RPUG
Road Profile Users' Group

CELEBRATING 250 YEARS OF PROGRESS

HONORING THE PAST. PAVING THE FUTURE.

2026 RPUG CONFERENCE ★ PITTSBURGH, PA ★ APRIL 28 - MAY 1

A HOMAGE TO ROADS AND ROAD PROFILING IN THE USA

RICHARD WIX
NATIONAL TRANSPORT RESEARCH ORGANISATION

Early Roads

https://camel76.wordpress.com/2013/12/31/widan-al-faras-tracing-the-worlds-oldest-road/#jp-carousel-2984

‘All Roads Lead to Rome’

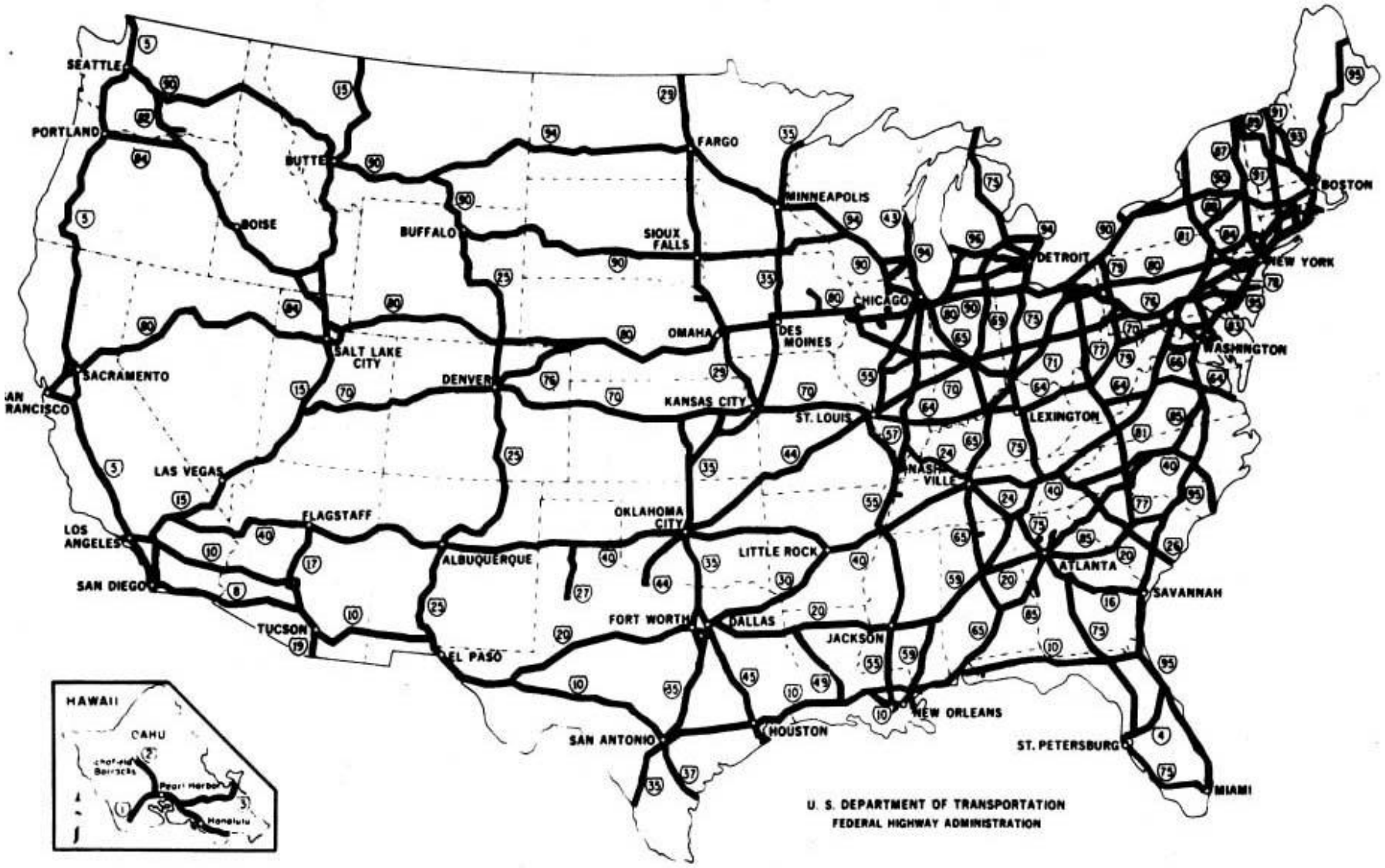
http://www.crystalinks.com/romeroads.html

Ways of the World: A History of the World's Roads and of the Vehicles That Used Them by Max Lay – Figure 3.10

Early American Road Development

Ways of the World: A History of the World's Roads and of the Vehicles That Used Them by Max Lay – Figure 3.10

The US Interstate System



https://highways.dot.gov/highway-history/interstate-system/50th-anniversary/dwight-d-eisenhower-system-interstate-and

Fact or fiction

One in five miles of the Interstate System is straight so airplanes can land in emergencies.

This myth is widespread and has no basis in law, regulation, design manual—or fact.

Airplanes occasionally land on Interstates when no alternative is available in an emergency, not because the Interstates are designed for that purpose.

