INTERNATIONAL ROAD DYNAMICS INC.

LTPP WIM DATA COLLECTION SYSTEMS

INSTALLATION AND CALIBRATION FOR NEW MEXICO SPS-1 LTPP ID 350100

MAY 27, 2008
CLIN 2004C TASK ORDER # 15

CONTRACT NO. DTFH61-05-D-00001

U.S. Department of Transportation
Federal Highway Administration

LONG TERM Pavement PERFORMANCE

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

This report details the installation and calibration of the New Mexico SPS-1 Weigh-in-Motion (WIM) site located on I-25 mile post 36.1. The WIM site is instrumented with IRD's iSINC (Intelligent Sensor Interface Network Controller) WIM Electronics, Kistler Quartz Sensors and inductive loops. The LTPP lane is in the north bound driving lane and is instrumented with two inductive loops and 8 Kistler Quartz sensors.

This Kistler sensor layout used at this site is referred to as a double threshold. There are two sensors arrays which span the entire width of the roadway. Each array weighs each side of the vehicle separately and twice (four measurements per axle).

The WIM system uses a CDMA modem for remote communication and data downloading. The WIM system power is provided by two 80 watt Solar Panels charging two 12 volt, 90 amp hr. batteries. The WIM Controller cabinet is located on the shoulder approximately 26 ft. east of the north bound shoulder.

The WIM equipment installation began on April 1, 2008 and was completed on April 30, 2008. The site was calibrated on May 14, 2008.

The calibration results demonstrate the WIM system meets the LTPP performance requirements for weight and axle spacing as detailed in the *Data Collection Guide for SPS WIM Sites*.

2.0 POINT OF CONTACTS

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3.0 SHEET 16 – SITE CALIBRATION SUMMARY

SITE CALIBRATION INFORMATION

1. DATE OF CALIBRATION (MONTH/DAY/YEAR): **May 14, 2008**

2. TYPE OF EQUIPMENT CALIBRATED:
   - ☒ WIM
   - ☐ CLASSIFIER
   - ☐ BOTH

3. REASON FOR CALIBRATION
   - ☐ REGULARLY SCHEDULED SITE VISIT
   - ☐ RESEARCH
   - ☐ EQUIPMENT REPLACEMENT
   - ☐ TRAINING
   - ☐ DATA TRIGGERED SYSTEM REVISION
   - ☒ NEW EQUIPMENT INSTALLATION
   - ☐ OTHER (SPECIFY) _____

4. SENSORS INSTALLED IN LTPP LANE AT THIS SITE (CHECK ALL THAT APPLY):
   - ☐ BARE ROUND PIEZO CERAMIC
   - ☐ BARE FLAT PIEZO
   - ☐ BENDING PLATES
   - ☐ CHANNELIZED ROUND PIEZO
   - ☐ LOAD CELLS
   - ☒ QUARTZ PIEZO
   - ☐ CHANNELIZED FLAT PIEZO
   - ☒ INDUCTANCE LOOPS
   - ☐ CAPACITANCE PADS
   - ☐ OTHER (SPECIFY) _____

5. EQUIPMENT MANUFACTURER: **International Road Dynamics Inc.**

WIM SYSTEM CALIBRATION SPECIFICS

6. CALIBRATION TECHNIQUE USED:
   - ☐ TRAFFIC STREAM:
     - NUMBER OF TRUCKS _____
     - ☐ STATIC SCALE
   - ☒ TEST TRUCKS:
     - NUMBER OF TEST TRUCKS **2**
     - PASSES PER TRUCK **29**

TRUCK#	TYPE	SUSPENSION
1	**9**	**1 & 2**
2	**9**	**1 & 2**
3	**X**	**X**
4	**X**	**X**
5	**X**	**X**

TYPE PER FHWA 13 BIN SYSTEM
SUSPENSION TYPES:
1 – AIR
2 – LEAF SPRING
3 – OTHER

7. SUMMARY CALIBRATION RESULTS (EXPRESSED AS A PERCENT)
   GVW MEAN DIFFERENCE **-1.1 %** STANDARD DEVIATION **1.3%**
   SINGLE AXLE MEAN DIFFERENCE **-1.9%** STANDARD DEVIATION **5.1%**
   DOUBLE AXLES MEAN DIFFERENCE **-0.4%** STANDARD DEVIATION **2.3%**

8. NUMBER OF SPEEDS AT WHICH CALIBRATION WAS PERFORMED: **3**

9. DEFINE THE SPEED RANGES USED (MPH): **55 - 60, 60 – 65, 65 - 75**

10. CALIBRATION FACTOR (AT EXPECTED FREE FLOW SPEED) **See following sheets**

11. IS AUTO-CALIBRATION USED AT THIS SITE? ☐
    IF USED, LIST AND DEFINE AUTO-CALIBRATION VALUE _____

CLASSIFIER TEST SPECIFICS

12. METHOD FOR COLLECTING INDEPENDENT VOLUME MEASUREMENT BY VEHICLE CLASS:
    ☐ VIDEO
    ☒ MANUAL
    ☐ PARALLEL CLASSIFIERS

13. METHOD TO DETERMINE LENGTH OF COUNT:
    TIME
    NUMBER OF VEHICLES
    NUMBER OF TRUCKS

14. MEAN DIFFERENCE IN VOLUMES BY VEHICLES CLASSIFICATION:
    FHWA CLASS 2 100**%**
    FHWA CLASS 3 100**%**
    FHWA CLASS 4&5 100**%**
    FHWA CLASS 8 100**%**
    FHWA CLASS 9 100**%**
    FHWA CLASS 12 **%**
    "UNCLASSIFIED" VEHICLES: **%**

15. PICTURES: _____

16. NOTES:
    _____

PERSON LEADING CALIBRATION EFFORT: **Bruce Myers**
CONTACT INFORMATION: **717-264-2077**

3.1.1 iSINC SITE CALIBRATION FACTORS & SITE PARAMETERS AS OF 5-14-2008

Calibration Menu

Select Lane		1					
Select Axle Sensor		1					
Threshold		16					
WIM Calib Factors >		Select Speed Bin	1	2	3	4	5
		Max Speed (kph)	88	96	105	112	120
		Calib Factor	3315	3315	3332	3332	3332
Select Lane		1					
Select Axle Sensor		2					
Threshold		16					
WIM Calib Factors >		Select Speed Bin	1	2	3	4	5
		Max Speed (kph)	88	96	105	112	120
		Calib Factor	2962	2962	2975	2975	2975
Select Lane		1					
Select Axle Sensor		3					
Threshold		16					
WIM Calib Factors >		Select Speed Bin	1	2	3	4	5
		Max Speed (kph)	88	96	105	112	120
		Calib Factor	3315	3315	3332	3332	3332
Select Lane		1					
Select Axle Sensor		4					
Threshold		16					
WIM Calib Factors >		Select Speed Bin	1	2	3	4	5
		Max Speed (kph)	88	96	105	112	120
		Calib Factor	2962	2962	2975	2975	2975

