PAVEMENT EVALUATION 2010

HAS PAVEMENT MANAGEMENT TECHNOLOGY SURPASSED PAVEMENT MANAGEMENT SOFTWARE

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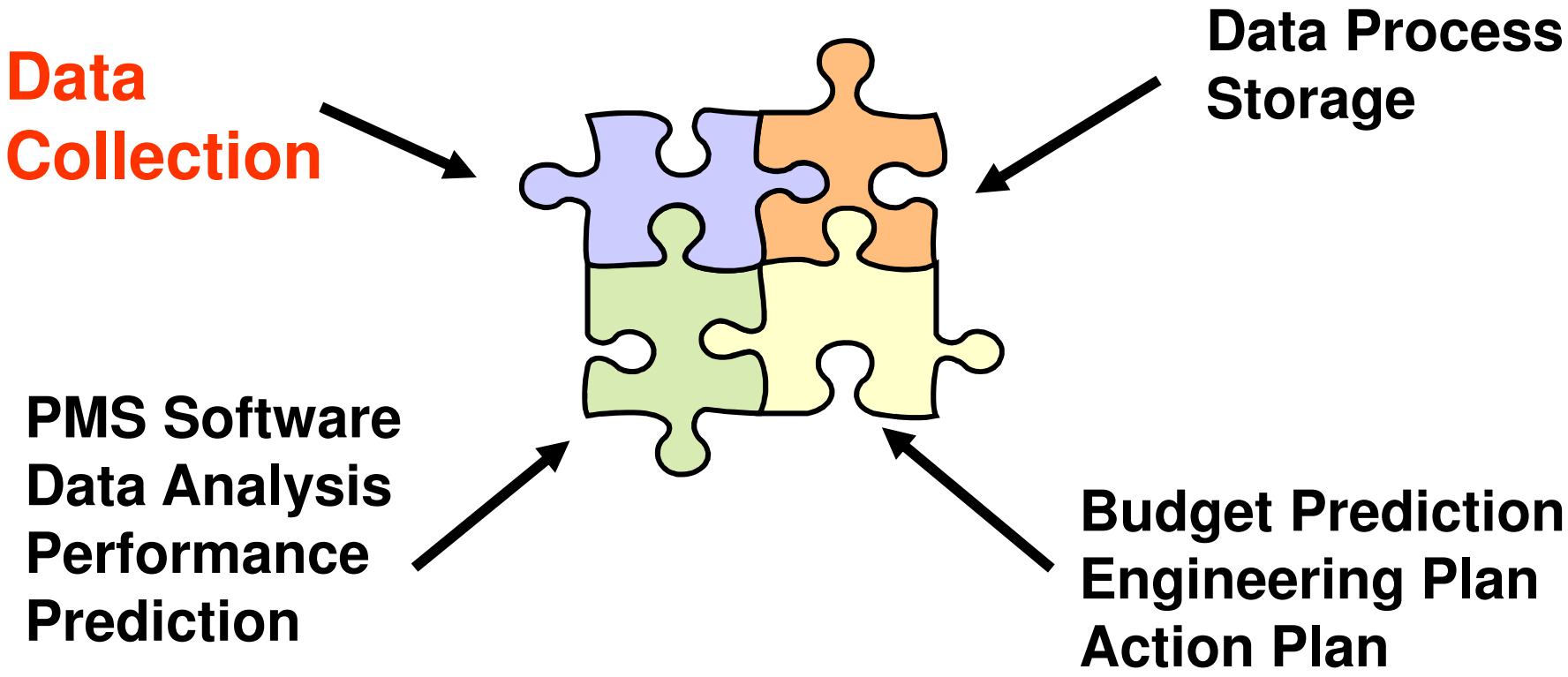
Pavement Management…

…a coordinated systematic process for carrying out all activities related to preserving pavements



Pavement Management…

…Key is preservation & maintenance, all with limited funds…….

