigh/Measure/Inspection	Waste Management	6:30 am
4/26/11	Equipment Assessment	WIM Site	7:30 am
4/26/11	Initial Performance Evaluation	WIM Site	8:00 am
4/26/11	System Test/Class and Speed Study	WIM Site	TBD
4/27/11	Test Truck Weigh/Measure/Inspection	Waste Management	6:30 am
4/27/11	Calibration/Validation	WIM Site	TBD
4/28/11	Travel	Camp Hill, PA	TBD

4 Maps

4.1 Site Location

Location:	US-2 at M.P. 91.8, 3.3 miles west of SR 2			Dir:	WB
Latitude:	47.5302°	Longitude:	-95.3302°		



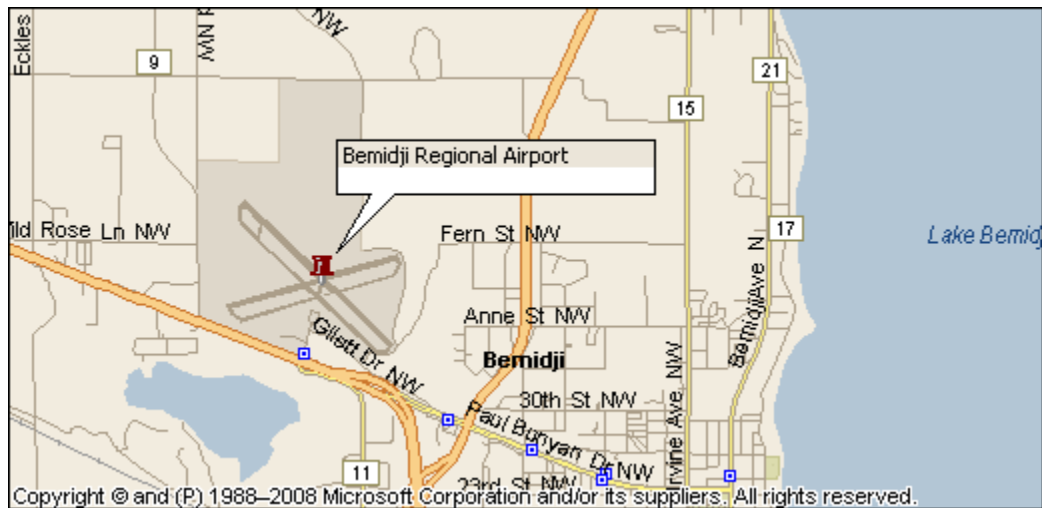
4.2 Truck Scale Location

Name:	Waste Management	Location:	751 Industrial Park Dr. SE, Bemidji, MN
Latitude:	47.4448°	Longitude:	-94.8573°



4.3 Airport Location

Name:	Bemidji Regional Airport	Location:	Bemidji, MN
Latitude:	47.5907°	Longitude:	-94.9333°



4.4 Hospital Location

Name:	Clearwater County Memorial Hospital - ER	Location:	203 4 th St. NW, Bagley, MN
Phone:	218-694-6501		



5 Occupational Health and Safety Plan

All fieldwork in the right-of-way will be carried out when the ground visibility is more than 3 km, and when there is no accumulation of water, snow, or ice is on the pavement.

To the extent possible, inspection work during extremely high and low temperatures will be avoided. If the work becomes necessary, workers will be reminded to make appropriate precautions (wear protective clothing, drink fluids, and avoid prolonged exposure to severe weather conditions).

All personnel present on the right-of-way will wear approved safety gear (boots, reflective safety vest, and helmet).

The following items will be available at the site: a standard first-aid kit, a cell phone, and the location of nearby hospital(s).

6 Contingency Plan

If inclement weather is forecasted prior to mobilizing to the site, the Project Manager will make the final decision to postpone the Validation visit. The Task Leader is responsible for contacting all parties involved to inform them of the postponement. He is also responsible for rearranging travel.

Once the Validation team is on-site, the On-Site Task Leader is responsible for making decisions to delay or postpone the Validation. He will contact the Project Manager to make recommendations for completing the Validation, and the Project Manager will make the final decision to cancel or postpone. The On-Site Task Leader is responsible for contacting the COTR and all other participating parties to inform them of the delay or postponement.

Traffic Sheet 17 LTTP MONITORED TRAFFIC DATA WIM SITE INVENTORY	STATE CODE:	27
	SPS WIM ID:	270500
	DATE (mm/dd/yyyy)	4/26/2011

1. ROUTE: US-2 **MILEPOST:** 91.8 **LTPP DIRECTION:** west

2. WIM SITE DESCRIPTION

Grade: <1% Sag Vertical: N
 Nearest Upstream SPS Section: _____
 Distance from sensors to SPS Section: _____ feet

3. LANE CONFIGURATION

Lanes in LTPP direction:	<u>2</u>	Median:	<u>3 - grass</u>
Lane width:	<u>12'</u>	Shoulder:	<u>2 - paved AC</u>
Shoulder width:	<u>12'</u>		

