



Accelerometers Digital Inclinometers Electronic Sensors Tilt Indicators Ball Bank Indicators Inclinometers Levelers Controllers Manual Inclinometers Slip Inclinometers Electronic Tilt Indicators Inclinometers Levelers Controllers Accelerometers Digital inclinometers Boom Angle Indicators Gradiometers Tilt Switches Signal Accelerometers Digital Inclinometers Electronic Sensors Tilt Indicators Ball Bank Indicators Inclinometers Manual Inclinometers Slip Indicators Boom Angle Indicators Electronic Switches Inclinometers Tilt Indicators Ball Bank Indicators Inclinometers Gradiometers Tilt Switches Attitude Indicators Digital Inclinometers Levelers Controllers Accelerometers Digital inclinometers Boom Angle Indicators Gradiometers Tilt Switches Signal Conditioners Attitude Indicators Tilt Indicators Ball Bank Indicators Inclinometers Levelers Controller **Got Tilt? Call us today, 610-500-2000** Accelerometers Electronic Gradiometers Tilt Switches Signal Accelerometers Tilt Switches Signal Inclinometers Slip Indicator

**Riekerinc.com**

Since  
**1917**

# Rieker Curve Advisory Reporting System (CARS™) Training Class

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May 2014

Updated November 2014

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# CONTENTS

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- Setup & Installation
- Collecting Data
  - Using the Field Application
- Analyzing Data and Generating Reports
  - Using the CARS™ Internet Portal

# Rieker CARS™ System Overview

## Names of the components and how they connect



# Setup

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- Activating your Account
- Setting up the Tablet connection
- Installing in the test Vehicle
- Leveling and Zeroing the Inclinator

# Setup - Activating your Account

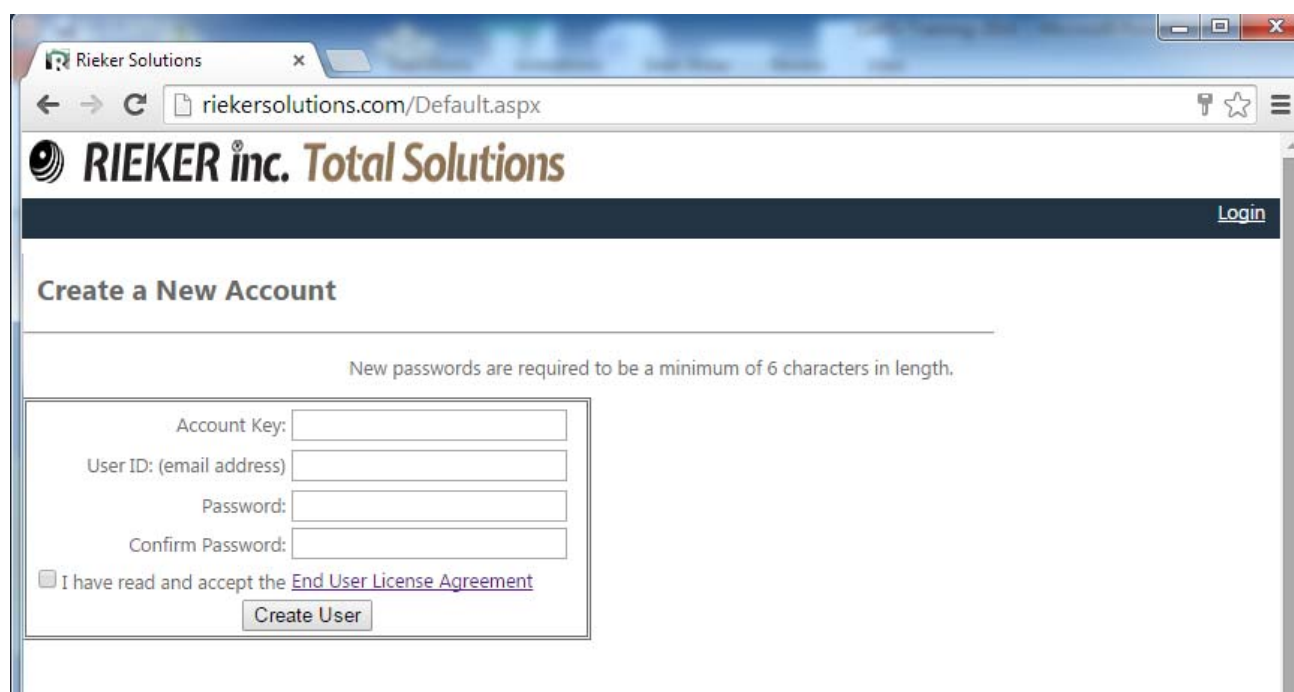
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- **Activation E-mail**
  - Sent to Account owner when Kit ship
  - If you didn't receive your key, email your name and kit serial number to [support@riekerinc.com](mailto:support@riekerinc.com)
- **16 digit Key in E-mail**
  - Keep your for future reference
- **CARS Portal: <http://riekersolutions.com>**
- **Create and Enter an Individual Password**
  - Keep your password in a safe place for future reference
  - Do not share your password

## Setup - Activating your Account

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- Go to: [HTTP://riekersolutions.com](http://riekersolutions.com)
- At the login prompt, choose **Register Account**



