



# RPUG 2018 CONFERENCE - SOUTH DAKOTA

*30 Years On The Road To Progressively Better Data*

**Rapid City September 18-21**

## 30 Years on the road to progressively better data

By

Wix & Schleppe

# What happened in 1989?

- The fall of the Berlin Wall
- Nintendo releases the Game Boy
- Introduction of the Intel 486 processor chip
- The first of 24 satellites of the Global Positioning System is placed into orbit
- Average income per year \$27,450.00



SD Department of Transportation  
Research Program Room B-116  
700 Broadway Avenue East  
Pierre, SD 57501-2586



**Announcement**

**South Dakota  
Road Profiler  
Users' Group Meeting**

**Ramkota Inn  
Pierre, South Dakota  
November 14-16, 1989**

**What is the Road Profiler?**

The South Dakota Department of Transportation developed a low cost, high speed road profile measurement system in 1982. Since then, SDDOT has used the Road Profiler to conduct statewide surveys of pavement roughness. In 1986, the Road Profiler was improved to measure rut depth as well as road profile.

**Why Meet?**

Several other states have built or purchased Road Profilers for their own use. This meeting will allow them to exchange technical information with each other and with other interested states. A Users' Group will organize and recommend future directions of Road Profiler development.

**Who Should Attend?**

Pavement managers and engineers responsible for measuring and reporting road roughness and condition should attend. States which own Road Profilers and states which need new road roughness equipment to meet HPMS requirements will benefit.

**Where and When is the Meeting?**

The meeting will be held in Pierre, South Dakota on November 14-16, 1989. Technical sessions will be at the Ramkota Inn and Convention Center. Field tests will be conducted on highways near Pierre.

**How Do I Get to Pierre?**

Pierre is served by Northwest and Continental Airlines. Service is limited, so make reservations early. SDDOT will operate a shuttle from and to the airport.

**How Do I Register?**

To register, contact Virginia Ripley at the Research Program of SDDOT. Call (605)773-3292, or mail the return portion of this announcement to the address indicated. Room reservations should be made directly with the motels. We encourage early reservations.

**What is the Registration Fee?**

To encourage states to attend, no registration fee will be charged. The meeting will be supported by the South Dakota Department of Transportation and the Federal Highway Administration.

**Any Questions?**

Call the SDDOT Research Program at (605)773-3292.

**Accommodations**

Lodging is available at the following locations, all within convenient walking distance of the meeting facility:

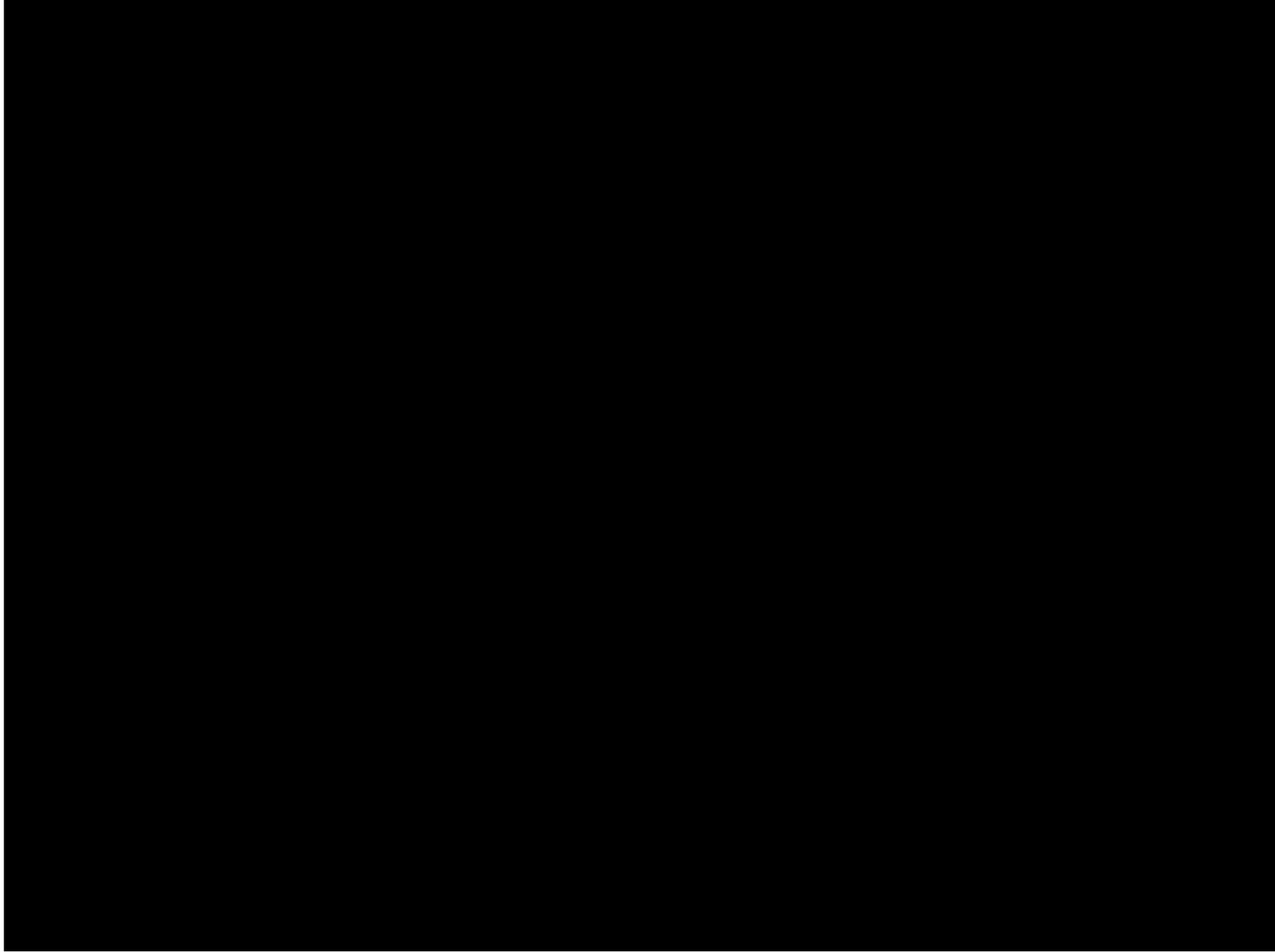
Ramkota Inn (605)224-6877  
\$39/night single  
\$45/night double

Dakota Inn (605)224-4140  
\$25/night single  
\$33/night double

Days Inn (605)224-0411  
\$25/night single  
\$29/night large single  
\$36/night double

You are encouraged to make early reservations.  
Please contact motels directly.