Site Parameters Menu

Lane Name			1
Lane State			ENABLED
Upstream Loop >		Loop State	ENABLED
		Module UID	9
		Channel Num	0
		Polarity Active	LOW
		Width (cm)	230
Downstream Loop >		Loop State	ENABLED
		Module UID	9
		Channel Num	1
		Polarity Active	LOW
		Width (cm)	230
		Distance(cm)	670
Axle Sensors >		Select Axle	1
		Axle State	ENABLED
		Module UID	5
		Channel Num	0
		Polarity Active	HIGH
		Type	KISTLER_DUAL
		Poition	Left
		Distance(cm)	274
		Temp State	ENABLED
		Temp Module UID	5
		Temp Channel Num	0
Axle Sensors >		Select Axle	2
		Axle State	ENABLED
		Module UID	5
		Channel Num	1
		Polarity Active	HIGH
		Type	KISTLER_DUAL
		Poition	Right
		Distance(cm)	274
		Temp State	ENABLED
		Temp Module UID	5
		Temp Channel Num	0
Axle Sensors >		Select Axle	3
		Axle State	ENABLED
		Module UID	5
		Channel Num	2
		Polarity Active	HIGH
		Type	KISTLER_DUAL
		Poition	Left
		Distance(cm)	579
		Temp State	ENABLED
		Temp Module UID	5
		Temp Channel Num	0
Axle Sensors >		Select Axle	4
		Axle State	ENABLED
		Module UID	5
		Channel Num	3
		Polarity Active	HIGH
		Type	KISTLER_DUAL
		Poition	Right
		Distance(cm)	579
		Temp State	ENABLED
		Temp Module UID	5
		Temp Channel Num	0
Processing >	MaxTimeout(ms)		3000
	Dynamic Comp(%)		100
	Sig Wt Diff(%)		40
	Min Axle Wt(kg)		1360
	Veh Rec Mode		Split
	Axl Sep(cm)		306

4.0 WIM SITE INVENTORY

1. ROUTE I-25 MILEPOST: 36.1 LTPP DIRECTION: **N** S E W

2. SITE DESCRIPTION
   GRADE: <1%
   ☐ Sag vertical
   Nearest SPS section downstream of the site: 350101
   Distance from sensor to nearest downstream SPS Section: 1470 ft.

3. LANE CONFIGURATION
   Number of lanes in LTPP direction: 2 lanes
   Lane width: 12 ft.
   ☐ Median painted
   ☐ Median physical barrier
   ☒ Median grass
   ☐ Median none
   ☐ Shoulder curb and gutter
   ☒ Shoulder paved AC
   ☐ Shoulder paved PCC
   ☐ Shoulder unpaved
   Shoulder width: 14 ft.

4. PAVEMENT TYPE: PCC

5. CONDITION: (Surface distresses by type / severity within WIM section)
   Good

6. SENSOR SEQUENCE: Loop - Kistler - Kistler - Loop

7. PAVEMENT REPLACEMENT AND/OR GRINDING:
   Straightedge check: Performed _____ Result: ☒ Pass / ☐ Marginal / ☐ Unsatisfactory
   Short wave check: Performed _____ Result: ☒ Pass / ☐ Marginal / ☐ Unsatisfactory
   Long wave check: Performed _____ Result: ☒ Pass / ☐ Marginal / ☐ Unsatisfactory

8. ANY EFFECTS FROM RAMPS OR LANE TRANSITIONS:
   ☐ Intersection/driveway within 300m upstream, distance: _____
   ☐ Intersection/driveway within 300m downstream, distance: _____
   ☐ LTPP lane used for passing by vehicles traveling in south bound lane

9. DRAINAGE:
   ☐ Open to ground
   ☐ Pipe to culvert or ditch
   ☒ None
   ☐ French drain

10. CABINET LOCATION:
    - ☒ Same side of road as LTPP lane
    - ☐ Median
    - ☐ Behind guard rail

    Distance from edge of travel lane to cabinet: 40 ft
    Distance from sensors: 40 ft
    Type: 336
    Access controlled by: ☐ LTPP / ☒ State / ☐ Joint
    Primary contact: Robert Meyers (505) 827-5466

11. POWER:
    Power type: ☐ Overhead / ☐ Underground / ☒ Solar
    Distance from cabinet to drop: 5 ft
    Service provider: N/A.

12. TELEPHONE:
    Telephone type: ☐ Overhead / ☐ Underground / ☒ Cell
    Distance from cabinet to drop: N/A
    Phone # : newmexicosps1wim.eairlink.com/2100

13. SYSTEM:
    Software: iSINC
    Version:
    Connection: ☒ RS232 / ☐ Parallel port / ☐ USB / ☐ Other

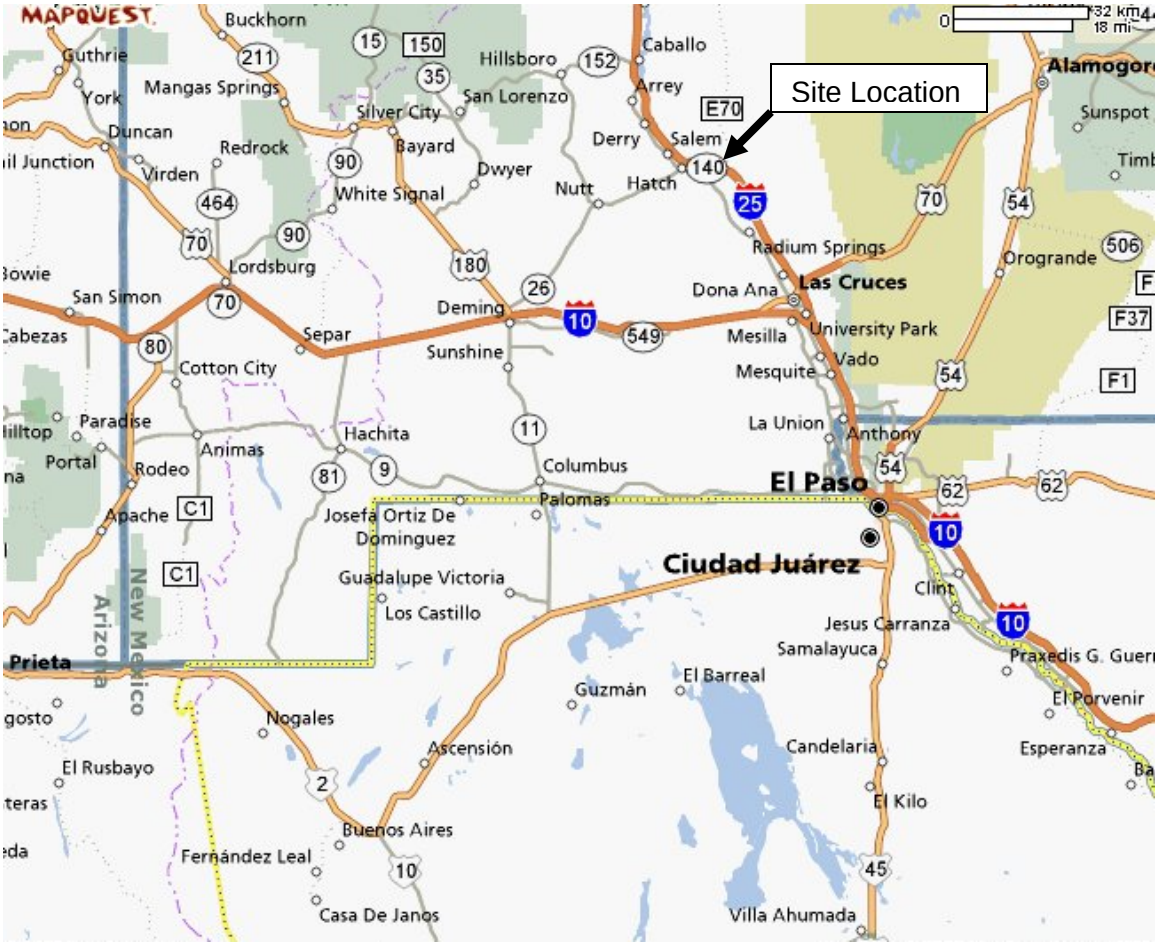
14. TEST TRUCK CYCLE:
    Turnaround time: 15 minutes
    Turnaround distance: 15 miles