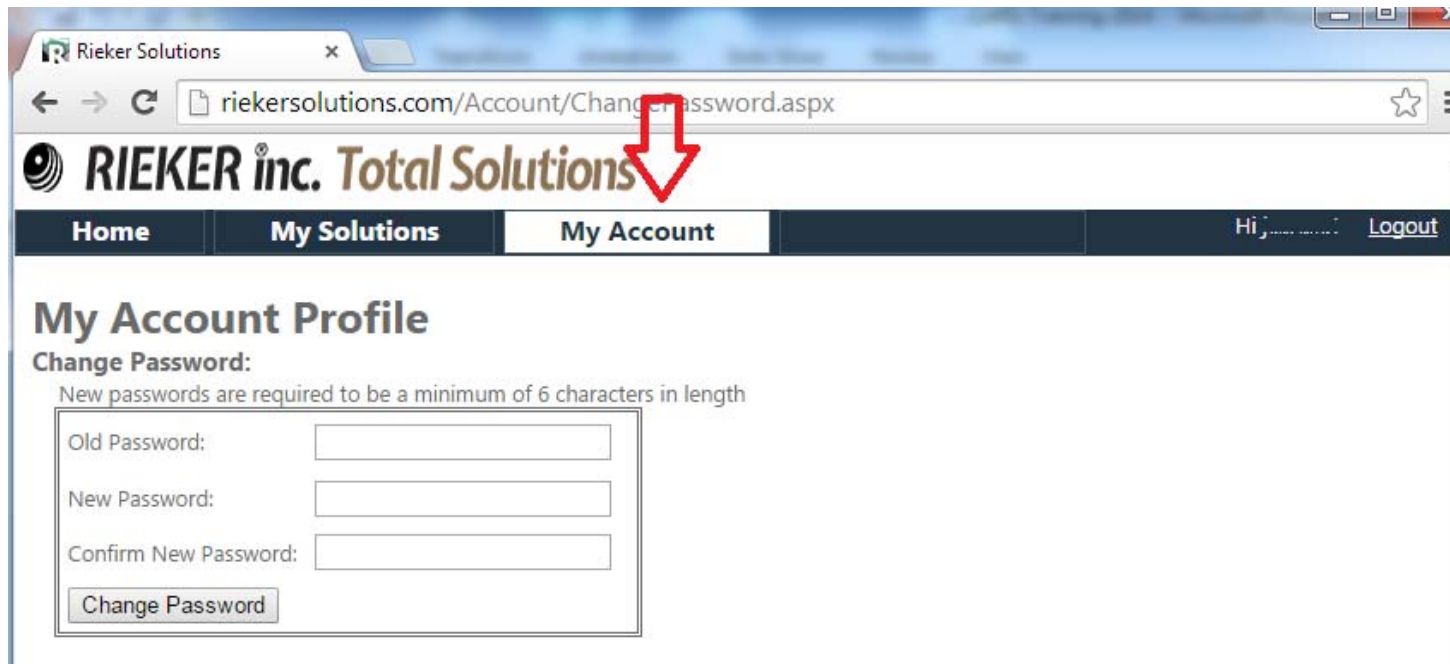
The screenshot shows a web browser window with the address bar displaying "riekersolutions.com/Default.aspx". The page header features the "RIEKER inc. Total Solutions" logo and a "Login" link. The main content area is titled "Create a New Account" and includes a note: "New passwords are required to be a minimum of 6 characters in length." Below this, there is a registration form with the following fields: "Account Key:", "User ID: (email address)", "Password:", and "Confirm Password:". A checkbox labeled "I have read and accept the [End User License Agreement](#)" is present, and a "Create User" button is located at the bottom of the form.

# Password Management – My Account

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## My Account

- Reset Password



The screenshot shows a web browser window with the URL `riekersolutions.com/Account/ChangePassword.aspx`. The page header includes the Rieker logo and the text "RIEKER inc. Total Solutions". A navigation menu contains "Home", "My Solutions", "My Account", and "Logout". The "My Account" section is titled "My Account Profile" and contains a "Change Password:" form. The form includes a note: "New passwords are required to be a minimum of 6 characters in length". The form fields are: "Old Password:", "New Password:", and "Confirm New Password:". A "Change Password" button is located at the bottom of the form. A red arrow points to the "Change Password" button.

# Setup - Setting up the Tablet

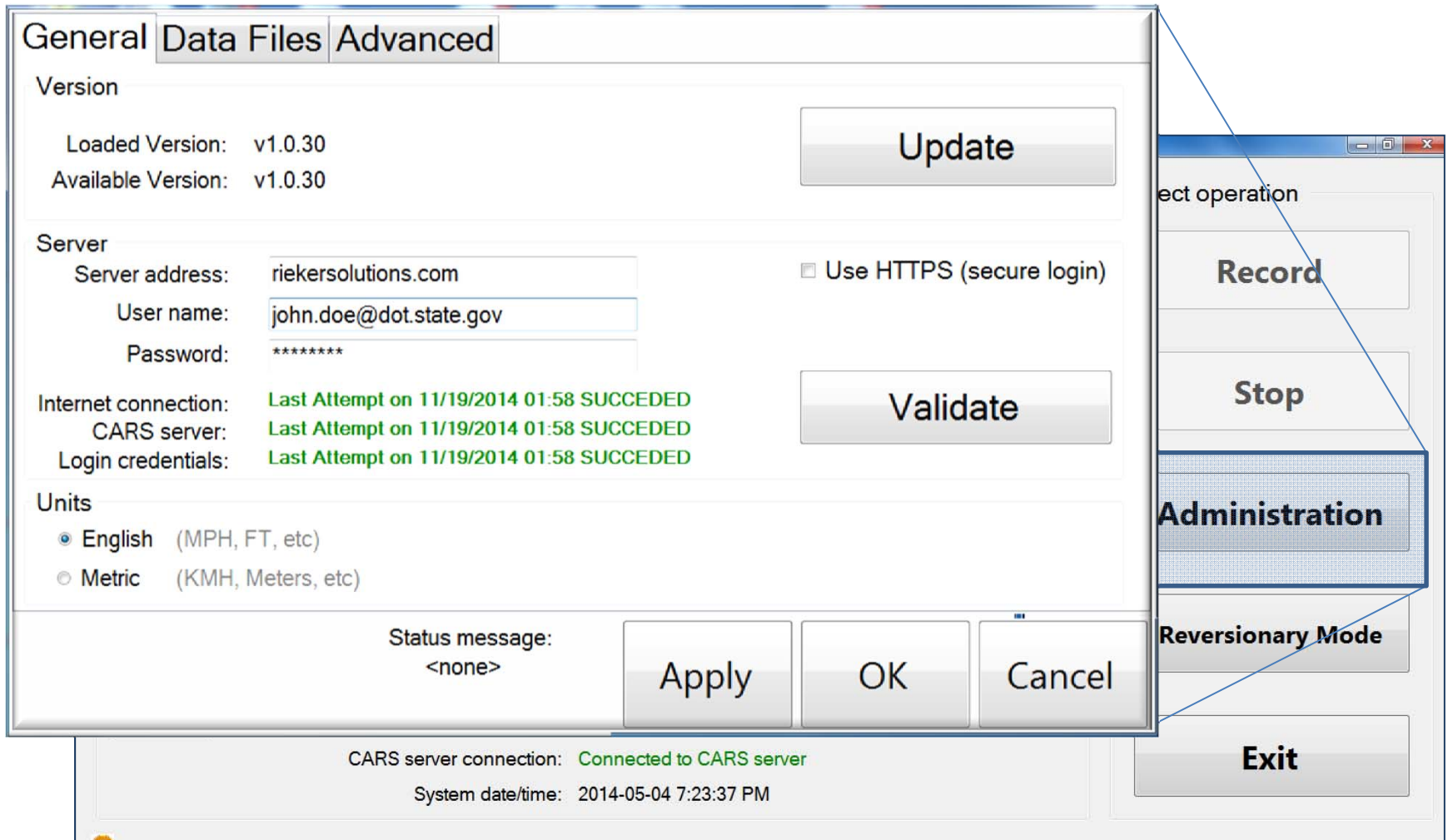
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- The Tablet comes configured with:
  - Windows 8.1
  - BBI Tablet software
  - Chrome & Firefox web browsers (Chrome is the default)
  - Go To Meeting
- Fully charge the Tablet using the wall charger
- Authorize on the local Wi-Fi if secure
  - Local Sys Admin may be needed for this step
  - Guest WiFi is fine – no need for internal services
- Verify account (Administration Page)
- Verify Tablet version (Administration Page)



