

# Verifying Contractor Profile Results

By Terry Treutel

Ride Quality Consultant

Former WisDOT Ride Spec Coordinator

# AASHTO R54-10

- AASHTO R54-10 – Standard Practice for Accepting Pavement Ride Quality When Measured Using Inertial Profiling Systems - Section 6.3 – Verification Testing – indicates that testing is to be performed within 10 working days after contractor testing is performed and provides the typical max allowable differences from the mean of agency and contractor IRI results.

Mean of and Contractor's IRI (in./mi)

Fewer than 50

50 to 100

Greater than 150

Max Allowable Difference

8.5% of Mean IRI

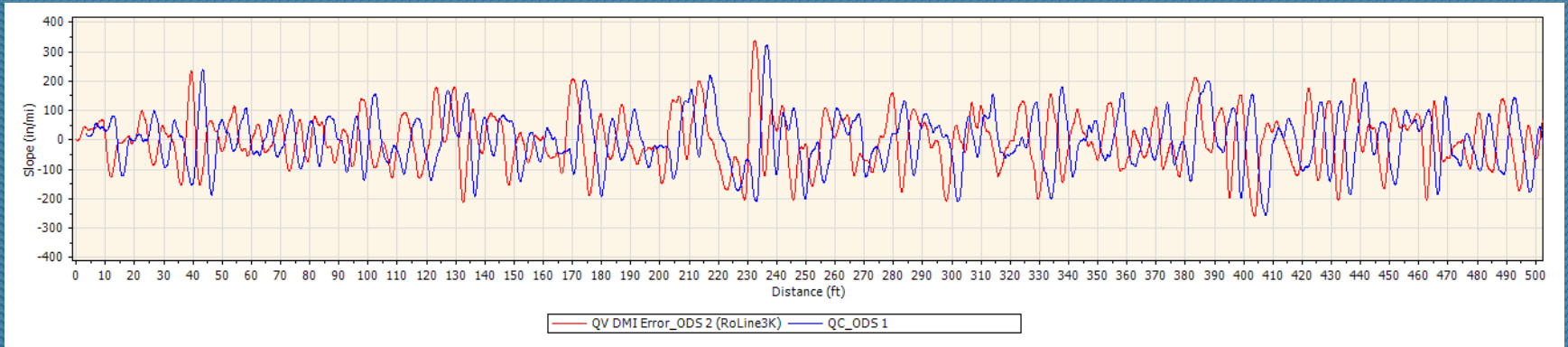
6.0% of Mean IRI

7.0% of Mean IRI

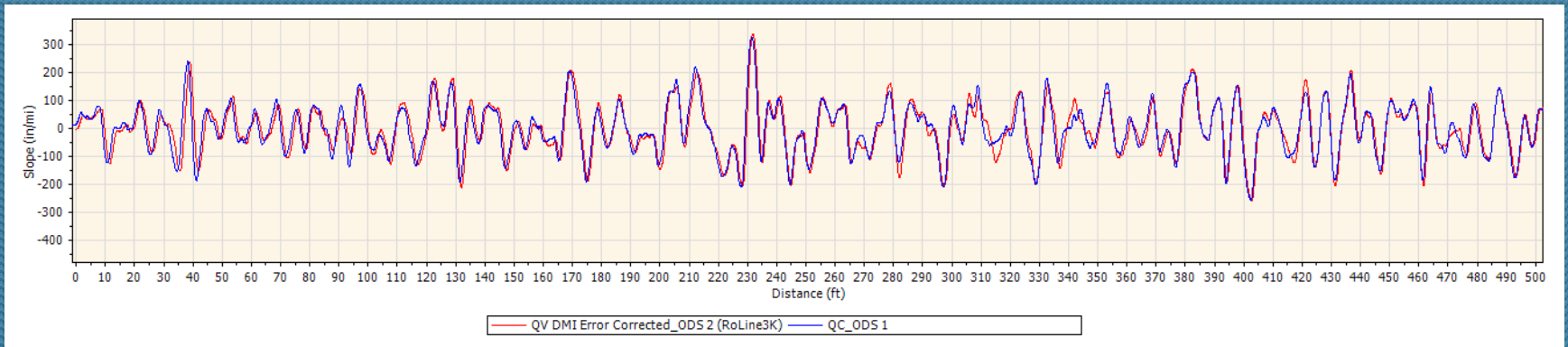
# Issues to Consider

- DMI differences
  - This issue can be identified when the features on the profiles are consistent but get increasingly out of sync over the profile length
- Tracking variability
  - Consistent tracking is essential to assure repeatable results
- Equipment problems
  - Check to make sure everything is mounted and working properly and that equipment and software settings are correct