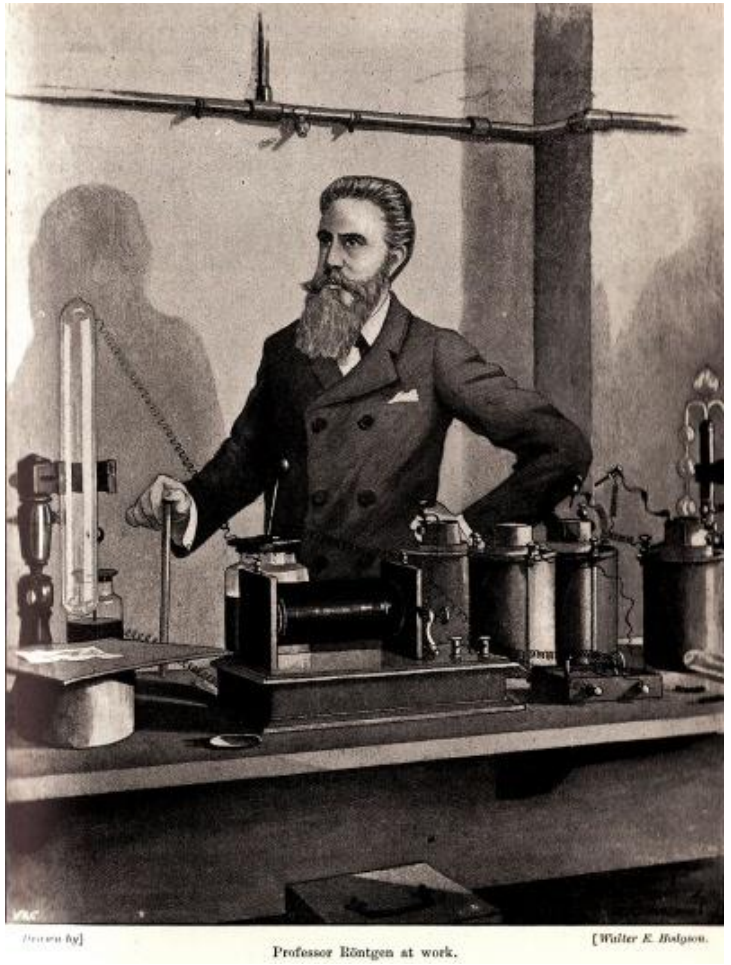
Interstate Highway System - The Myths | FHWA

Impact of American Roads

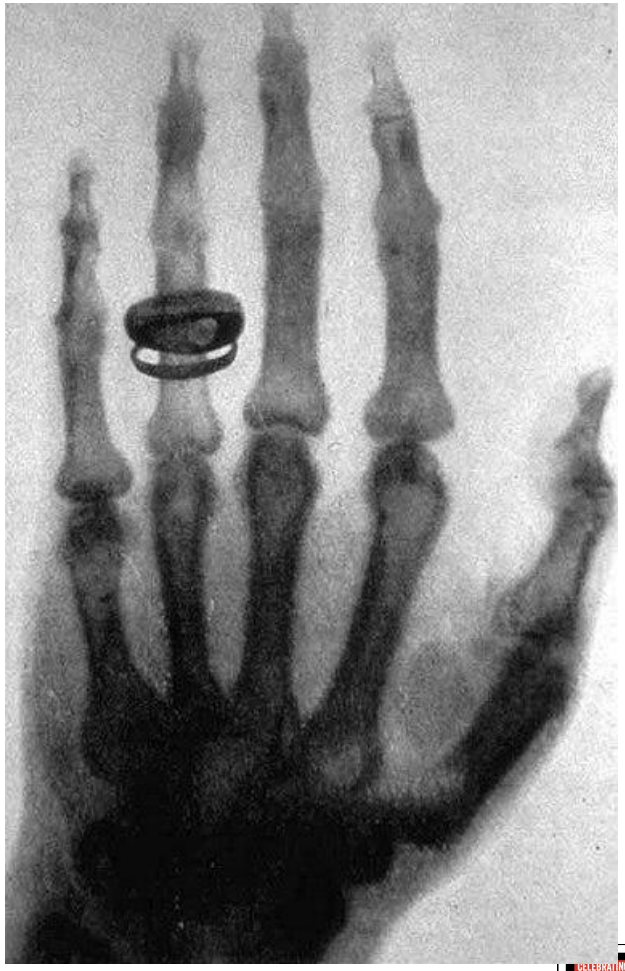
Human Physiology

Looking after Yourself…..