# Setting Up the Tablet – Validate your credentials

- Validate your credentials under Administration



## Setup - Installing in the Test Vehicle

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- Locate a flat surface on the vehicle dash
- Affix RDS7-GPS-PRO with Velcro provided
- Mount tablet with provided mount
- Mount GPS antennae in the center of the vehicle roof
- Connect Power using Cigarette lighter adapter
- Connect USB and Antennae to RDS-GPS-PRO
- Turn on RDS7-GPS-PRO and allow to warm up 1 min
- Turn on Tablet
  - Login as CARS user
  - Launch BBI Software

## Setup - Leveling and Zeroing the Inclinator

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- Re-zero unit each day before test data collection
- Re-zero after unit is powered On
  - Factory setting are restored on Power Off
- Drive to a known level pad and press “REL” to zero
- A more complicated method is available if no level pad can be found

# Collecting Data

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Using the Field App



# Collecting Data – Using the Field App

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- Launching the Field App
- Normal Use
- Optional Data Collection
- Loss of GPS – Reversionary Mode Use

# Collecting Data – Using the Field App

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- Ensure the RDS7-GPS-PRO device is Powered and Levelled
  - Antennae connected
  - USB connected to the tablet
  - Allow the GPS to acquire a signal (about a minute)
- From the Desktop tap on BBI Safe Speed
- If the RECORD button is enabled, the tablet is ready to capture test data
- The tablet will not be connected to the Internet while driving and collecting data

# Collecting Data – Using the Field App

## Field App – Home Screen

The screenshot displays the 'CARS Tablet' application interface. It is divided into several sections:

- Real time data:** A grid of buttons for 'Posted Speed Limit (MPH)' ranging from 10 to 100. The '45' button is highlighted in green. A 'N / A' button is at the top.
- Recording Status:** Shows 'Recording Status: Recording' and 'Recording Mode: Normal' in green text.
- Device Status:** Shows 'RDS7-GPS-PRO USB: Connected' and 'GPS Signal: Excellent' in green text.
- Location Data:** Shows 'Latitude: N 39° 52' 35.556"', 'Longitude: W 75° 27' 37.248"', and 'Speed: 2.1 MPH'.
- Time:** Shows 'GPS Date/Time (GMT): 2014-12-04 9:57:13 PM'.
- Inclinometer:** Shows 'Inclinometer: Connected' and 'Inclination: 0.0°'.
- Operations:** A 'Select Operation' panel on the right contains buttons for 'Recording' (green), 'Stop', 'Switch To Reversionary Mode', 'Administration', and 'Exit'.
- Actions:** A 'Flag spot' button and a 'Connect to CARS Server' button are located in the lower middle section.
- Footer:** A message at the bottom states 'No data sessions available for uploading'.

# Collecting Data – Using the Field App

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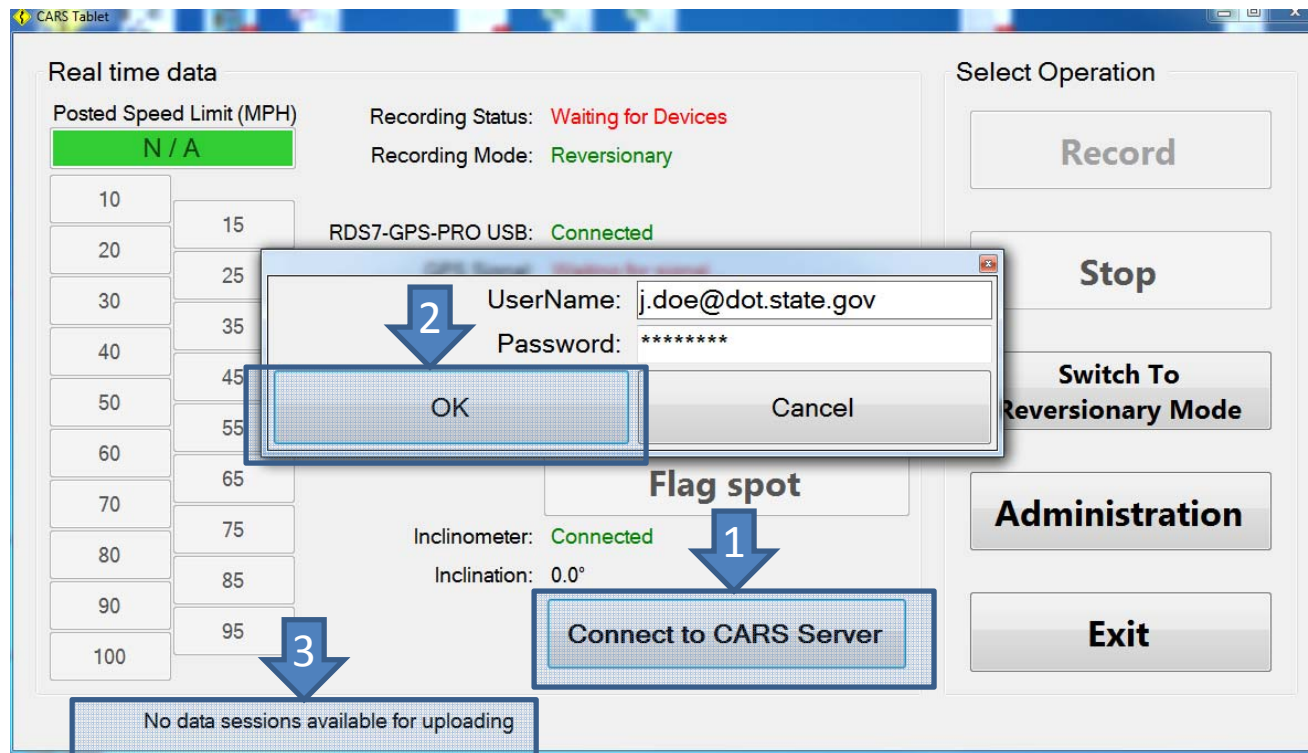