15. PICTURES: See following pages, Site Map, WIM Site, Site layout drawings

16. NOTES:

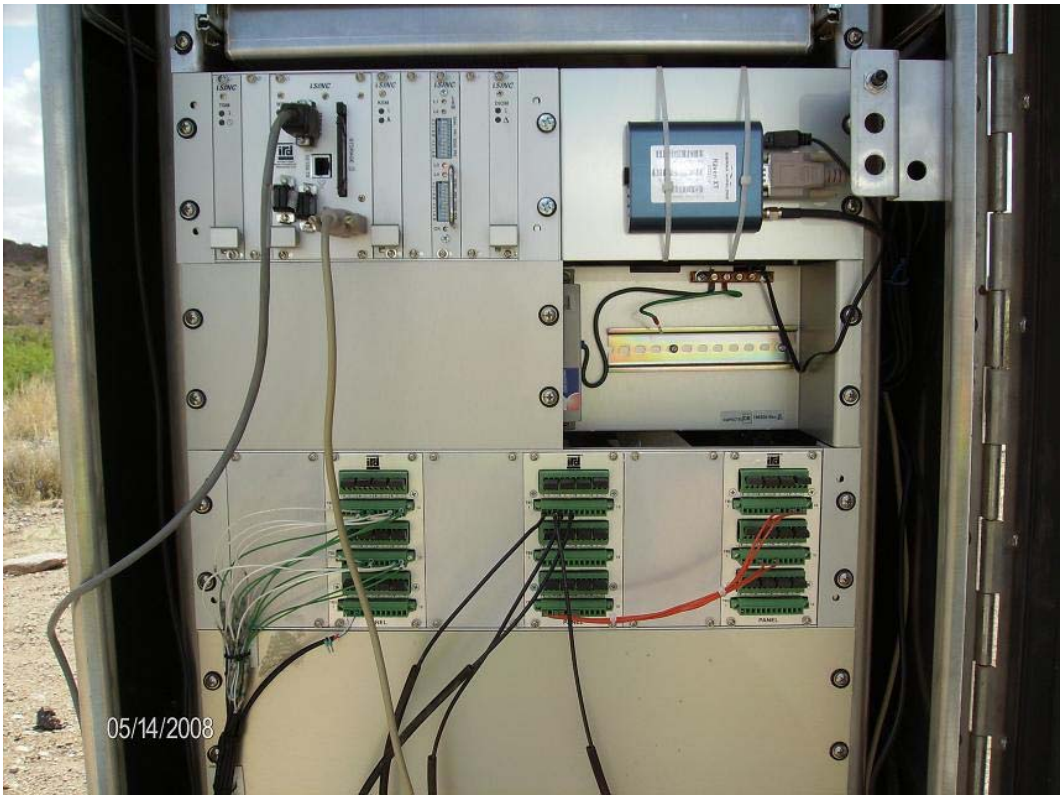
COMPLETED BY: **Bruce Myers**
CONTACT INFORMATION: **717-264-2077**