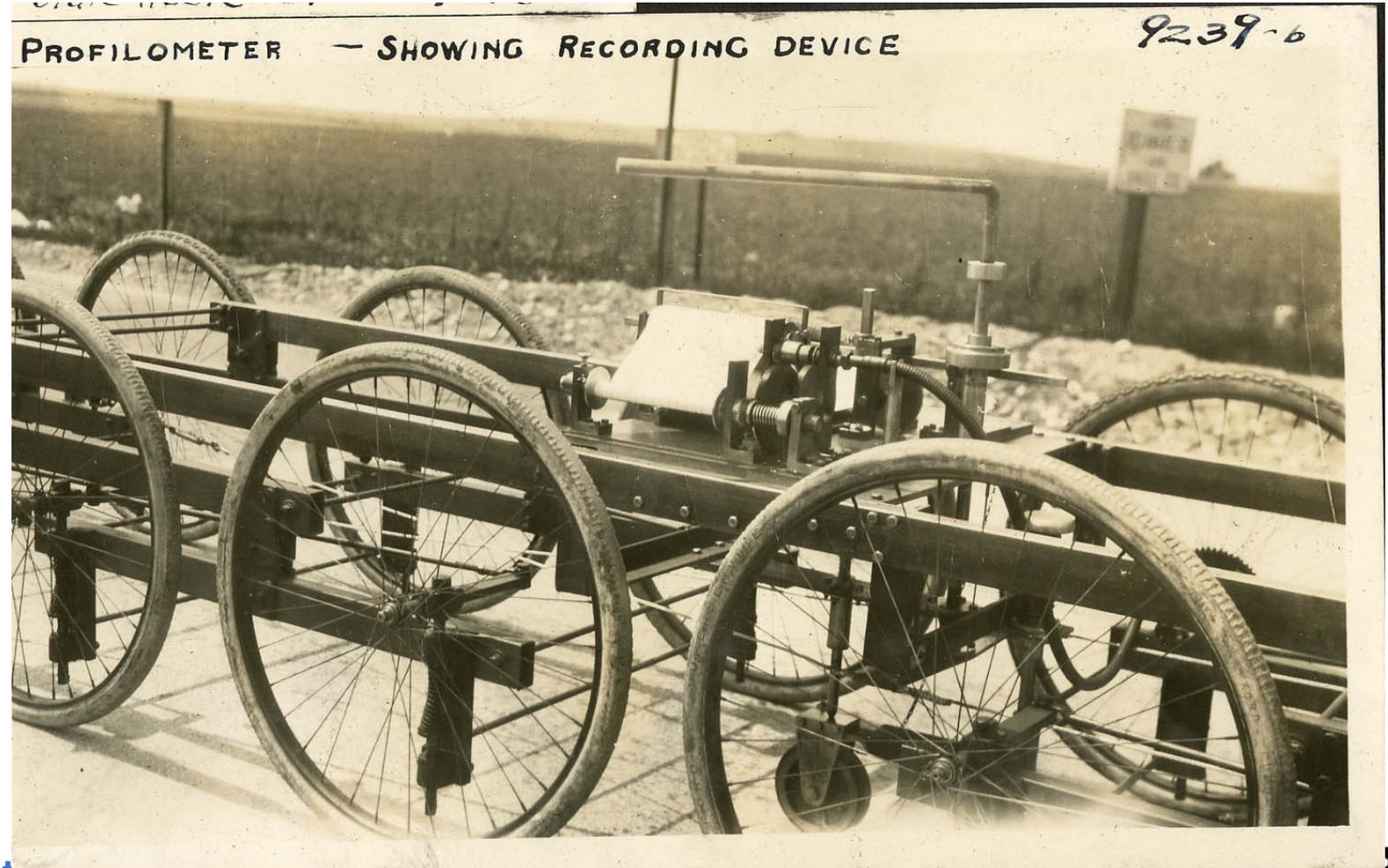
Source: Steve Karamihas UMTRI

Source: Steve Karamihas, UMTRI



Source: B L Schleppe, OH DOT

# 1928 Ohio Road Profilometer





Source: B L Schleppe, OH DOT



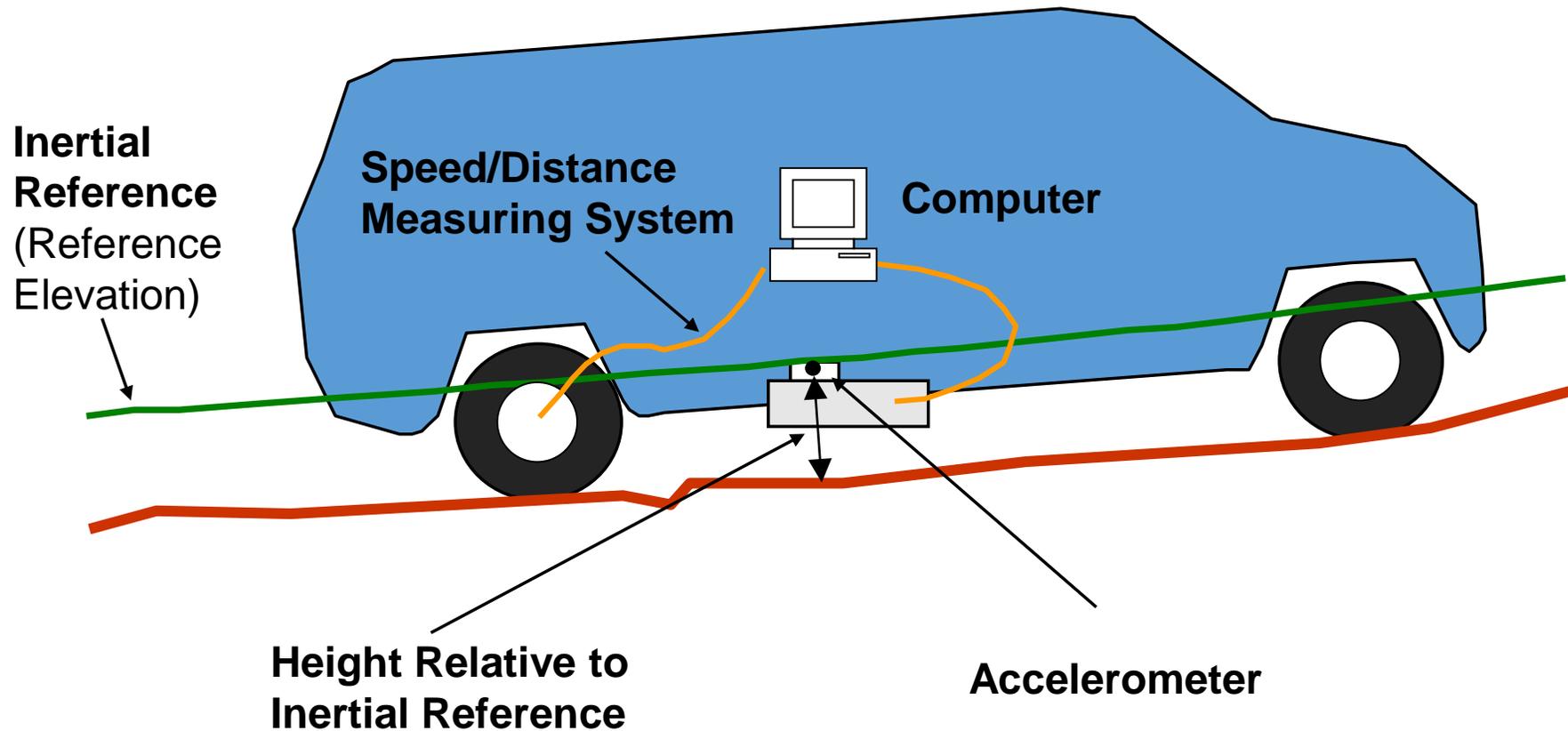
Source: B L Schleppi, OH DOT



30 years on the Road To Progressively Better Data

# Profiler Types

## Inertial Profiler

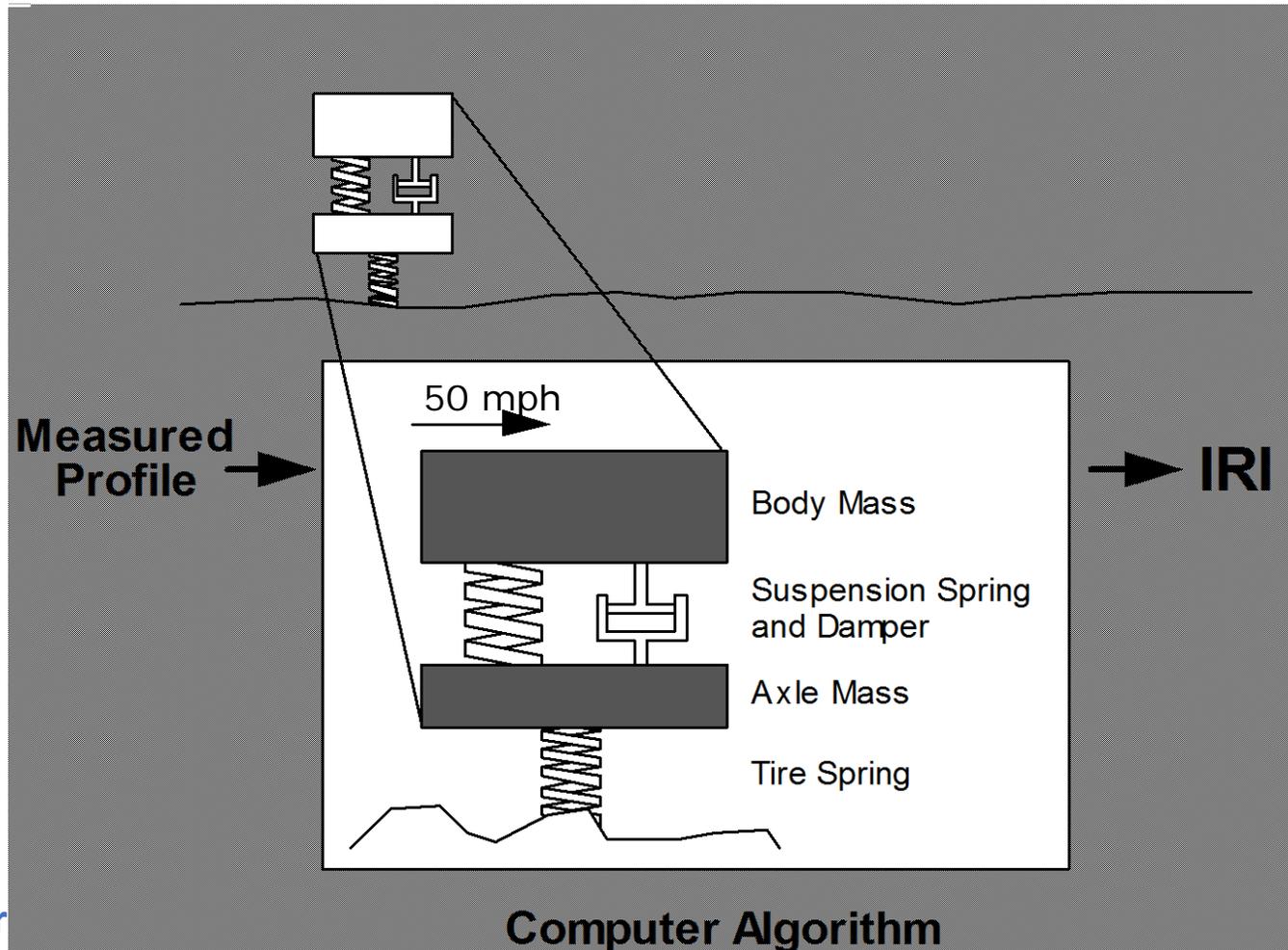


# Evolution of Height Sensors

- Halogen Incandescent Light
- Ultrasonic
- Infrared
- Single Spot Lasers
- 3 Spot Laser footprint
- Wide Single Spot Laser
- Linescan Laser (wide but slender footprint)