- Record Continuously
  - No need to start/stop recording
  - Start and Stop is OK too
- Drive smoothly at or below the speed limit
  - Slower is better
  - Stay in the center of the travel lane
  - Avoid over/under steering
  - Make at least one pass in both directions
  - Make a provisional test run for comparison
- When testing is complete – press STOP



# Collecting Data – Uploading Data

- Data is uploaded Automatically when connected to CARS server
  - Internet Connection is needed
  - BBI App needs to be running

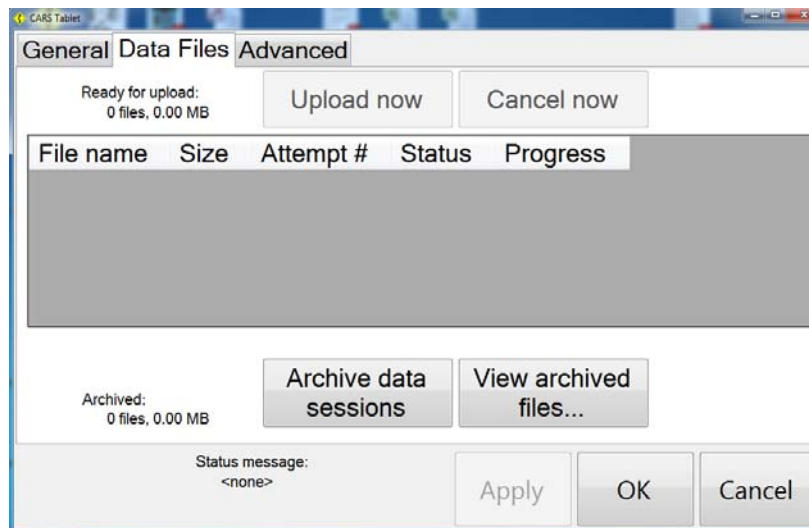


1. Connect
2. Login
3. Check Status

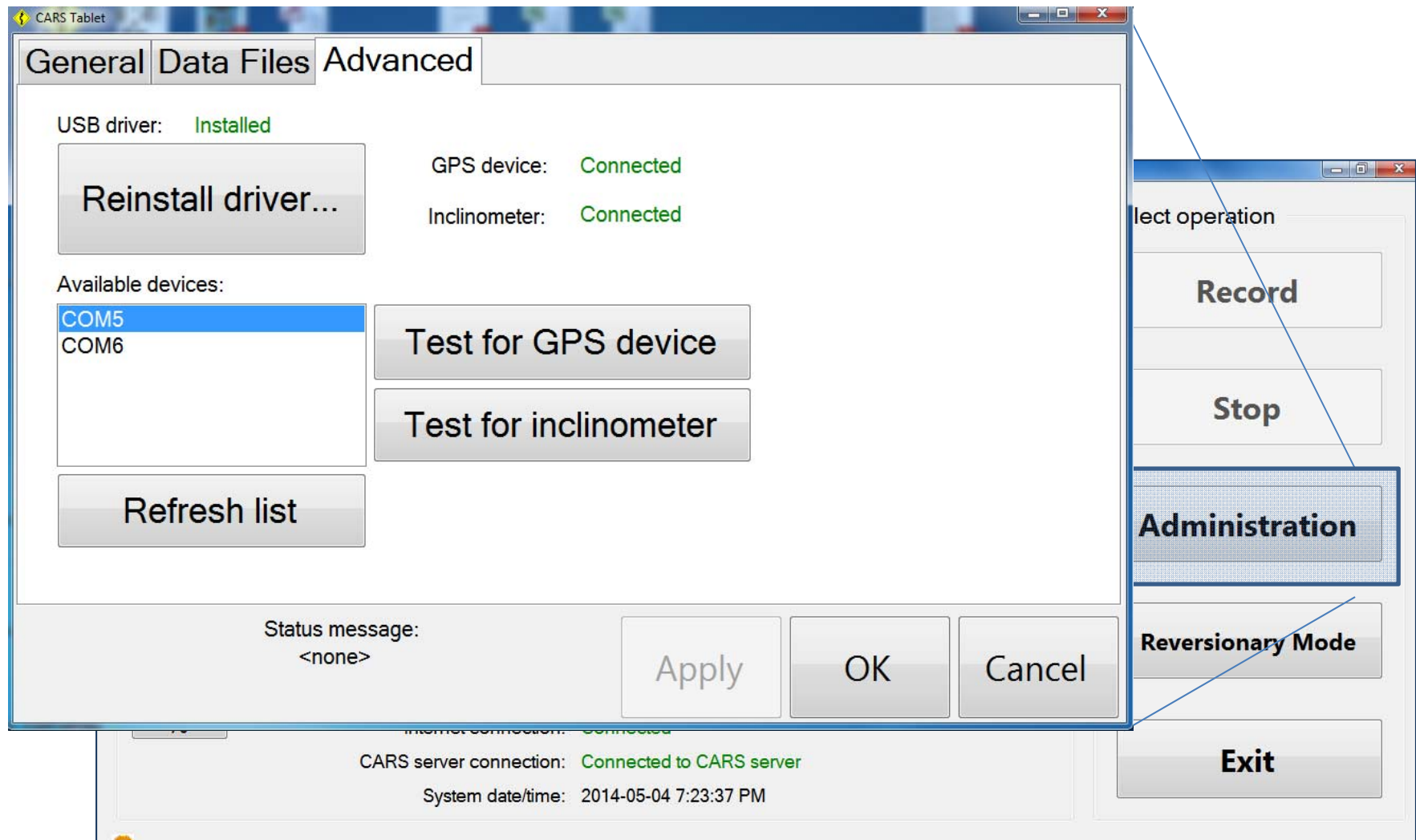
# Collecting Data – Uploading Data

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- Data is uploaded Automatically when connected to CARS server
  - Tablet needs an Internet Connection
  - BBI App needs to be running
- (Optional) Status can be viewed under Administration Tab
- (Optional) Force Files to Upload and debug
- (Optional) Archive data sessions and View archived files