Scipione Riva-Rocci – 1896

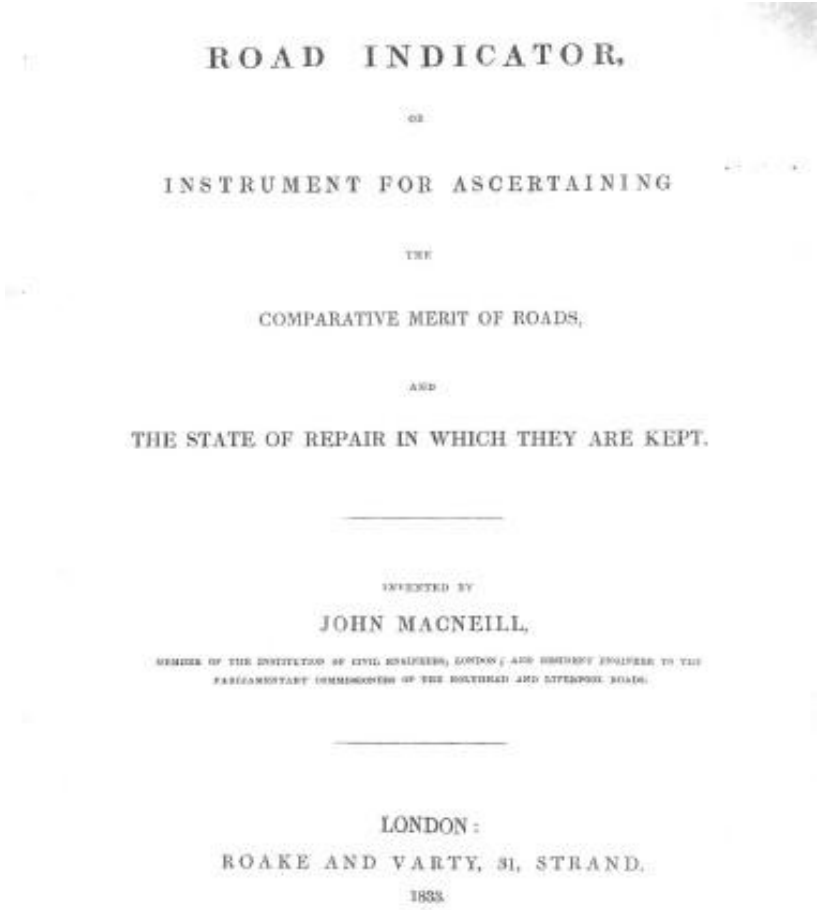

Professor Röntgen at work.

[Walter E. Bolgson.



Wilhelm Conrad Röntgen - 1895

Pavement Condition Monitoring (1833)



ROAD INDICATOR,

OR

INSTRUMENT FOR ASCERTAINING

THE

COMPARATIVE MERIT OF ROADS,

AND

THE STATE OF REPAIR IN WHICH THEY ARE KEPT.

INVENTED BY

JOHN MACNEILL,

MEMBER OF THE INSTITUTION OF CIVIL ENGINEERS, LONDON; AND ASSISTANT ENGINEER TO THE PARLIAMENTARY COMMISSIONERS OF THE HOLYHEAD AND LIVERPOOL ROADS.

LONDON:

ROAKE AND VARTY, 31, STRAND.

1833.

This Instrument is capable of being applied to several very important purposes in road engineering, amongst which are the following,

First, It affords the means of ascertaining the exact power required to draw a carriage over any line of road.

Secondly, It can be applied to compare one line of road with another, so as to determine which of them is the best, and, the exact amount of the difference, as regards horse power, both for slow and fast coaches.

Thirdly, The comparative value of different road surfaces may be determined with great exactness.

Fourthly, It affords the means of keeping a registry, in a most accurate manner, from year to year, of the state of a road, showing its improvement or deterioration, and the exact parts in which such improvement or deterioration have taken place.

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Ride quality really is an issue…..