4. PAVEMENT TYPE AC

5. PAVEMENT SURFACE CONDITION - Distress Survey

Date: <u>4/26/11</u>	Photo Filename: <u>270500_upstream_04_26_11.jpg</u>
Date: <u>4/26/11</u>	Photo Filename: <u>270500_downstream_04_26_11.jpg</u>
Date:	Photo Filename:

6. SENSOR SEQUENCE

Loop - Quartz - Quartz - Loop

7. REPLACEMENT AND/OR GRINDING

Date: _____
Date: _____
Date: _____

8. RAMPS OR INTERSECTIONS

Intersection within 300' upstream of site:	N
Intersection within 300' downstream of site:	N
Is shoulder routinely used for turning?	N

9. DRAINAGE

Drainage (*bending plate and load cell*) : _____
 Clearance under plate (in.): _____
 Clearance /access to flush fines from under system: _____

Traffic Sheet 17 LTPP MONITORED TRAFFIC DATA WIM SITE INVENTORY	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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10. CABINET LOCATION

Same side of road as LTPP lane: Y
Distance from edge of traveled lane: 47 ft
distance from system: 53 ft
type: Other

Cabinet access controlled by: Agency and LTPP
Contact name: Bob Worel Phone # 651-779-5522
Alternate name: Roy Czinku Phone # 306-653-6627

11. POWER

Distance to cabinet from drop: 4 ft
Type: AC
AC in cabinet? Y
Service provider: _____ Phone # _____

12. TELEPHONE

Distance to cabinet from drop: 92 ft
Type: landline
Service provider: _____ Phone # _____

13. SYSTEM

Software and version no. iSINC
Computer connection: RS-232

14. TEST TRUCK TURNAROUND TIME

Duration: 5 minutes Distance: 3 miles

15. PHOTOS

	Filename
Power source:	<u>270500_power_service_box_04_26_11.jpg</u>
Phone source:	<u>270500_telephone_pedestal_04_26_11.jpg</u>
Cabinet exterior:	<u>270500_cabinet_exterior_04_26_11.jpg</u>
Cabinet interior:	<u>270500_cabinet_interior_front_04_26_11.jpg</u>
Weight sensors:	<u>270500_leading_WIM_sensor_04_26_11.jpg</u>
	<u>270500_trailing_WIM_sensor_04_26_11.jpg</u>
Other sensors:	<u>270500_leading_loop_sensor_04_26_11.jpg</u>
	<u>270500_trailing_loop_sensor_04_26_11.jpg</u>
Downstream from sensors on LTPP lane:	<u>270500_downstream_04_26_11.jpg</u>
Upstream from sensors on LTPP lane:	<u>270500_upstream_04_26_11.jpg</u>

Traffic Sheet 18 LTPP MONITORED TRAFFIC DATA WIM SITE COORDINATION	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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1. DATA PROCESSING

- a. Download: LTPP only
- b. Data review: LTPP
If state, how often?
- c. Data submission LTPP
If state how often?

2. EQUIPMENT

- a. Purchase LTPP
- b. Installation Included with purchase
- c. Maintenance Contract with purchase
Expiration Date
- d. Calibration LTPP
- e. Manuals and software control: LTPP
- f. Power
i. Type Underground ii. Payment State
- g. Communication
i. Type Landline ii. Payment State

3. PAVEMENT

- a. Type Asphalt Concrete
- b. Allowable Rehabilitation activities Maintenance only
- c. Profile Site Markings Temporary

Traffic Sheet 18 LTPP MONITORED TRAFFIC DATA WIM SITE COORDINATION	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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4. Onsite Activities

- a. WIM Validation Check advance notice required

_____ Days 2 Weeks

- b. Notice for straightedge and grinding check

_____ Days 2 Weeks

i. On site lead LTPP

ii. Accept grinding LTPP

- c. Authorization to calibrate site State

- d. Calibration routine LTPP annually
Other: _____

- e. Test Vehicle Responsibilities

- i. Trucks

1st- Air suspension 3S2 LTPP

2nd- Air Suspension 3S2 LTPP

3rd- _____

4th- _____

- ii. Loads LTPP

- iii. Drivers LTPP

- f. Contractor(s) with prior experience in wim calibration in state:

- g. Access to cabinet Joint

- h. State personel required on site No

- i. Traffic control required No

- J. Enforcement coordination required No

Traffic Sheet 18 LTPP MONITORED TRAFFIC DATA WIM SITE COORDINATION	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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5. SITE SPECIFIC CONDITIONS

- a. Funds and accountability: _____
- b. Reports: _____
- c. Other: _____
- c. Special Conditions _____

6. CONTACTS

- a. Equipment (operational status, access, etc.)
Name Roy Czinku Phone # 306-653-6627
Agency IRD
- b. Maintenance (equipment)
Name Roy Czinku Phone # 306-653-6627
Agency IRD
- c. Data Processing and pre-visit data
Name Basel Abukhater Phone # 716-632-0804
Agency Stantec
- d. Construction schedule and verification
Name _____ Phone # _____
Agency _____
- e. Test Vehicles (trucks, loads, drivers)
Name Steve Thorson Phone # 218-968-2223
Agency Thorson Trucking
- f. Traffic control
Name _____ Phone # _____
Agency _____
- g. Enforcement coordination
Name _____ Phone # _____
Agency _____
- h. Nearest static scale
Name Norbor, Inc. Location: Solway, MN
Phone: 218-751-2023