# Troubleshooting Connection Issues



## Collecting Data –Optional Information Data Collection

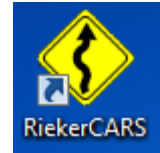
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- Select Speed Limit
  - Optionally change the speed limit selection for use in curve reporting
  - Has no affect on Data Collection or Analysis
- Flag Spot
  - Optionally collect a note at a particular point with Flag Spot
  - Flag has no affect on Data Collection

## Collecting Data – Reversionary Mode

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- Loss of GPS signal
  - GPS may not be available from time to time
  - Try again at a different time
- Requires two passes in each direction
- Speeds should vary by at least 10 mph
  - Speed needs to be held constant
  - Use Cruise Control
- Radius and Super-e are not be available on Reversionary Report output

# Collecting Data – Reversionary Mode



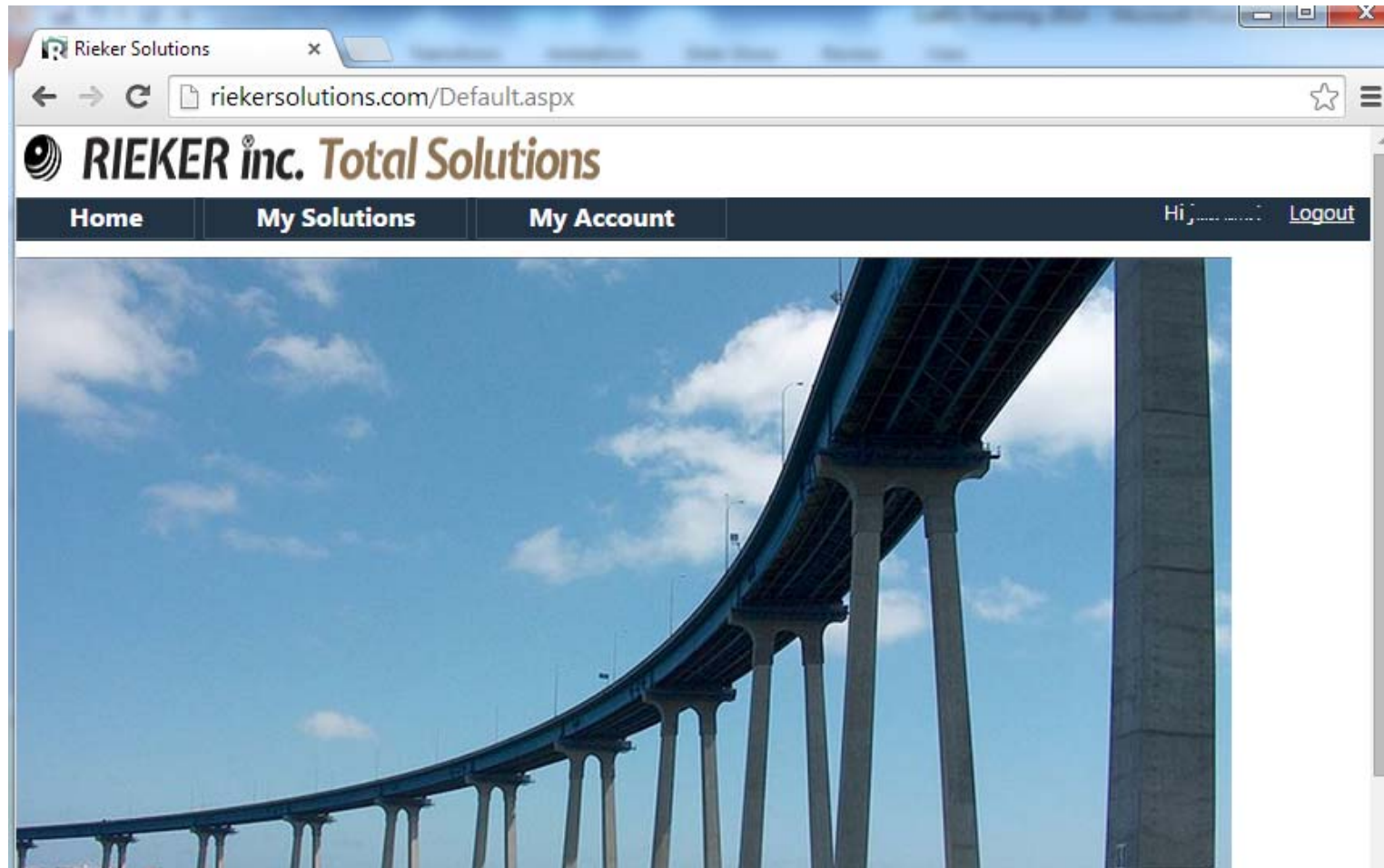
## Reversionary Mode Data Collection Screen

The screenshot displays the 'BBI Safe Speed' application window. The interface is divided into several sections:

- Real time data:**
  - 1st Pass:** Shows a current speed of 40 mph. It includes buttons for '+ 5mph', 'Select', 'Clear Speed', '- 5mph', and 'no data'. The 'Select' button is highlighted in green.
  - 2nd Pass:** Shows a current speed of 45 mph. It includes buttons for '+ 5mph', 'Select', 'Clear Speed', '- 5mph', and 'no data'.
- Select operation:** A vertical column of buttons on the right side, including 'Record', 'Stop', 'Administration', 'GPS Mode', and 'Exit'.
- Status Indicators:**
  - Recording status: Stand By
  - Recording mode: Cannot record data
  - Ball bank unit: Not connected - check USB cable and power
  - Inclination: --.--°
  - System date/time: 2014-05-04 7:35:31 PM
  - Internet connection: Connected
  - CARS server connection: Connected to CARS server

# Analyzing Data and Generating Reports

## Using the CARS™ Internet Portal



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# Analyzing Data and Generating Reports – CARS™ Portal

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## Using the CARS™ Internet Portal