# Shifted Filtered Profiles

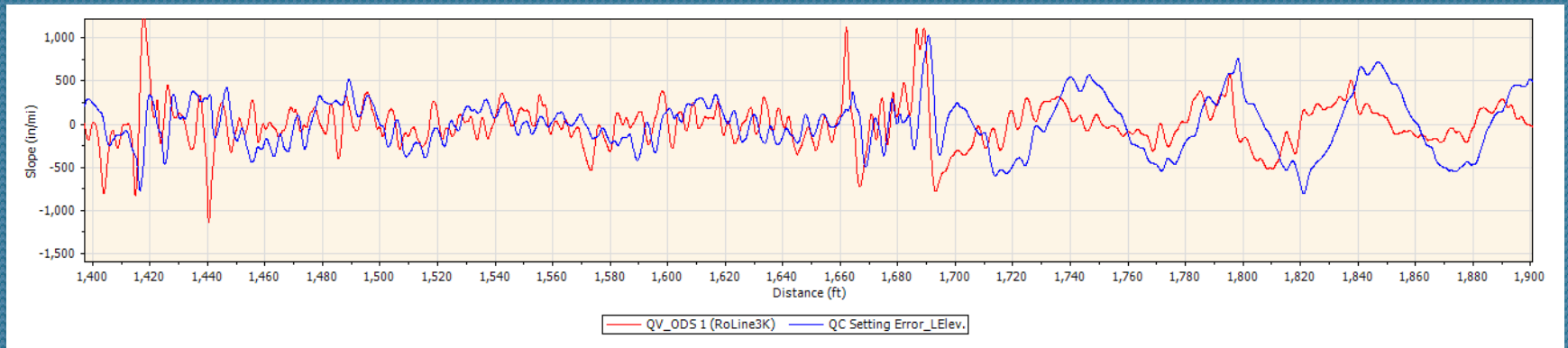


## QV DMI Error

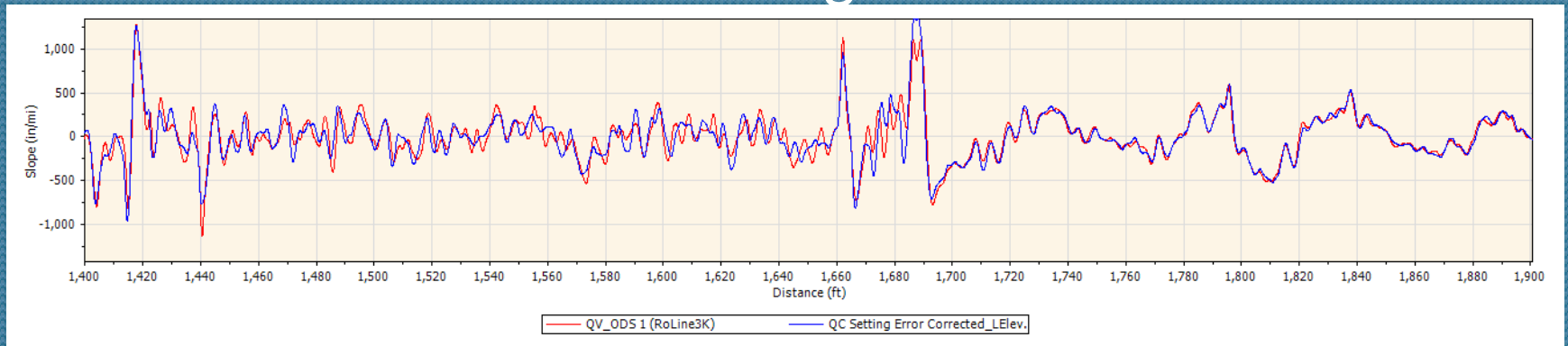


## QV DMI Error Corrected

# Shifted Filtered Profiles



## QC Setting Error



## QC Setting Error Corrected

# AASHTO R 56-10

- AASHTO R56-10 – Standard Practice for Certification of Inertial Profiler Systems Section 8.4.3 – stipulates that the absolute average difference of the profile measurement from the distance measured with a steel tape must be less than .15 percent to pass.
- A profiler with a  $+.15\%$  DMI variance compared to a profiler with a  $-.15\%$  DMI variance would be nearly 16 feet different in each mile tested

# Verification Process

- Device Approval – annually or as needed
- Contract Verification
  - Periodic test section comparisons
  - Periodic full length comparisons
- Determine comparison results
- Evaluate results
- Investigate excessive variability causes
- Compare differences in bonus/penalty results
- Report results and actions taken

# Profiler Approval

- Test site that is representative of the pavement on which the profiler will be used
- Suitable Reference Device
- Profilers with auto start and event marking capabilities must be capable of making five or more sequential runs on test site with 92 percent repeatability between runs and 90 percent accuracy matching reference results
- Approval is annually and whenever repairs, upgrades or adjustments are performed or results are questionable

# Approval Report Card

Statistic	Repeatability - Left	Repeatability - Right	Accuracy - Left	Accuracy - Right
Comparison Count	45	45	10	10
% Passing	100.00	100.00	100.00	90.00
Mean	97.93	96.62	95.30	91.30
Minimum	95.00	93.00	94.00	89.00
Maximum	99.00	99.00	96.00	93.00
Standard Deviation	0.9	1.6	0.7	1.4
Grade	Passed	Passed	Passed	Passed

# QC/QV Comparison Testing

- Contractor profiles new pavement for acceptance according to requirement of ride specification
- State DOT or their representative perform comparison profiling with contractor to verify the results are consistent
- ProVAL's Cross Correlation Module provides a point by point comparison of the two profiles
