Pavement Data Collection

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An Employee-Owned Company

Some Things

Learned

PAVEMENT DISTRESS DATA COLLECTION

- Pilots
- Location
- Quality

ARA

Pilots

- **Pilots are costly**
- **Usually not well defined**
- **No training involved**
- **No Specifications**
- **Procedures are vague**
- **Few people use the results**
- **No data collection vendor wants to look bad**

Location - A Credibility Issue

Location Referencing System

- **Link node (Segments)**

- **Continuous (Milepost)**

Physical Inventory Files

- **Permanent physical features**

- **Accuracy**

- **Current**

- **Links to all data systems**

PMS Database

- **Segment lengths**

- **Terminal points**

- **Linked to Physical Inventory Data**

- **Linked to GIS**

- **Database integration**

- **Field Data Locations match Database**

Accuracy of Location Data

- **Must be accurate**

- **Must be kept current**

- **Signs must match database**

Testing Aids for Location Accuracy

- **DMI Calibration**

- **Use of GPS**

- **Driving skills**

- **Direction of testing**

- **Physical Events**

- **Accurate GIS**

Quality

- **Training**

- **Manual Field vs. Images**

- **Level of Quality**

- **Specifications**

EXPANDING THE REALM OF POSSIBILITY

REVIEW OF THE VARIABILITY AND ACCURACY OF PAVEMENT DISTRESS DATA

VARIABILITY OF DATA

- ■ **Type**

- ■ **Severity**
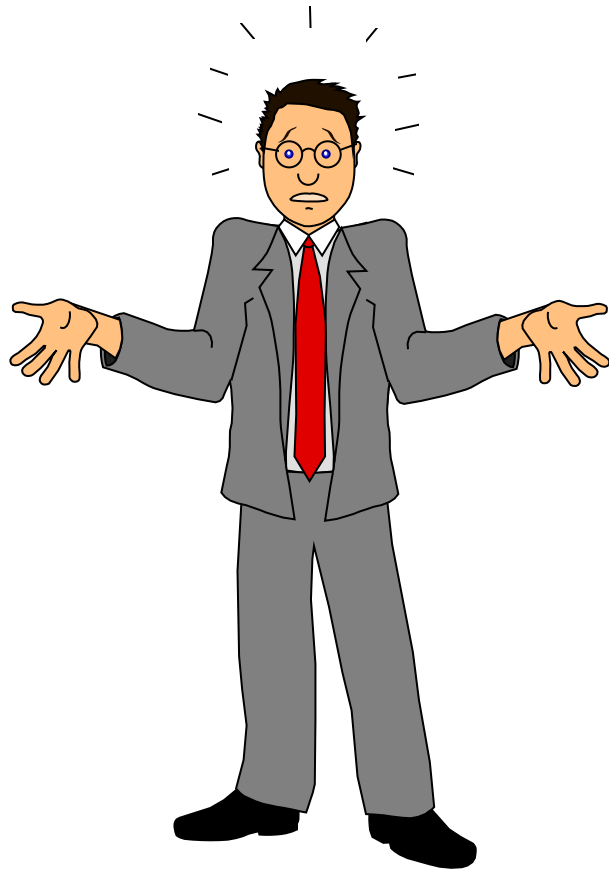
- ■ **Extent**

- ■ **Data Collection Method**

Manual

- Windshield
- Shoulder
- Walking Detailed

Automated

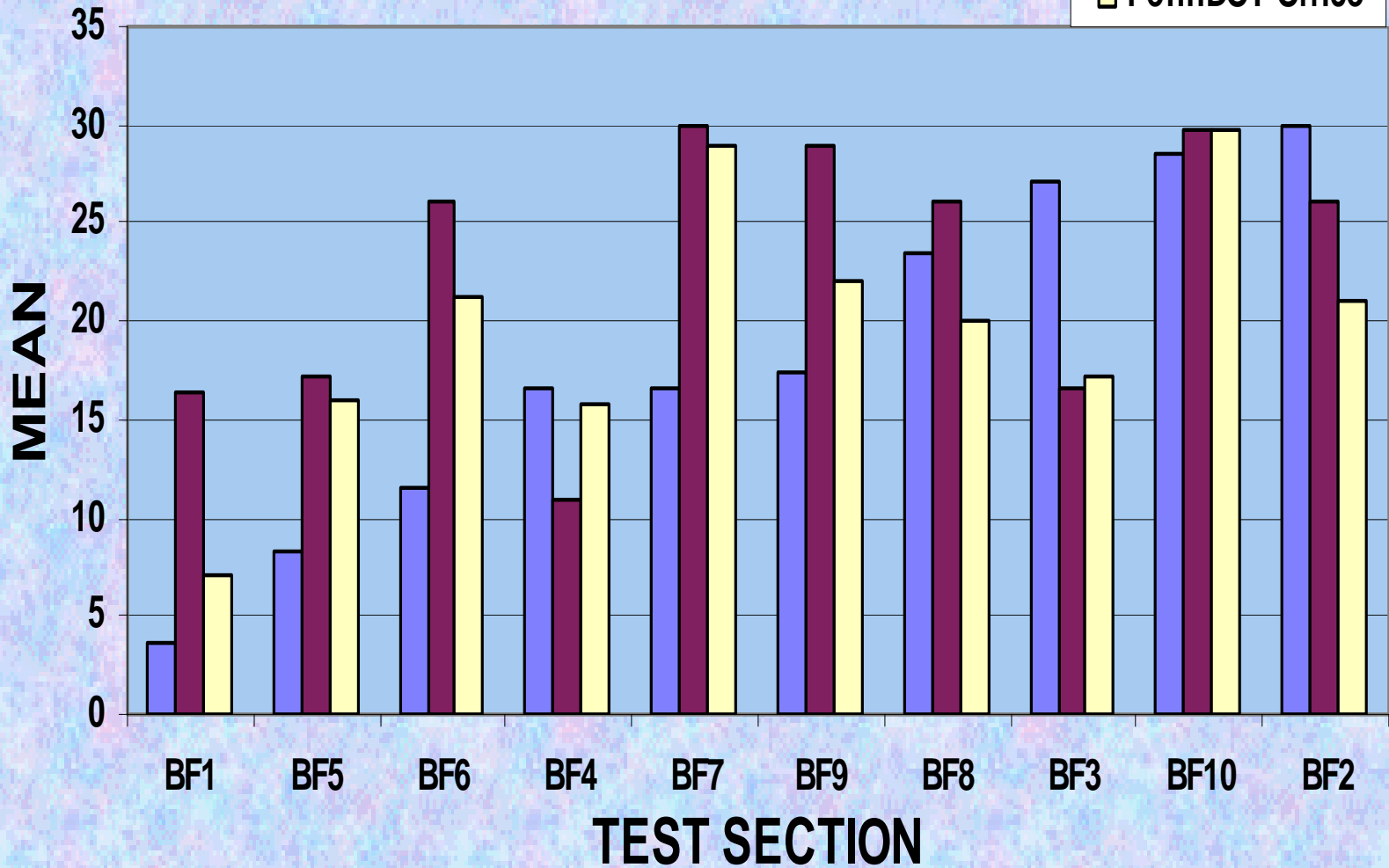- Sensors
- Video
- Film

OFFICE VS. FIELD MANUAL SURVEYS

- **Fatigue**

- **Miscellaneous**

- **Edge Deterioration**

- **Bit. Trans. Crk. No. and Length**
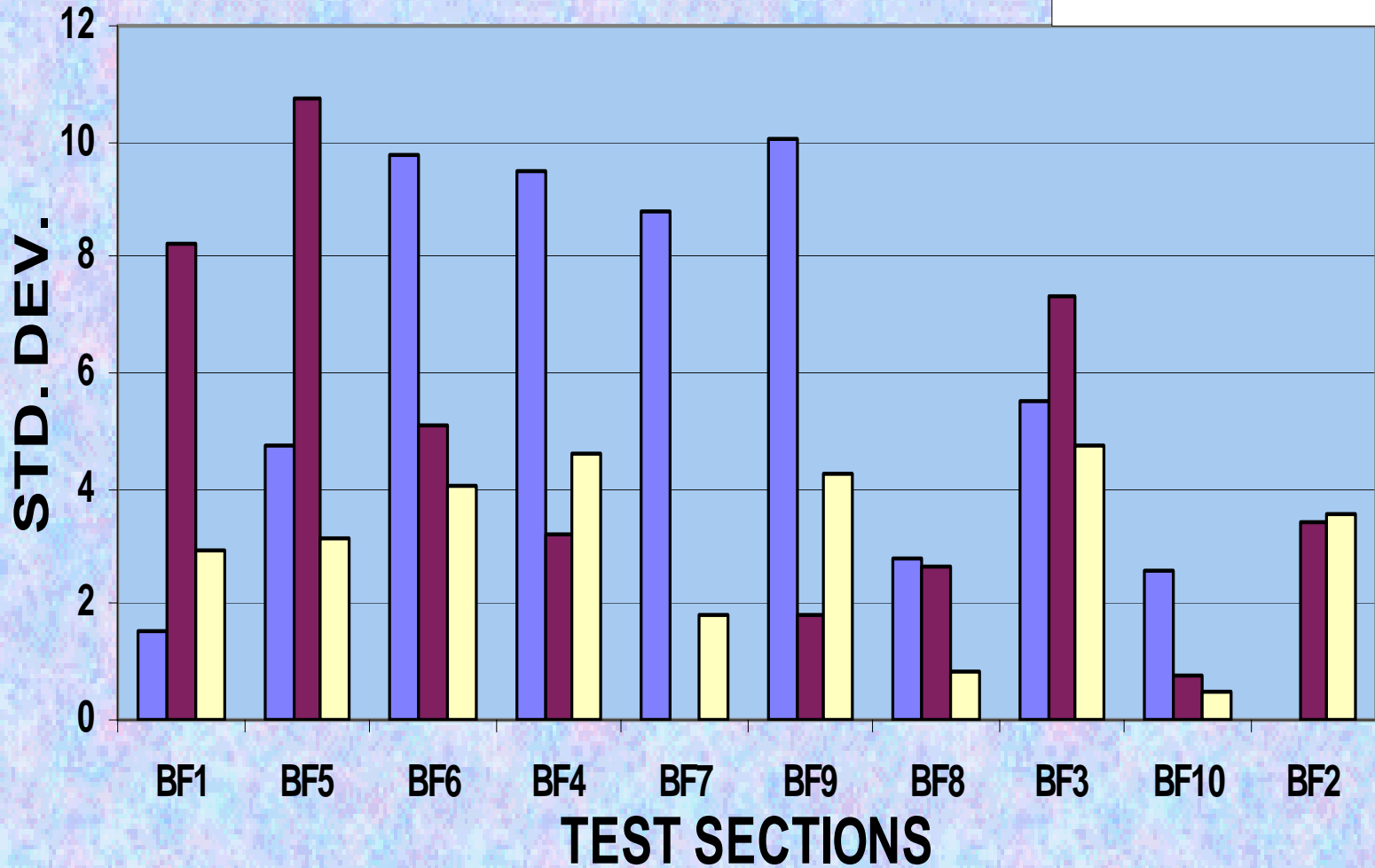
- **Patch Count and Area**