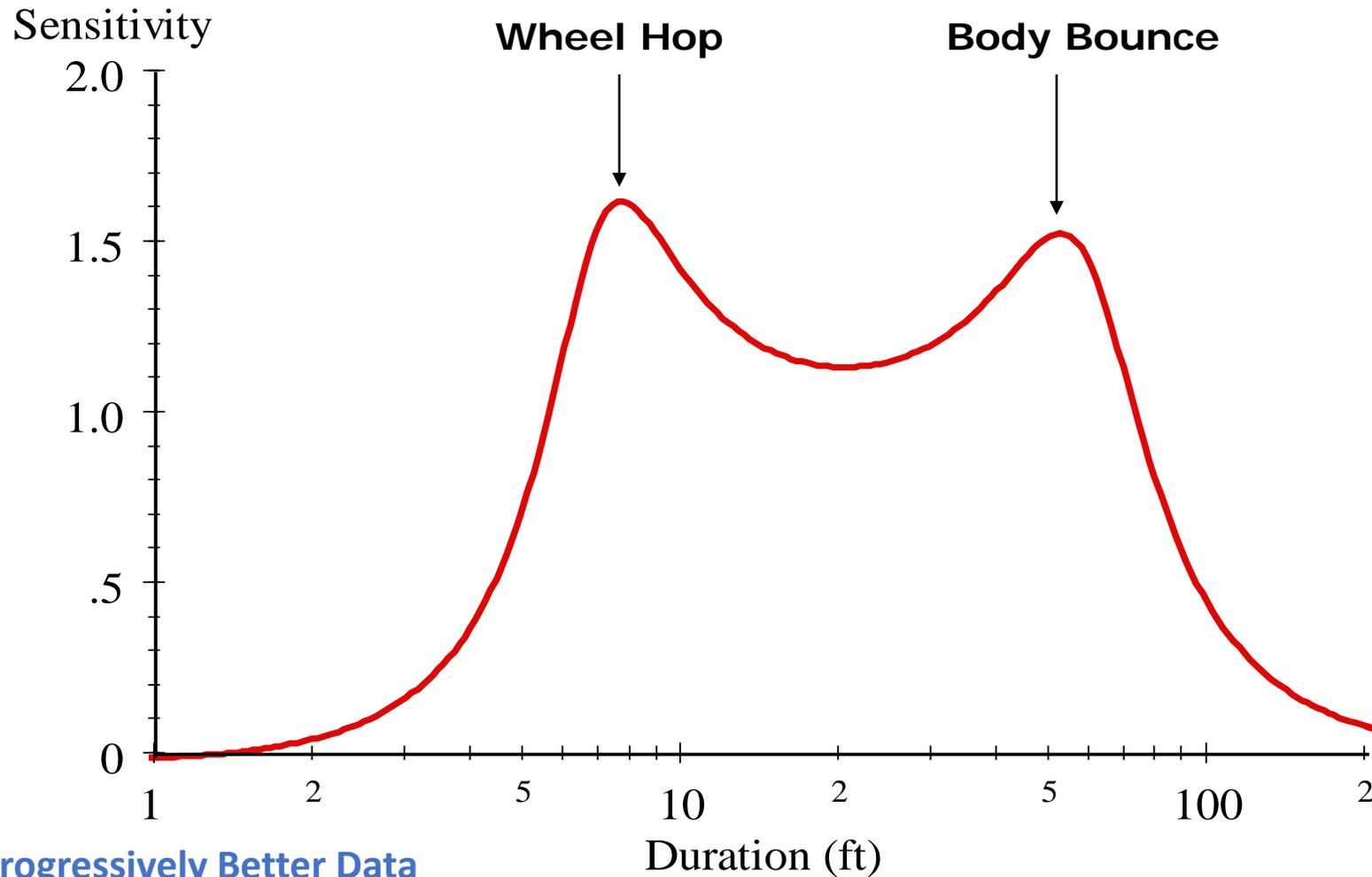
# International Roughness Index (IRI)

Using profiles to simulate vehicle response (What the public “feels”)