- When profiles have a strong cross correlation, IRI results will generally also compare well

# Recommendations

- Use auto start and stop feature to assure accurate and consistent start and stop locations
- Compare run lengths to identify if they differ
- Synchronize profiles for cross correlation in ProVAL
- Check shifted and filtered results to see if the same features are being identified and if they align
- Try different tracking techniques or tracking devices if repeatability between runs becomes an issue
- Check equipment calibration, mounting and software settings to help isolate the cause of a problem

# Define Expectations

- How much of a projects total length should be profiled
- How many projects? All or a representative sample ?
- What are acceptable comparison limits for cross correlation, IRI results and localized roughness?
- What is the end result bonus or penalty using both QC and QV results and when is there a problem?
- What will be done when there is a problem?

# What is Possible?

- Depends on:
  - The roadway design
  - The number of curves
  - The number of hills
  - The number of manhole, inlets, intersections, etc.
  - The profilers used and the setting and filtering applied to the collected profiles
  - The operators ability to follow the same wheel paths multiple times

# Finding The Answers

- Development of a uniform compliance standard for cross correlation requirements for all pavement is unrealistic
- Learning how well the same operator can compare to themselves on multiple runs using the same and different equipment would be a place to start
- Use auto event markers to identify areas that are difficult to produce a smooth ride and investigate ways to minimize or eliminate cause

# Getting Started

- Define the percentage of projects that will be tested
- Determine length of profiles used in the comparison
- Define what will be included in the comparison (cross correlation, segment IRI, localized roughness, and maybe pay calculation differences??)
- Define the limits for variation that that should be investigated further and how
- Define Dispute Resolution Process and indicate how disputes were resolved