FATIGUE

Legend: Field Raters, Pasco Office, PennDOT Office

MEAN (y-axis, 0 to 35)

TEST SECTION (x-axis): BF1, BF5, BF6, BF4, BF7, BF9, BF8, BF3, BF10, BF2
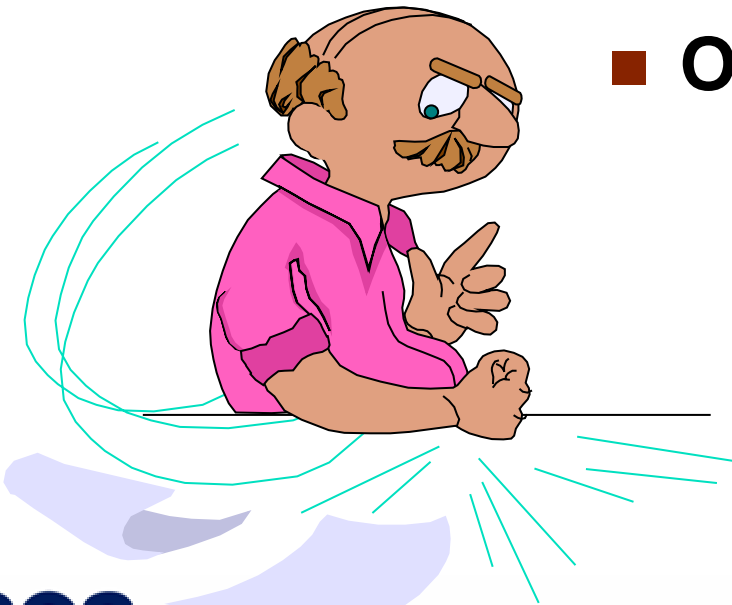
EXPANDING THE REALM OF POSSIBILITY

Training

- **Training Materials**

- **Employee Turnover**

- **Quality Control**

DISTRESS DEFINITIONS

- SHRP
- FHWA/AASHTO Protocols
- Others

DIM Tutor Pavement Menu

There are three basic types of pavements in use:

- Asphalt Concrete Surfaced Pavement(ACP)

- Jointed(Plain and Reinforced) Portland Cement Concrete(JCP)

- Continuously Reinforced Portland Cement Concrete(CRC)

Each type of Pavement has a unique set of distresses which are evaluated. The tutor contains a section for each pavement type.

AC Pavement

Jointed Concrete Paven

Continuously Reinforc Concrete Pavement

Select the type of pavement you would like to explore from the options above.

Main Menu   Help   Quit

AC Pavement - Cracking

Distress Type

Fatigue Cracking

Severity Level

High Severity

Moderate to High

Moderate Severity

Low to Moderate

Low Severity

Select Another Distress

Example 1 of 2

<-   —>

Distress Description:

Fatigue cracking occurs in areas subjected to repeated traffic loadings (wheel paths.)

