"Smooth Ride?"

Contractor Performed Tests in the Quality Assurance Process:

The Nevada Experience

Presented by:
Steven Hale, P.E.

Outline

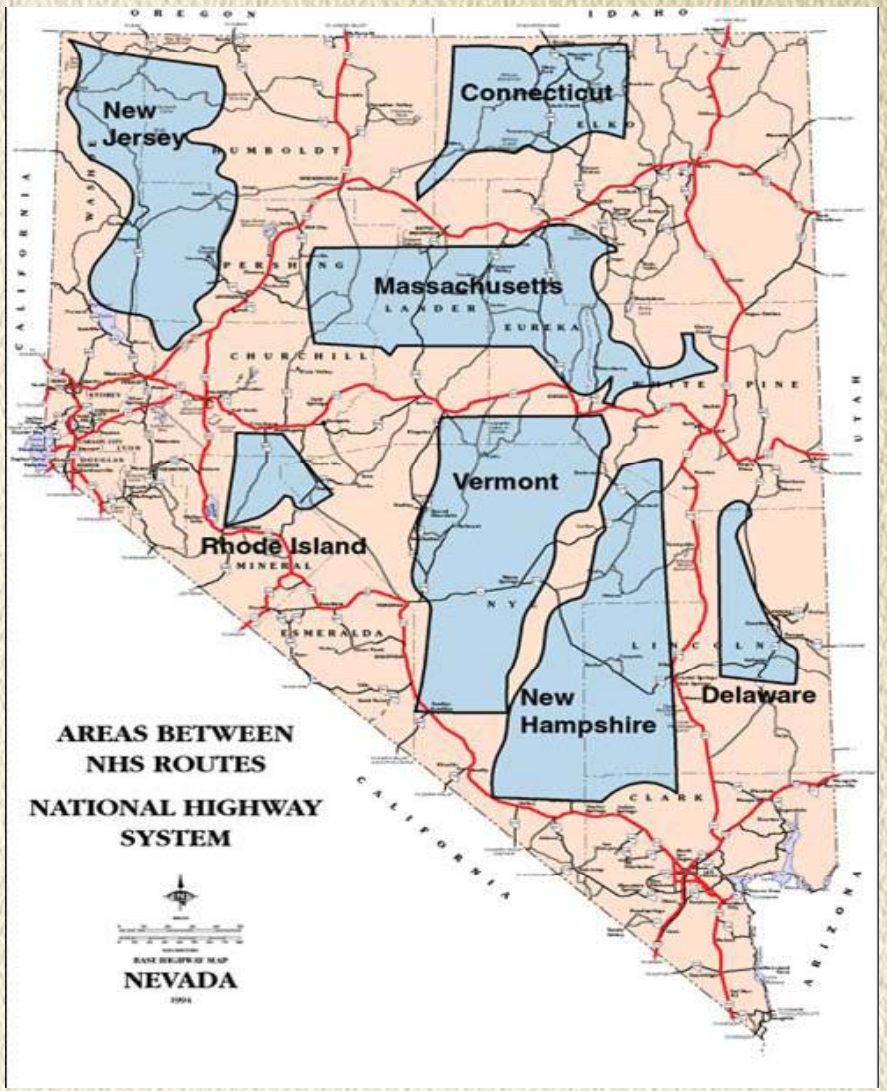
- Roadways maintained by NDOT
- NDOT's Pavement Management System
- Smoothness specification
  - HMA pavements
  - PCC pavements
  - Bridge decks