# Reporting Results

- Report results of the comparison
  - What was compared
  - Results of comparisons
  - Limits for comparisons
  - Decisions or resolutions that were made to resolve any differences
  - WisDOT uploads verification reports to the Materials Reporting System located at:
    - [www.Atwoodsistemas.com](http://www.Atwoodsistemas.com)

# Materials Reporting System

Atwood Systems - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites RSS Print Mail Photos Calendar MSN Share

Address <http://www.atwoodsystems.com/> Go Links

Windows Live Wisconsin seal What's New Profile Mail Photos Calendar MSN Share Sign in

LEXMARK Print Now: Normal Quick Black and White Text Only Photos (2) Preview

---

## Atwood Systems

Enterprise Data Management Solutions for the Transportation Construction Industry



[Home](#) | [System Links](#) | [Contacts](#) | [Terms](#) | [Support](#)

---

### Welcome...

We are an Information Systems provider of enterprise level business-to-business management software and services to the highway, roads and bridge construction industry.

Our project and materials management software provide integrated, configurable and cost effective solutions for collecting data from distributed, disparate data sources into central data storage to facilitate management and reporting to internal and external customer information systems on the web and private wide-area networks.

Our enterprise services and support are the solutions to diverse information needs in a global business economy.

### More about us...

We have a successful 15 year track record providing dynamic, results oriented information technology services...[more](#)

Atwood Systems Copyright 2010

start 4 Internet Expl... Microsoft Power... Mathy 107 2010 WisDOT Li... 7 ProVAL 3.2 PCM - Results [...] 2010 Zignego H... 2010 Trierweiler ... 6:37 PM

# Ride Data Website

Information Browser - Microsoft Internet Explorer

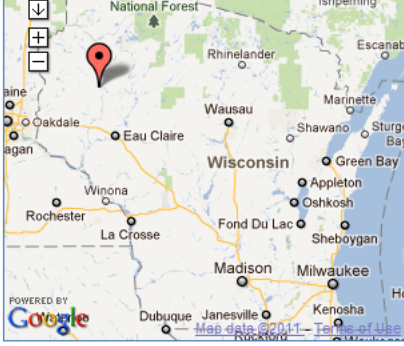
File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print Mail Photos Calendar MSN Share

Address <http://www.abwoodsystems.com/ibv2/default.cfm> Go Links

Windows Live Wisconsin seal What's New Profile Mail Photos Calendar MSN Share Sign in

LEXMARK Print Now: Normal Quick Black and White Text Only Photos (10) Preview






 POWERED BY Google





**Project Contact Information** [Print Location and Contact Info](#)

Project ID & Description: 1197-18-72 NEW AUBURN - SPOONER  
Contract ID: 20100126026

Office: (715) 234-1478 Address: Augusta and 19th Street Intersection  
Cell: (715) 299-7206 Directions: USH 53, West on STH 48, South on 19th Street  
Fax: (715) 234-1479

Leader: Don Andre Cell #: (715) 299-7206 Office #: (715) 299-7206  
Manager: Bob Anderson Cell #: (715) 577-3855 Office #: (715) 635-2528  
Supervisor: Brendan Dirkes Cell #: (715) 225-9314 Office #: (715) 395-3026  
Traffic Co: Mega Rentals Traffic Co. #: (715) 835-4040  
Contractor's Mat'l Contact: Cell #: Office #:

[View materials data](#)  No Structures data found.  
[View Testing & Sampling Guide](#)  No Pavement data found.  
 No Certified Tester information found. [View IRI data](#)  
 No HMA Density information found.  No PCC data found.