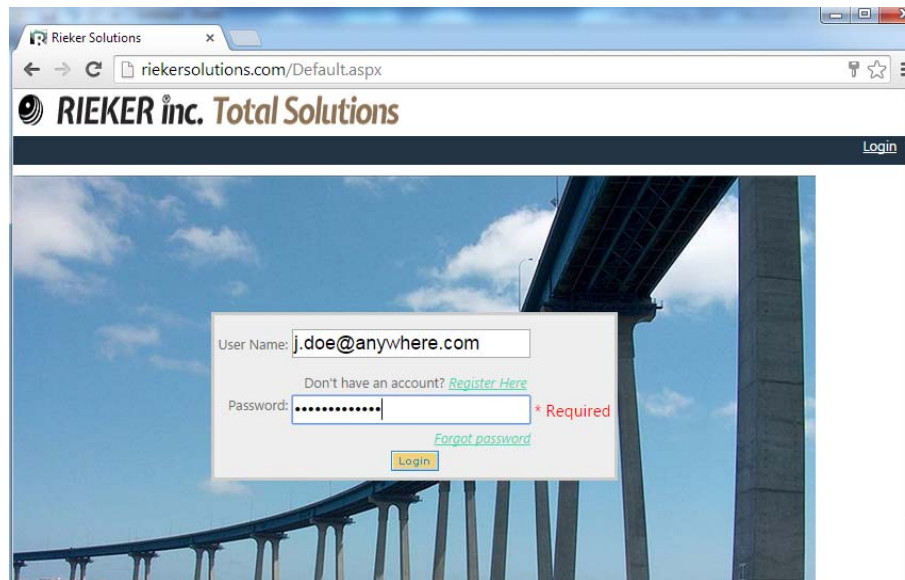
- Logging in to the Portal
- Reviewing Data
- Creating and Saving a Curve
- Viewing and Printing a Report
- Exporting and Saving Data



# CARS™ Portal – Reviewing Data

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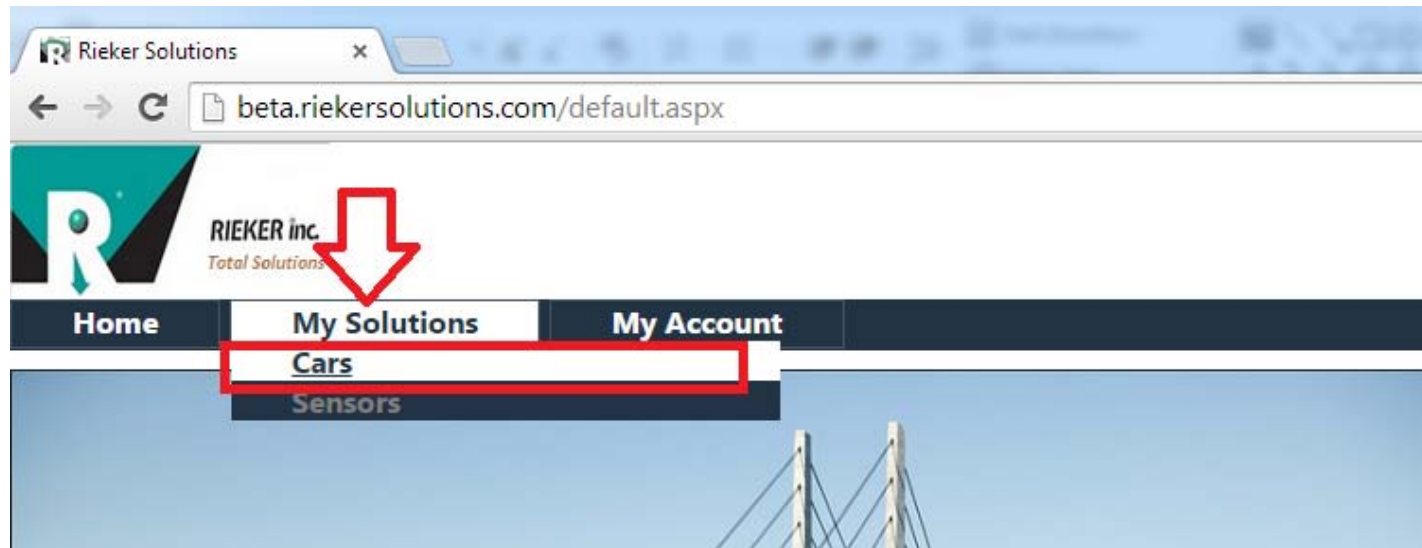
- Go to: <http://riekersolutions.com>
  - Any internet connected computer or the Tablet
  - Tested with Mozilla Firefox and Chrome™
  - Windows™ Internet Explorer (IE) will not work



- Log in using your username and password from registration
- Forgotten Password can be reset using your Account Key

# CARS™ Portal – Reviewing Data

- From the Rieker Solutions Home Page
  - Select My Solution -> CARS



# CARS™ Portal – Reviewing Data

## CARS™ Home Page

- Data Sessions
- Curves
- Reversionary Data
- Flags
- Mile Marker
- Signs

The screenshot displays the CARS™ Portal interface. At the top, there is a navigation menu with options: Home, Settings, Help, and Administration. Below this, there are tabs for Data Sessions, Curves, Flags, Reversionary Data, Mile Marker Data, and Signs. The main content area features a table with the following columns: Name, # of data points, Collected by, Collected on, Uploaded on, Corridor, and Processed. A single data session is listed: 'jcaruso 2014/11/21 15:41:40 (edit)' with 1,138 data points, collected by 'jcaruso' on '11/21/2014 15:41', and uploaded on '11/21/2014 16:11'. The table includes 'export' and 'delete' buttons for the selected session. Below the table is a 'Zoom to selected data sessions' button. To the right of the table is a 'Clear selection' button and a dropdown menu showing the selected session details. At the bottom of the interface is a map showing a road network with a highlighted green and blue segment representing the data session. The map includes a search bar, a zoom control, and a 'Map' button.