4.1.1 SITE MAP



I-25 North Bound Mile Post 36.1

4.1.2 PICTURES, WIM SITE


05/14/2008

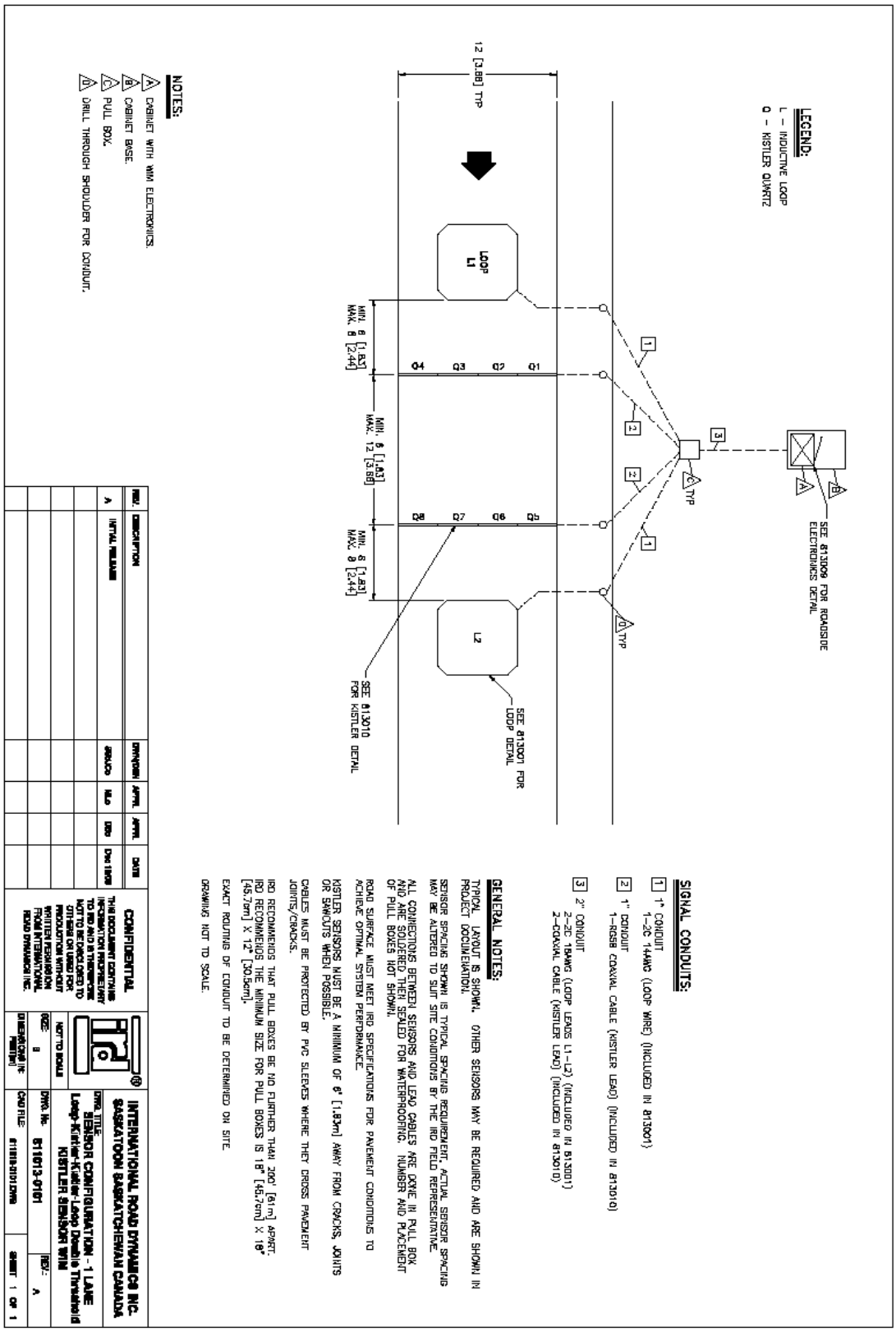

05/14/2008

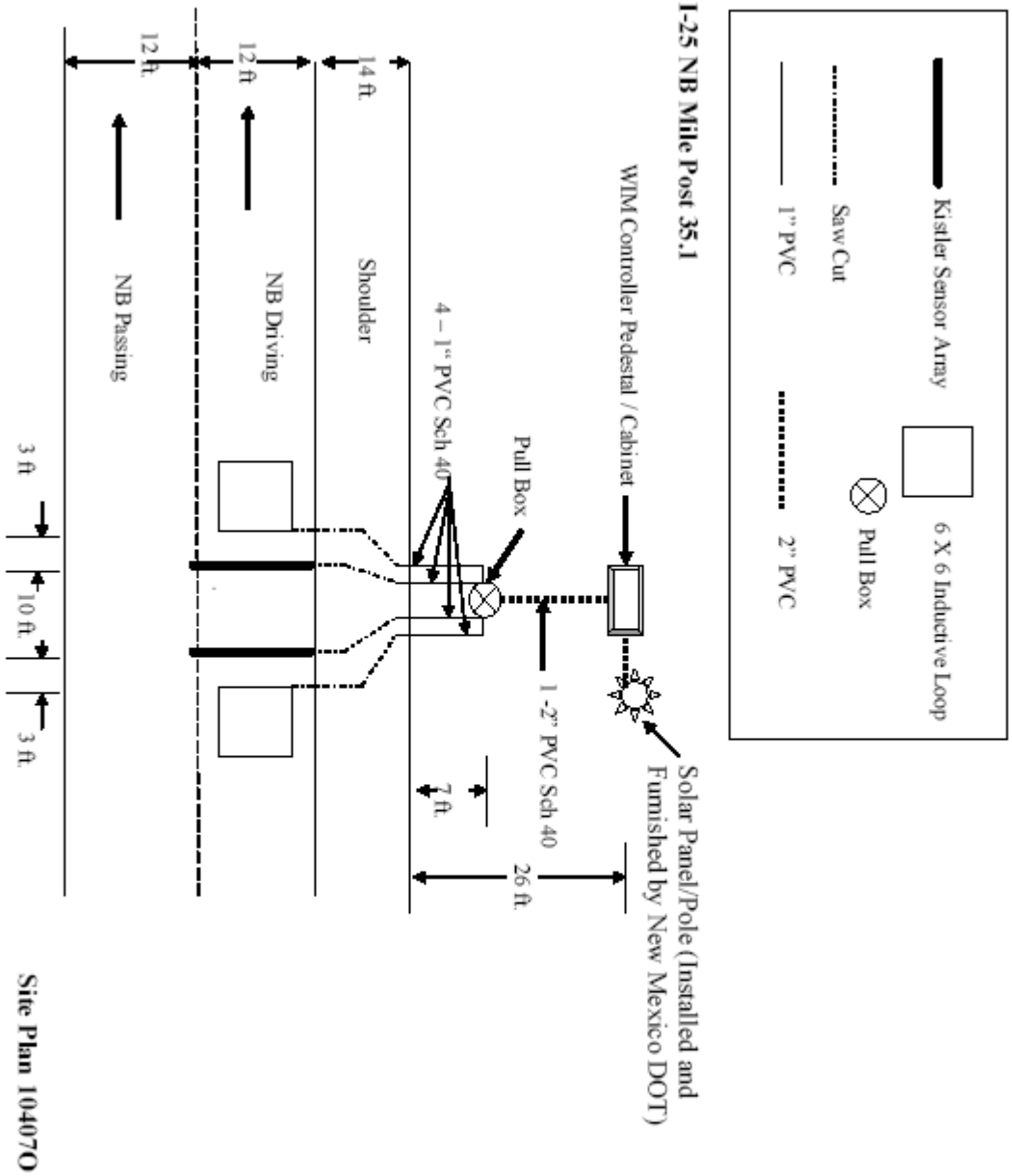
4.1.3 PICTURES, WIM INSTALLATION



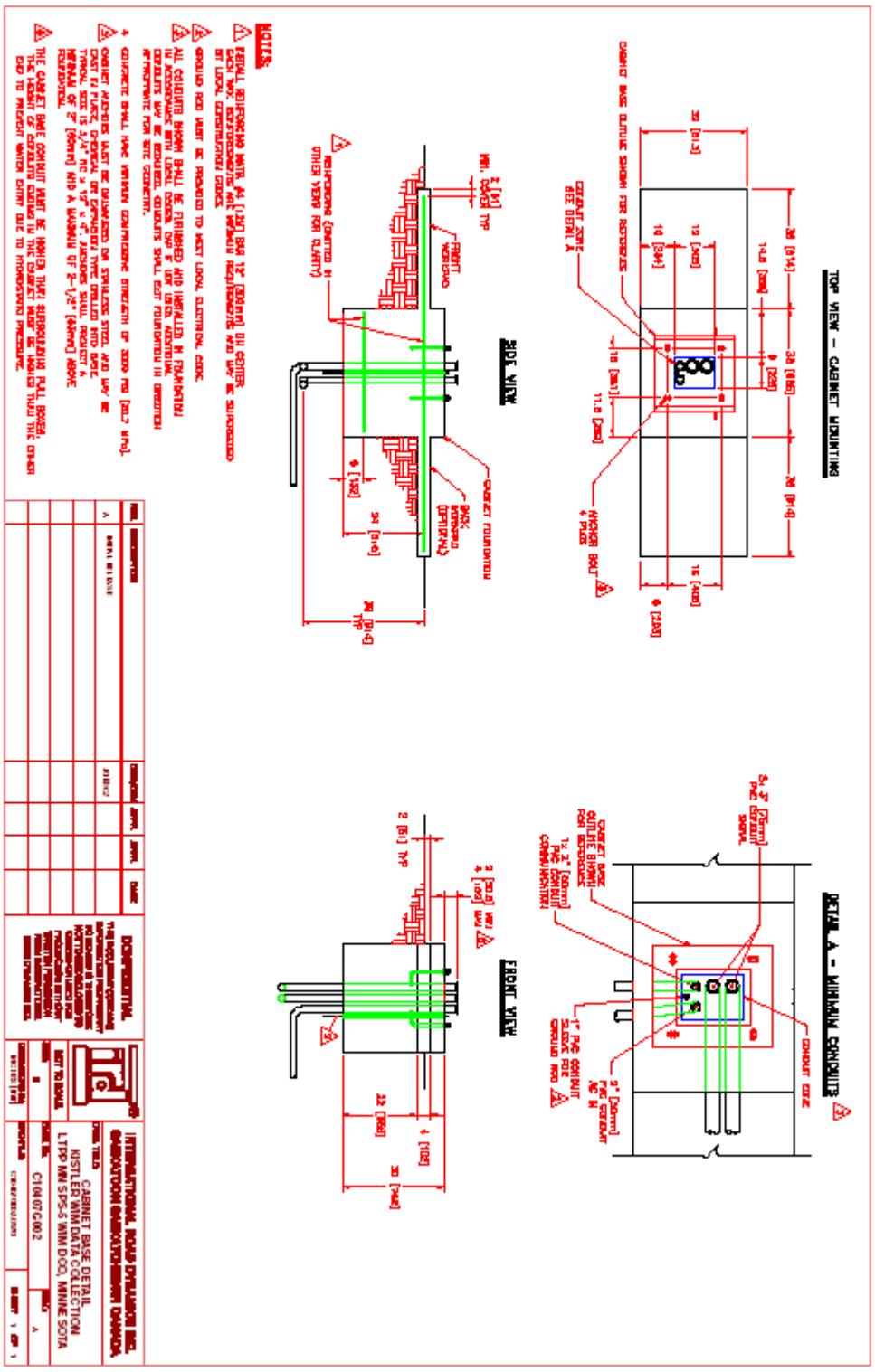



4.1.4 SITE DRAWING & LAYOUT




Kistler Sensor Array
6 X 6 Inductive Loop
Saw Cut
Pull Box
1" PVC
2" PVC
I-25 NB Mile Post 35.1
WIM Controller Pedestal / Cabinet
Solar Panel/Pole (Installed and Furnished by New Mexico DOT)
Pull Box
4 – 1" PVC Sch 40
1 -2" PVC Sch 40
7 ft.
26 ft.
14 ft.
12 ft.
12 ft.
Shoulder
NB Driving
NB Passing
3 ft.
10 ft.
3 ft.
Site Plan 10407O

4.1.5 WIM CABINET CONCRETE PEDESTAL



4.1.6 ELECTRICAL READINGS

IRD

Site Service Sheet

Clear

System Type: iSINC/Kistler Quartz

Date: 5/13/2008 **State:** NM **Location:** I-25 Mile Post 36.1
Job #: 10407O **Site #:** **Directions:** Approx. 4 Miles South of Hatch, NM

		Lead	Trail						
Loops	**Lane**	**1 NB**	**1 NB**						
Resistance		.8 ohm	.8 ohm						
Leakage		inf	inf						
Inductance uH		146 uh	147 uh						
Frequency									

Kistler	**Lane - 1**	**CH 0**	**CH 1**	**CH 2**	**CH 3**				
Amplitude		OK	OK	OK	OK				
Capacitance		9.6 nF	9.8 nF	9.9 nF	9.8 nF				
Resistance		inf	inf	inf	inf				

Kistler	**Lane - 2**								
Amplitude									
Capacitance									
Resistance									
Serial #									
Piezo	**Lane - 3**								
Amplitude									
Capacitance									
Resistance									
Serial #									
Kistler	**Lane - 4**								
Amplitude									
Capacitance									
Resistance									
Serial #									

System

A/C Service	O.K.
Power Supply	13.4 Vdc
DC Supply	13.4 Vdc
Back-Up	13.4 Vdc
System Input	
Modem Power	
Phone off	
Phone on	

Software

System: iSINC

Site Full Operating Capacity **Pass**

Technician: Bruce Myers **Date:** 5/13/2008

5.0 WIM CALIBRATION

5.1.1 TEST TRUCK #1 INFORMATION

DATE OF CALIBRATION: **May 14, , 2008**

1. TEST TRUCK NUMBER: 1 2. FHWA CLASS: 9 3. Number of axles: 5

Axle	Empty Truck Axle Weights (lb)	4. Pre-Test Loaded Axle Weights (lb)	5. Post-Test Loaded Axle Weights (lb)	6. Measured Directly or Calculated
A		11440		D
B		32740		D (B&C combined)
C				