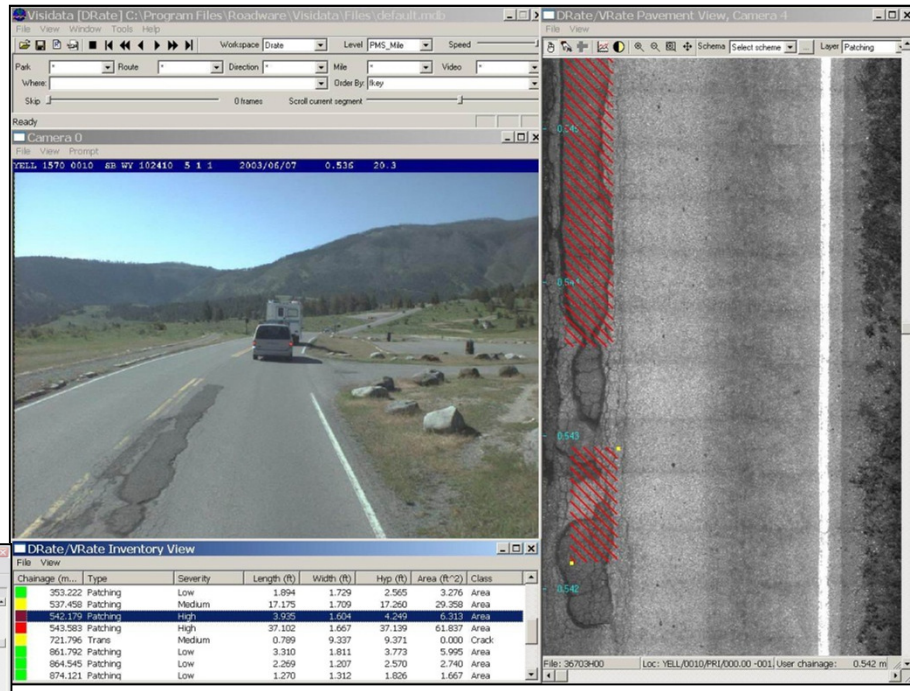
- **Advance New Technology**
- **Improve Performance**
- **Reduce % Deficient**
- **Marry Data With Real World Application**

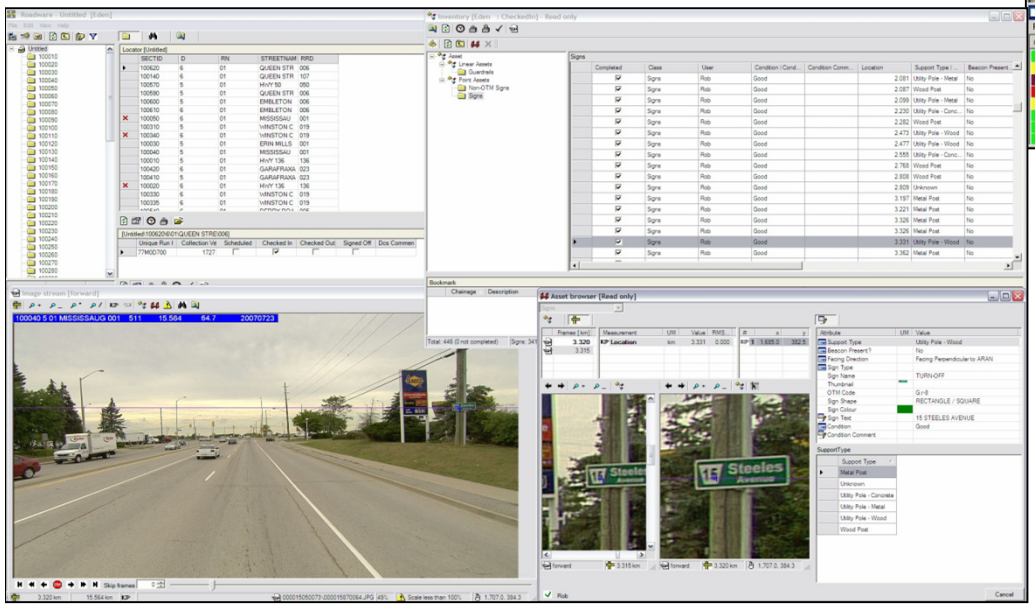
Once Upon A Time

- Trained/knowledgeable personnel
- Previous experience and formal training
- Accreditation integral part of process
- Routine interaction of data collection personnel

