INTERNATIONAL ROAD DYNAMICS INC.
702 - 43rd Street East, Saskatoon, SK, Canada,
Phone: (306) 653-6600 Fax: (306) 242-5599

- Site Service Report -

Date: February 15, 2011
From: Rino Quiñones
IRD Contract No.: 11167
To: Cindy Mantie
Project Name/Location: I-95 Maine**,** mile marker 200.2 North Bound
Service Date(s): February 15th 2011

Job Description: Service Visit Due to Kistler Sensors not working. Implement Field Change Order 15401601.

Work Completed:
1) Hazard Assesment completed. Enough room in the shoulder to park, and with proper gear to work in cold weather.
2) Installed Pull-up resistor for the temperature sensor as per Field Change Order 15401601. This change is required for temperature sensors with lead cable length of 300ft or shorter lengths having problem.
3) Tested sensors prior to removal of the solder sleeves on the Kistler sensors. See tables 1, 2 and 3.
4) Tested lighting protection tabs on the SIOP. All are OL's (good).
5) Removed solder sleeves on all Kistler sensors. Tested Kistler Sensors using DVM, LCR, Insulation Tester, and dual trace oscilloscope.

Noticed problem on pair K1 and K2 pair. Scope trace signal is intermittent. K5 and K6 pair signals are good. K5 and K6 are on the same side of the road as K1 and K2. Any axles going over K5 and K6 must also be going over K1 and K2. K1 waveforms okay. K2 waveforms are not causing trigger on the scope although I was able to see waveforms momentarily. Re-terminated cable of K2, results are good.

6) Enabled Channel 2 of KSM card. Tested all channels of the KSM card. Good. Moved KSM card/ribbon cable from UID 5 to 2 and tested all channels. (Swapped sensors on the SIOP by moving the upstream Kistlers to downstream and downstream Kistlers to upstream. This is to see if any problem on the KSM channels follow a pattern).
Updated config and monitored diagnostics; good. Temp sensor uid also updated but still showing zero celcius; actual road temp is -2.5C with ambient temp at -11C. Moved back to UID 5 and returned to original configuration. 6) Grounded chassis to earth ground. TB1 negative wired to ground bus bar (which is connected to ground rod).

7) Tested batteries, 14Volts.
8) Called Jason Penney to check on remote connection to site; good. Jason to download data tomorrow and check.
9) Took pictures of site. Noticed cracks on the white line right by the Kistler sensors.

Table 1: Inductive Loops Test Results

Loop	Resistance (ohms)	Inductance (uH)	Resistance to Ground Using DVM (no megger avail.).
Loop 1	0.8	137.3	OL
Loop 2	0.8	137.2	OL

Table 2: Kistler Sensor Test Results Before Cables were re-terminated

Kistler	Capacitance Combined (nF)	Dissipation
Kistler 1 upstream left	10.80	.005
Kistler 2 upstream left		
Kistler 3 upstream right	10.67	.006
Kistler 4 upstream rght		
Kistler 5 downstream left	11.52	.005
Kistler 6 downstream left		
Kistler 7 downstream right	10.62	.003
Kistler 8 downstream right		

INTERNATIONAL ROAD DYNAMICS INC.
702 - 43rd Street East, Saskatoon, SK, Canada,
Phone: (306) 653-6600 Fax: (306) 242-5599

Table 3: Kistler Sensor Test Results without solder sleeves.

Kistler	Resistance across conductors (ohms) DVM meter	Resistance Braid to earth ground (Meg Ohms) DVM Meter	Insulation Resistance (Meg Ohms) using Kister Meter. Braid to earth ground	Capacitance (nF)	Dissipation	Capacitance Combined (nF)
Kistler 1 upstream left	OL	3	<10	5.85	.002	10.78
Kistler 2 upstream left	OL	3	<10	4.2	.002	
Kistler 3 upstream right	OL	3	<10	5.62	.002	10.65
Kistler 4 upstream rght	OL	3	<10	5.04	.002	
Kistler 5 downstream left	OL	2.85	<10	4.9	.002	11.51
Kistler 6 downstream left	OL	2.85	<10	6.63	.003	
Kistler 7 downstream right	OL	2.85	<10	5.8	.003	10.59
Kistler 8 downstream right	OL	2.85	<10	4.81	.002	

Ambient Temperature: -11Celcius, road surface -2.5Celcius

Observations

1) Green Connectors on SIOP: ferels no longer fit in the existing green connectors because the top screws do not pop-up completely when loosen. There is one spare connector and this is now use by K5 toK8. No ferels present on K1 to K4, just bare wires going to the connector. Bring some spare next site visit.
2) Data from midnight of Feb 16th to present is not better than previous days. Still a lot of unequal axles. Problem could be attributed to low insulation resistance of the Kistler sensors.
3) Temperature log showing reasonable pavement temperature at site.
4) Waveforms: amplitude of typical front axle is 1Volt peak for 5 axle class 9 trucks. Test results range from approximately 0.7V-peak to 1.1V-peak.
5) Wrote NCR-914 in JIRA with regards to old instruction sent with pull-up resistor.