Outline

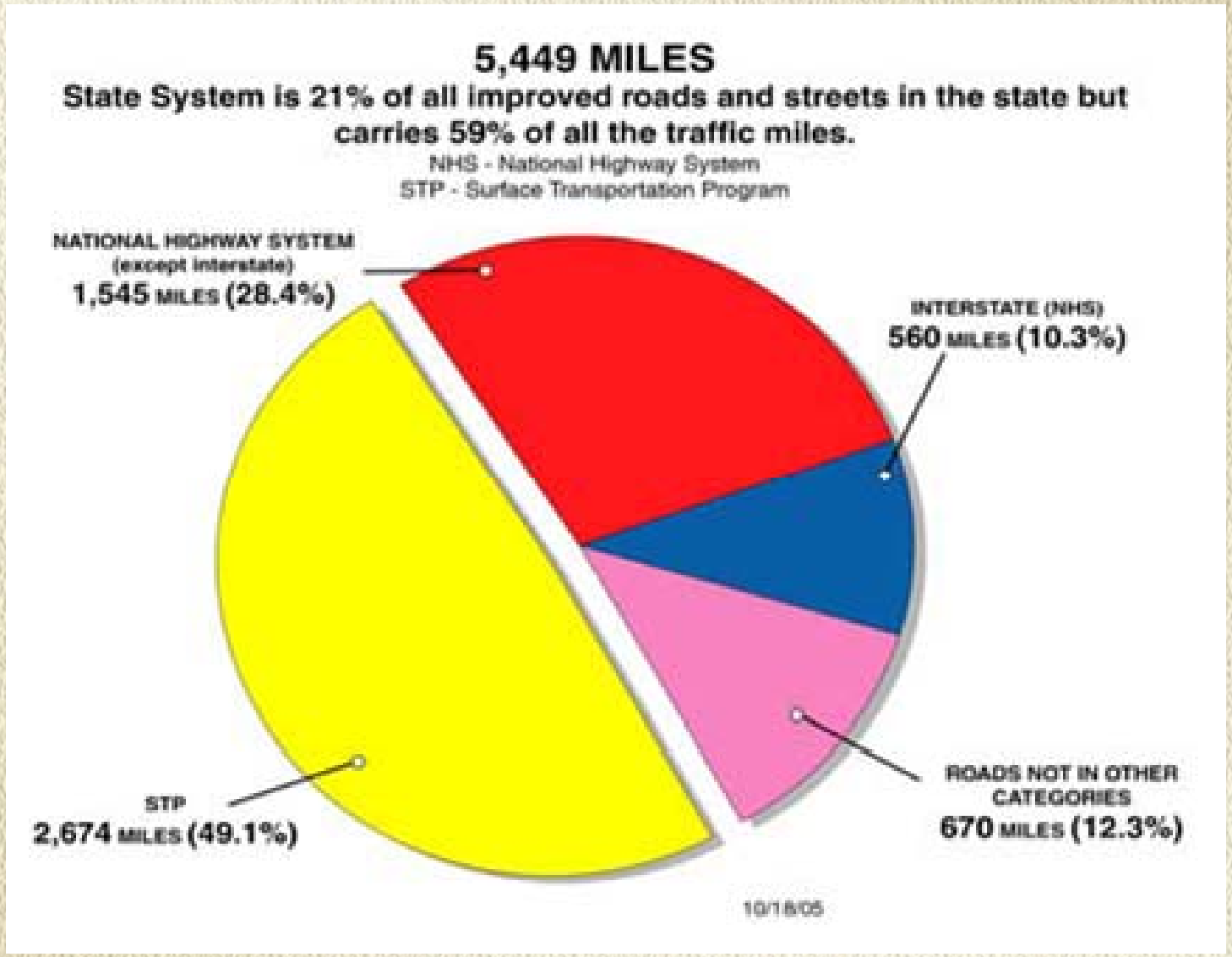
- Contractor's results for acceptance
- What NDOT field inspectors are taught
- Success of using contractor's results
  - Smoothest interstates in 2003
  - National pavement conditions in 2007
- What the future holds

Roadways Maintained by NDOT

- **Interstate (NHS)**
  - 560 miles
- **NHS Routes (except Interstates)**
  - 1,545 miles
- **STP Routes**
  - 2,674 miles
- **Other Routes**
  - 670 miles



Roadways Maintained by NDOT



NDOT's Pavement Management System

- **How is ride data collected**
  - **NDOT uses a ride van**
  - **Collects 10,000 data points per second**
  - **Data is processed by proprietary software**

NDOT's Pavement Management System

- **Frequency of ride testing:**
  - **Data is collected on NHS routes yearly**
  - **Data is collected on STP & HPMS in odd years**

- **Importance of ride data**
  - **Data assists in project prioritization**

Smoothness Specification for Roadways

Smoothness Specification for Roadways

- **Straightedge measurement**

  - NDOT personnel perform measurement
  - Twelve foot straight edge is used
  - Measurements taken both parallel and perpendicular to centerline
  - Roadway surface shall not vary by more than 1/4 in. (1/8 in. for PCCP)

Smoothness Specification for Roadways

Smoothness Specifications for Roadways

- **Profilograph measurement**

  - Contractor provides California type profilograph
  - Contractor performs testing
  - Other types of profilographs can be used
  - NDOT oversees testing and evaluates results