Putting Funds Where They Count Most

Pavements are the single most valuable and critical asset for most roadway agencies





Roadside assets are the second most valuable asset

Pavement Roughness

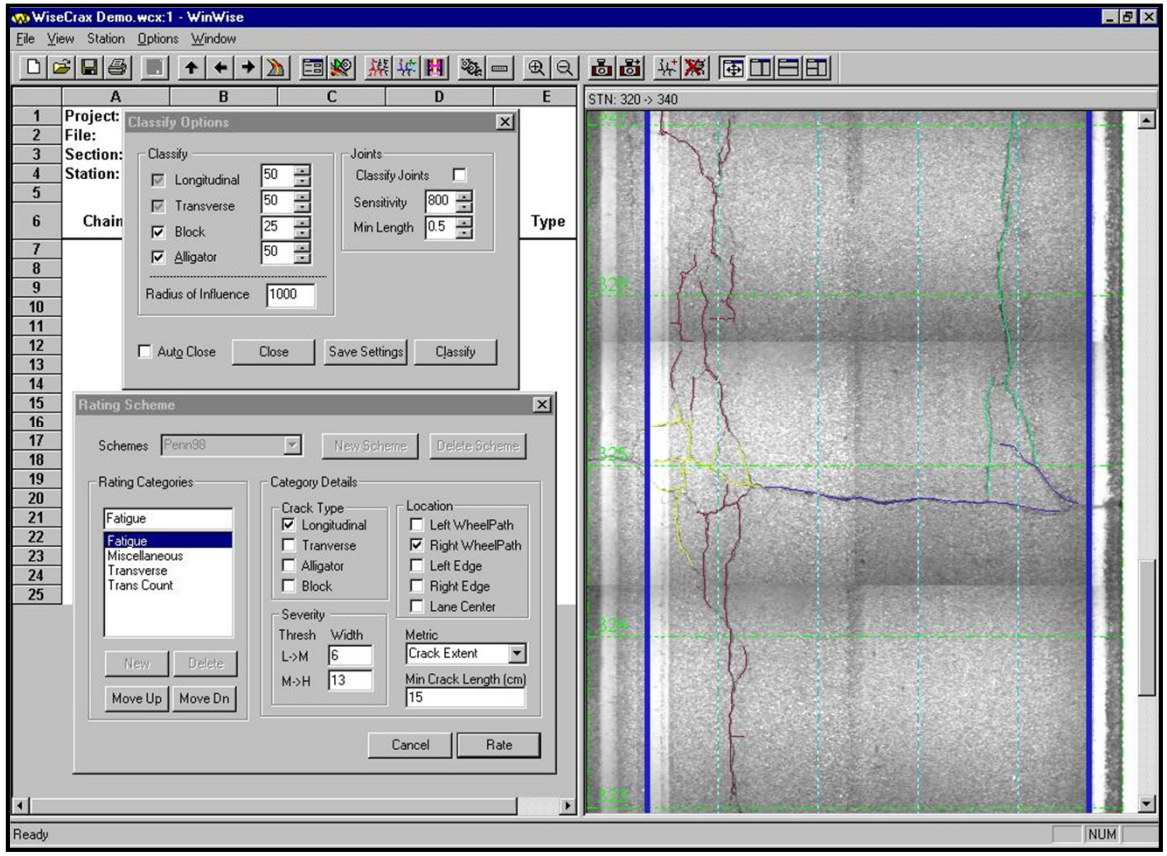
- FHWA survey – most important issue for highway users is roadway condition
- AASHTO surveys – roadway condition is primarily judged by highway users based on pavement roughness
- LTPP program – pavements built with better ride quality take longer to reach unacceptable ride quality levels

Pavement roughness is key performance indicator to highway users

What about the Local User?