Action Items:

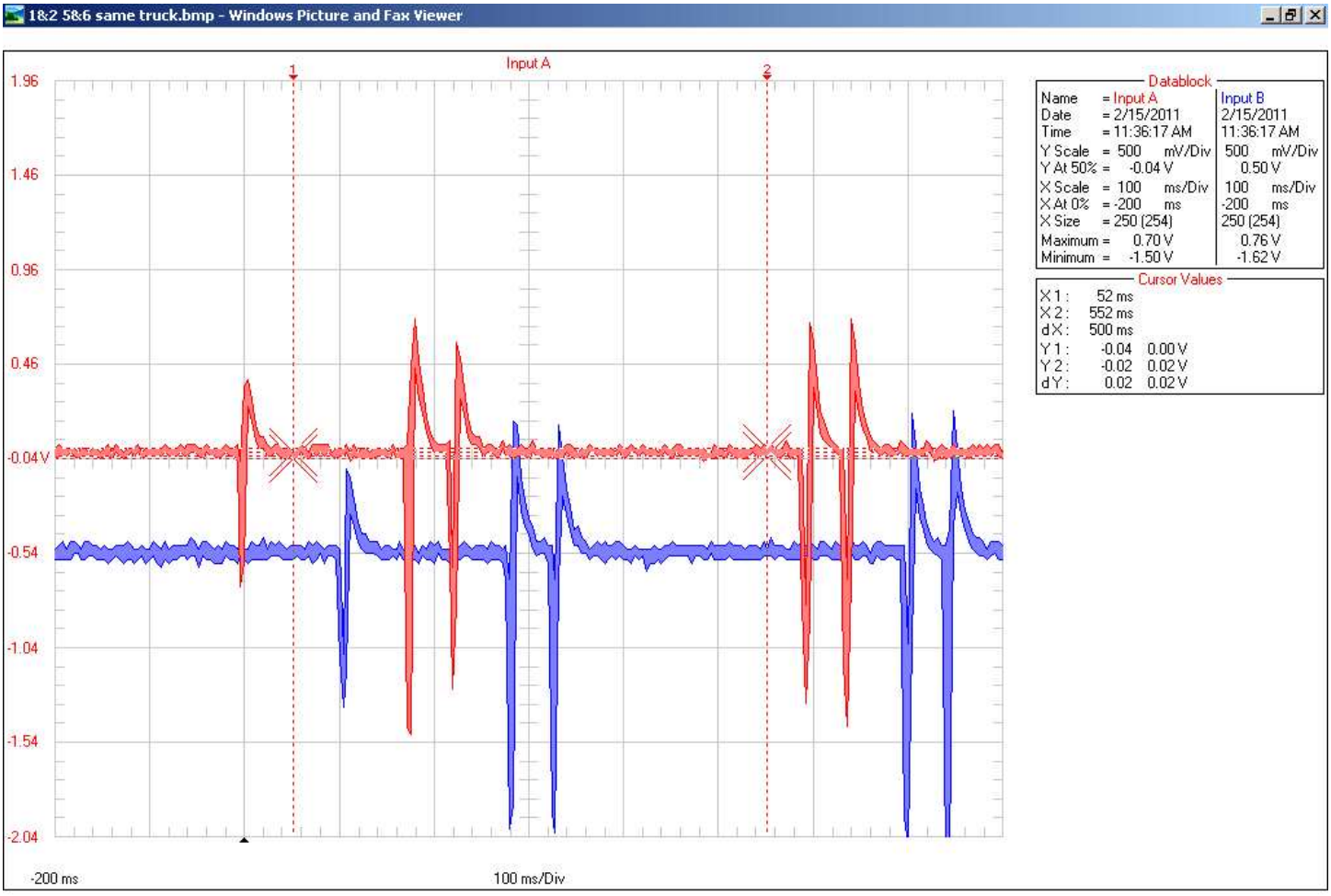
Item	Action Required	Ownership
1.	Kistler sensors failing due to low insulation resistance. Determine course of action as per contract requirements. Note cracks on the pavement, see pictures on Appendix A.	Cindy M.
2.		
3.		
4.		