Can be a series of interconnected cracks in early stages of development. Develops into many-

Severity Description:
HIGH

An area of moderately or severely spalled interconnected cracks forming a complete pattern; pieces may move when subjected to traffic; cracks may be sealed; pumping may be evident.

Main Menu   Select Another Category   Help   Quit

Practice Exercise

- Fatigue Cracking
- Block Cracking
- Edge Cracking
- Longitudinal Cracking
- Reflection Cracking
- Transverse Cracking
- Patch / Patch Deterioration
- Potholes
- Rutting
- Shoving
- Bleeding
- Polished Aggregate
- Raveling
- Lane / Shoulder Drop off
- Water Bleeding / Pumping

What distress is this?

Exercise Score

You have answered 2 questions correctly out of 4 questions asked.
There are 84 questions remaining in the exercise.

Main Menu | Help | Quit

What Quality of Data is Required ?

- Research

- Pavement Performance Model

- Maintenance Fund Allocation

- Long-Term Trends

- General Health of System

- Just Collect Numbers

HOW DO WE MEASURE QUALITY?

- Gut Feeling

- Random Manual Checks

- Precision and Bias?

WHAT VARIABLE(S) DO WE EVALUATE TO MEASURE QUALITY?

- Distresses?

- Weighting Factors?

- Composite Index?

- Treatment Cost?

Cost

- **No Specifications**

- **Descriptive Specification**

- **End Result Specification**

Quality Monitoring Plan

- Pre-Survey Quality Control

- Data Collection Quality Control and Equipment Calibration

- Office Data Quality Control

EXPANDING THE REALM OF POSSIBILITY
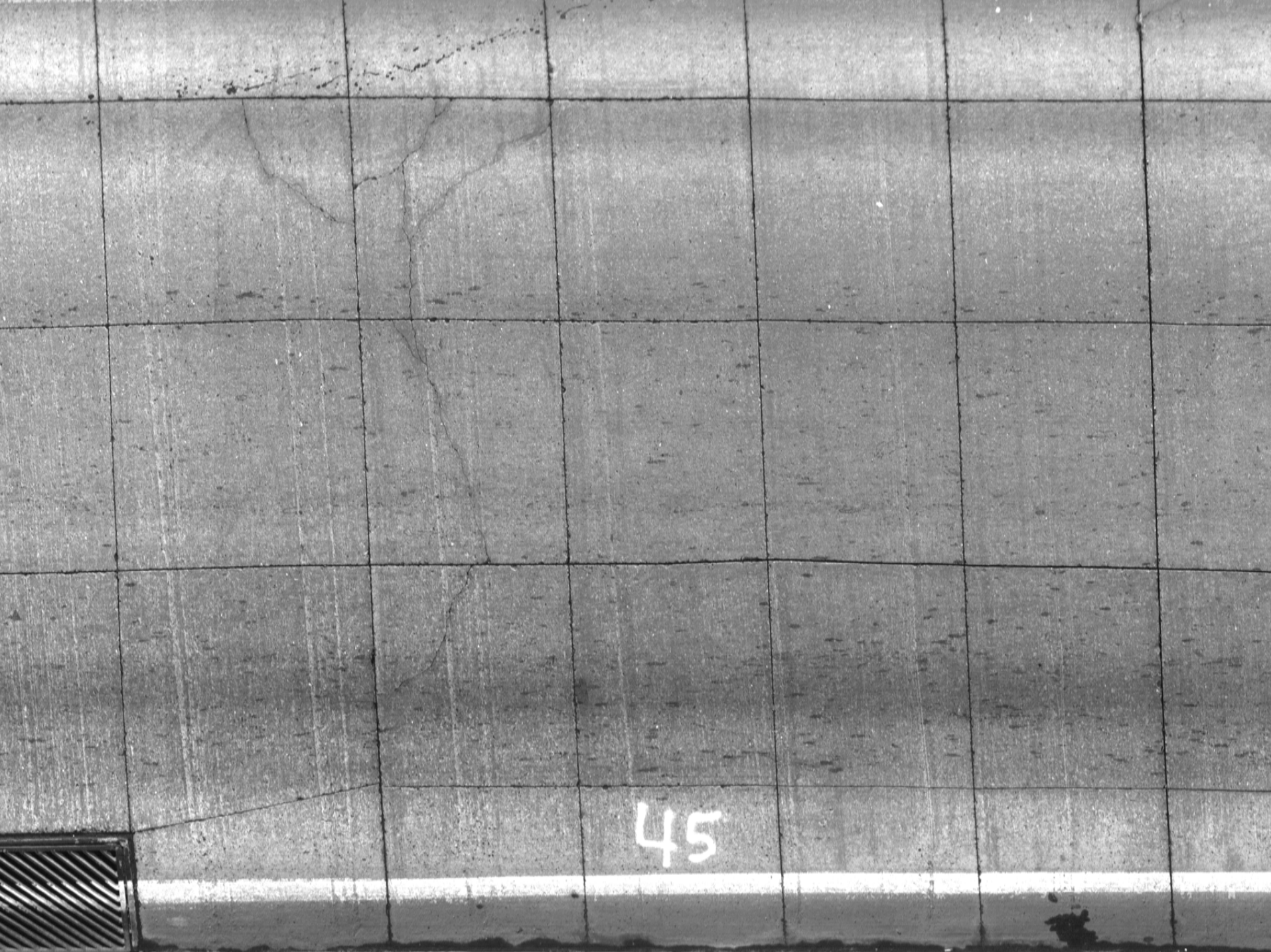
Pre-Survey Quality Control