Pavement Distress

- Another key performance indicator is distress
- Distress data vital to pavement management



Data Collection Tools

Photolog

- Single or multi-camera
- High Definition Images
- Desktop and Web Based Viewing software (virtual drives)
- Direct-to-digital

Geometry & Spatial

- Inertial measurement unit
- HPMS curve type
- Long. Grade
- Cross slope
- Centerline mapping
- Spatial referencing for GIS integration

Pavement

- Pavement video
- Automated Crack Detection
- Roughness
- Texture
- Rutting
- Surface Distress

Assets

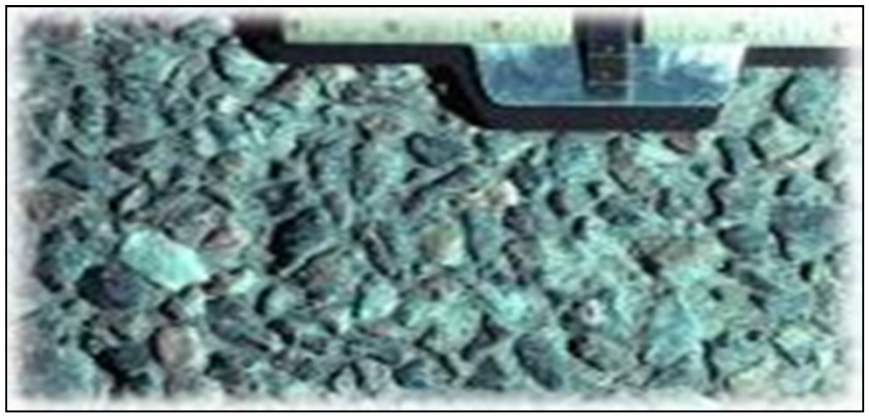
- Inventory from High Definition right of way imagery
- Location determined (linear and spatial)
- Offset measured
- Height and width measured
- Asset type recorded

Pavement

Rutting and Transverse Profile:

- **Laser-based**
  - 1,280 points
  - determine depths of ruts

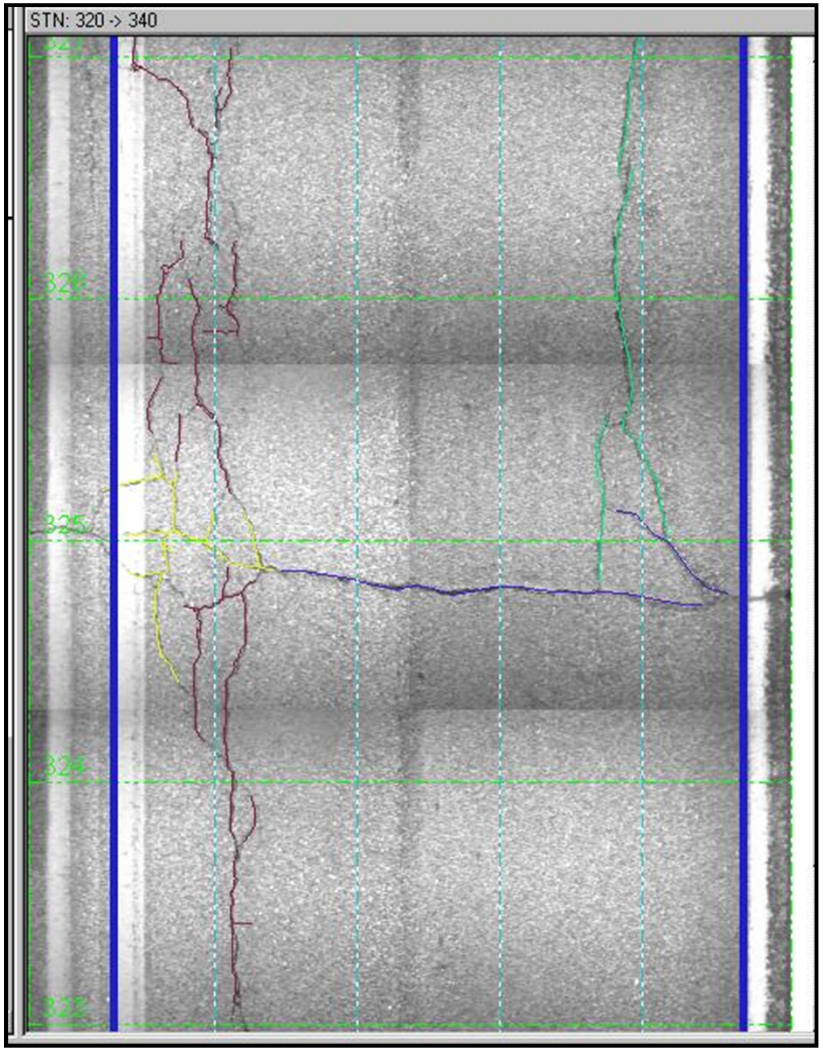
Macro Texture:



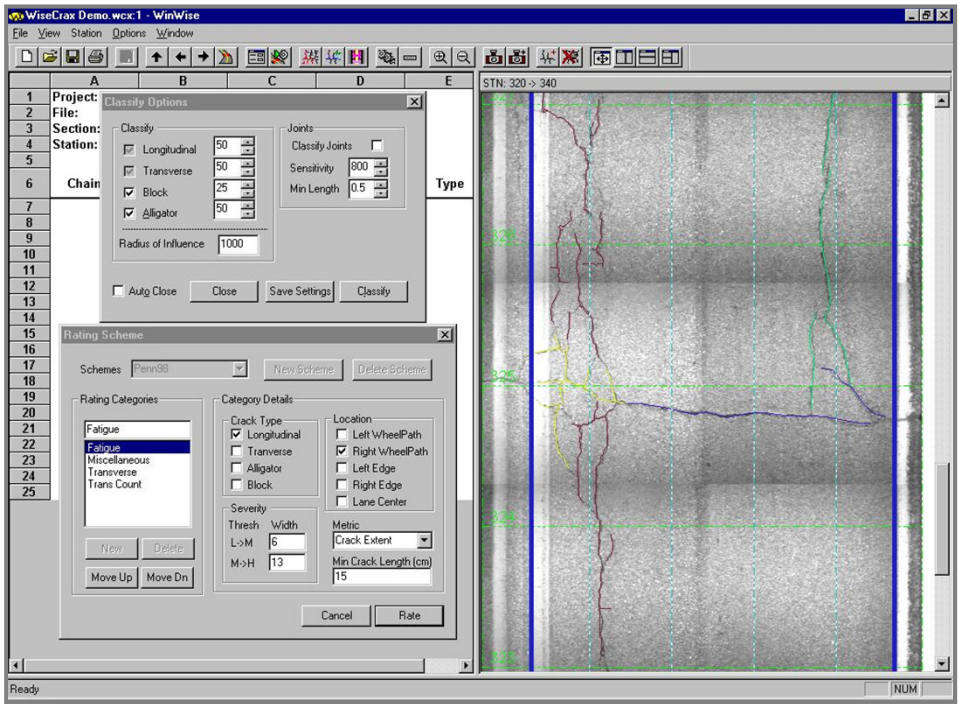
- 64 kHz Laser Sensor
- Road surface macro texture
- 3D tools