Source: Steve Karamihas UMTRI

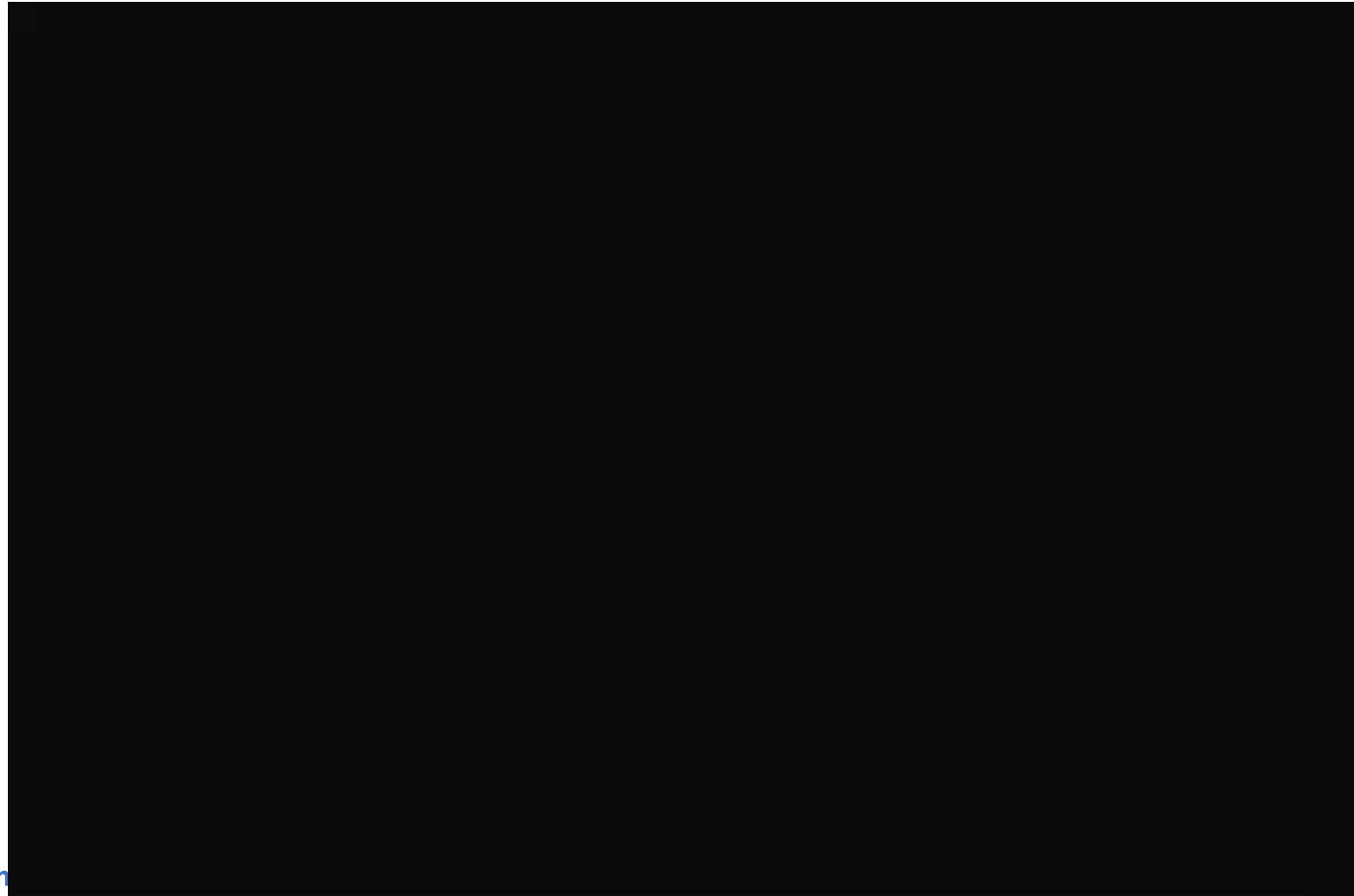
# IRI Sensitivity

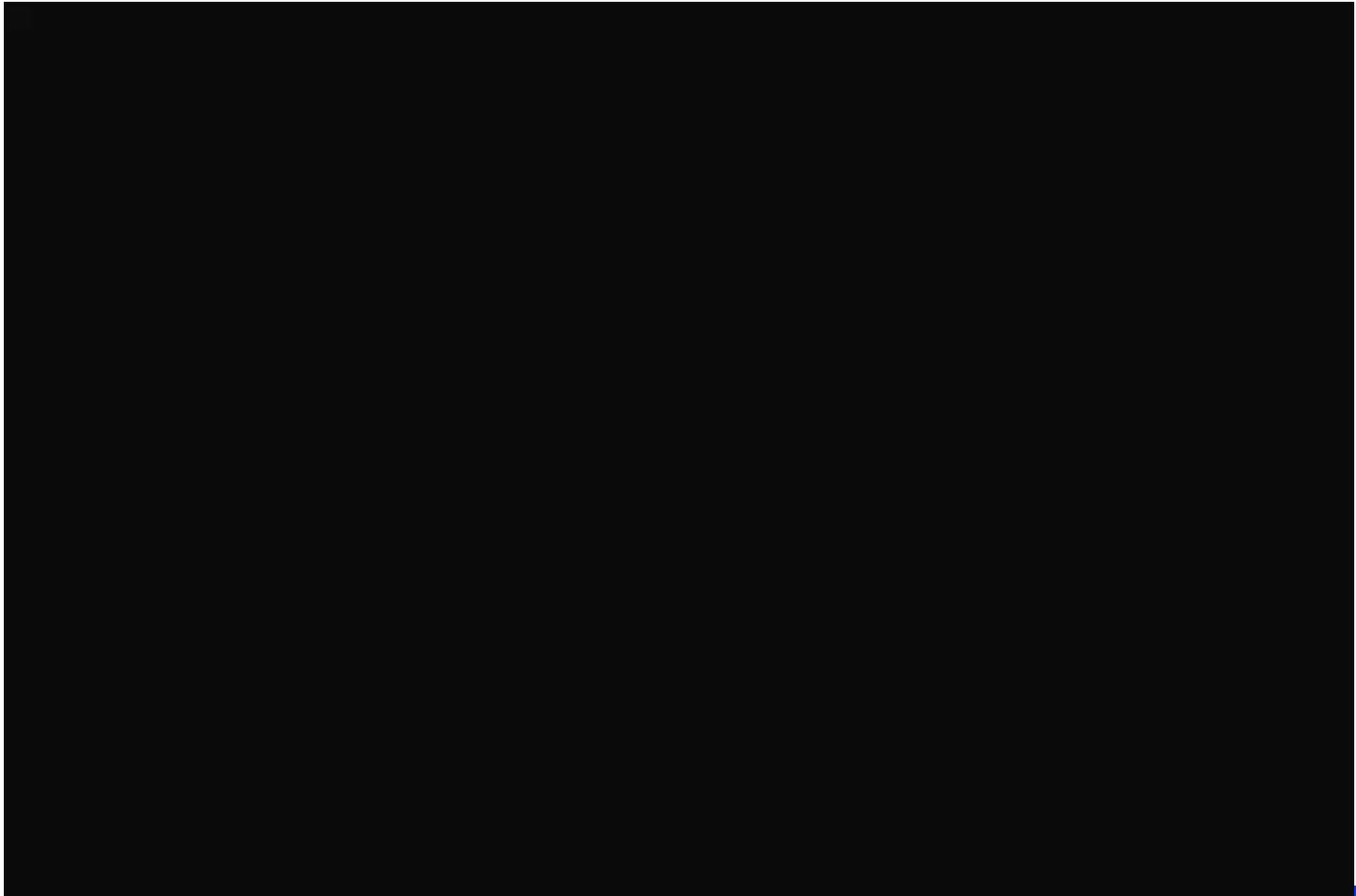




# Evolution of Uses of IRI

- Network Monitoring and Reporting
  - HPMS & PMS
- Construction Acceptance of Pavements
  - Textured Surfaces
  - Lightweight profilers (get on early & simulate profilographs)
  - Positive and Negative pay adjustments
- Construction Acceptance of Structures
- Forensic Investigations
- Use in Maintenance Operations





# History of Problems and Solutions

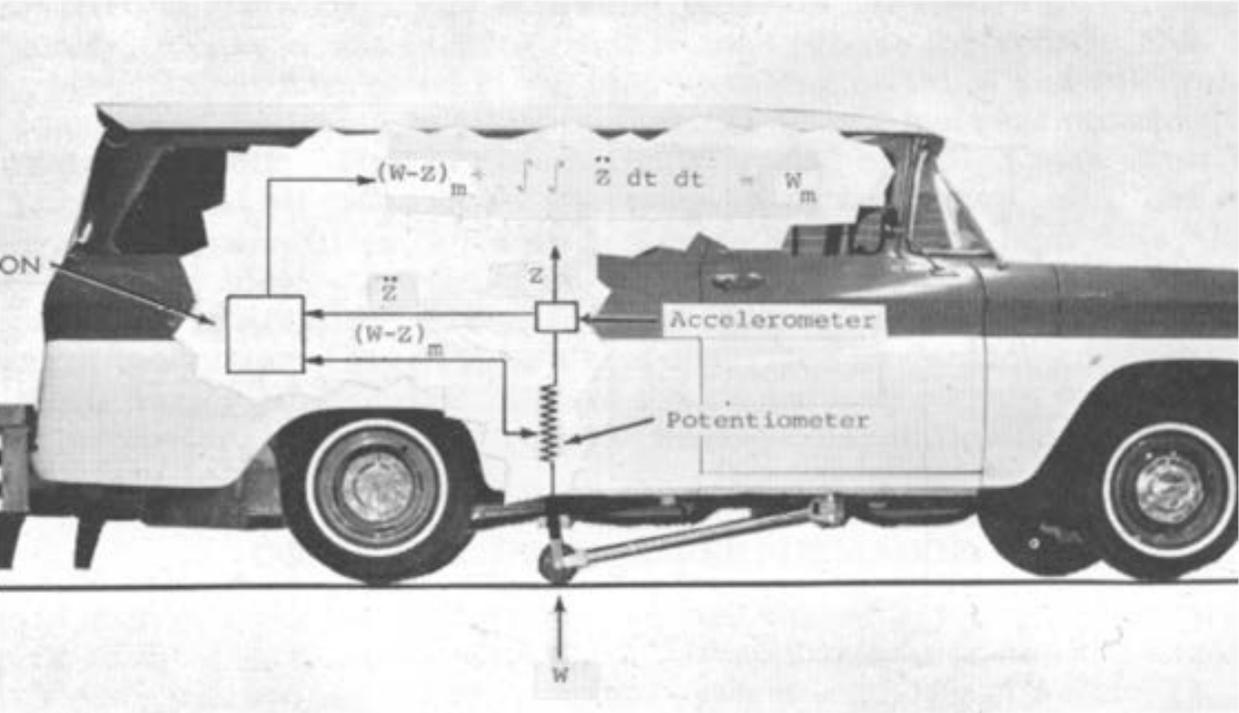
- High Cost of GM/KJLaw Profilometer
- SD Road Profiler
- Texture – Line-scan height lasers
- Different Profilers measuring same road got different IRI
- TPF 5-063
  - Ground truth
  - Reference profile
  - Black Box
- ProVAL and its evolution

# BPR roughometer



# GM profilometer

1964 - General Motors Research



Spangler, E. B. and W. J. Kelly, "GMR Road Profilometer—A Method for Measuring Road Profile." Highway Research Record No. 121 (1966) pp. 27-54.



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30 years on the Road To Progressively Better Data



THE STATE

OF WYOMING



Mike Sullivan, Governor

Leno Menghini, Superintendent and Chief Engineer

## *Wyoming State Highway Department*

P.O. BOX 1708

CHEYENNE, WYOMING 82002-9019

### WHO SHOULD ATTEND?

Anyone who owns/operates a Road Profiler or is interested in acquiring a Road Profiler should attend. Engineers responsible for road roughness data and pavement management will benefit.

# Wyoming 1989

## REGISTRATION FEE?

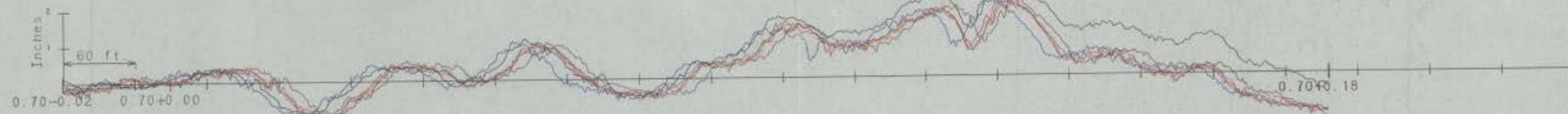
There is a \$40 pre-registration fee to cover the cost of two hosted lunches and coffee breaks. Participants may register at the meeting if they wish, but the registration fee will be \$50 at the door. Pre-registration is encouraged to ease the logistics burden of setting up the meeting.

PRF011: Filtered Profile Plot Program  
Copyright 1986 SDDOT

Highway: 010025F From 0.70 -0.02 to 0.70 +0.18

File/Disk and limits plotted:

*Survey* 0025F0.000/9999. 0.70 + -0.02 to 0.70 +0.18, Lane 1,  $\lambda = 300$ .ft  
*Nebraska* I0025F 000/1. 0.70 + -0.02 to 0.70 +0.18, Lane 1,  $\lambda = 300$ .ft  
*No Data* I0025F 000/1. 0.70 + -0.02 to 0.70 +0.18, Lane 1,  $\lambda = 300$ .ft  
*Are Tech* 001000 028/1. 0.70 + -0.02 to 0.70 +0.18, Lane 1,  $\lambda = 300$ .ft  
*So Data* I0025F 000/1. 0.70 + -0.02 to 0.70 +0.18, Lane 1,  $\lambda = 300$ .ft  
*Wyoming* I0025F 000/1. 0.70 + -0.02 to 0.70 +0.18, Lane 1,  $\lambda = 300$ .ft

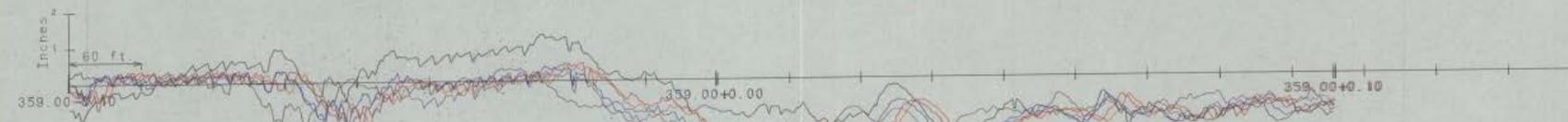


PRF011: Filtered Profile Plot Program  
Copyright 1986 SDDOT

Highway: 010080E From 359.00 -0.10 to 359.00 +0.10

File/Disk and limits plotted:

*Survey* 0080E0.359/9999. 359.00 + -0.10 to 359.00 +0.10, Lane 1,  $\lambda = 300$ .ft  
*Nebraska* I0080E 358/1. 359.00 + -0.10 to 359.00 +0.10, Lane 1,  $\lambda = 300$ .ft  
*No Data* I0080E 360/1. 359.00 + -0.10 to 359.00 +0.10, Lane 1,  $\lambda = 300$ .ft  
*Are Tech* 001000 029/1. 359.00 + -0.10 to 359.00 +0.10, Lane 1,  $\lambda = 300$ .ft  
*So Data* I0080E 358/1. 359.00 + -0.10 to 359.00 +0.10, Lane 1,  $\lambda = 300$ .ft  
*Wyo* I0080E 358/1. 359.00 + -0.10 to 359.00 +0.10, Lane 1,  $\lambda = 300$ .ft