- Equipment Operator Training

- Pre-survey Equipment Calibration

- Survey VDOT Calibration Verification Sites

- Sensor Data Precision & Bias Statements

- Survey Routing Plan QC

- Distress Rater Training & Certification

- Distress Index Precision & Bias Statements

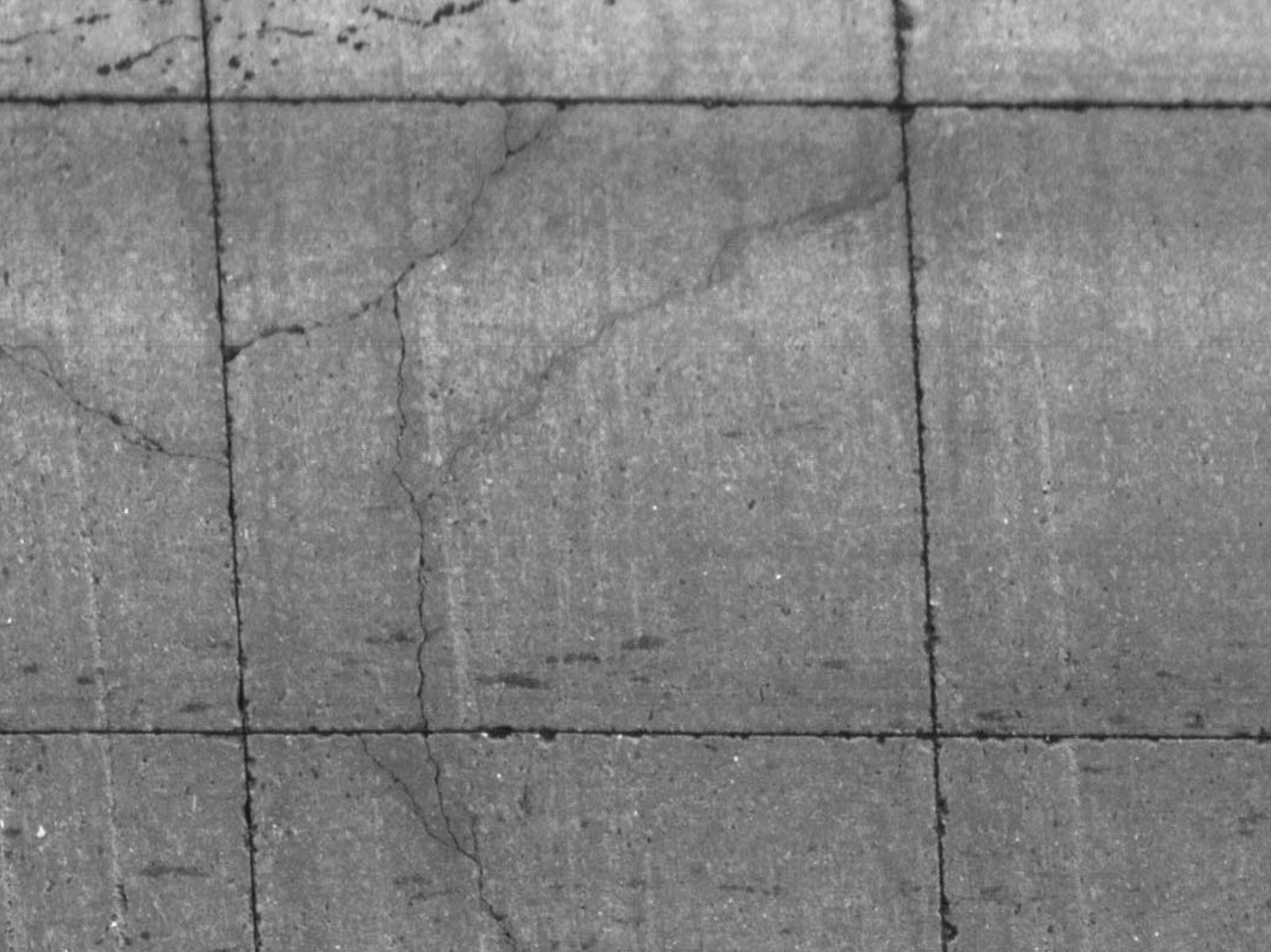# Data Collection Quality Control and Equipment Calibration