D		33820		D (D&E combined)
E				

7. CALCULATIONS:

Empty Truck Gross Weight (lb)	Pre-Test Loaded Gross Weight (lb)	Post-Test Loaded Gross Weight (lb)	Pre to Post Difference (lb)
	78000		78000

8. TRACTOR CAB STYLE: ☐ Cab over engine / ☒ Conventional ☒ With sleeper

9. TRACTOR MANUFACTURER:
   Make: Kenworth
   Model:

10. TRAILER LOAD DESCRIPTION: Sand

11. TRAILER TARE WEIGHT (lb): _____

12. AXLE SPACINGS

Axle	Spacing (feet & inches)
A-B	19'
B-C	4.3'
C-D	30.3’
D-E	10’

KINGPIN OFFSET FROM AXLE B (ft, + towards rear): +2 ft

SUSPENSSION:

Axle	17. Tire Size	18. Suspension description (leaf, air, # of leaves, taper or flat leaf, etc.)
A	11R24.5	Leaf spring – three leaves
B	11R24.5	air
C	11R24.5	air
D	11R22.5	air
E	11R22.5	air

5.1.2 PICTURES, TEST TRUCK 1


SUPER RYDZ
05/14/2008


29
05/14/2008


MHC
05/14/2008


EAST
RANDOLPH, OHIO
EAST
RANDOLPH, OHIO
05/14/2008

5.1.3 TEST TRUCK #2 INFORMATION

DATE OF CALIBRATION: **May 14, 2008**

1. TEST TRUCK NUMBER: 2 2. FHWA CLASS: 9 3. Number of axles: 5

Axle	Empty Truck Axle Weights (lb)	4. Pre-Test Loaded Axle Weights (lb)	5. Post-Test Loaded Axle Weights (lb)	6. Measured Directly or Calculated
A		10500		D
B		36820		D (B&C combined)
C				
D		14700		D (D&E combined)
E				

7. CALCULATIONS:

Empty Truck Gross Weight (lb)	Pre-Test Loaded Gross Weight (lb)	Post-Test Loaded Gross Weight (lb)	Pre to Post Difference (lb)
	62100		62100

8. TRACTOR CAB STYLE: ☐ Cab over engine / ☒ Conventional ☒ With sleeper

9. TRACTOR MANUFACTURER:
   Make: Peterbuilt
   Model:

10. TRAILER LOAD DESCRIPTION: Sand

11. TRAILER TARE WEIGHT (lb): _____

12. AXLE SPACINGS

Axle	Spacing (feet & inches)
A-B	19.8’
B-C	4.2’
C-D	31.4’
D-E	10’

KINGPIN OFFSET FROM AXLE B (ft, + towards rear): +3 ft

SUSPENSSION:

Axle	17. Tire Size	18. Suspension description (leaf, air, # of leaves, taper or flat leaf, etc.)
A	11R24.5	Leaf spring – two leaves
B	11R24.5	air
C	11R24.5	air
D	11R22.5	air
E	11R22.5	air

5.1.4 PICTURES, TEST TRUCK 2


05/14/2008


05/14/2008


Peterbilt
05/14/2008


EAST
EAST
RANDOLPH, OHIO
05/14/2008

6.0 TEST TRUCK CALIBRATION RECORDS

6.1.1 VALIDATION RUNS

International Road Dynamics Inc.