Traffic Sheet 19 LTPP MONITORED TRAFFIC DATA CALIBRATION TEST TRUCK # 1	STATE CODE: 27
	SPS WIM ID: 270500
	DATE (mm/dd/yyyy) 4/26/2011

CALIBRATION TEST TRUCK - Primary

PART A

1. FHWA CLASS: 9 2. Number of axles: 5

3. AXLE WEIGHTS (lbs)

	a. Empty Truck Avg. Axle Weight	b. Pre-test Average Axle Weight	c. Post-Test Avg. Axle Weight	d. Direct or Calculated?
A		12110	11810	Direct
B		15710	15655	Direct
C		15710	15655	Direct
D		16900	16935	Direct
E		16900	16935	Direct
F				

4. GVW (same units as axles)

a. Empty GVW: _____
b. Average Pre-Test Loaded weight: 77330
c. Post Test Loaded Weight: 76990
d. Difference Post Test - Pre-Tests: 340

5. TRUCK DESCRIPTION

a. Tractor Cab Style: Conventional Sleeper Cab: Yes
photo: ☒

b. Make: Kenworth
c. Model: _____

d. Trailer Load Distribution Description:

binned wood chips

photo: ☒

e. Tractor Tare weight - _____ - _____
f. Trailer Tare weight - _____ - _____
g. Axle Spacing - _____

A to B 17.5 B to C 4.3 C to D 35.3 D to E 4.1 E to F _____

h. Wheelbase - ☐ Measured _____ ☒ Computed 61.2
i. Kingpin offset from Axle B (units) -1.2' photo: ☐
j. Overall Length - ☒ Measured 75.0

Traffic Sheet 19 LTPP MONITORED TRAFFIC DATA CALIBRATION TEST TRUCK # <u>1</u>	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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CALIBRATION TEST TRUCK - Primary

6. SUSPENSION

	a. Tire size	b.Suspension description (leaf, air # of leaves, taper or flat leaf, etc.)	c. photo
A	295/75R22.5	steel spring	☒
B	295/75R22.5	air	☒
C	275/80R22.5	air	☒
D	295/75R22.5	air	☒
E	295/75R22.5	air	☒
F			☐

d. Cold Tire Pressures (psi)- from right to left

Steering Axle	Axle B	Axle C	Axle D	Axle E	Axle F
96.0	114.2	109.2	110.4	102.4	
112.1	118.3	110.0	112.2	110.0	
	110.0	106.9	114.2	108.1	
	110.0	110.3	120.1	110.3	

PART B

Table 1 - Raw Measurements -Platform Scale

Axles	Meas.	Pre-test Weight	Instance	Instance	Post-test weight
A	I				
A+B	II				
A+B+C	III				
A+B+C+D	IV				
A+B+C+D+E(1)	V				
A+B+C+D+E+(F)(1)	VI				
B+C+D+E+(F)	VII				
C+D+E+(F)	VIII				
D+E+(F)	IX				
E+(F)	X				
(F)	XI				
A+B+C+D+E+(F)(2)	XII				

Traffic Sheet 19 LTPP MONITORED TRAFFIC DATA CALIBRATION TEST TRUCK # <u>1</u>	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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CALIBRATION TEST TRUCK - Primary

Table 2 - Axle and GVW Computations -Platform Scale Pre-test

	1		2		Avg.
Axle A	I	0	VI-VII	0	0
Axle B	II-I	0	VII-VIII	0	0
Axle C	III-II	0	VIII-IX	0	0
Axle D	IV-III	0	IX-X	0	0
Axle E	V-IV	0	X-XI	0	0
Axle F	VI-V		XI		
GVW	VI	0	XII	0	0

Table 3- Axle and GVW Computations - Platform Scale - Instance -

	1		2		Avg.
Axle A	I	0	VI-VII	0	0
Axle B	II-I	0	VII-VIII	0	0
Axle C	III-II	0	VIII-IX	0	0
Axle D	IV-III	0	IX-X	0	0
Axle E	V-IV	0	X-XI	0	0
Axle F	VI-V		XI		
GVW	VI	0	XII	0	0

Table 4- Axle and GVW Computations - Platform Scale - Instance -

	1		2		Avg.
Axle A	I	0	VI-VII	0	0
Axle B	II-I	0	VII-VIII	0	0
Axle C	III-II	0	VIII-IX	0	0
Axle D	IV-III	0	IX-X	0	0
Axle E	V-IV	0	X-XI	0	0
Axle F	VI-V		XI		
GVW	VI	0	XII	0	0

Table 5- Axle and GVW Computations - Platform Scale Post-Test

	1		2		Avg.
Axle A	I	0	VI-VII	0	0
Axle B	II-I	0	VII-VIII	0	0
Axle C	III-II	0	VIII-IX	0	0
Axle D	IV-III	0	IX-X	0	0
Axle E	V-IV	0	X-XI	0	0
Axle F	VI-V		XI		
GVW	VI	0	XII	0	0

Traffic Sheet 19 LTPP MONITORED TRAFFIC DATA CALIBRATION TEST TRUCK # <u>1</u>	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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CALIBRATION TEST TRUCK - Primary

Table 6 - Raw Data -Axle Scales - Pre-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	12020	15770	15770	16890	16890		77340
2	12200	15650	15650	16910	16910		77320
Avg.	12110	15710	15710	16900	16900		77330

Table 7- Raw Data- Axle scales -

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
Avg.							