- Weekly Survey Equipment Calibration Verification

- Daily Survey Equipment Checks & Calibration Verification

- Periodic Equipment Calibration Verification

- Initial Data Checks of Field Data Received

- Post-Survey Calibration Verification

Resolution Board
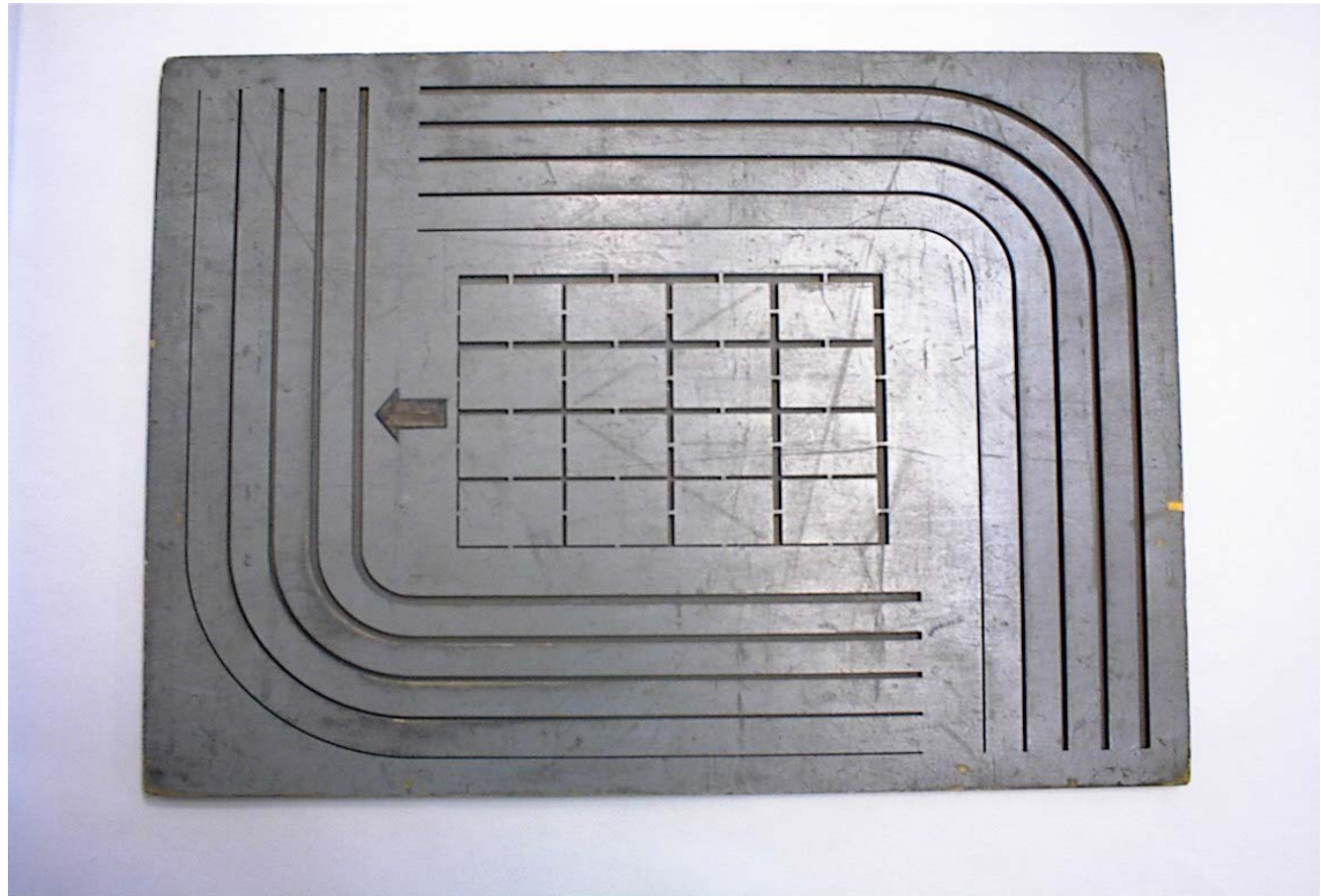
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Office Data Quality Control