Pavement Imaging

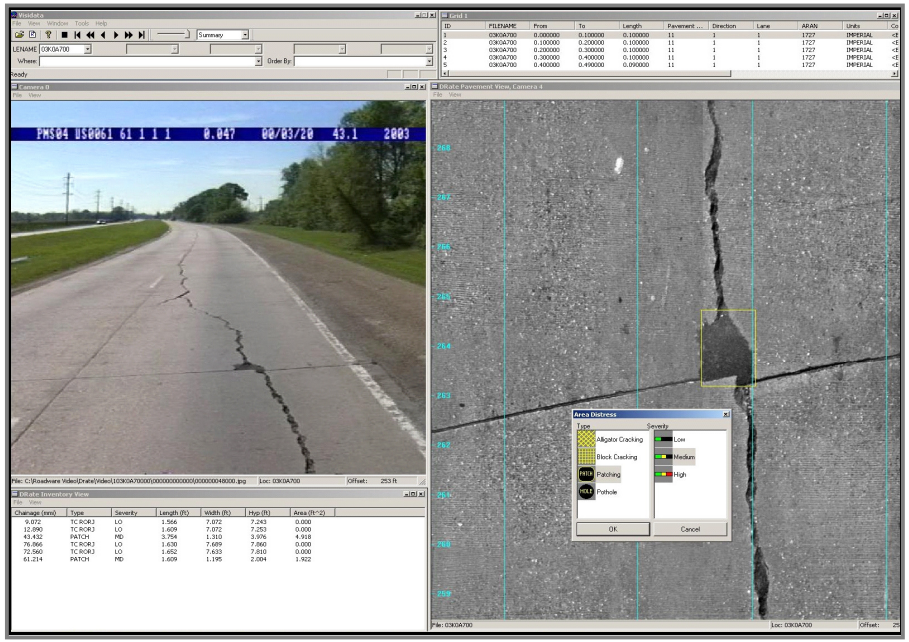
- **Imaging:**
  - Day or night operation
  - 10-14 foot width
  - Images can be post-processed for surface distress
  - Provides a permanent and referenced record



Pavement Imaging



- Automation
  - Commercially available Automated Distress Analysis software
  - Full lane, highly repeatable, image recognition processing



- Experience Machine -Rate
  - (mouse/keyboard) semi-automated process
  - Visual indications of the rated distresses are marked on the screen

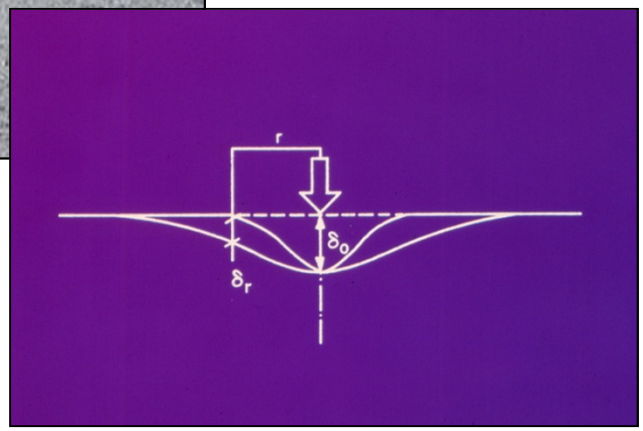
Example Criteria

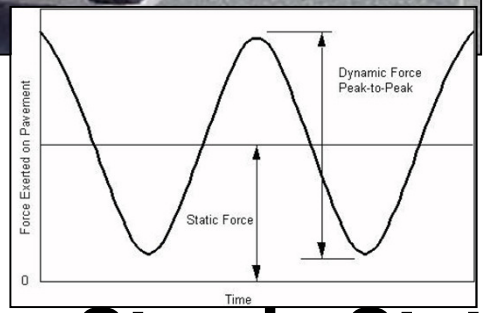
LONGITUDINAL CRACKING
Cracks predominantly parallel to pavement centerline. Location within the lane (wheel path versus non-wheel path) is significant.