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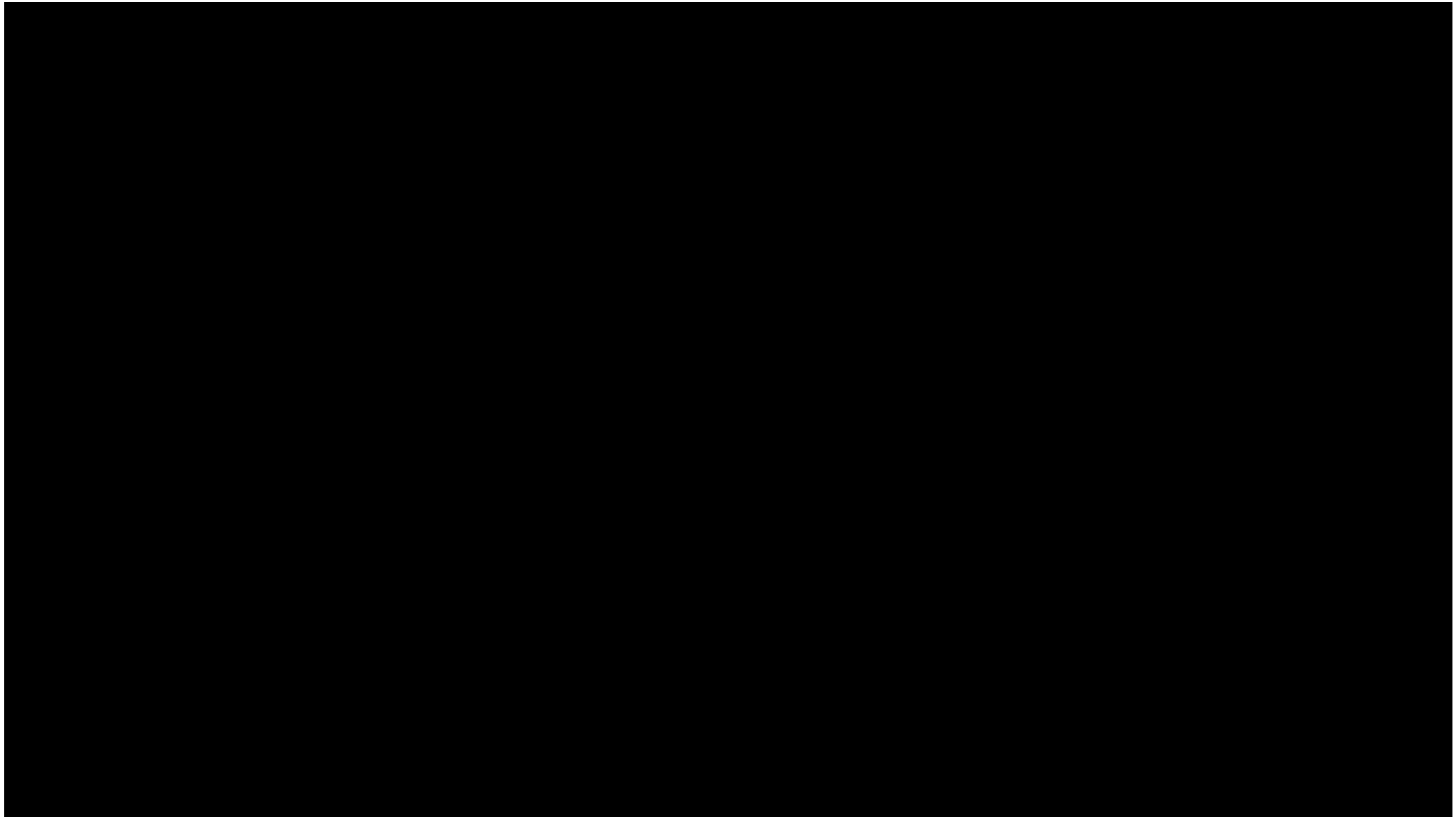
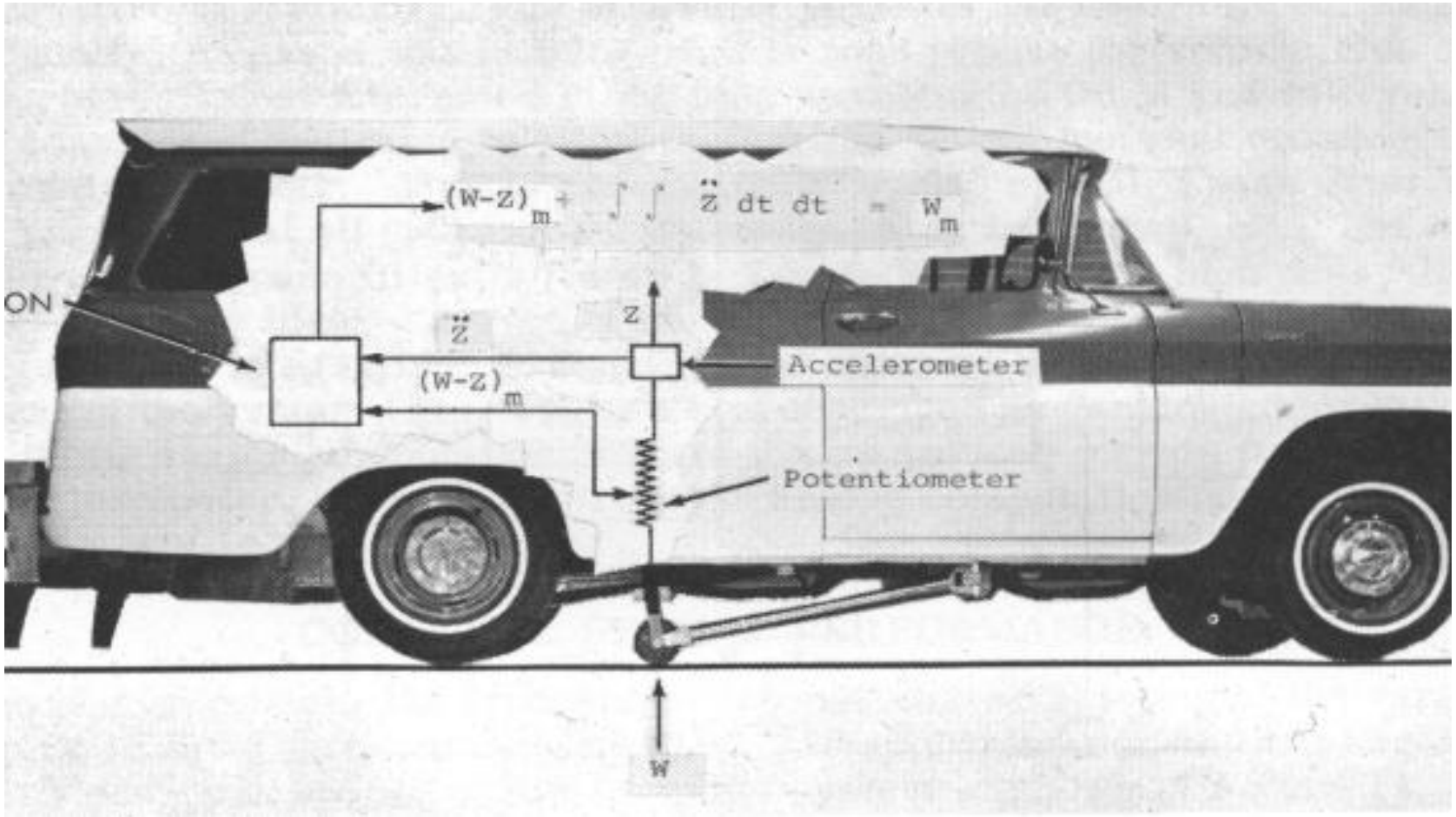
Early Road Condition Monitoring Systems



But a change was in the air…….