- **Training**

- **Processed Sensor Data & Digital Imagery QC**

- **Pavement Distress Data QC**

- **Processed Pavement Distress Data QC**

- **External QA Review of Distress Data**
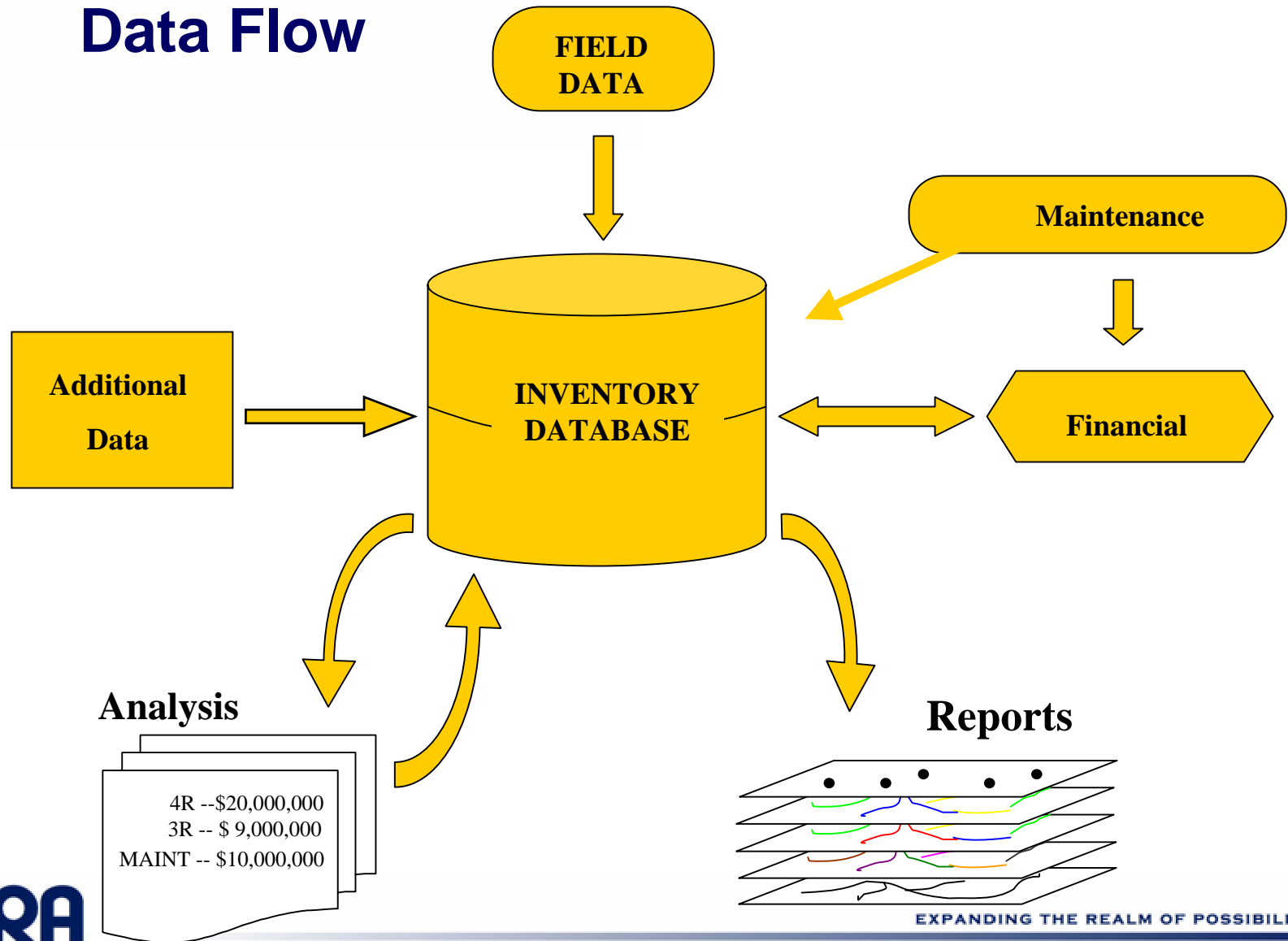
- **Pre-Delivery QC**

Suggested QA Process

- Choose <u>variable(s)</u> to be monitored

- Establish precision and bias for that <u>variable(s)</u> by best method available