Table 8- Raw Data- Axle scales -

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
Avg.							

Table 9 - Raw Data -Axle Scales - Post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11820	15640	15640	16940	16940		76980
2	11800	15670	15670	16930	16930		77000
Avg.	11810	15655	15655	16935	16935		76990

Validation Test Truck Run Set - Pre

Measured By: Dean J. Wolf

Verified By: _____

Traffic Sheet 19 LTPP MONITORED TRAFFIC DATA CALIBRATION TEST TRUCK # 2	STATE CODE: 27
	SPS WIM ID: 270500
	DATE (mm/dd/yyyy) 4/26/2011

CALIBRATION TEST TRUCK - Secondary

PART A

1. FHWA CLASS: 9 2. Number of axles: 5
3. AXLE WEIGHTS (lbs)

	a. Empty Truck Avg. Axle Weight	b. Pre-test Average Axle Weight	c. Post-Test Avg. Axle Weight	d. Direct or Calculated?
A		11590	11370	Direct
B		14445	14375	Direct
C		14445	14375	Direct
D		11275	11265	Direct
E		11275	11265	Direct
F				

4. GVW (same units as axles)

- a. Empty GVW: _____
- b. Average Pre-Test Loaded weight: 63030
- c. Post Test Loaded Weight: 62650
- d. Difference Post Test - Pre-Tests: 380

5. TRUCK DESCRIPTION

- a. Tractor Cab Style: Conventional Sleeper Cab: Yes
photo: ☒

- b. Make: Peterbilt
- c. Model: _____

d. Trailer Load Distribution Description:

binned wood chips

photo: ☒

- e. Tractor Tare weight - _____ - _____
- f. Trailer Tare weight - _____ - _____
- g. Axle Spacing - _____

A to B 17.2 B to C 4.4 C to D 33.0 D to E 4.1 E to F _____

- h. Wheelbase - ☐ Measured _____ ☒ Computed 58.7
- i. Kingpin offset from Axle B (units) -1.0 photo: ☐
- j. Overall Length - ☒ Measured 70.0

Traffic Sheet 19 LTPP MONITORED TRAFFIC DATA CALIBRATION TEST TRUCK # 2	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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CALIBRATION TEST TRUCK - Secondary

6. SUSPENSION

	a. Tire size	b.Suspension description (leaf, air # of leaves, taper or flat leaf, etc.)	c. photo
A	295/75R22.5	steel spring	☒
B	295/75R22.5	air	☒
C	295/75R22.5	air	☒
D	285/75R24.5	air	☒
E	285/75R24.5	air	☒
F			☐

d. Cold Tire Pressures (psi)- from right to left

Steering Axle	Axle B	Axle C	Axle D	Axle E	Axle F
96.0	114.2	109.2	110.4	102.4	
112.1	118.3	110.0	112.2	110.0	
	110.0	106.9	114.2	108.1	
	110.0	110.3	120.1	110.3	

PART B

Table 1 - Raw Measurements -Platform Scale

Axes	Meas.	Pre-test Weight	Instance	Instance	Post-test weight
A	I				
A+B	II				
A+B+C	III				
A+B+C+D	IV				
A+B+C+D+E(1)	V				
A+B+C+D+E+(F)(1)	VI				
B+C+D+E+(F)	VII				
C+D+E+(F)	VIII				
D+E+(F)	IX				
E+(F)	X				
(F)	XI				
A+B+C+D+E+(F)(2)	XII				

Traffic Sheet 19 LTPP MONITORED TRAFFIC DATA CALIBRATION TEST TRUCK # 2	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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CALIBRATION TEST TRUCK - Secondary

Table 2 - Axle and GVW Computations -Platform Scale Pre-test

	1		2		Avg.
Axle A	I	0	VI-VII	0	0
Axle B	II-I	0	VII-VIII	0	0
Axle C	III-II	0	VIII-IX	0	0
Axle D	IV-III	0	IX-X	0	0
Axle E	V-IV	0	X-XI	0	0
Axle F	VI-V		XI		
GVW	VI	0	XII	0	0

Table 3- Axle and GVW Computations - Platform Scale - Instance -

	1		2		Avg.
Axle A	I	0	VI-VII	0	0
Axle B	II-I	0	VII-VIII	0	0
Axle C	III-II	0	VIII-IX	0	0
Axle D	IV-III	0	IX-X	0	0
Axle E	V-IV	0	X-XI	0	0
Axle F	VI-V		XI		
GVW	VI	0	XII	0	0