Smoothness Specification for Roadways

- NDOT specifies three different smoothness types
  - Type A
  - Type B
  - Type C

*Only Type A smoothness used for PCCP

Smoothness Specification for Roadways

- "Must Grind" specification

  - Corrective measures for dense-graded plantmix and PCCP

  - Corrective measures for an open-graded friction course

Smoothness Specification for Bridge Decks

Smoothness Specification for Bridge Decks

- **Straightedge measurement**

  - NDOT personnel perform measurement
  - A 12 ft straight edge is used
  - Roadway surface shall not vary by more than 1/8 in. (Without overlay)
  - Roadway surface shall not vary by more than 1/3 in. (With an overlay > 1 in. thickness)

Smoothness Specification for Bridge Decks

- **Profilograph measurement**
  - **Only concerned with "Must Grinds"**

- **"Must Grind" specification**
  - **Corrective measures for a bridge deck**

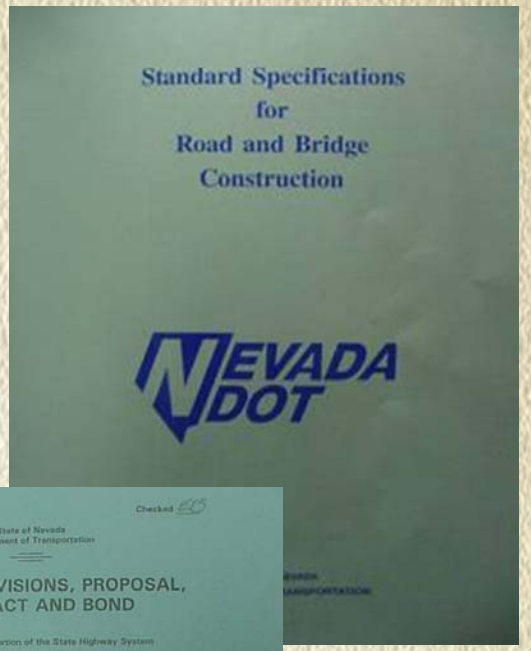
Contractor's Results for Acceptance

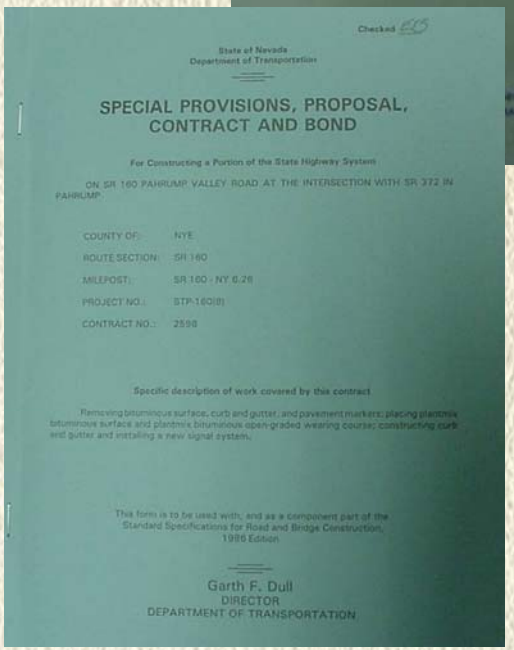
- NDOT does not perform profilograph testing

  - Lack of manpower
  - Initial cost of profilograph equipment
  - Maintenance costs associated with equipment

What NDOT Field Inspectors are Taught

- **Prior to profilograph testing:**
  - **Review Standard Specifications**
  - **Review project's Special Provisions**
  - **Entire length of each traffic lane is measured *<u>within 48 hours</u>* of each days placement**





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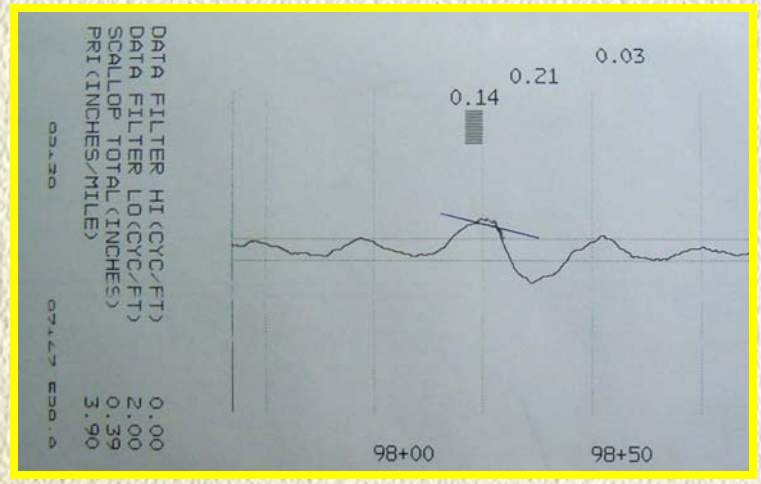
What NDOT Field Inspectors are Taught