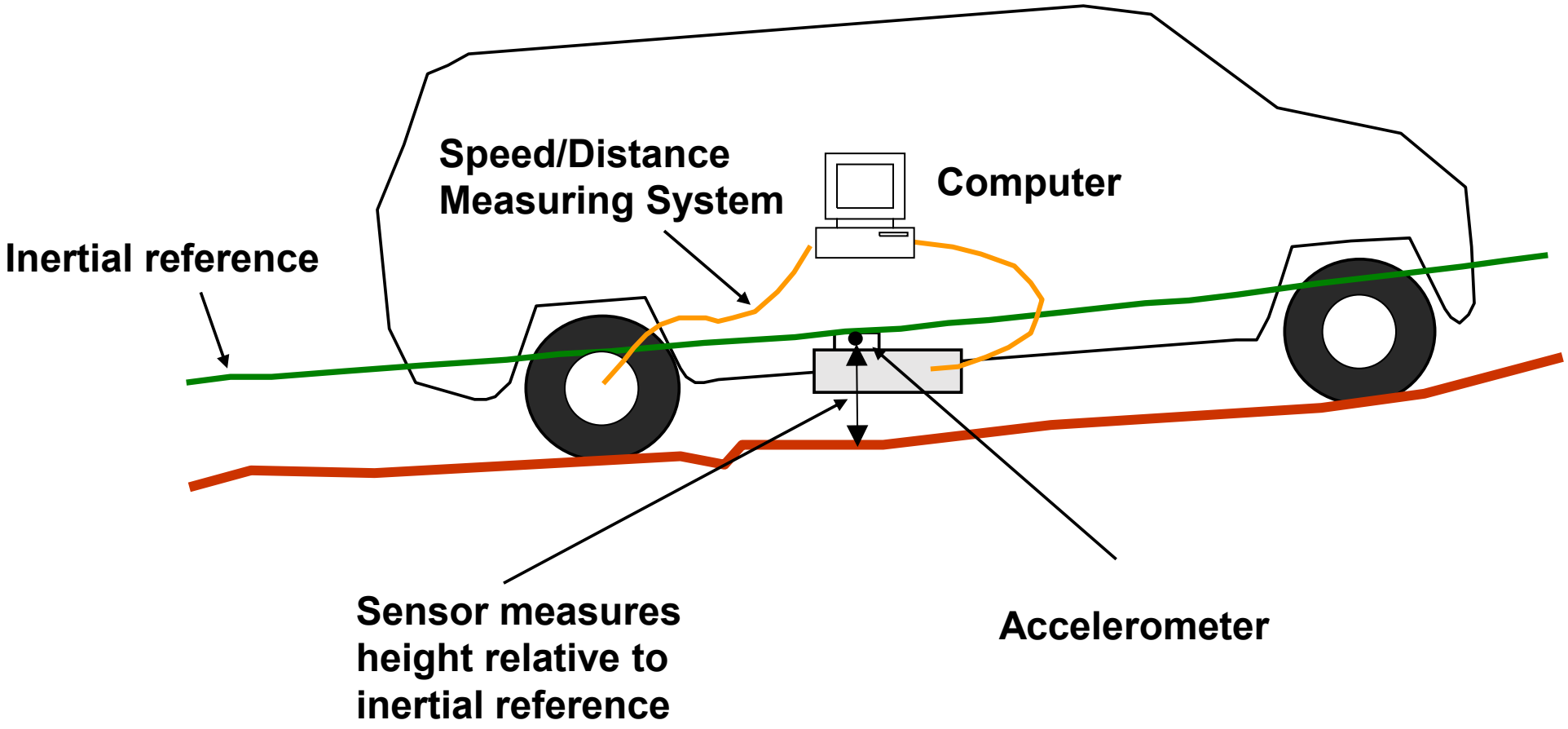


Spangler, E. B. and W. J. Kelly, "GMR Road Profilometer–A Method for Measuring Road Profile." Highway Research Record No. 121 (1966) pp. 27-54.

1964 - General Motors Research

Spangler, E. B. and W. J. Kelly, "GMR Road Profilometer–A Method for Measuring Road Profile." Research Publication GMR-452, Research Laboratories, General Motors Corporation, Warren, MI (1964) pp. 20.