Table 4- Axle and GVW Computations - Platform Scale - Instance -

	1		2		Avg.
Axle A	I	0	VI-VII	0	0
Axle B	II-I	0	VII-VIII	0	0
Axle C	III-II	0	VIII-IX	0	0
Axle D	IV-III	0	IX-X	0	0
Axle E	V-IV	0	X-XI	0	0
Axle F	VI-V		XI		
GVW	VI	0	XII	0	0

Table 5- Axle and GVW Computations - Platform Scale Post-Test

	1		2		Avg.
Axle A	I	0	VI-VII	0	0
Axle B	II-I	0	VII-VIII	0	0
Axle C	III-II	0	VIII-IX	0	0
Axle D	IV-III	0	IX-X	0	0
Axle E	V-IV	0	X-XI	0	0
Axle F	VI-V		XI		
GVW	VI	0	XII	0	0

Traffic Sheet 19 LTPP MONITORED TRAFFIC DATA CALIBRATION TEST TRUCK # 2	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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CALIBRATION TEST TRUCK - Secondary

Table 6 - Raw Data -Axle Scales - Pre-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11640	14430	14430	11270	11270		63040
2	11540	14460	14460	11280	11280		63020
Avg.	11590	14445	14445	11275	11275		63030

Table 7- Raw Data- Axle scales -

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
Avg.							

Table 8- Raw Data- Axle scales -

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
Avg.							

Table 9 - Raw Data -Axle Scales - Post-test

Pass	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW
1	11400	14380	14380	11250	11250		62660
2	11340	14370	14370	11280	11280		62640
Avg.	11370	14375	14375	11265	11265		62650

Validation Test Truck Run Set - Pre

Measured By: Dean J. Wolf

Verified By: _____

Traffic Sheet 21 (Wheel Load) LTPP MONITORED TRAFFIC DATA WIM SYSTEM TRUCK RECORDS										STATE CODE: 27 SPS WIM ID: 270500 DATE: (mm/dd/yyyy): 4/26/2011									
---	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--	--	--	--

Pvmt Temp	Radar speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW	A-B space	B-C space	C-D space	D - E space	E - F space	Axle Length	Overall Length
44.1	54	1	1	7:32:46	4814	54.0	12.1	15.6	15.2	16.8	16.7		76.4	17.5	4.3	35.3	4.1		61.2	75.0
44.1	53	2	1	7:32:51	4816	53.0	11.3	14.1	14.0	11.7	10.8		62.0	17.2	4.4	33.0	4.1		58.7	70.0
46.4	59	1	2	7:47:06	4928	60.0	12.0	15.8	15.6	17.0	16.9		77.4	17.5	4.3	35.3	4.0		61.1	75.0
46.4	59	2	2	7:47:12	4931	59.0	11.0	14.9	14.5	12.1	11.1		63.5	17.2	4.4	32.9	4.1		58.6	70.0
47.9	65	1	3	8:00:46	5037	65.0	12.4	15.5	15.6	16.8	16.1		76.4	17.5	4.3	35.3	4.0		61.1	75.0
47.9	65	2	3	8:00:50	5039	66.0	11.2	15.1	14.7	11.3	11.1		63.3	17.2	4.4	33.0	4.1		58.7	69.0
48.4	55	1	4	8:14:15	5130	54.0	11.7	15.5	15.0	17.2	16.7		76.0	17.5	4.3	35.3	4.0		61.1	75.0
48.4	56	2	4	8:14:21	5131	57.0	11.3	14.3	14.2	11.7	11.2		62.7	17.2	4.4	33.0	4.1		58.7	69.0
49.8	59	1	5	8:28:10	5203	59.0	12.2	15.9	15.7	17.3	17.2		78.2	17.5	4.3	35.3	4.0		61.1	75.0
49.8	60	2	5	8:28:18	5206	60.0	10.8	15.3	14.9	11.9	11.0		64.0	17.1	4.4	33.0	4.0		58.5	69.0
48.7	54	1	6	8:41:52	5286	54.0	12.2	15.6	15.3	17.3	16.5		76.9	17.5	4.3	35.3	4.0		61.1	75.0
48.7	54	2	6	8:41:58	5288	54.0	11.1	14.0	14.3	11.3	10.4		61.2	17.1	4.3	33.0	4.1		58.5	69.0
48.5	60	1	7	8:55:16	5347	60.0	12.0	15.9	15.3	17.9	17.2		78.3	17.5	4.3	35.3	4.0		61.1	74.0
48.5	59	2	7	8:55:21	5348	59.0	11.1	14.5	14.7	12.0	11.3		63.6	17.2	4.4	33.0	4.1		58.7	70.0
56.7	59	1	8	10:08:04	5678	58.0	12.0	15.8	15.3	17.0	16.8		76.8	17.5	4.4	35.3	4.1		61.3	75.0
56.7	60	2	8	10:08:08	5680	60.0	11.4	15.1	14.8	11.6	10.9		63.8	17.2	4.4	33.0	4.1		58.7	69.0
56.8	63	1	9	10:21:05	5748	63.0	11.8	15.7	15.5	16.9	16.7		76.6	17.5	4.3	35.3	4.0		61.1	75.0
56.8	60	2	9	10:21:34	5749	60.0	11.0	14.4	14.6	11.8	10.7		62.6	17.2	4.4	32.9	4.1		58.6	69.0
56.9	63	1	10	10:34:11	5811	63.0	12.4	16.1	15.5	16.9	16.6		77.5	17.5	4.3	35.3	4.1		61.2	75.0
56.9	65	2	10	10:34:20	5812	65.0	11.0	14.5	14.7	11.9	11.0		63.1	17.1	4.4	33.0	4.1		58.6	69.0
60.7	54	1	11	10:48:10	5885	54.0	12.0	15.7	15.6	16.8	16.7		76.9	17.5	4.3	35.3	4.0		61.1	75.0
60.7	52	2	11	10:48:15	5886	53.0	11.2	13.9	13.9	11.4	10.8		61.3	17.2	4.4	33.0	4.0		58.6	69.0
59.3	64	1	12	11:01:32	5962	64.0	12.2	15.5	14.9	16.4	16.7		75.6	17.5	4.3	35.3	4.0		61.1	75.0
59.3	67	2	12	11:01:45	5964	67.0	11.4	14.7	14.3	11.3	10.7		62.6	17.2	4.4	33.0	4.1		58.7	70.0