# Attendances over the years

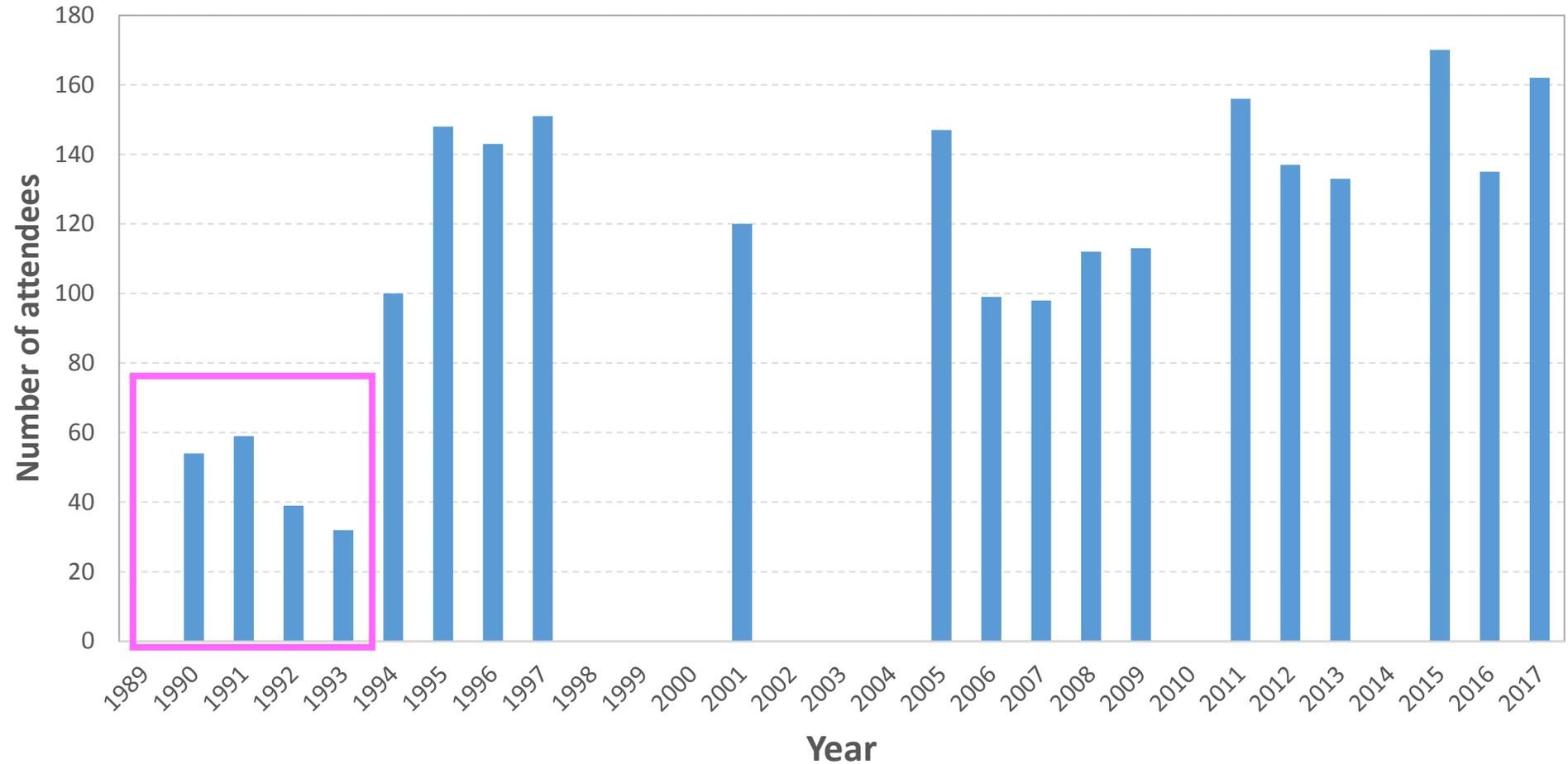


Table 4.2

DATA RECORDING INTERVALS FOR PROFILERS

Region	Profiler Number	Agency	Profiler Type	Sensor Type	Recording Interval (ft)
Mississippi	01	Mississippi DOT	ICC	Ultrasonic	1.07227
Mississippi	02	Alabama DOT	ICC	Ultrasonic	1.08795
Mississippi	03	Int. Cybernetics	ICC	Laser	0.54196
Mississippi	05	Pavetech	Pavetech	Ultrasonic	0.86
Mississippi	06	SHRP – Southern	K.J. Law	Optical	0.5
Nevada	03	Montana DOT	ICC	Ultrasonic	1.06793
Nevada	04	Oregon DOT	ICC	Ultrasonic	1.07666
Nevada	07	Utah DOT	ICC	Laser	0.52448
Nevada	08	Arizona DOT	K.J. Law	Optical	0.5
Nevada	09	SHRP – Western	K.J. Law	Optical	0.5
Pennsylvania	02	Virginia DOT	ICC	Ultrasonic	1.09216
Pennsylvania	03	PCS Law	ICC	Ultrasonic	1.08472
Pennsylvania	04	ARAN Roadware	ARAN	Laser	0.33
Pennsylvania	05	Ohio DOT	K.J. Law	Optical	0.5
Pennsylvania	06	Pasco	ICC	Ultrasonic	1.04803
Pennsylvania	07	SHRP – North Atlantic	K.J. Law	Optical	0.5
Pennsylvania	08	Int. Cybernetics	ICC	Laser	0.54196
Pennsylvania	73	Pennsylvania DOT	ICC	Ultrasonic	1.12311
Pennsylvania	74	Pennsylvania DOT	ICC	Ultrasonic	1.12164
Pennsylvania	75	Pennsylvania DOT	ICC	Ultrasonic	1.12396
Pennsylvania	76	Pennsylvania DOT	ICC	Ultrasonic	1.11652
South Dakota	01	Iowa DOT	ICC	Ultrasonic	1.06
South Dakota	02	Nebraska DOT	South Dakota Design	Ultrasonic	1
South Dakota	03	Minnesota DOT	Pavetech	Ultrasonic	1.084
South Dakota	06	Wyoming DOT	South Dakota Design	Ultrasonic	1
South Dakota	08	SHRP – North Central	K.J. Law	Optical	0.5
South Dakota	09	Saskatchewan DOT	CAL High Speed	Ultrasonic	1.0367
South Dakota	10	South Dakota DOT	ARAN	Laser	0.6667
South Dakota	11	North Dakota DOT	Pavetech	Ultrasonic	1.1

# ROAD PROFILER ANALYSIS

## ROAD PROFILER USER GROUP

### FIFTH ANNUAL MEETING

#### PENNSYLVANIA



**Dipstick<sup>®</sup>**  
Auto-Read Road Profiler

- For rapid calibration of high-speed road meters
- Tolerance control for bridge decks, runways, and pavements





Trivia – which state has hosted the most meetings?

- a) Nevada
- b) South Dakota
- c) Virginia
- d) Minnesota
- e) Texas
- f) Colorado



## Seventh Annual Meeting



Orlando, Florida  
October 3-5, 1995

### 1995 RPUG EXHIBITORS

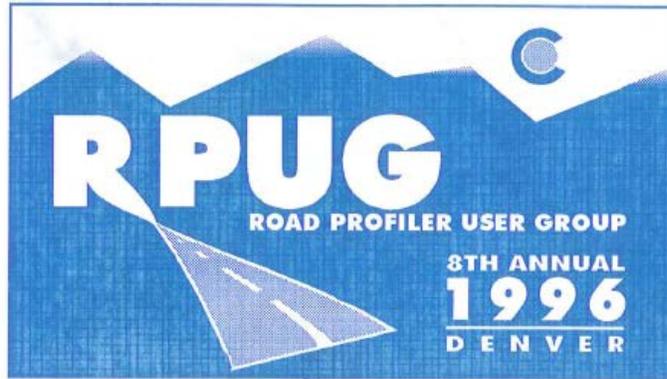
The following vendors have exhibits set up in the pre function area outside of the meeting hall:

PASCO  
DYNATEST  
PAVETECH  
K. J. LAW  
KEYSTONE  
ROADWARE  
AMES  
MHM ASSOCIATES, INC.  
SURFACE SYSTEM INSTRUMENTS  
INFRASTRUCTURE MANAGEMENT SERVICES  
INTERNATIONAL CYBERNETICS CORP.

Equipment Demonstrations are also being provided by some vendors in the parking lot to the rear of the building.

Please take the time to tour the exhibits and review the latest technology.

Stewart Famous  
Osceola County Road Department  
2350 Kissimmee Park Road  
St. Cloud, FL 34769  
Phone (407) 892-3110  
Fax (407) 892-7106



**September 22 - 25, 1996**  
**Marriott City Center - Denver, Colorado**

## **Meeting Notes**

**Sponsored by:**

Colorado Department of Transportation  
Federal Highway Administration  
Colorado State University Transportation Information Program

**Corporate Sponsors:**

Roadware Corporation  
Pathway Services





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[Introduction](#)  
[Accommodations](#)  
[Theme](#)  
[Registration](#)  
[NHI Course](#)  
[Test Tracks](#)  
[Agenda/Program](#)  
[Vendors](#)  
[Attendees](#)  
[More Info](#)



# ANNOUNCING

the Ninth Annual

## Road Profiler User Group Meeting

October 26-29, 1997  
Overland Park, Kansas

### Introduction

The Kansas Department of Transportation, in conjunction with the Federal Highway Administration, is very proud to host the **9th Annual Road Profiler User Group**. The purpose of this conference is to serve as a forum for the **exchange of information** between end users, data collectors, vendors, construction and design engineers, consultants, and researchers who have an interest in road profiles, road roughness, and pavement smoothness. The conference is intended for engineers and researchers in pavement and its related fields at all levels of government, contractors, consultants, universities, equipment manufacturers, and vendors.