Basic components of an inertial profiler

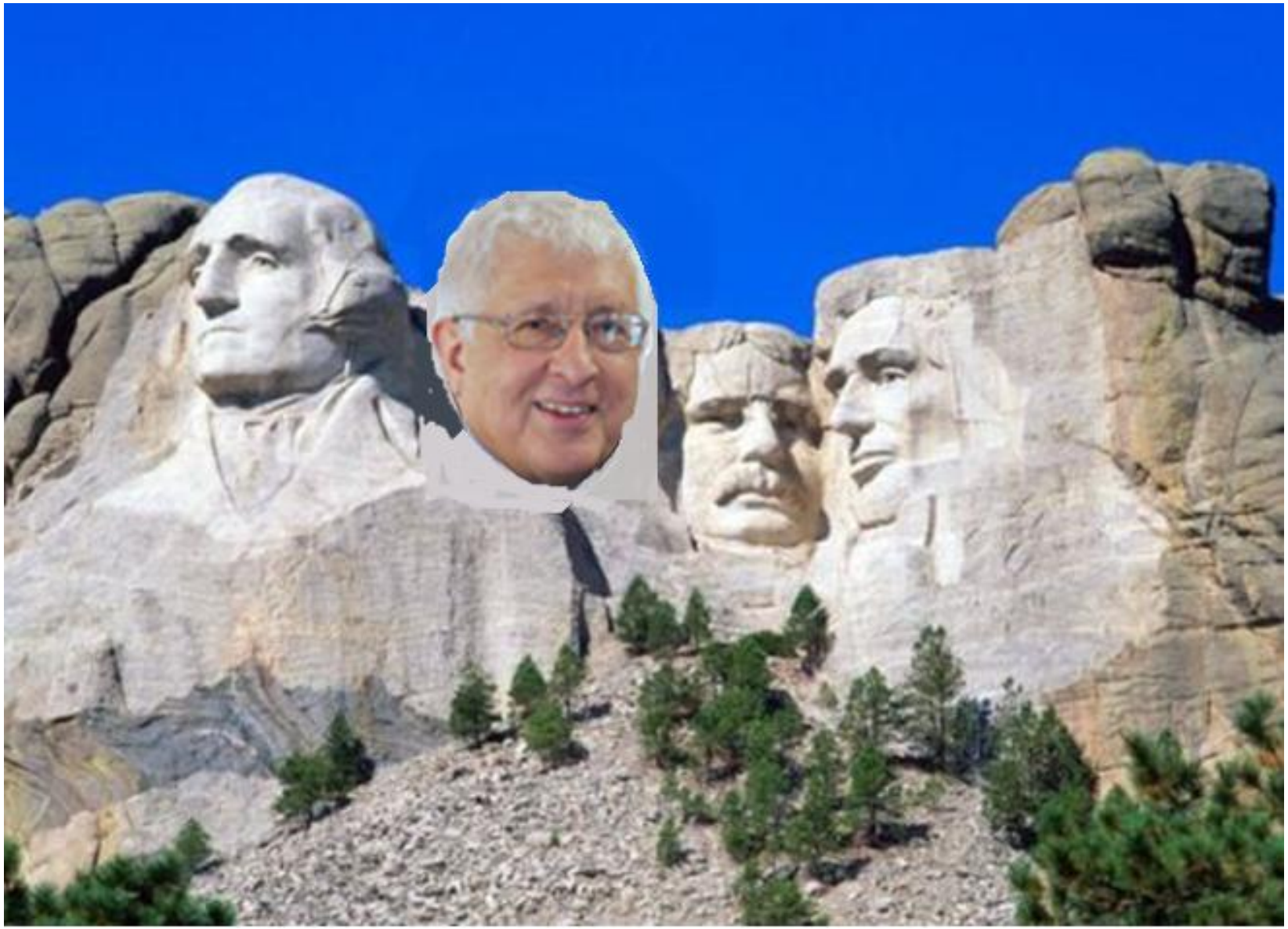


Adapted from LBOP by Sayers & Karamihas

Along came the SD Road Profiler

Photo courtesy of UMTRI

It was big news in SD….



Fort Collins, Colorado - Profiler Experiment 1987

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In the beginning back in 1989….

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.

Tentative Agenda

Tuesday, November 14 (9:00-5:00)

Welcome	SD/FHWA
Statement of Purpose	FHWA
Road Profiler Description	SD
Principles of Profilometry	SD
Luncheon	Hosted
Building a Road Profiler	WY
Buying a Road Profiler	KS
Electronic Assembly	MN
Vehicle Assembly	IL
Hardware Support	WY
Software Support	SD
Q & A	Open Forum

Wednesday, November 15 (8:00-5:00)

Scheduling	NE
Verification	MN
Urban Operations	CT
Upload/Download	WI
Highway Referencing	SD
Milepost Referencing	IL
Geographic Referencing	PA
Establishing Reference	NC
Luncheon	Hosted
Field Test Description	SD
Field Tests & Demos	States

Tentative Agenda, cont.

Thursday, November 16 (8:00-4:00)

Statewide Surveys	NE
Rut Depth Studies	MN
HPMS Reporting	FHWA
Engineering Applications	SD
Field Test Reports	States
Field Test Summary	SD
Lunch	On Your Own
Videologging	IA
Planned Improvements	SD
Future RPUG Activities	FHWA/SD
Closing Comments	FHWA

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.

Registration Form
South Dakota Road Profiler Users' Group Meeting

Name_____
Title_____
Organization_____
Address_____
City, State, Zip_____
Phone_____
Need Shuttle? YES NO Arrival Time/Flight_____

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

FEE: None

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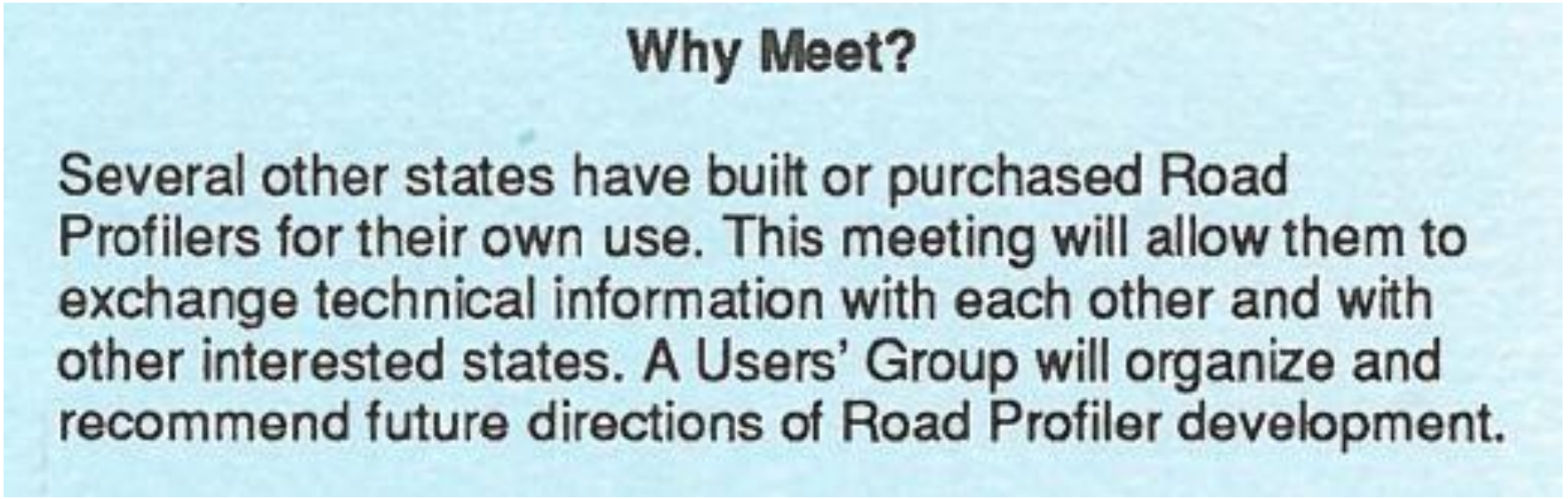
Next slide



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.

The purpose of the RPUG is to serve as a forum for the exchange of information between end users, data collectors, vendors, construction and design engineers and researchers who have an interest in road profiles, road roughness/smoothness, pavement surface textures, friction, and tire-pavement noise.

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And for the first few years…..