Name	# of data points	Collected by	Collected on	Uploaded on	Corridor	Processed
<filter>	<filter>	<filter>	<filter>	11/	<filter>	
<input checked="" type="checkbox"/> jcaruso 2014/11/21 15:41:40 (edit)	1,138	jcaruso	11/21/2014 15:41	11/21/2014 16:11	(edit)	<input type="checkbox"/>

# CARS™ Portal – Reviewing Data

- SELECT Data Sessions using check boxes
- “Zoom to Selected Data”
  - View on Google™ Maps, use Pan and Zoom to review



The screenshot shows the Rieker Solutions web portal interface. At the top, there's a navigation menu with 'Home', 'Settings', 'Help', and 'Administration'. Below that, there are tabs for 'Data Sessions', 'Curves', 'Flags', 'Reversionary Data', 'Mile Marker Data', and 'Signs'. The main content area features a table with the following columns: Name, # of data points, Collected by, Collected on, Uploaded on, Corridor, and Processed. A row is selected with a checkmark in the first column, showing details for a data session collected by 'jcaruso' on 11/21/2014. Below the table, there are 'export' and 'delete' buttons. To the right of the table, there's a 'Clear selection' button and a list of selected sessions. Below the table, there's a 'Zoom to selected data sessions' button. The bottom half of the screenshot shows a map view of the selected data session, with a green line representing the data session and blue flags indicating flagged spots. The map includes labels for roads like 'Baltimore Pike' and 'Chadds Ford', and landmarks like 'Concord Cour' and 'State Farm'.

Name	# of data points	Collected by	Collected on	Uploaded on	Corridor	Processed
<filter>	<filter>	<filter>	<filter>	11/	<filter>	
<input checked="" type="checkbox"/> jcaruso 2014/11/21 15:41:40 (edit)	1,138	jcaruso	11/21/2014 15:41	11/21/2014 16:11 (edit)		<input type="checkbox"/>

- Data Session – Green
- Areas of interest – Shaded Yellow to Red
- Curves – Blue
- Flagged Spot – Blue Flag

## CARS™ Portal – Reviewing Data

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- Zoom into an “Area of Interest”
  - Yellow – Red shading indicate areas of interest
  - High Zoom levels, each data point appears as a green dot
- Select Curve Tab to Identify and Save a New Curve
  - Cast a “net” around the points to be used in the analysis
  - First click selects the net’s center, second click to choose radius
  - Adjust the net so that data points optimize PC and PT
  - Nudge the PC and PT to maximize the “fit” of each pass
- Save the Curve

# CARS™ Portal – Reviewing Data

Home Settings Help Administration Hijc

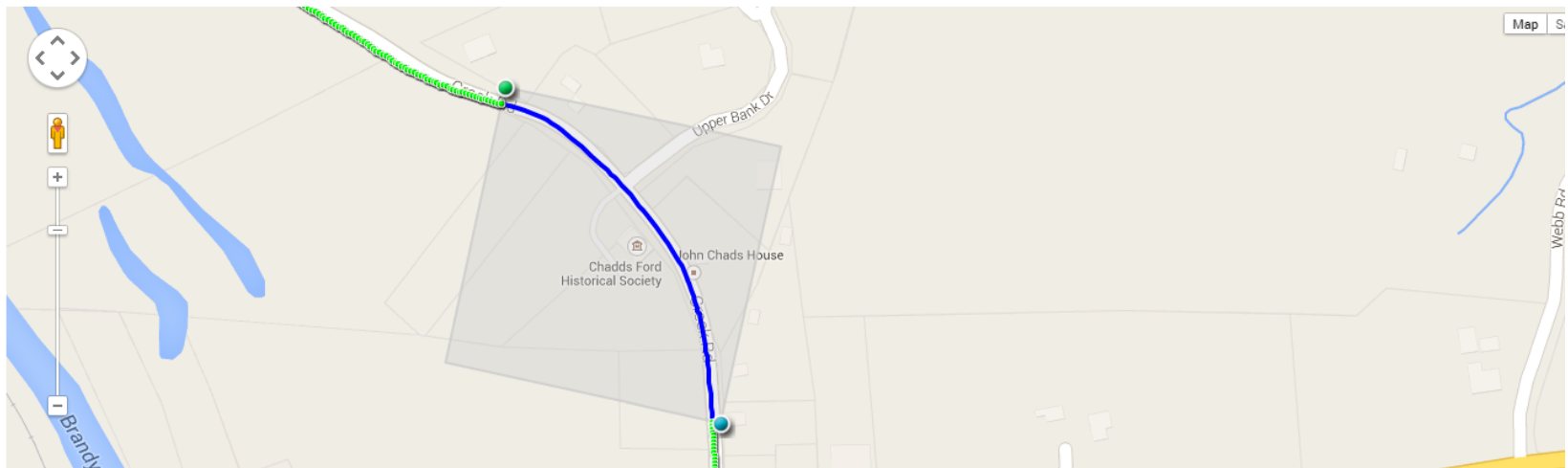
Data Sessions Curves Flags Reversionary Data Mile Marker Data Signs

Name	Corridor	Created by	Last saved on	# Passes	Passes #	Fit (%)	Radius (feet)	Length (feet)	Nudge PC	Nudge PT	Point of Curvature: Latitude	Point of Tangent: Latitude
<filter>	<filter>	<filter>	<filter>		1	99.1 %	824.1 ft	1075.3 ft	-	+	39.87615	39.87378
<input type="checkbox"/> Benchmark1 (edit)	(edit)	jcaruso		1								
<input type="checkbox"/> 52-Old Kennett Rd Curve 1 (edit)	(edit)	lcurrie		4								
<input type="checkbox"/> 52-Old Kennett Rd Curve 2 (edit)	(edit)	lcurrie		4								
<input type="checkbox"/> 52- SmithBridge curve 1 (edit)	(edit)	lcurrie		4								
<input type="checkbox"/> 52- SmithBridge curve 2 (edit)	(edit)	lcurrie		4								
<input type="checkbox"/> New London-R83   North Curve 27 (edit)	(edit)	lcurrie		4								
<input type="checkbox"/> airport chester creek (edit)	(edit)	lcurrie		2								

1 2 ... 16 > >>

Curve	PC lat/Ing (degrees)	PT lat/Ing (degrees)	save	delete	cancel
Alabama1003-MP3.04-3.13	39.87615 °	-75.59337 °	39.87378 °	-75.59139 °	

Point of Curvature: Longitude: -75.59337  
Point of Tangent: Longitude: -75.59139  
Mile marker: [no mile marker]  
Clear selected curve