INTERNATIONAL ROAD DYNAMICS INC.
702 - 43rd Street East, Saskatoon, SK, Canada,
Phone: (306) 653-6600 Fax: (306) 242-5599

Appendix A: Upstream Kistlers 1 to 4 Downstream Kistlers 5 to 8

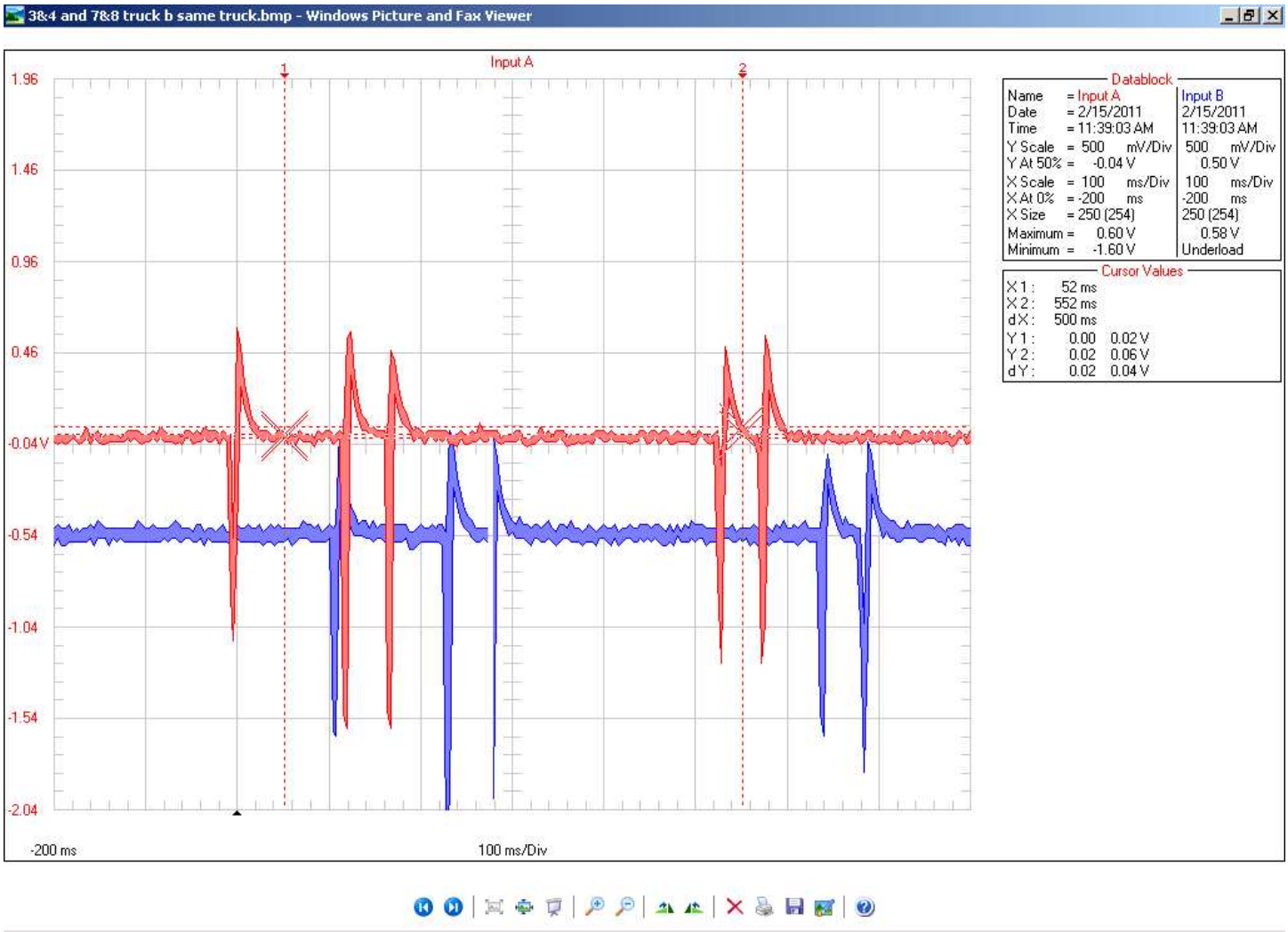
INTERNATIONAL ROAD DYNAMICS INC.
702 - 43rd Street East, Saskatoon, SK, Canada,
Phone: (306) 653-6600 Fax: (306) 242-5599

Appendix B: Kistlers 1&2 (red), and 5&6 (blue) oscilloscope traces. These are good signals.