FHWA VERIFICATION 2008a

Static Test Vehicle Measurements

ID				GVW	F/A	T1	T2	1>2	2>3	3>4	4>5
1				78.0	11.4	32.7	33.8	19.0	4.3	30.3	10.0
2				62.1	10.5	36.8	14.7	19.8	4.2	31.4	10.0

Dynamic Test Vehicle Measurements

ID	V#	Speed	Temp	GVW	F/A	T1	T2	1>2	2>3	3>4	4>5
1	2704	69	80	78.2	13.1	32.0	33.2	19.0	4.4	30.4	10.1
2	2775	60	82	60.2	10.5	34.5	15.1	20.0	4.3	31.4	10.1
1	3014	64	91	77.4	11.2	32.6	33.6	19.0	4.4	30.4	10.0
2	3015	65	91	60.7	9.9	36.1	14.7	20.0	4.3	31.6	10.1
1	3062	67	95	77.7	11.5	32.9	33.2	19.0	4.3	30.1	10.1
2	3063	67	95	62.2	10.2	36.6	15.4	19.9	4.3	31.5	10.1
1	3099	68	97	77.7	11.6	32.6	33.4	19.0	4.4	30.4	10.1
2	3096	75	97	61.2	9.7	36.2	15.3	20.1	4.4	31.6	10.1
1	3135	59	99	78.0	11.8	31.7	34.4	19.0	4.4	30.5	10.1
2	3136	59	99	61.7	10.2	37.0	14.6	20.0	4.3	31.6	10.1
1	3170	64	102	77.4	11.3	31.7	34.4	18.9	4.3	30.3	10.1
2	3174	62	102	61.7	10.0	36.3	15.4	20.1	4.3	31.6	10.1
1	3220	68	104	78.2	11.7	33.0	33.5	19.0	4.4	30.4	10.1
2	3222	68	104	60.4	9.8	35.9	14.7	20.1	4.3	31.7	10.1
1	3266	70	104	76.2	11.1	32.5	32.7	18.9	4.3	30.3	10.0
2	3265	73	104	61.7	9.8	36.5	15.4	20.0	4.3	31.5	10.1
1	3321	59	107	76.9	12.2	32.0	32.8	18.8	4.3	30.3	10.0
2	3322	59	107	62.6	10.1	38.1	14.4	20.0	4.3	31.5	10.1
1	3363	68	107	76.7	11.0	32.5	33.3	18.9	4.3	30.4	10.1
2	3364	60	107	61.7	10.2	36.5	15.0	20.1	4.3	31.6	10.1
1	3416	69	109	79.2	11.9	33.4	33.9	19.1	4.3	30.4	10.1
2	3419	65	109	61.0	10.1	36.2	14.8	19.9	4.3	31.5	10.0
1	3454	68	109	77.8	11.2	32.8	33.8	19.0	4.3	30.2	10.0
2	3452	75	109	62.8	9.7	37.3	15.8	20.0	4.3	31.5	10.0
1	3503	60	109	76.7	11.5	32.2	33.0	18.9	4.3	30.4	10.1
2	3504	59	109	59.3	9.8	35.1	14.4	20.1	4.4	31.7	10.1
1	3538	65	109	77.4	11.6	31.8	33.9	18.9	4.3	30.3	10.0
2	3339	60	109	61.0	10.3	36.1	14.5	19.9	4.3	31.4	10.1
1	3581	70	109	78.5	11.5	32.8	34.2	18.9	4.3	30.4	10.1
2	3582	62	109	61.9	10.0	36.9	15.0	20.1	4.3	31.5	10.1
1	3650	68	111	77.5	11.3	32.4	33.7	19.1	4.3	30.4	10.0
2	3649	76	111	61.3	9.1	37.1	15.2	20.1	4.3	31.5	10.1
1	3721	57	111	76.9	12.0	32.0	32.9	18.8	4.4	30.4	10.0
2	3722	60	111	61.2	9.8	36.8	14.7	20.1	4.3	31.6	10.1
1	3796	65	111	76.7	11.4	31.7	33.6	18.9	4.3	30.2	10.0
2	3797	62	111	60.2	10.2	35.7	14.4	20.1	4.3	31.5	10.1
1	3852	68	106	75.9	10.9	32.3	32.7	18.9	4.3	30.3	10.0
2	3851	73	106	60.5	9.5	36.2	14.8	20.0	4.6	31.2	10.0

6.1.2 TEST TRUCKS ERROR CALCULATIONS

Truck	V#	Speed	Temp	GVW	F/A	T1	T2	1>2	2>3	3>4	4>5
1	2704	69	80	0.3%	14.9%	-2.1%	-1.8%	0.0	0.1	0.1	0.1
2	2775	60	82	-3.1%	0.0%	-6.2%	2.7%	0.2	0.1	0.0	0.1
1	3014	64	91	-0.8%	-1.8%	-0.3%	-0.6%	0.0	0.1	0.1	0.0
2	3015	65	91	-2.3%	-5.7%	-1.9%	0.0%	0.2	0.1	0.2	0.1
1	3062	67	95	-0.4%	0.9%	0.6%	-1.8%	0.0	0.0	-0.2	0.1
2	3063	67	95	0.2%	-2.9%	-0.5%	4.8%	0.1	0.1	0.1	0.1
1	3099	68	97	-0.4%	1.8%	-0.3%	-1.2%	0.0	0.1	0.1	0.1
2	3096	75	97	-1.4%	-7.6%	-1.6%	4.1%	0.3	0.2	0.2	0.1
1	3135	59	99	0.0%	3.5%	-3.1%	1.8%	0.0	0.1	0.2	0.1
2	3136	59	99	-0.6%	-2.9%	0.5%	-0.7%	0.2	0.1	0.2	0.1
1	3170	64	102	-0.8%	-0.9%	-3.1%	1.8%	-0.1	0.0	0.0	0.1
2	3174	62	102	-0.6%	-4.8%	-1.4%	4.8%	0.3	0.1	0.2	0.1
1	3220	68	104	0.3%	2.6%	0.9%	-0.9%	0.0	0.1	0.1	0.1
2	3222	68	104	-2.7%	-6.7%	-2.4%	0.0%	0.3	0.1	0.3	0.1
1	3266	70	104	-2.3%	-2.6%	-0.6%	-3.3%	-0.1	0.0	0.0	0.0
2	3265	73	104	-0.6%	-6.7%	-0.8%	4.8%	0.2	0.1	0.1	0.1
1	3321	59	107	-1.4%	7.0%	-2.1%	-3.0%	-0.2	0.0	0.0	0.0
2	3322	59	107	0.8%	-3.8%	3.5%	-2.0%	0.2	0.1	0.1	0.1
1	3363	68	107	-1.7%	-3.5%	-0.6%	-1.5%	-0.1	0.0	0.1	0.1
2	3364	60	107	-0.6%	-2.9%	-0.8%	2.0%	0.3	0.1	0.2	0.1
1	3416	69	109	1.5%	4.4%	2.1%	0.3%	0.1	0.0	0.1	0.1
2	3419	65	109	-1.8%	-3.8%	-1.6%	0.7%	0.1	0.1	0.1	0.0
1	3454	68	109	-0.3%	-1.8%	0.3%	0.0%	0.0	0.0	-0.1	0.0
2	3452	75	109	1.1%	-7.6%	1.4%	7.5%	0.2	0.1	0.1	0.0
1	3503	60	109	-1.7%	0.9%	-1.5%	-2.4%	-0.1	0.0	0.1	0.1
2	3504	59	109	-4.5%	-6.7%	-4.6%	-2.0%	0.3	0.2	0.3	0.1
1	3538	65	109	-0.8%	1.8%	-2.8%	0.3%	-0.1	0.0	0.0	0.0
2	3339	60	109	-1.8%	-1.9%	-1.9%	-1.4%	0.1	0.1	0.0	0.1
1	3581	70	109	0.6%	0.9%	0.3%	1.2%	-0.1	0.0	0.1	0.1
2	3582	62	109	-0.3%	-4.8%	0.3%	2.0%	0.3	0.1	0.1	0.1
1	3650	68	111	-0.6%	-0.9%	-0.9%	-0.3%	0.1	0.0	0.1	0.0
2	3649	76	111	-1.3%	13.3%	0.8%	3.4%	0.3	0.1	0.1	0.1
1	3721	57	111	-1.4%	5.3%	-2.1%	-2.7%	-0.2	0.1	0.1	0.0
2	3722	60	111	-1.4%	-6.7%	0.0%	0.0%	0.3	0.1	0.2	0.1
1	3796	65	111	-1.7%	0.0%	-3.1%	-0.6%	-0.1	0.0	-0.1	0.0
2	3797	62	111	-3.1%	-2.9%	-3.0%	-2.0%	0.3	0.1	0.1	0.1
1	3852	68	106	-2.7%	-4.4%	-1.2%	-3.3%	-0.1	0.0	0.0	0.0
2	3851	73	106	-2.6%	-9.5%	-1.6%	0.7%	0.2	0.4	-0.2	0.0