Severity levels
LOW
A crack with a mean width ≤ 6 mm; or a sealed crack with sealant material in good condition and with a width that cannot be determined.
MODERATE
Any crack with a mean width > 6 mm and ≤ 19 mm; or any crack with a mean width ≤ 19 mm and adjacent low severity random cracking.
HIGH
Any crack with a mean width > 19 mm; or any crack with a mean width ≤ 19 mm and adjacent moderate to high severity random cracking.

Pavement Deflections

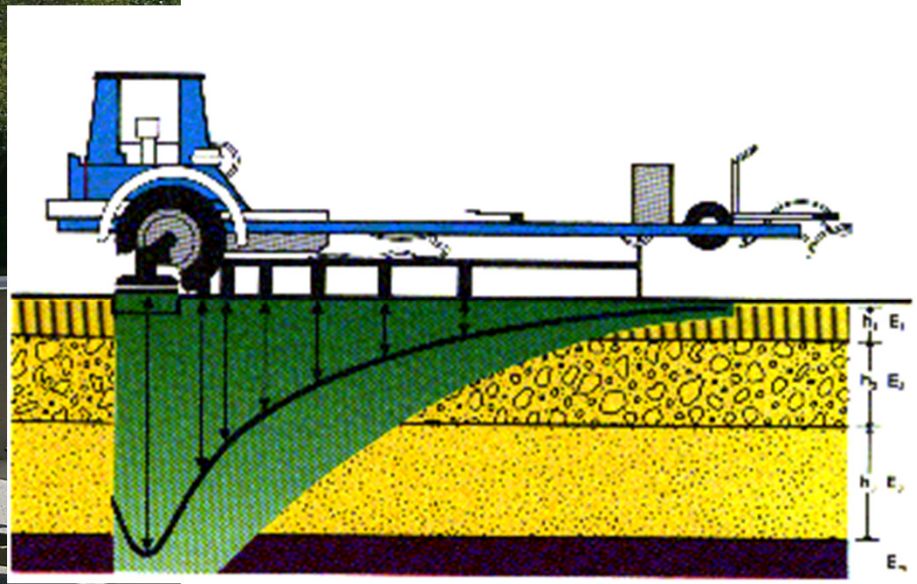
Benkelman Beam



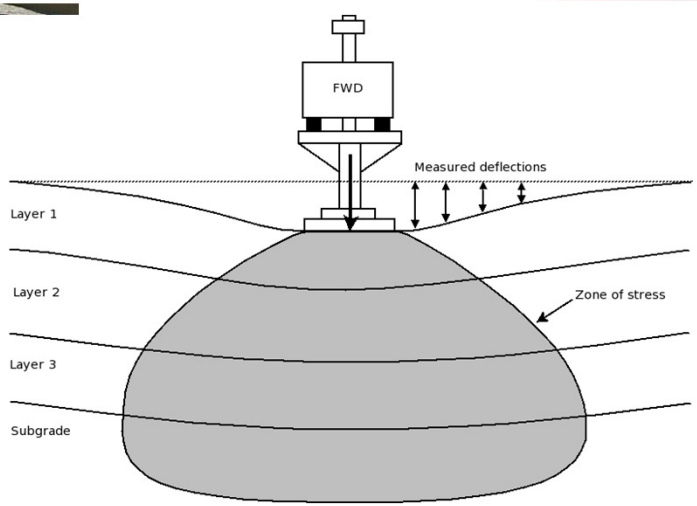


Steady-State Loading Devices

Falling Weight Deflectometer