Principles of Road Profile Measurement (Profilometry 102)

South Dakota Road Profiler Users Group
September 23, 1992

RPUG 92

SOUTH DAKOTA ROAD PROFILER USER'S GROUP

REPORT OF THE SECOND ANNUAL MEETING

Cheyenne, Wyoming
September 25-27, 1990

Wyoming Transportation Department
In cooperation with the
Federal Highway Administration
Pavement Division
April, 1991

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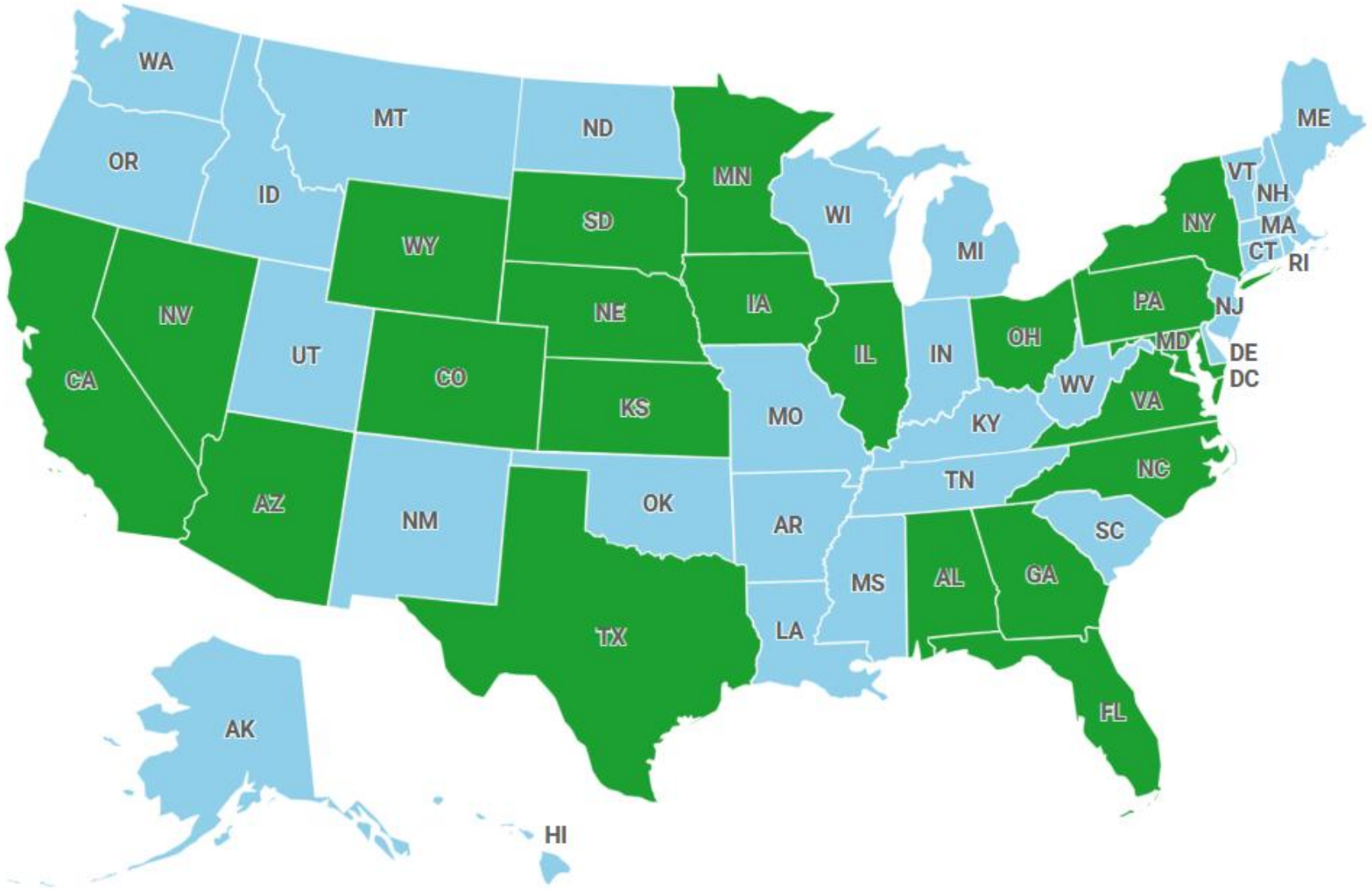
The lay of the land circa 1991

TABLE 9

ROUGHNESS MEASURING EQUIPMENT USAGE, 1986 AND 1991 *(36)*

	Number of Agencies Using	
Equipment Type	**1986**	**1991**
GMR Profilometer (K.J. Law)	4	3
South Dakota Road Profiler	1	25
K.J. Law 8300	0	3
Cox CS8000 Ultrasonic	0	8
Mays/PCA/Cox Ride Meters	32	22
ARAN	0	10
BPR Roughometer	4	0
Others	0	2

RPUG over the years



https://www.fla-shop.com/visited-states/?st=AL%2CAZ%2CCA%2CCO%2CFL%2CGA%2CIA%2CIL%2CKS%2CMD%2CMN%2CNC%2CNE%2CNV%2CNY%2COH%2CPA%2CSD%2CTX%2CVA%2CWY&vc=1ca032&uc=90cfea&hc=40bfa6&bc=ffffff&sl=on

Trivia – which state has hosted the most RPUGs?