- Assist in calibration of profilograph
- Wheelbase = 25’
- Tire pressure = 25 psi or manufacturer’s spec.
- Vertical height calibration
- Longitudinal distance calibration
- Check scale on computerized chart
- Check computer printout

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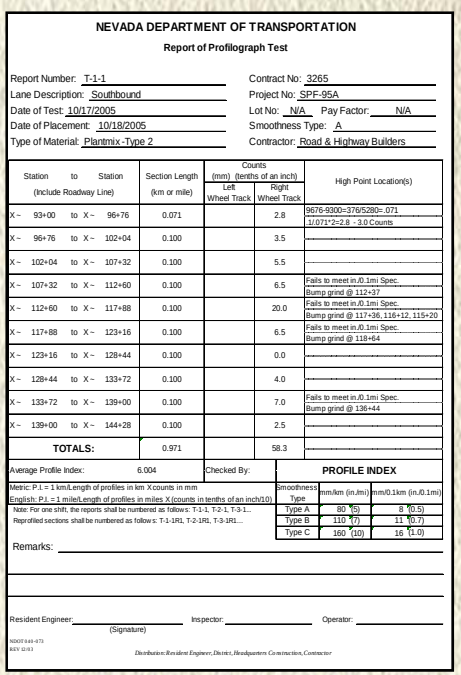
What NDOT Field Inspectors are Taught

- **During profilograph testing:**

  - Be present during all operations
  - Use 12’ straightedge to perform spot checks
  - Testing performed in correct location
  - Testing performed in direction of travel
  - Check speed of the profilograph

What NDOT Field Inspectors are Taught



NEVADA DEPARTMENT OF TRANSPORTATION

Report of Profilograph Test

Report Number: T-1-1
Lane Description: Southbound
Date of Test: 10/17/2005
Date of Placement: 10/18/2005
Type of Material: Plantmix -Type 2

Contract No: 3265
Project No: SPF-95A
Lot No: N/A Pay Factor: N/A
Smoothness Type: A
Contractor: Road & Highway Builders

Station (Include Roadway Line)	to	Station	Section Length (km or mile)	Counts (mm) (tenths of an inch) Left Wheel Track	Right Wheel Track	High Point Location(s)
X ~ 93+00	to	X ~ 96+76	0.071		2.8	9676-9300=376/5280=.071 .1/.071*2=2.8 - 3.0 Counts
X ~ 96+76	to	X ~ 102+04	0.100		3.5	
X ~ 102+04	to	X ~ 107+32	0.100		5.5	
X ~ 107+32	to	X ~ 112+60	0.100		6.5	Fails to meet in./0.1mi Spec. Bump grind @ 112+37
X ~ 112+60	to	X ~ 117+88	0.100		20.0	Fails to meet in./0.1mi Spec. Bump grind @ 117+36, 116+12, 115+20
X ~ 117+88	to	X ~ 123+16	0.100		6.5	Fails to meet in./0.1mi Spec. Bump grind @ 118+64
X ~ 123+16	to	X ~ 128+44	0.100		0.0	
X ~ 128+44	to	X ~ 133+72	0.100		4.0	
X ~ 133+72	to	X ~ 139+00	0.100		7.0	Fails to meet in./0.1mi Spec. Bump grind @ 136+44
X ~ 139+00	to	X ~ 144+28	0.100		2.5	
TOTALS:			0.971		58.3	

Average Profile Index: 6.004 Checked By:

Metric: P.I. = 1 km/Length of profiles in km X counts in mm
English: P.I. = 1 mile/Length of profiles in miles X (counts in tenths of an inch/10)
Note: For one shift, the reports shall be numbered as follows: T-1-1, T-2-1, T-3-1...
Reprofiled sections shall be numbered as follows: T-1-1R1, T-2-1R1, T-3-1R1...