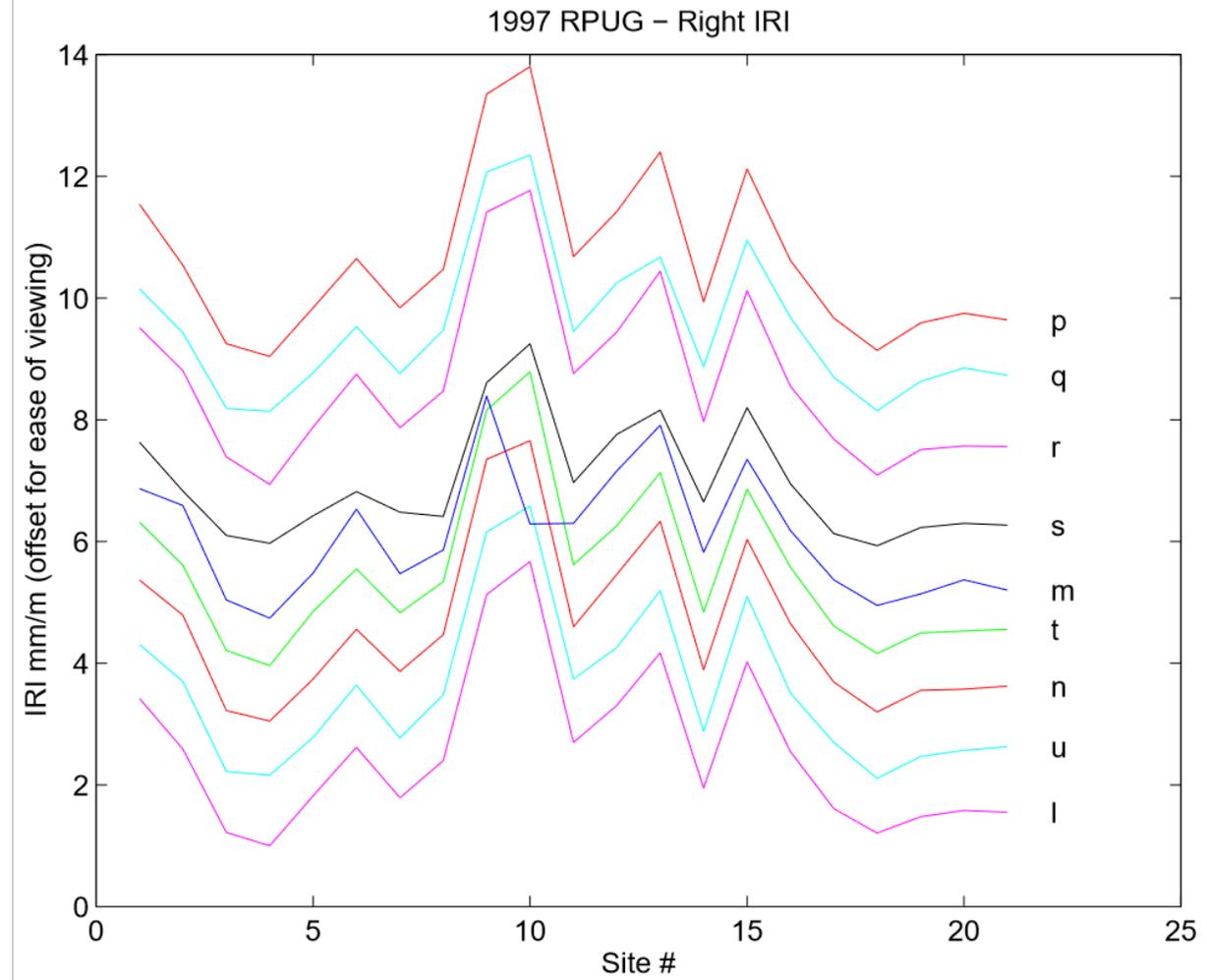
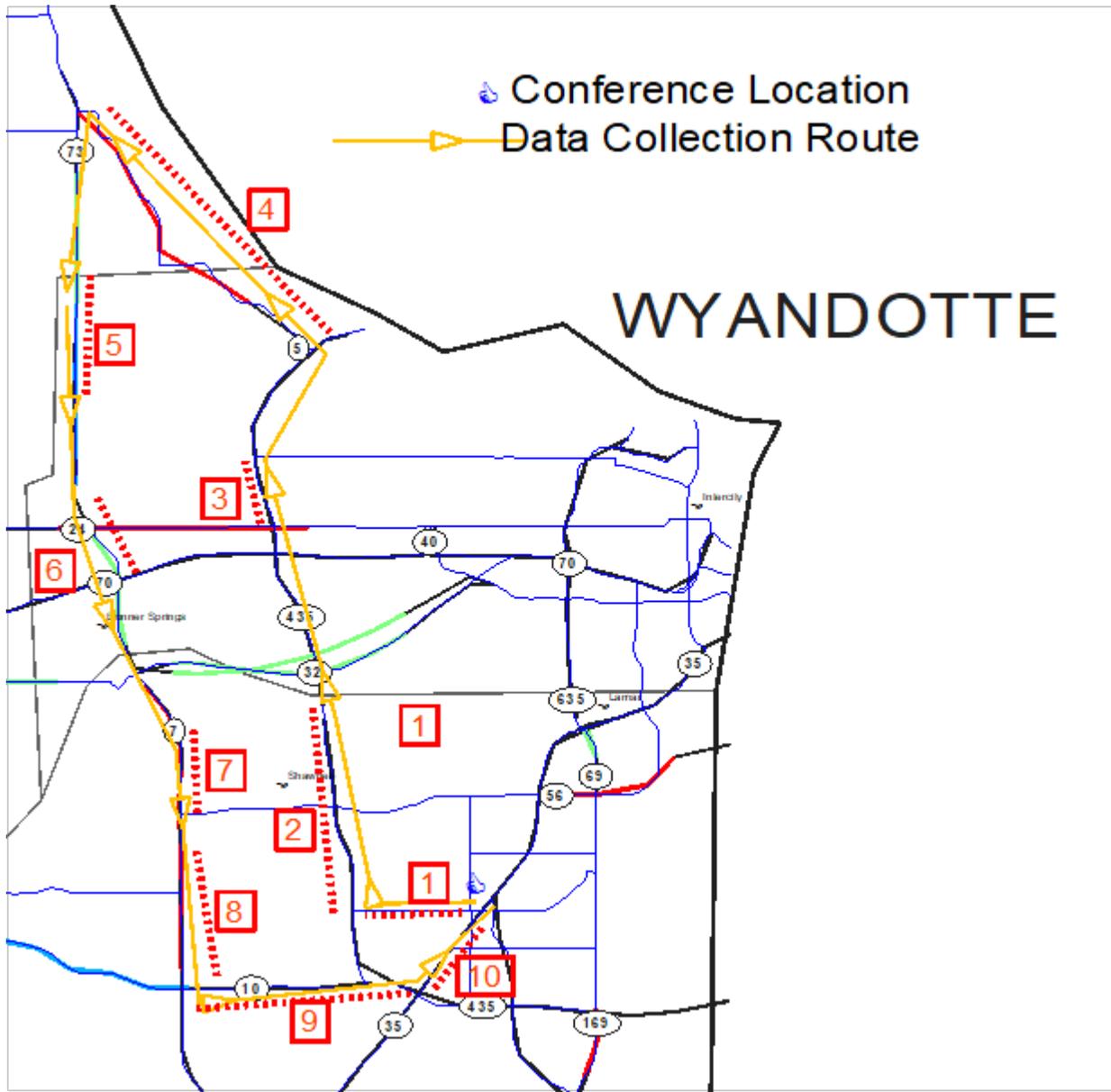
The conference will be held at the [Radisson Hotel](#) in Overland Park which is located about 45 minutes south from the Kansas City International Airport (KCI). [Overland Park](#) is in the heart of the affluent Johnson County and offers first class [shopping](#) and excellent [restaraunts](#) with easy access to the area's [attractions](#).



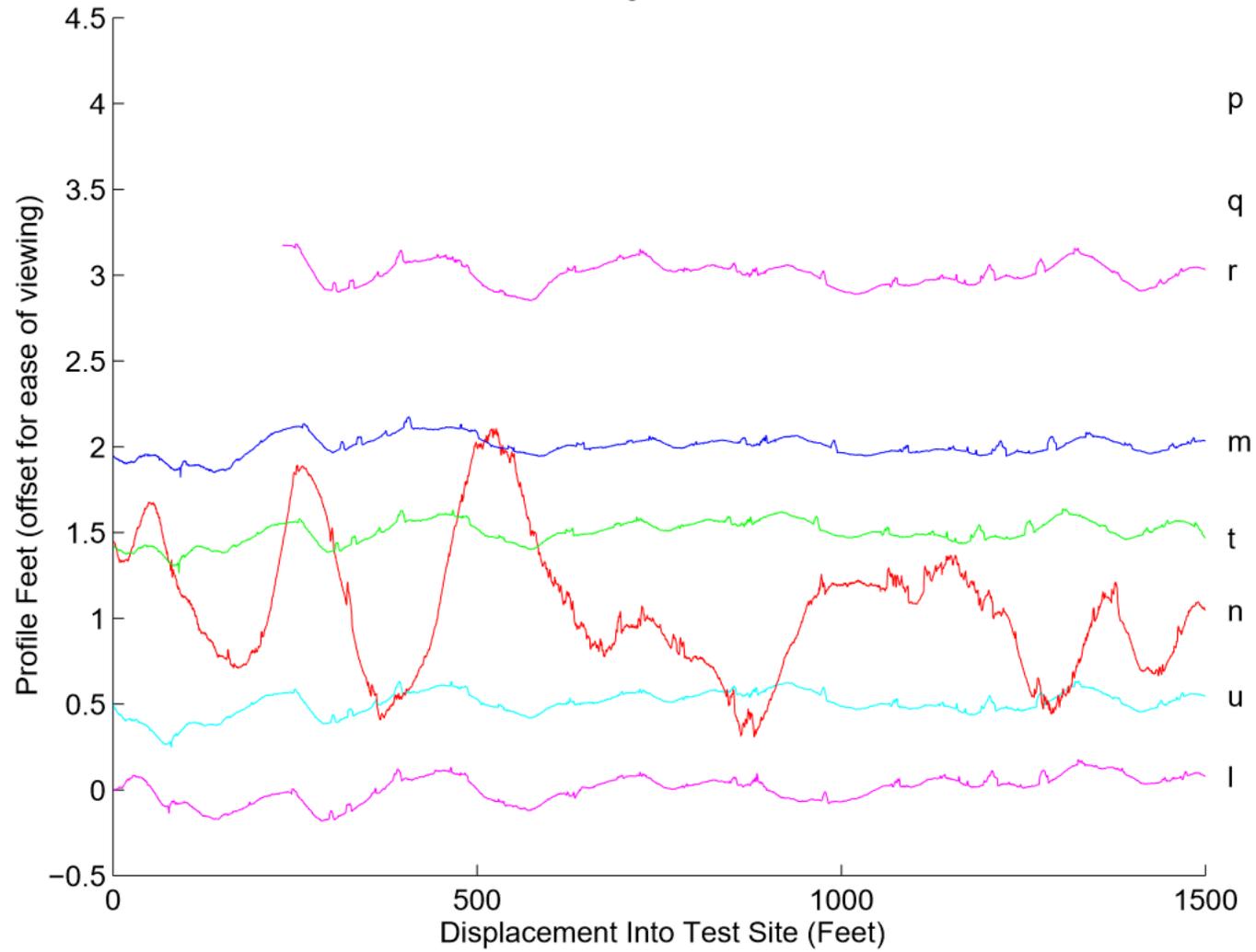
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Last updated 05/29/97