Recorded By: <u> djw </u>	Verified By: <u> ar </u>	Run Set <u> Pre </u>
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Traffic Sheet 21 (Wheel Load) LTTP MONITORED TRAFFIC DATA WIM SYSTEM TRUCK RECORDS										STATE CODE: 27 SPS WIM ID: 270500 DATE: (mm/dd/yyyy): 4/26/2011									
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Pvmt Temp	Radar speed	Truck	Pass	Time	Record No.	WIM Speed	Axle A	Axle B	Axle C	Axle D	Axle E	Axle F	GVW	A-B space	B-C space	C-D space	D - E space	E - F space	Axle Length	Overall Length
58.4	54	1	13	11:16:02	6038	54.0	12.0	15.3	15.2	16.9	16.7		76.1	17.5	4.3	35.3	4.0		61.1	75.0
58.4	55	2	13	11:16:08	6039	55.0	11.3	14.4	14.4	11.5	10.8		62.2	17.1	4.4	33.0	4.1		58.6	70.0
60.8	59	1	14	11:30:11	6106	59.0	12.7	15.7	15.3	17.2	17.1		77.9	17.5	4.3	35.3	4.1		61.2	74.0
60.8	65	2	14	11:30:20	6107	65.0	11.5	13.7	14.6	11.5	11.2		62.5	17.2	4.4	33.0	4.0		58.6	69.0
64.7	54	1	15	13:09:47	362	54.0	11.9	15.8	15.1	17.3	16.1		76.2	17.5	4.3	35.3	4.1		61.2	75.0
64.7	54	2	15	13:09:52	363	55.0	11.0	13.8	14.3	11.8	10.7		61.7	17.2	4.4	32.9	4.1		58.6	70.0
65.4	59	1	16	13:24:10	428	59.0	12.2	16.0	15.4	17.9	17.4		78.9	17.5	4.4	35.3	4.1		61.3	75.0
65.4	60	2	16	13:24:26	430	61.0	10.7	14.3	14.6	11.5	10.9		61.9	17.1	4.4	32.9	4.0		58.4	69.0
65.9	64	1	17	13:38:35	505	64.0	12.2	15.4	15.5	16.6	16.1		75.8	17.5	4.3	35.3	4.1		61.2	75.0
65.9	66	2	17	13:39:08	511	66.0	11.0	14.6	14.2	11.2	11.3		62.3	17.2	4.4	33.0	4.0		58.6	70.0
65.9	55	1	18	13:52:12	572	55.0	11.4	15.2	15.1	16.5	16.1		74.2	17.5	4.3	35.2	4.1		61.1	74.0
65.9	60	2	18	13:52:22	575	60.0	10.9	14.7	14.5	11.8	11.2		63.2	17.2	4.4	32.9	4.1		58.6	70.0
64.8	64	1	19	14:06:07	640	64.0	11.6	15.9	15.7	16.8	16.6		76.8	17.4	4.4	35.3	4.0		61.1	75.0
64.8	66	2	19	14:06:27	641	66.0	11.5	14.6	14.5	11.1	11.0		62.8	17.2	4.4	32.9	4.1		58.6	69.0
63.7	65	1	20	14:19:59	711	65.0	12.0	15.4	15.4	16.7	16.3		75.7	17.5	4.3	35.2	4.1		61.1	75.0
63.7	63	2	20	14:20:17	714	63.0	10.6	14.6	14.4	11.4	10.9		62.0	17.1	4.4	32.9	4.1		58.5	70.0

Recorded By: <u> djw </u>	Verified By: <u> ar </u>	Run Set <u> Pre </u>
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Traffic Sheet 22 LTPP MONITORED TRAFFIC DATA SITE EQUIPMENT ASSESSMENT LTPP LANE ONLY	STATE CODE: 27 SPS WIM ID: 270500 STATE ASSIGNED ID 0 DATE (mm/dd/yyyy) 4/26/2011
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9. IN ROAD SENSORS:

Describe any deficiencies regarding the sensor installation. Indicate sensors that show any signs of being broken, severely worn, missing, removed, or loose. List photos on Sheet 24 for

the equipment is operating within the manufacturer's tolerances.