- Write end result specification for the <u>required</u> quality of data

- Establish QA Plan

- Pilot sections to train & calibrate vendor

Asset Data Collection

- **PMS Data Collection**

- **Collecting Digital Images of Assets**

- **Development of Asset Database**

- **Asset Identification Available from Images**

- **Asset Attribute Data**

Prototype Pavement Management System Data Flow

FIELD DATA

Maintenance

Additional Data

INVENTORY DATABASE

Financial

Analysis

4R -- $20,000,000
3R -- $ 9,000,000
MAINT -- $10,000,000

Reports

EXPANDING THE REALM OF POSSIBILITY

Additional Data Sets

- **Current Data**
  - **Traffic Counts**
- **Additions for Prototypes**
  - **Construction / Rehab Costs**
- **Bridge Management**
  - **Bridge Inventory**
- **Safety Management**
  - **Accidents**
- **Miscellaneous Additions**
  - **Geotechnical Info**
  - **Environmental Info**
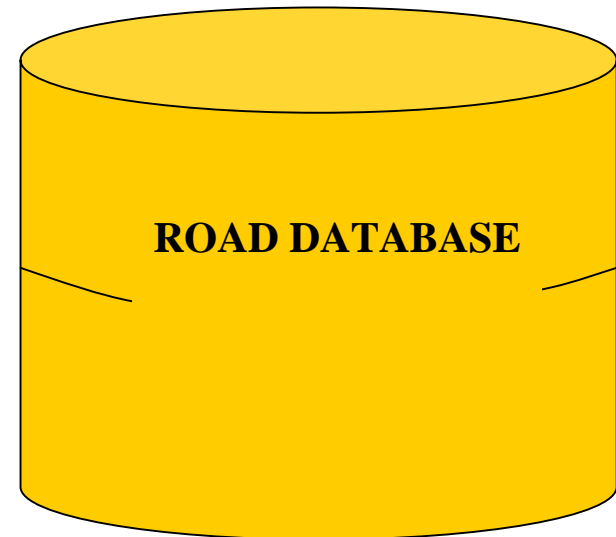
ROAD DATABASE

Road Inventory Program GIS

- **Contains Multiple Themes (Layers)**
- **One Theme for Various Fields in RIP Database**
  - **(Condition, Widths, Traffic, etc…)**
- **Images Used for Background**
  - **Digital Raster Graphics (DRG)**
  - **Digital Ortho Quads (DOQ)**

Accidents

Cycle 3 Condition - 2002

Cycle 2 Condition - 1999

Traffic

Shapefile

Background
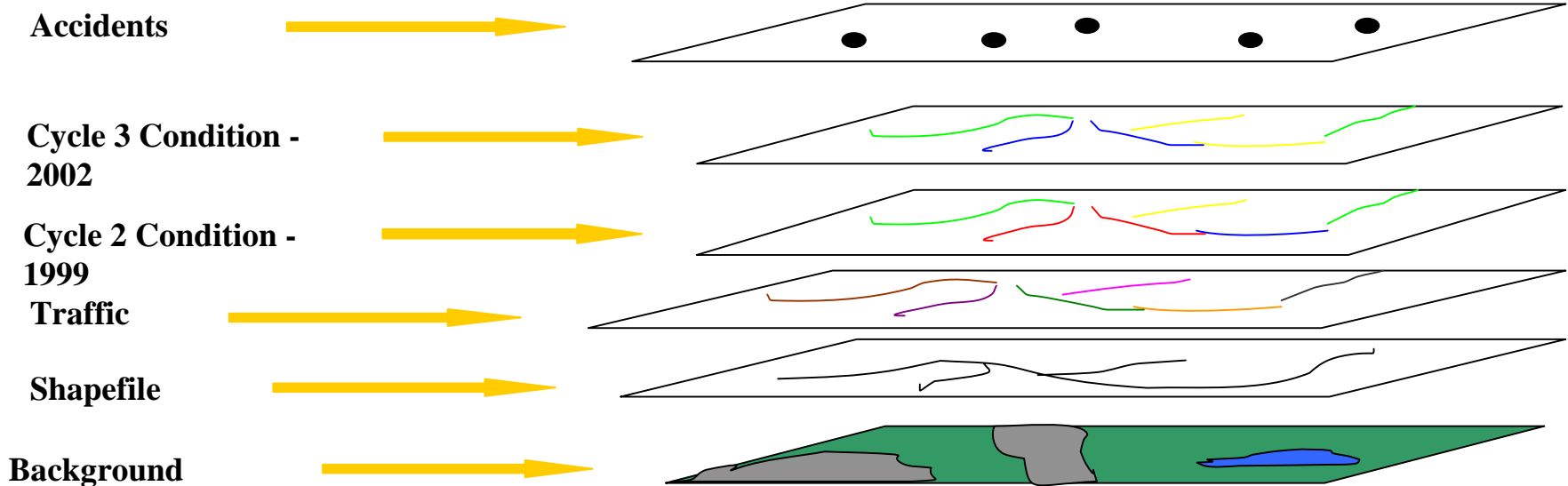
ARA's Transportation Sector

- **Formerly - ERES Consultants & CGH Pavement Engineering**

- **Depth of Professional Support - over 130 professional staff members.**

- **Coast to Coast Locations - 9 States & 1 Canadian Province.**

ARA

Selected ARA Specialties

- **Pavement Management**

- **Pavement Engineering & Research**

- **Pavement Evaluation & Testing**

- **Automated Data Collection**

- **Traffic Data Collection & Analysis**

- **Database & Software Development**

Digital Survey Vehicles

- **Longitudinal Profile**

- **Pavement Images**

- **Right-of-Way Images**

- **Sign Images**

- **Distance Measuring Instrument (DMI)**

- **Differential GPS (sub-meter)**

- **Inertial Navigation**

ARA's Newest Digital Survey Vehicle (DSV)