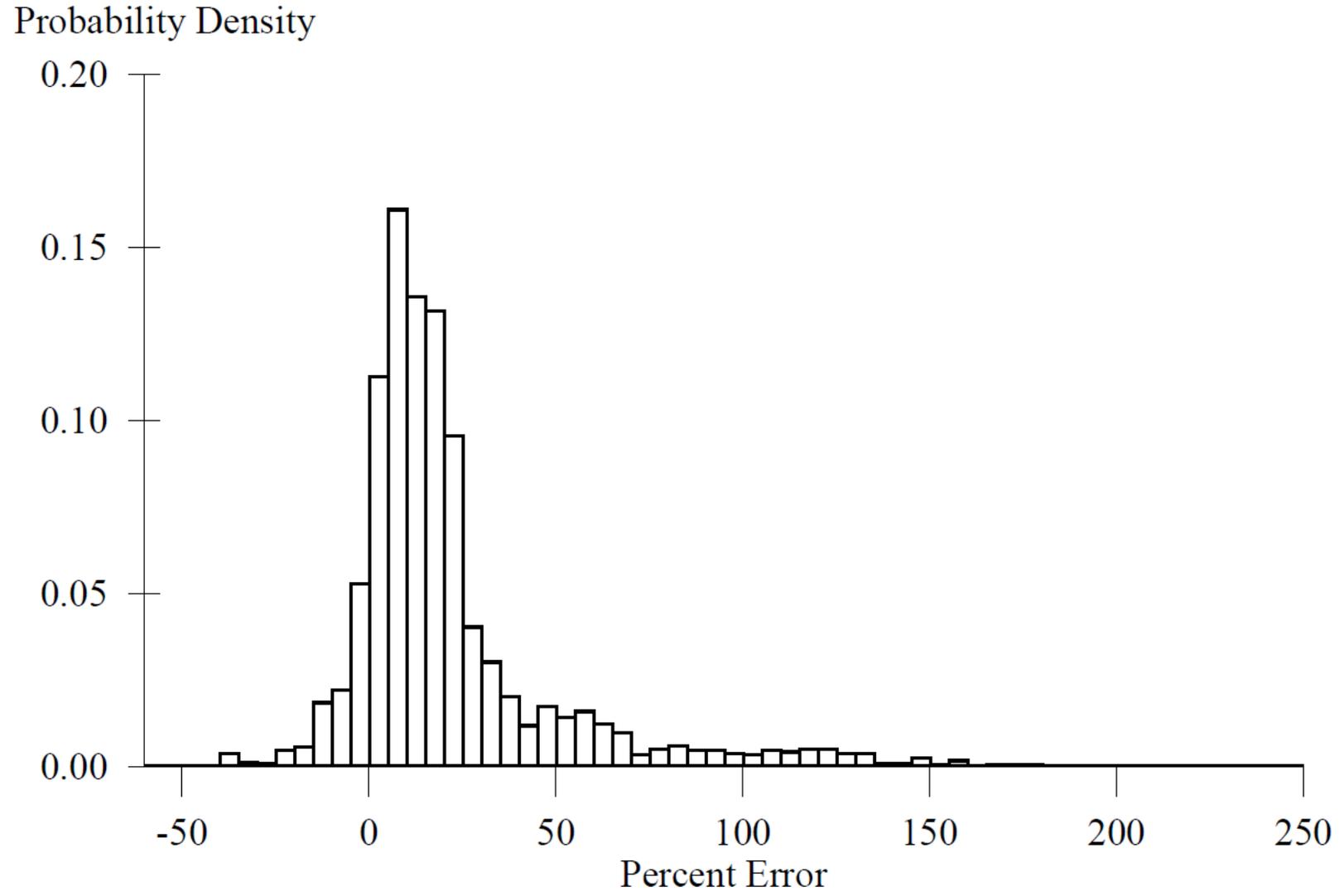
Designed for Netscape 3.0 using a screen resolution of 800x600.