TRUCK OBSERVATIONS

- 10.** Indicate any irregular truck behaviors such as bouncing, swerving, or braking near the weighing area (within 40 meters). Note the distance from the weighing sensors.

A visual observation of the trucks as they approach, traverse, and leave the sensor area indicated bouncing at a location 450 feet prior to the WIM scales. The dynamics appeared to diminish prior to the trucks crossing the WIM scales and did not appear to affect the accuracy of the WIM system. The trucks appear to track down the center of the lane.

Minimum 15 minute or 35 truck sample video sample for pavement interaction deficiencies:

Tape Filename: _____

Time: _____

From: _____

To: _____

Traffic Sheet 22 LTPP MONITORED TRAFFIC DATA SITE EQUIPMENT ASSESSMENT LTPP LANE ONLY	STATE CODE: 27 SPS WIM ID: 270500 STATE ASSIGNED ID 0 DATE (mm/dd/yyyy) 4/26/2011
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11. CLASSIFICATION VERIFICATION VIDEO:

TAPE 1- NAME: _____

Interval	Filename	From	To
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____
6	_____	_____	_____
7	_____	_____	_____
8	_____	_____	_____

TAPE 2- NAME: _____

Interval	Filename	From	To
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____
6	_____	_____	_____
7	_____	_____	_____
8	_____	_____	_____

TAPE 3- NAME: _____

Interval	Filename	From	To
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____
6	_____	_____	_____
7	_____	_____	_____
8	_____	_____	_____

Traffic Sheet 22 LTPP MONITORED TRAFFIC DATA SITE EQUIPMENT ASSESSMENT LTPP LANE ONLY	STATE CODE: 27 SPS WIM ID: 270500 STATE ASSIGNED ID 0 DATE (mm/dd/yyyy) 4/26/2011
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SYSTEM ACCURACY TESTS

12. CONDUCT THE FOLLOWING SYSTEM ACCURACY TESTS EITHER ON- SITE OR IN OFFICE

Speed Accuracy - Complete Sheet 20 and attach.

Average radar speed	<u>62.7</u> mph	Average WIM Speed	<u>62.9</u> mph
Mean Difference	<u>0.3</u> mph	SD of mean	<u>0.8</u>

Posted Speed Limit	<u>65</u> mph		
Speed Range	15th percentile - <u>62</u> mph	85th percentile-	<u>69</u> mph

Spacing and Weight - Complete Sheet 21 and attach.

Average distance between axles of drive tandem		<u> </u> feet	
% error from 4.25 ft (industry average)	OR	<u>4.36</u>	ft (WIM system average)
= <u>2.5</u> %			

Average front axle weight for Class 9 vehicles		<u> </u> lbs	
% error from 10.3 kips (industry average) OR	OR	<u>11.6</u>	lbs (known site value)
= <u>12.5</u> %			

SUPPORT EQUIPMENT STRUCTURES

17. Indicate any deficiencies with any site equipment other than the in-road sensors. List all photos on the Sheet 24 for each occurrence.

Cabinet/Foundation None ☒

no cabinet or foundation deficiencies

Pull Boxes None ☒

no pull box deficiencies

Mast None ☒

no service mast deficiencies

Solar Panels None ☒

no solar panel deficiencies

Traffic Sheet 22 LTPP MONITORED TRAFFIC DATA SITE EQUIPMENT ASSESSMENT LTPP LANE ONLY	STATE CODE: 27 SPS WIM ID: 270500 STATE ASSIGNED ID 0 DATE (mm/dd/yyyy) 4/26/2011
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Telephone D-Mark Box None ☒

no telephone d-mark box deficiencies

Power Service Box None ☒

no power service box deficiencies

Grounding None ☒

no grounding deficiencies

Conduit None ☒

no conduit deficiencies

STATIC AND DYNAMIC ELECTRONIC EQUIPMENT TESTS

18. Complete and attach a Sheet 22 addendum applicable to the installed road equipment.

ADDITIONAL COMMENTS

All values for the WIM sensors and inductive loops were within tolerances. Electronic tests of the power and communication devices indicated that they were operating normally.