6.1.3 OVERALL PERFORMANCE

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Specifications					
Confidence	95%	Speed range low	55	to	60
	(1.96)	Speed range medium	60	to	65
Gross vehicle weight	10%	Speed range high	65	to	76
Tandem group weight	15%	Temperature range low	80	to	95
Single axle weight	20%	Temperature range medium	95	to	100
Axle spacings	0.5	Temperature range high	100	to	110

Overall					
Characteristic	Error	StdDev	Specification	Calculated	Pass/Fail
Gross vehicle weight	-1.1%	1.3%	10%	3.6%	pass
Tandem group weight	-0.4%	2.3%	15%	4.9%	pass
Single axle weight	-1.9%	5.1%	20%	11.9%	pass
Axle spacings	0.1	0.1	0.5	0.3	pass

Speed range 55 to 60 (11 runs)				
Characteristic	Error	StdDev	Specification	Calculated
Gross vehicle weight	-1.4%	1.4%	10%	4.3%
Tandem group weight	-1.2%	2.3%	15%	5.8%
Single axle weight	-0.7%	4.6%	20%	5.9%
Axle spacings	0.1	0.1	0.5	0.3

Speed range 60 to 65 (9 runs)				
Characteristic	Error	StdDev	Specification	Calculated
Gross vehicle weight	-1.3%	0.9%	10%	3.2%
Tandem group weight	-0.6%	2.1%	15%	4.7%
Single axle weight	-2.5%	2.5%	20%	7.6%
Axle spacings	0.1	0.1	0.5	0.3

Speed range 65 to 76 (18 runs)				
Characteristic	Error	StdDev	Specification	Calculated
Gross vehicle weight	-0.7%	1.3%	10%	3.4%
Tandem group weight	0.2%	2.3%	15%	4.8%
Single axle weight	-2.3%	6.3%	20%	15.1%
Axle spacings	0.1	0.1	0.5	0.3

Temperature range 80 to 95 (6 runs)				
Characteristic	Error	StdDev	Specification	Calculated
Gross vehicle weight	-1.0%	1.4%	10%	3.8%
Tandem group weight	-0.6%	2.7%	15%	6.0%
Single axle weight	0.9%	7.2%	20%	15.6%

Temperature range 95 to 100 (4 runs)				
Characteristic	Error	StdDev	Specification	Calculated
Gross vehicle weight	-0.6%	0.6%	10%	1.9%
Tandem group weight	-0.1%	2.2%	15%	4.4%
Single axle weight	-1.3%	5.0%	20%	11.4%

Temperature range 100 to 110 (22 runs)				
Characteristic	Error	StdDev	Specification	Calculated
Gross vehicle weight	-1.0%	1.5%	10%	4.0%
Tandem group weight	-0.3%	2.4%	15%	5.1%
Single axle weight	-2.5%	4.1%	20%	10.8%

6.1.4 WEIGHT GRAPHS

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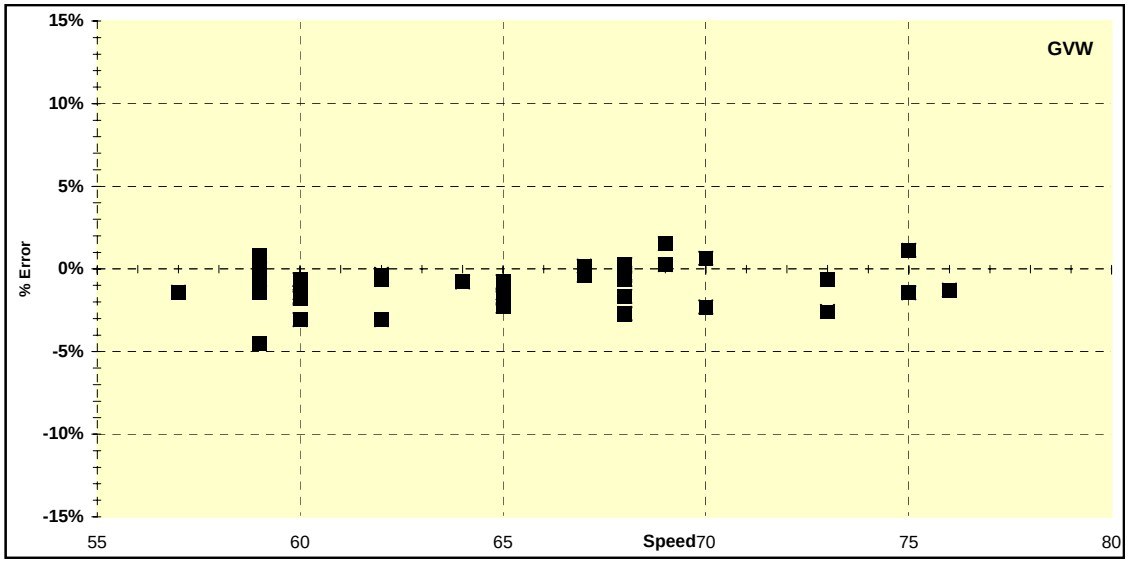