INTERNATIONAL ROAD DYNAMICS INC.
702 - 43rd Street East, Saskatoon, SK, Canada,
Phone: (306) 653-6600 Fax: (306) 242-5599

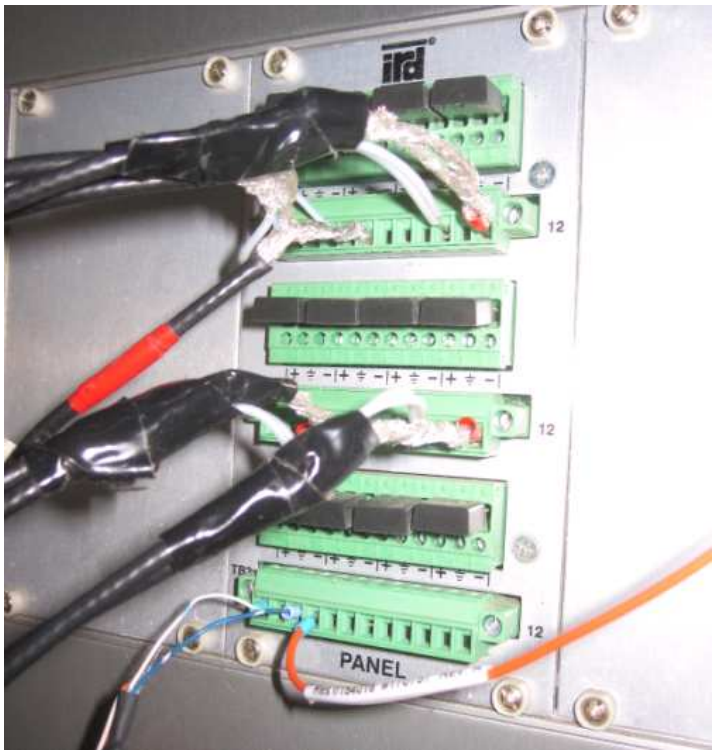
Appendix B: **Continued**….Kistlers 3&4 (red), and 7&8 (blue) oscilloscope traces. These are good signals.



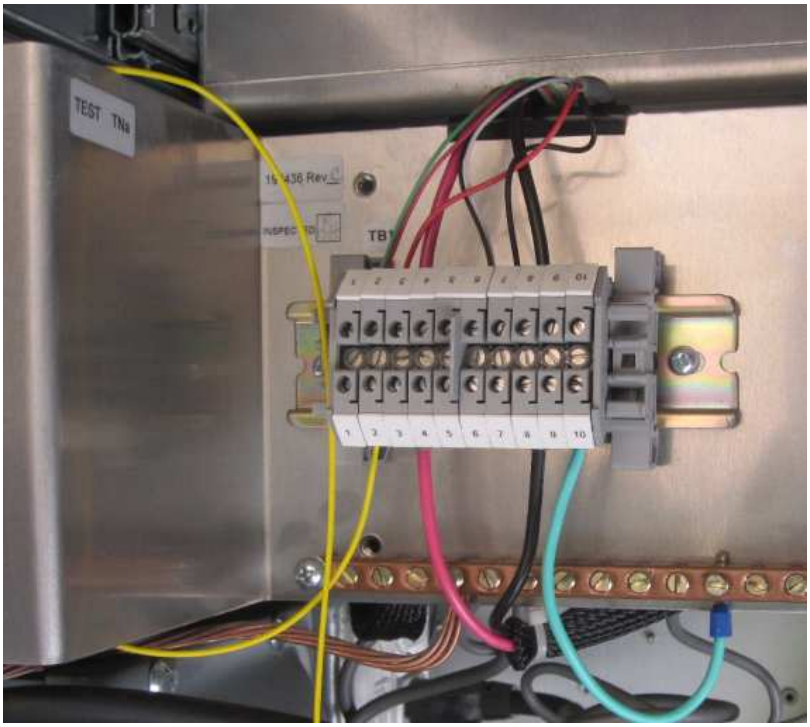
INTERNATIONAL ROAD DYNAMICS INC.
702 - 43rd Street East, Saskatoon, SK, Canada,
Phone: (306) 653-6600 Fax: (306) 242-5599

Appendix C: Site Pictures

Kister Sensors and Temp Sensor Termination



Pull-up resistor yellow wire connection to +12Vdc



Charger showing 14.2Volts of batteries

INTERNATIONAL ROAD DYNAMICS INC.
702 - 43rd Street East, Saskatoon, SK, Canada,
Phone: (306) 653-6600 Fax: (306) 242-5599

Appendix C: Site pictures continued…
Kistler Lane sensors

INTERNATIONAL ROAD DYNAMICS INC.
702 - 43rd Street East, Saskatoon, SK, Canada,
Phone: (306) 653-6600 Fax: (306) 242-5599

Appendix C: Site pictures continued…
Can you dig it…deceivingly nice on a windy day.