A.	Nevada	4
B.	South Dakota	2
C.	Virginia	5
D.	Minnesota	2
E.	Texas	3
F.	Colorado	2

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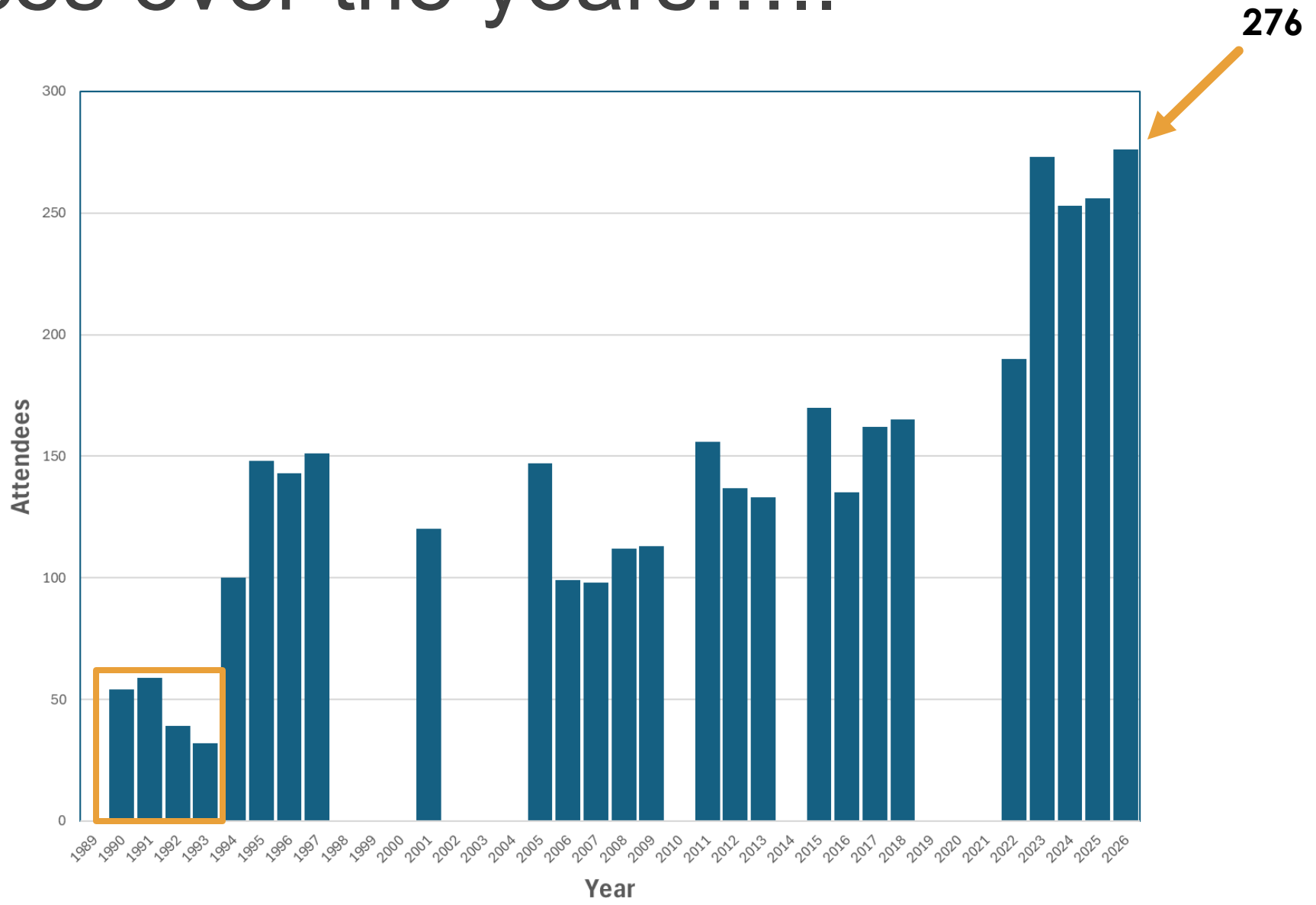
Attendances over the years…..



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Some familiar names…

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

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

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

DAVE HUFT
SOUTH DAKOTA - DOT
TRANS. BLDG. 700 BROADWAY AVE. E.
PIERRE, SD 57501

Elson B. Spangler
Surface Dynamics, Inc.

Mike Sayers
University of Michigan

Steve Karamihas
University of Michigan

Larry A. Scofield
Arizona Trans. Research Center
7755 S. Research Drive
Suite 106
Tempe, AZ 85284
(602) 831-2620

Bill Swindall
Roadware
P.O. Box 520
Paris ONTARIO N3L3T6

Kenneth J. Law
K.J. Law Engineers, Inc.
42300 W. Nine Mile Road
Novi, MI 48375-4103

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And here’s 3 you’ll hear from soon….back in 2003

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Rudy’s record

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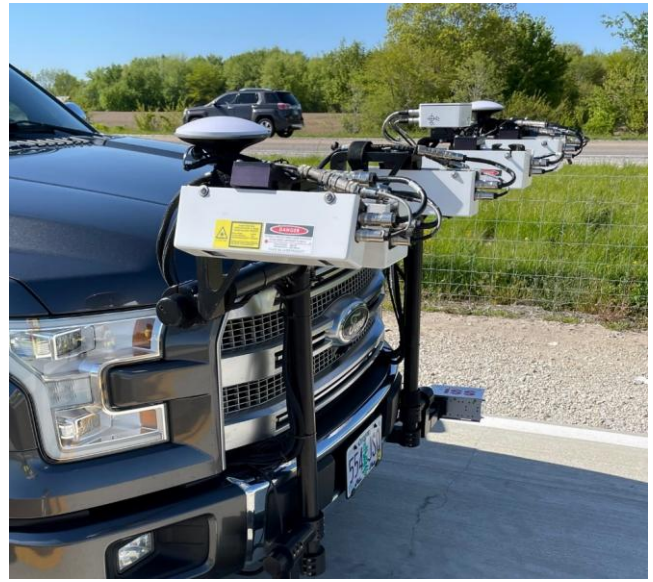

What's Next?

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