PROFILE INDEX

Smoothness Type	mm/km (in./mi.)	mm/0.1km (in./0.1mi)
Type A	80 (5)	8 (0.5)
Type B	110 (7)	11 (0.7)
Type C	160 (10)	16 (1.0)

Remarks:

Resident Engineer: (Signature) Inspector: Operator:

NDOT 848-473
REV 12/03

Distribution: Resident Engineer, District, Headquarters Construction, Contractor

- **After profilograph testing:**
  - **Test form is complete and accurate**
  - **Accuracy is especially important if ride incentive/disincentive specified on project**

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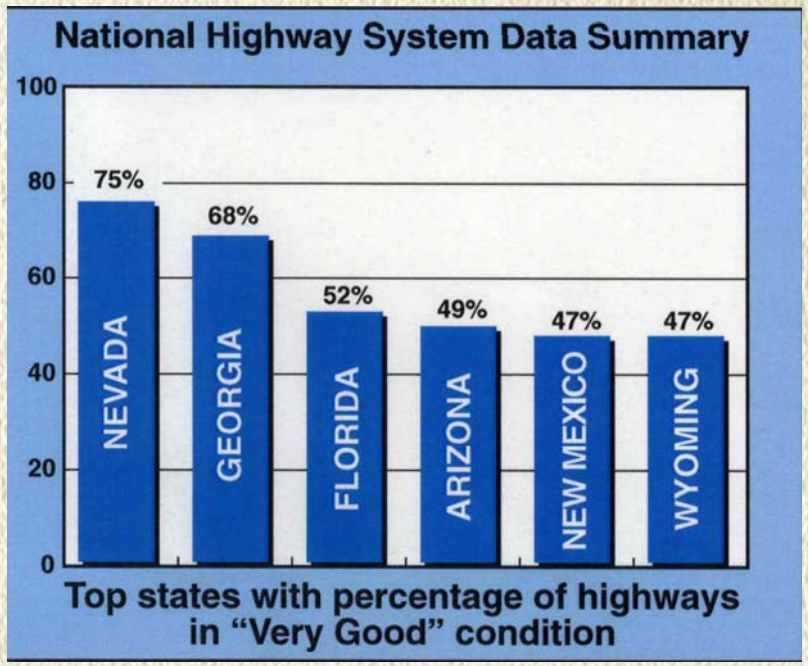
Remarks:

Resident Engineer: _____ (Signature) Inspector: _____ Operator: _____

NDOT 040-073
REV 12/03

Distribution: Resident Engineer, District, Headquarters Construction, Contractor

Success of Using Contractor's Results



- **Nevada ranked #1 in 2003**
  - **75% of Interstates w/ "very smooth" condition**
  - **Georgia ranked second with 68%**
  - **Most states are well under 50%**

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Success of Using Contractor's Results

- **Nevada ranked #2 in 2007**

  - 81% of its roadways in "good condition"

  - Georgia was ranked #1 with 92%

National Pavement Conditions

Pavement Conditions by State, 2007

Includes all Arterial Routes, including Interstates, freeways, and major urban routes

State	Percentage			
	Poor	Mediocre	Fair	Good
Delaware	10	17	29	44
Florida	2	11	10	76
Georgia	0	4	3	92
Hawaii	27	44	19	10
Idaho	11	14	18	57

Source: TRIP analysis based on Federal Highway Administration data

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National Pavement Conditions

Pavement Conditions by State, 2007

Includes all Arterial Routes, including Interstates, freeways, and major urban routes

State	Percentage			
	Poor	Mediocre	Fair	Good
Montana	3	8	13	76
Nebraska	7	17	14	62
Nevada	5	8	6	81
New Hampshire	13	14	13	60
New Jersey	46	32	13	10

Source: TRIP analysis based on Federal Highway Administration data

National Pavement Conditions

- **The top five states:**

1. **Georgia – 92% (good condition)**
2. **Nevada – 81% (good condition)**
3. **Montana – 76% (good condition)**
4. **Florida – 76% (good condition)**
5. **Kansas – 75% (good condition)**

What the Future Holds

- Continue using contractor's results
- Develop profilograph workshop for inspectors
- Ride incentive/disincentive for PCCP
- Possible movement to a zero blanking band
- Possible movement to IRI

NEVADA DOT

2011 RPUG Conference

Questions???

Thank you