 [Request DOT Approval Authority](#)  [My Account Info](#)  
 [ASI Administration](#) (For ASI use only)  [Project Tracking Support](#) (For Authorized use only)

**Year 2011**

[8954-05-71](#) CITY RICE LAKE, SAWYER ST (TWN RD)  
[8997-00-05](#) CITY RICE LAKE, N MAIN ST (LOC ST)

**Year 2010**

[1196-04-79](#) NEW AUBURN - RICE LAKE (USH 53)  
[1196-04-80](#) RICE LAKE - NEW AUBURN (USH 53)  
[1197-18-71](#) NEW AUBURN - SPOONER (USH 53)  
[1197-18-72](#) NEW AUBURN - SPOONER (USH 53)

Done Internet

start 3 Internet E... Microsoft Pow... Mathy 107 2010 WisDOT... ProVAL 3.2 PCM - Results... 2010 Zignego... 2010 Trierweil... Abwood Syste... 6:58 PM

# Project Profile Runs

Information Browser - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print Mail Photos Calendar MSN Share

Address <http://www.atwoodsystems.com/ibv2/default.cfm> Go Links

Windows Live Wisconsin seal What's New Profile Mail Photos Calendar MSN Share Sign in

LEXMARK Print Now: Normal Quick Black and White Text Only Photos (10) Preview

Project Details Materials Data Structures Data Pavement Data **IRI Data** PCCP Thickness HMA Density eGuide Details Cert. Tester Aggt. Sources

Reference Docs Go

**IRI Data Summary for project 1197-18-72** [View Lane Master Data](#) [Print Summary Report](#)

Description	Run Date & Time	Type	Pay Spec	Station Start	Station End	Bonus/Deduct Left	Bonus/Deduct Right	Reviewed By	Review Date
Tester Name: KEVIN PATROW									
<a href="#">Details</a> RICE LAKE 51	09/26/2010 06:45	CONCRETE	QMP 1.03	684+24	449+24	\$ -1361.66	\$ -4980.00	DON ANDRE	01/14/11
<a href="#">Details</a> RICE LAKE 58	09/30/2010 03:15	CONCRETE	QMP 1.03	124+24	54+24	\$ 1118.33	\$ -80.00	DON ANDRE	01/14/11
<a href="#">Details</a> RICE LAKE 60	09/30/2010 03:57	CONCRETE	QMP 1.03	124+24	54+24	\$ 26.67	\$ -250.00	DON ANDRE	01/14/11
<a href="#">Details</a> RICE LAKE 63	10/03/2010 03:47	CONCRETE	QMP 1.03	179+24	124+24	\$ 15.00	\$ -459.99	DON ANDRE	01/14/11
<a href="#">Details</a> RICE LAKE 65	10/03/2010 04:18	CONCRETE	QMP 1.03	179+24	124+24	\$ 1300.00	\$ 0.00	DON ANDRE	01/14/11
<a href="#">Details</a> RL 75 SB LN 2	10/04/2010 04:38	CONCRETE	QMP 1.03	684+24	599+24	\$ -306.67	\$ -891.67	DON ANDRE	01/14/11
<a href="#">Details</a> RL 76 SB LN 2	10/04/2010 05:02	CONCRETE	QMP 1.03	599+24	534+24	\$ -736.67	\$ -500.00	DON ANDRE	01/14/11
<a href="#">Details</a> RL 79 SB LN 2	10/04/2010 06:14	CONCRETE	QMP 1.03	534+24	454+24	\$ -1418.34	\$ -2503.33	DON ANDRE	01/14/11
<a href="#">Details</a> RL 82 SB LN 2	10/06/2010 03:09	CONCRETE	QMP 1.03	269+24	219+24	\$ -1275.01	\$ -1423.34	DON ANDRE	01/14/11
<a href="#">Details</a> RL 85 SB LN 1	10/06/2010 03:34	CONCRETE	QMP 1.03	269+24	219+24	\$ -605.00	\$ -1798.34	DON ANDRE	01/14/11
<a href="#">Details</a> RL 88 SB LN 1	10/06/2010 03:54	CONCRETE	QMP 1.03	399+24	314+24	\$ -151.66	\$ -2770.00	DON ANDRE	01/14/11