## CARS™ Portal – Reviewing Data

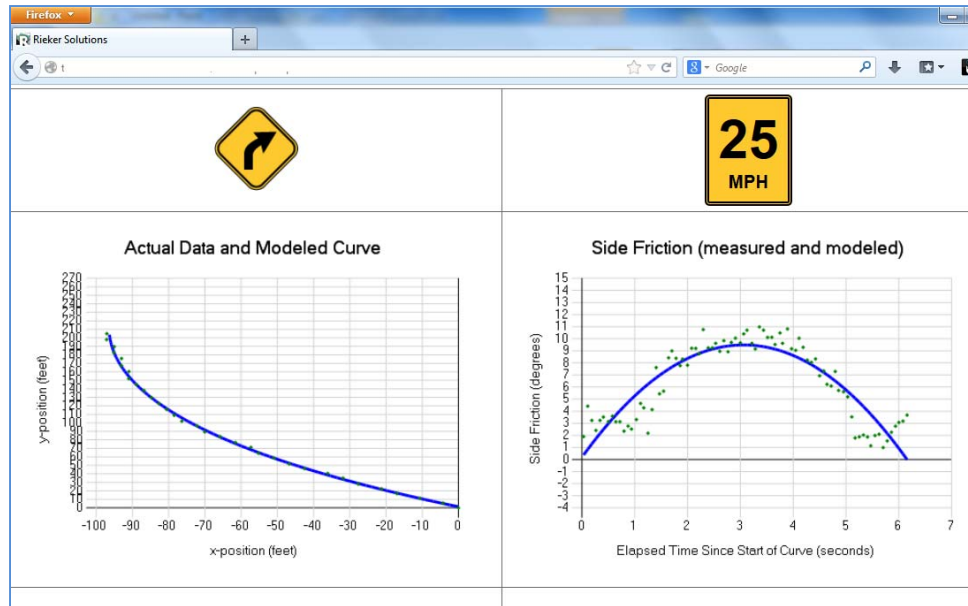
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- Curve data is modeled as a smooth curve
- Optimize the “Fit” between the raw data and the model
- A fit of 96% or better will yield acceptable results
  - Move the PC and PT so the curves ends just as the road becomes straight or tangent to the turn
  - Bad or curves with erratic data should be deleted
- It is important to include as many data points as possible before the fit starts to break down
  - Selecting only a few points to get 100% fit will not yield accurate results

# CARS™ Portal – View Curve Report

## Report Screen

- Select the Curve from the Curve Tab
- Click View Report



- Adjust limits for local standards
- Export Report Data
- Delete Passes



# CARS™ Portal – Reversionary Data Reports

## Reversionary Data

- Select two data sessions
  - same curve
  - same direction
- Enter Curve Name and Save
- Delete Curves
- Print PDF report



The screenshot shows the 'Reversionary reports' section of the CARS Portal. The page has a dark navigation bar with links for Home, My Solution, My profile, Admin, Help, and Logout. Below the navigation bar, there are tabs for Data Sessions, Curves, and Flags. The 'Rev. Data' tab is selected, showing a search box with the text '<search reversionary reports>' and a dropdown menu with '[all]'. Below the search box are buttons for 'Delete', 'Export reversionary report', and 'Print report'. The main content area is titled 'Reversionary reports:' and contains a paragraph explaining that reversionary data sessions lack GPS data. Below this is a section titled 'Create new reversionary report:' with a sub-instruction to 'Select two data files to include in the reversionary report.' A table lists two data sessions, both selected with checkboxes.

ID	file	pass #	direction	test speed MPH	sample count	uploaded by	date
<input checked="" type="checkbox"/>	169 jcaruso 2014/04/24 14:18:38	1	Right	40 MPH	22	jcaruso	2014/05/04 08:42:42.087 PM
<input checked="" type="checkbox"/>	170 jcaruso 2014/04/24 14:18:38	2	Right	45 MPH	20	jcaruso	2014/05/04 08:42:52.530 PM

# CARS™ Portal – Reversionary Data Reports

## Reversionary Reports Screen

- Adjust limits for local standards
- Review Analysis
- Export Data



Home My Solution My profile Admin Help

Data Sessions Curves Flags

Rev. Data

View and create reports for data sessions without GPS data.

<search reversionary reports>

[all]  
joetest2

Delete

Export reversionary report

Print report

Report name:

Save

*Upload reversionary data sessions on Data Sessions tab.*

### Reversionary reports:

Reversionary data sessions lack GPS data. The driver must enter the test driving speed manually. Only The reversionary curve advisory speed report only provides a single advisory speed value.

16° (0.28 ft/ft) for speed of 20mph or less

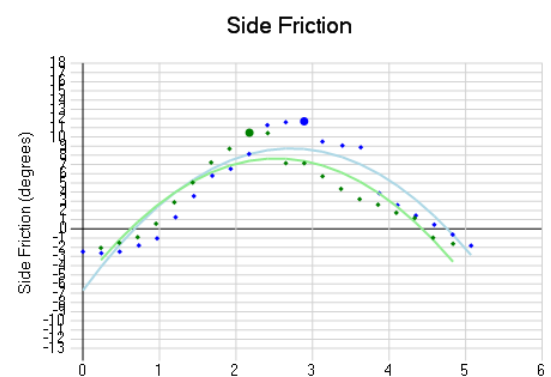
Custom (degrees):

**Side Friction Limit Used: 12°**

**Advisory Speed: 40MPH**

Raw Data:

### Side Friction



The graph shows Side Friction (degrees) on the y-axis (ranging from 0 to 1) and Curve Length (miles) on the x-axis (ranging from 0 to 6). The data points are represented by blue dots, and a green curve is fitted to the data. The curve peaks at approximately 0.8 degrees of side friction at a curve length of about 2.5 miles.

# CARS™ Training Summary

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- Key Take Aways

Topic	Key Take away
Setup	Properly secure and level the device
Field Collection	Drive slow and smooth
Curve Analysis	Include as much data out to the PC and PT before the model (fit) breaks down

# CARS™ Total Solution for Curve Analysis and Reporting

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## Questions?



# CARS™ Total Solution for Curve Analysis and Reporting

*The CARS™ Total Solution allows you to drive miles of road without stopping, at any speed, and capture all the data you need with a single pass in each directions*



**JUST DRIVE.**

Introducing for 2014 the fully automated solution for determining safe curve speed!

Rieker Curve Advisory Reporting System (CARS™) automatically captures road data for every mile you drive, with traffic, at any speed.

Just one pass will capture all telemetry needed to produce safe curve speed reports.

Call today 610-500-2000!



**RIEKER inc.**

CARS Solution...

- » Meets FHWA 2009 MUTCD requirements.
- » Allows driving with traffic - one pass - any speed.
- » Automatically calculates safe curve speed.
- » Find out more [www.riekerinc.com/CurveAdvisoryReporting.htm](http://www.riekerinc.com/CurveAdvisoryReporting.htm)

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