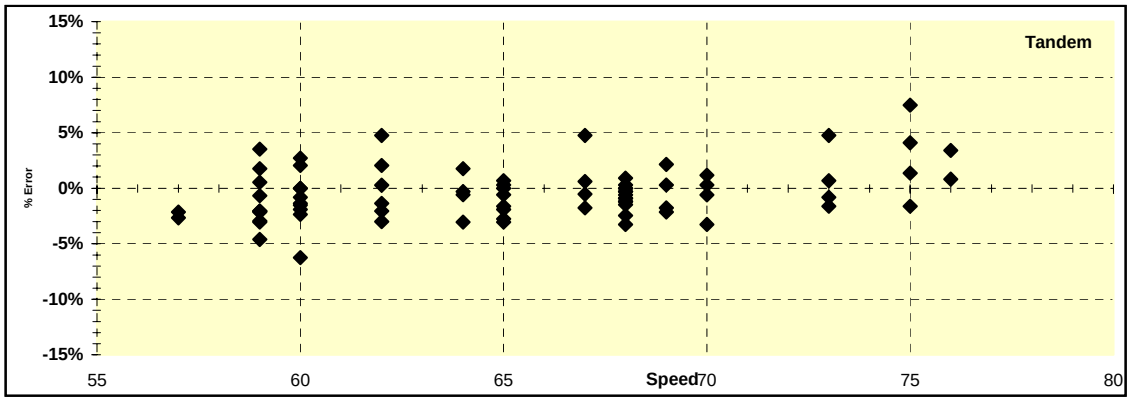

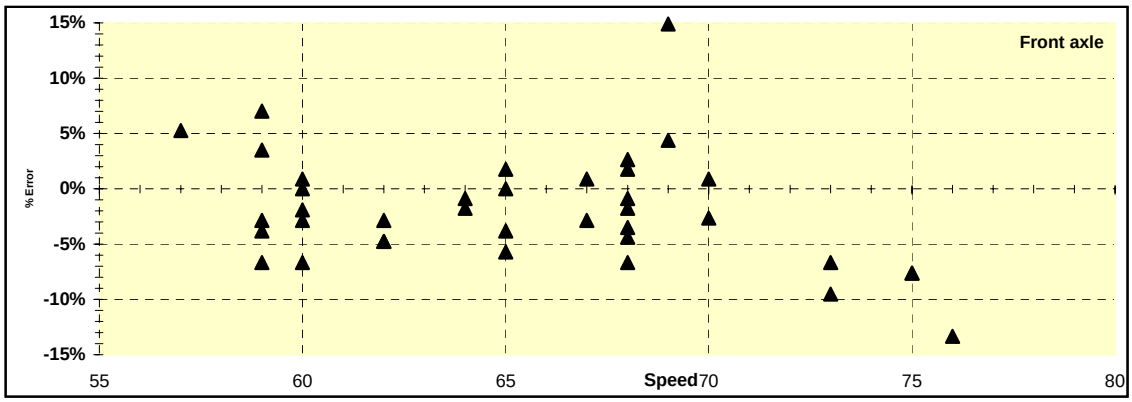

New Mexico SPS1 I-25 Bruce Myers 2008/05/14

6.1.5 TEMPERATURE INFLUENCE GRAPHS

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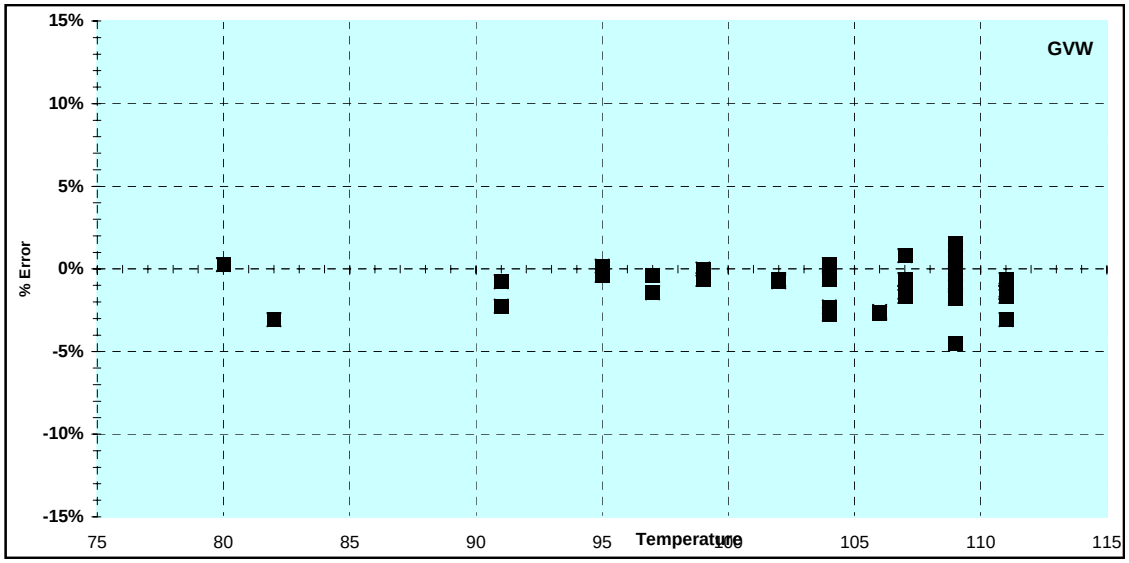

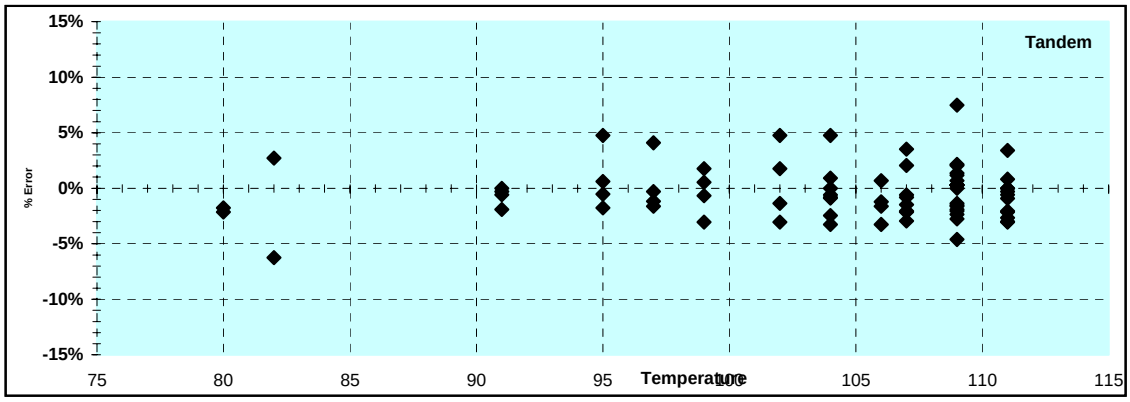

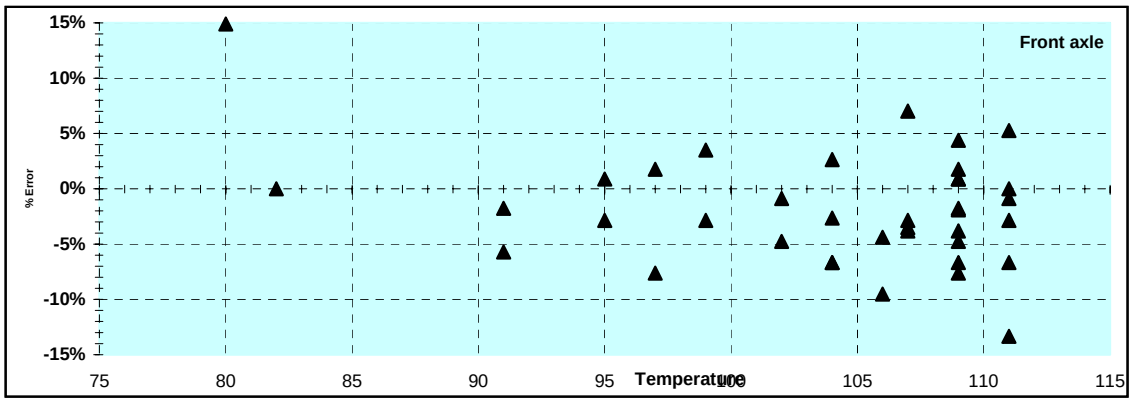

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