Year 2011

[8954-05-71](#) CITY RICE LAKE, SAWYER ST (TWN RD)

[8997-00-05](#) CITY RICE LAKE, N MAIN ST (LOC ST)

Year 2010

[1196-04-79](#) NEW AUBURN - RICE LAKE (USH 53)

[1196-04-80](#) RICE LAKE - NEW AUBURN (USH 53)

[1197-18-71](#) NEW AUBURN - SPOONER (USH 53)

[1197-18-72](#) NEW AUBURN - SPOONER (USH 53)

start Internet E... Microsoft Pow... Mathy 107 2010 WisDOT... ProVAL 3.2 PCM - Results... 2010 Zignego... 2010 Trierweil... Atwood Systeme... 6:59 PM

# Reference Documents

Information Browser - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites

Address <http://www.atwoodsystems.com/ibv2/default.cfm>

Windows Live Wisconsin seal

LEXMARK Print Now: Normal Quick Black

Map of Wisconsin showing major cities and roads. A red pin is located near Eau Claire.

Year 2011

- [8954-05-71](#) CITY RICE LAKE, SAWYER ST (TWN RD)
- [8997-00-05](#) CITY RICE LAKE, N MAIN ST (LOC ST)

Year 2010

- [1196-04-79](#) NEW AUBURN - RICE LAKE (USH 53)
- [1196-04-80](#) RICE LAKE - NEW AUBURN (USH 53)
- [1197-18-71](#) NEW AUBURN - SPOONER (USH 53)
- [1197-18-72](#) NEW AUBURN - SPOONER (USH 53)

<http://www.atwoodsystems.com - Reference Documents - Microsoft Internet Explorer>

View Ref Docs [Upload Ref Docs](#)

Click on a filename to download it.

	<a href="#">2010 Chippewa Conc QV HWY 53 SB Lane 2 LRWP RQ 500.pdf</a>	41 KB	02/10/2011
	<a href="#">2010 Chippewa Conc QV HWY 53 SB Lane 2 LRWP RQ Continuous.pdf</a>	50 KB	02/10/2011
	<a href="#">2010 Chippewa Conc QV HWY 53 SB Lane 2 LRWP RQ Full.pdf</a>	27 KB	02/10/2011
	<a href="#">2010 Chippewa Conc QV HWY 53 SB Lane 2 LWP CC.pdf</a>	55 KB	02/10/2011
	<a href="#">2010 Chippewa Conc QV HWY 53 SB Lane 2 RWP CC.pdf</a>	55 KB	02/10/2011
	<a href="#">2010 Chippewa HWY 53 QV Report.doc</a>	262 KB	02/10/2011
	<a href="#">Chippewa HWY 53 SB Lane LRWP.pvp</a>	3,902 KB	02/10/2011
	<a href="#">rice.lake69.sb.ln.2.44+24-38+61.pdf</a>	133 KB	10/03/2010
	<a href="#">rice.lake70.sb.ln.1.44+24-38+56.pdf</a>	133 KB	10/03/2010
	<a href="#">rice.lake71.sb.ln.1.124+24-52+11.pdf</a>	1,004 KB	10/03/2010
	<a href="#">rice.lake73.sb.ln.1.124+24-52+44.pdf</a>	983 KB	10/03/2010
	<a href="#">rice.lake74.sb.ln.1.684+24-596+89.pdf</a>	1,198 KB	10/04/2010

[http://www.atwoodsystems.com/ibv2/irireview/DatafileDownload.cfm?ftype=main&proj\\_id\\_param=1197%2D18%2](http://www.atwoodsystems.com/ibv2/irireview/DatafileDownload.cfm?ftype=main&proj_id_param=1197%2D18%2)

Internet

start 4 Internet E... Microsoft Pow... Mathy 107 2010 WisDOT... ProVAL 3.2 PCM - Results... 2010 Zignego... 2010 Trierweil... Atwood Syste... 7:00 PM



Thank you