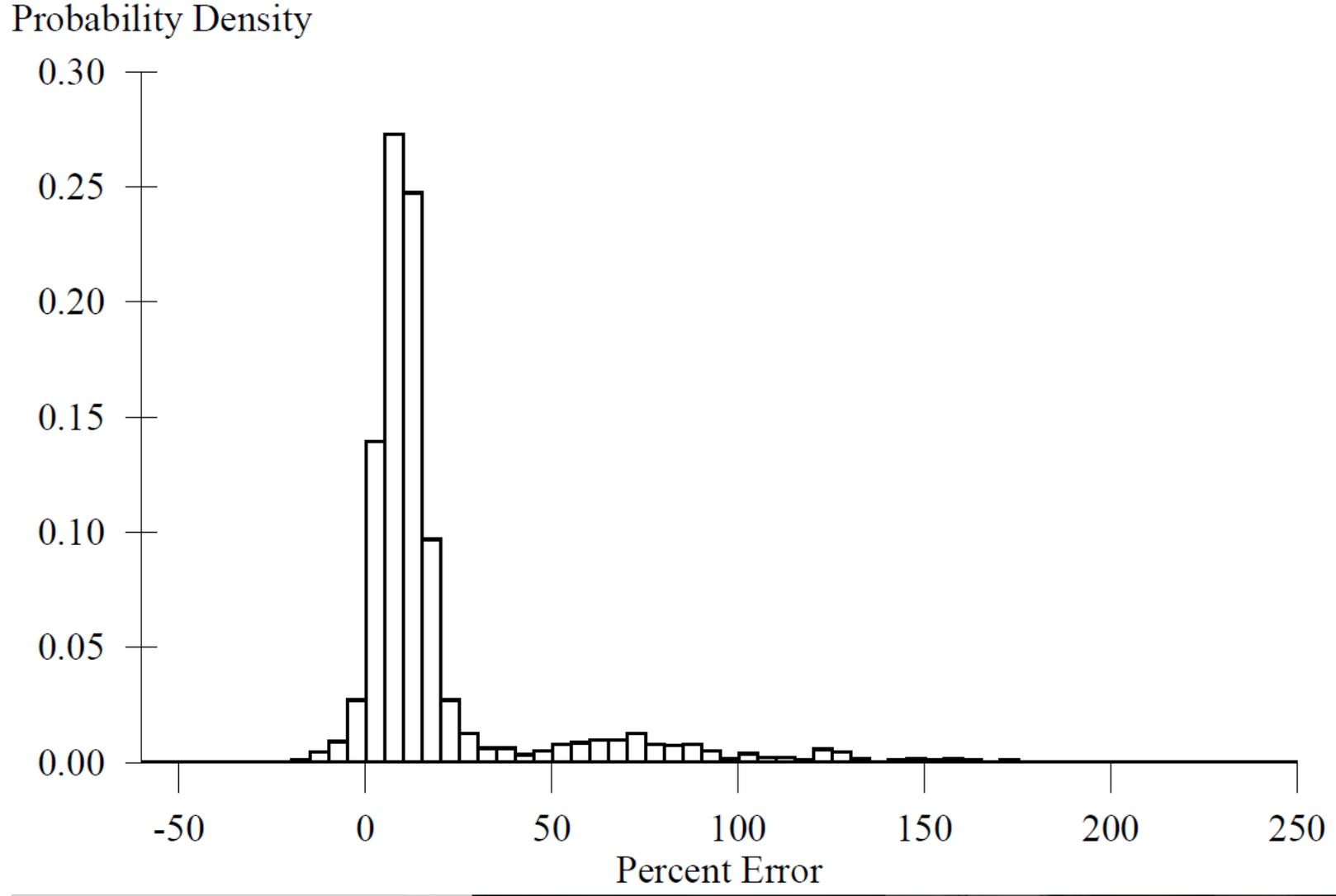
1997 RPUG – Right Profile Plots Site 1



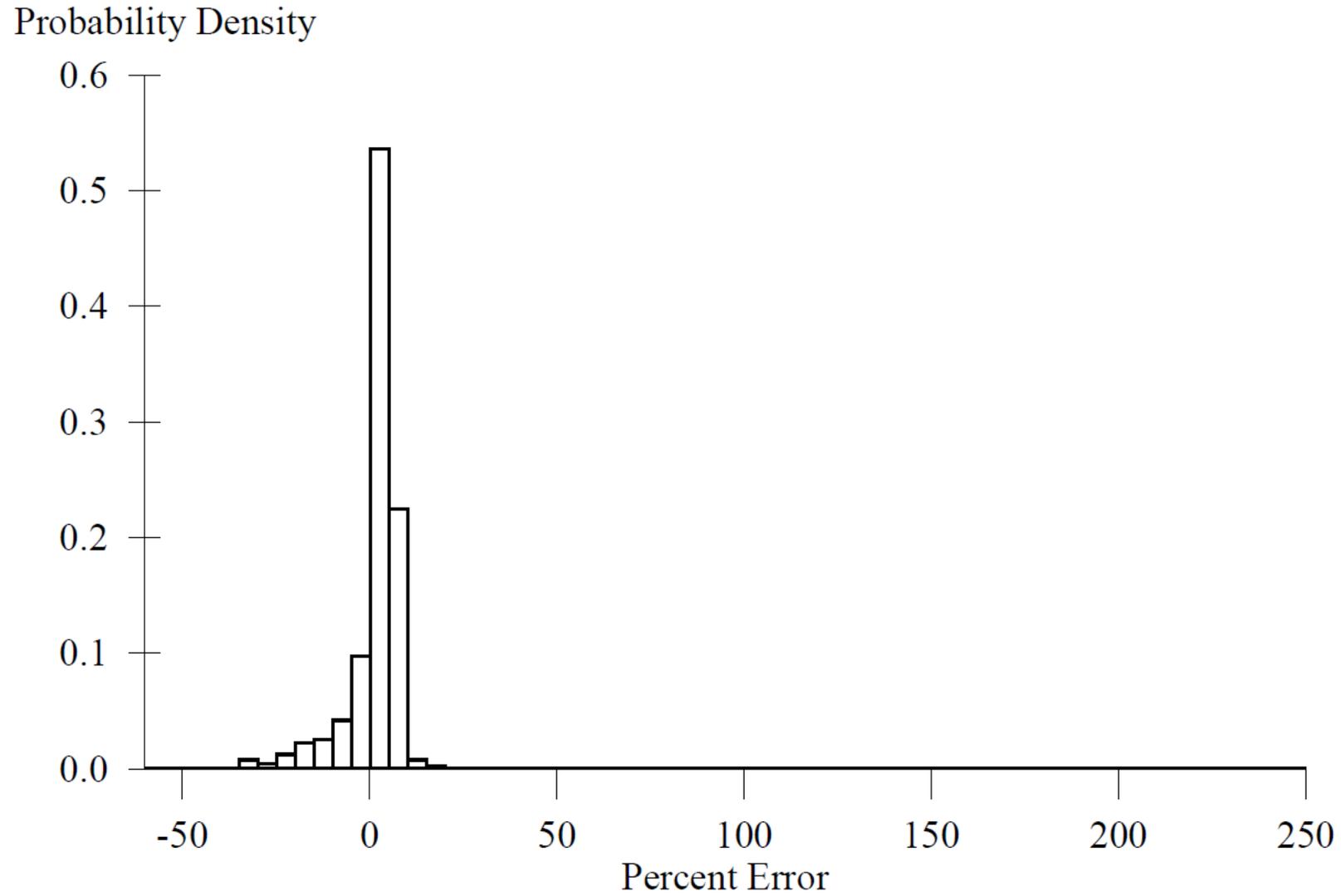
1993



2004



2015





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30 years on the Road To Progressively Better Data

1994



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2016



30 years on the Road To Progressively Better Data



30 years on the Road To Progressively Better Data



2003



# Austin, Texas car parks – beware!



# Time for some exercise





Rudy Blanco  
Vice-President

P.O. BOX 639  
NORMAN, OK 73070

TELEPHONE (405) 364-5553  
FACSIMILE (405) 364-5796

THOMAS M. ADKINS  
WYOMING HIGHWAY DEPT.  
P.O. BOX 1708  
CHEYENNE, WY 82002-9019

JANICE ARELLANO  
PENNSYLVANIA - DOT  
COMMONWEALTH & FORSTER STS  
HARRISBURG, PA 17120

CARL BERTRAND  
DEPT. OF HIGHWAYS & PUBLIC TRANS.  
P.O. BOX 5051  
AUSTIN, TX 78710-5051

RUDY BLANCO  
PAVE TECH INC.  
516 W. CALIFORNIA  
OKLAHOMA CITY, OK 73102

EDGUARO BLOCK  
CONNECTICUT - DOT  
24 WOLCOTT HILL ROAD  
WETHERSFIELD, CT 06109

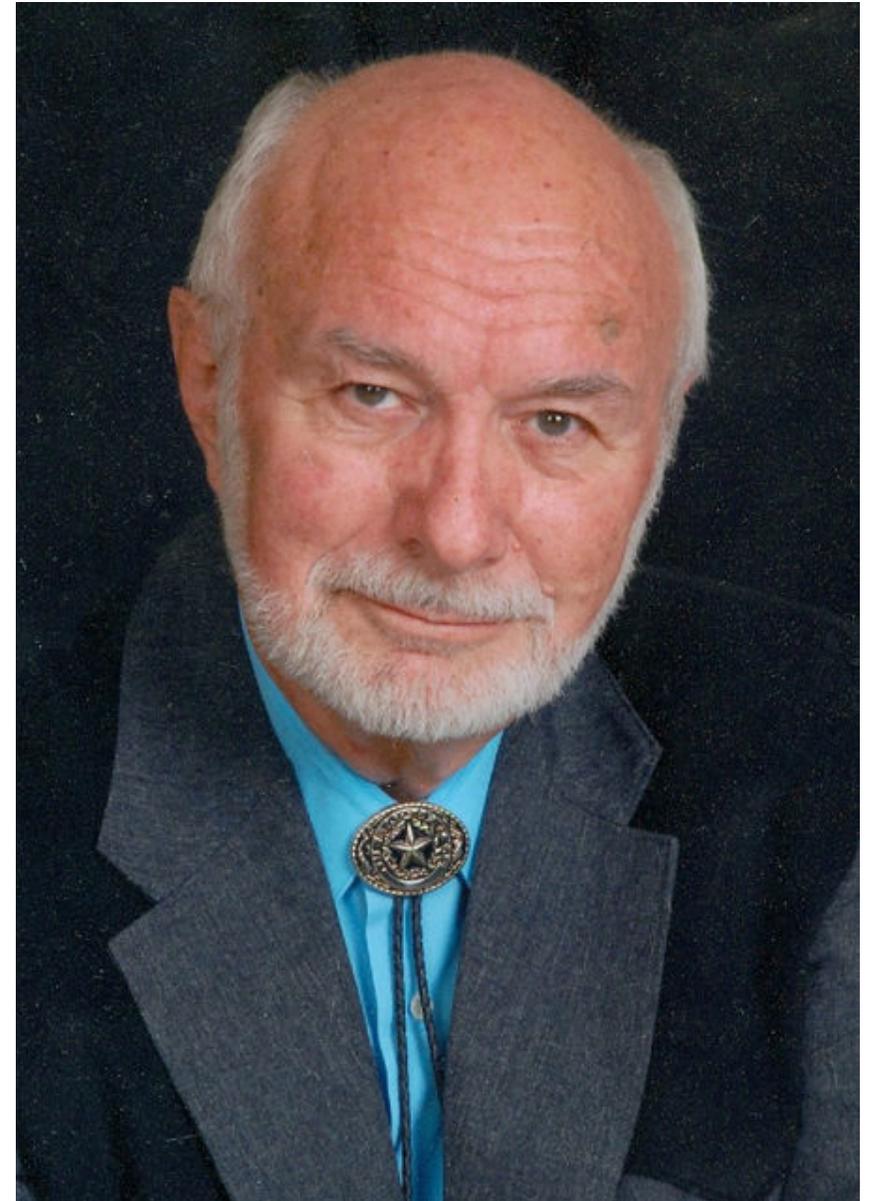
DOYT BOLLING  
FHWA - DENVER  
555 ZNAG ST.  
LAKEWOOD, CO 80228

Prevent others from  
information in P

# In-memoriam

## Jim Cable – Iowa State University

## Philip Bertucci - NJDOT



# RPUG heirlooms



# 1990 attendees list

KHALED KSAIBAATI  
UNIVERSITY OF WY, CIVIL ENG. DEPT.  
P.O. BOX 3295 UNIVERSITY STATION  
LARAMIE, WY 82071

KEN MCGHEE  
VIRGINIA - DOT  
P.O. BOX 3817 UNIVERSITY STATION  
CHARLOTTESVILLE, VA 22903

BOB MCQUISTON  
FHWA - WASHINGTON D.C.  
400 SEVENTH ST. SW.  
WASHINGTON, DC 20590-0001

DONALD J. MEYERS  
PAVEDEX INC.  
E. 9514 MONTGOMERY  
SPOKANE, WA 99206

ROBERT E. OLENOSKI  
INTERNATIONAL CYBERNETICS CORP.  
3044 SCHERER DRIVE N.  
ST. PETERSBURG, FL 33716

BLAIR LUNDE  
SOUTH DAKOTA - DOT  
TRANS. BLDG. 700 BROADWAY AVE. E.  
PIERRE, SD 57501

RON MCNAMERA  
FLORIDA - DOT  
P.O. BOX 1029  
GAINESVILLE, FL 32602

BILL METHENY  
KANSAS - DOT  
2300 VAN BUREN  
TOPEKA, KS 66611

SCOTT NAY  
UTAH - DOT  
4501 SOUTH 2700 WEST  
SALT LAKE CITY, UT 84119

GREG OLIPHANT  
PAVE TECH INC.  
516 W. CALIFORNIA  
OKLAHOMA CITY, OK 73102



Dave says “Enjoy your time South Dakota!”