Assessor Dean J. Wolf

Traffic Sheet 22 Addendum - Kistler Quartz LTPP MONITORED TRAFFIC DATA SITE EQUIPMENT ASSESSMENT LTPP LANE ONLY	STATE CODE: 27 SPS WIM ID: 270500 STATE ASSIGNED ID 0 DATE (mm/dd/yyyy) 4/26/2011
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STATIC EQUIPMENT VALUES (SYSTEM OFF)

1. POWER

a. Solar Panel		WATTS		VDC
b. Equipment Power	122.2	VAC		VDC
c. Battery 1	13.1	VDC		
d. Battery 2		VDC		
e. Regulated		VDC		
f. Power Supply	13.5	VDC		VDC
g. System Input	122.2	VAC		VDC
h. Modem Power	122.2	VAC		VDC
i. Telephone	47.6	VDC		

2. LOOP SENSORS

	Resistance	Inductance	Shield
a. Leading	0.5 Ω	141 μ h	6.6 M Ω
b. Trailing	0.5 Ω	141 μ h	17.7 M Ω

3. KISTLER SENSORS

	Resistance	Capacitance
a. K1 (lead/left)	10 ¹⁰ Ω	10.1 n f
b. K2 (lead/middle)	Ω	n f
c. K3 (lead mid/right)	Ω	n f
d. K4 (lead/right)	<10 ⁹ Ω	9.3 n f
e. K5 (trail/left)	10 ¹¹ Ω	15 n f
f. K6 (trail/mid left)	Ω	n f
g. K7 (trail/mid right)	Ω	n f
h. K8 (trail/right)	10 ¹⁰ Ω	9.7 n f

DYNAMIC EQUIPMENT VALUES (SYSTEM ON)

4. LOOP SENSORS

	Frequency
a. Leading	10.4 KHz
b. Trailing	10.6 KHz

5. KISTLER SENSORS

Dynamic testing for the Kistler Quartz sensor is not recommended.

Assessor _____ Dean J. Wolf

Traffic Sheet 24A LTPP MONITORED TRAFFIC DATA SITE PHOTO LOG - Equipment	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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Item	Description	Filename
1	Power Source	270500_power_service_box_04_26_11.jpg
2	Telephone Source	270500_telephone_pedestal_04_26_11.jpg
3	Cabinet Exterior	270500_cabinet_exterior_04_26_11.jpg
4	Cabinet Interior	270500_cabinet_interior_front_04_26_11.jpg
5	Leading weight sensor	270500_leading_WIM_sensor_04_26_11.jpg
6	Trailing weight sensor	270500_trailing_WIM_sensor_04_26_11.jpg
7	Leading classification sensor	
8	Trailing classification sensor	
9	Leading loop sensor	270500_leading_loop_sensor_04_26_11.jpg
10	Trailing loop sensor	270500_trailing_loop_sensor_04_26_11.jpg
11	Downstream from site	270500_downstream_04_26_11.jpg
12	Upstream from site	270500_upstream_04_26_11.jpg
13	Cabinet Interior - Rear	
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		

RECORDED BY: _____ Dean J. Wolf

Traffic Sheet 24B LTPP MONITORED TRAFFIC DATA SITE PHOTO LOG - Test Trucks	STATE CODE: 27 SPS WIM ID: 270500 DATE (mm/dd/yyyy) 4/26/2011
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Item	Description	Filename
1	Tractor, Truck #1	270500_Truck_1_Tractor_04_26_11.jpg
2	Trailer/Load, Truck #1	270500_Truck_1_Trailer_04_26_11.jpg
3	Kingpin Offset, Truck #1	
4	Suspension A, Truck #1	270500_Truck_1_Suspension_1_04_26_11.jpg
5	Suspension B, Truck #1	270500_Truck_1_Suspension_2_04_26_11.jpg
6	Suspension C, Truck #1	270500_Truck_1_Suspension_3_04_26_11.jpg
7	Suspension D, Truck #1	270500_Truck_1_Suspension_4_04_26_11.jpg
8	Suspension E, Truck #1	270500_Truck_1_Suspension_5_04_26_11.jpg
9	Suspension F, Truck #1	
10	Tractor, Truck #2	270500_Truck_2_Tractor_04_26_11.jpg
11	Trailer/Load, Truck #2	270500_Truck_2_Trailer_04_26_11.jpg
12	Kingpin Offset, Truck #2	
13	Suspension A, Truck #2	270500_Truck_2_Suspension_1_04_26_11.jpg
14	Suspension B, Truck #2	270500_Truck_2_Suspension_2_04_26_11.jpg
15	Suspension C, Truck #2	270500_Truck_2_Suspension_3_04_26_11.jpg
16	Suspension D, Truck #2	270500_Truck_2_Suspension_4_04_26_11.jpg
17	Suspension E, Truck #2	270500_Truck_2_Suspension_5_04_26_11.jpg
18	Suspension F, Truck #2	
19	Tractor, Truck #3	
20	Trailer/Load, Truck #3	
21	Kingpin Offset, Truck #3	
22	Suspension A, Truck #3	
23	Suspension B, Truck #3	
24	Suspension C, Truck #3	
25	Suspension D, Truck #3	
26	Suspension E, Truck #3	
27	Suspension F, Truck #3	
28	Scale	
29		
30		

RECORDED BY: _____ Dean J Wolf