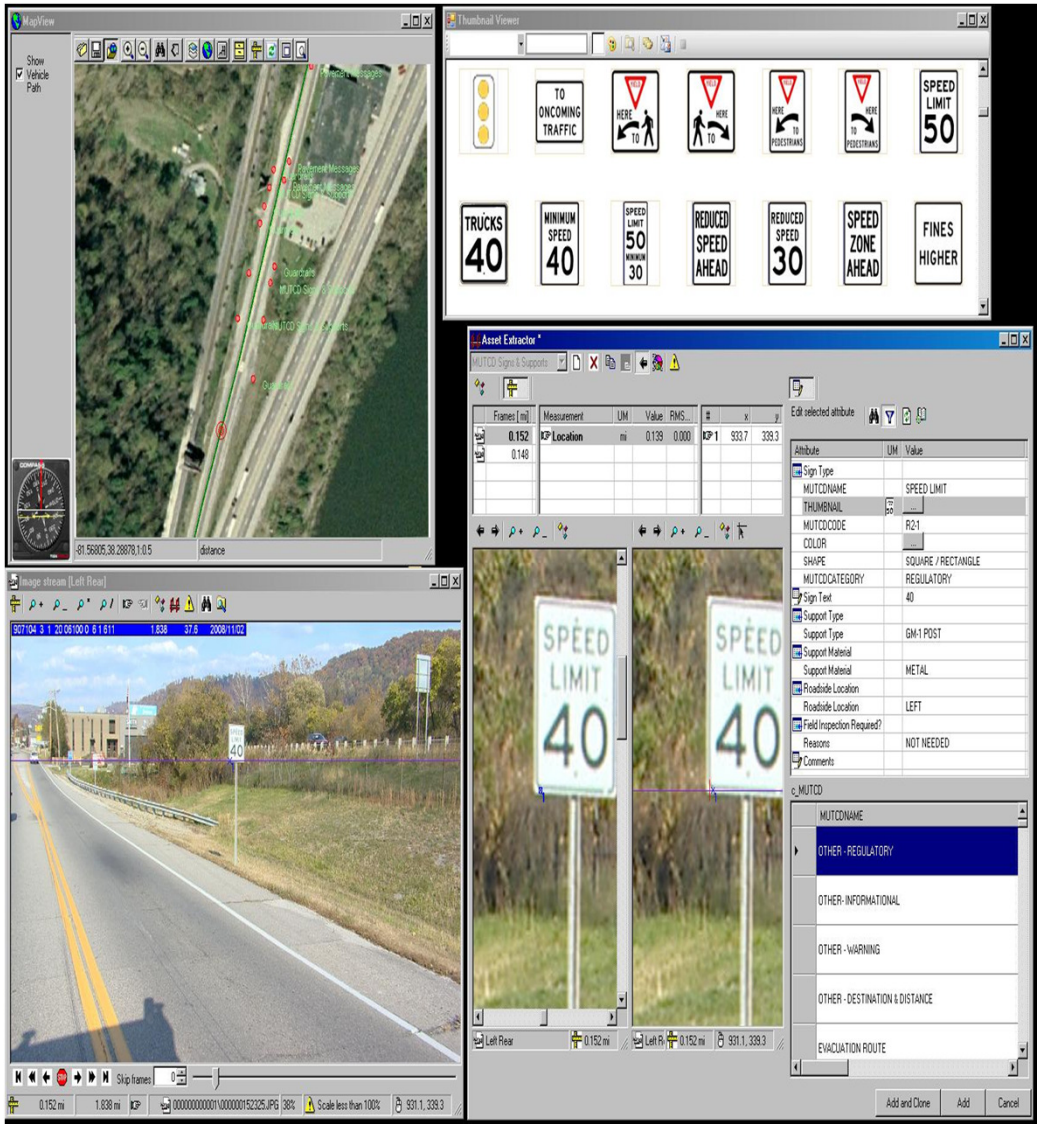
- Structural capacity determinations
- Void detection and load transfer measurements
- Section delineation
- QC/QA



Ground Penetrating Radar (GPR)

- Non-destructive, geophysical technique which produces almost continuous cross section of sub-surface
- At network level, data can be collected at traffic speeds. Deliverables include: segmentation of network based on changes in construction, material type and material thickness
- If more detail is required, denser data set can be acquired to look at features such as voids, delamination, and reinforcement detail

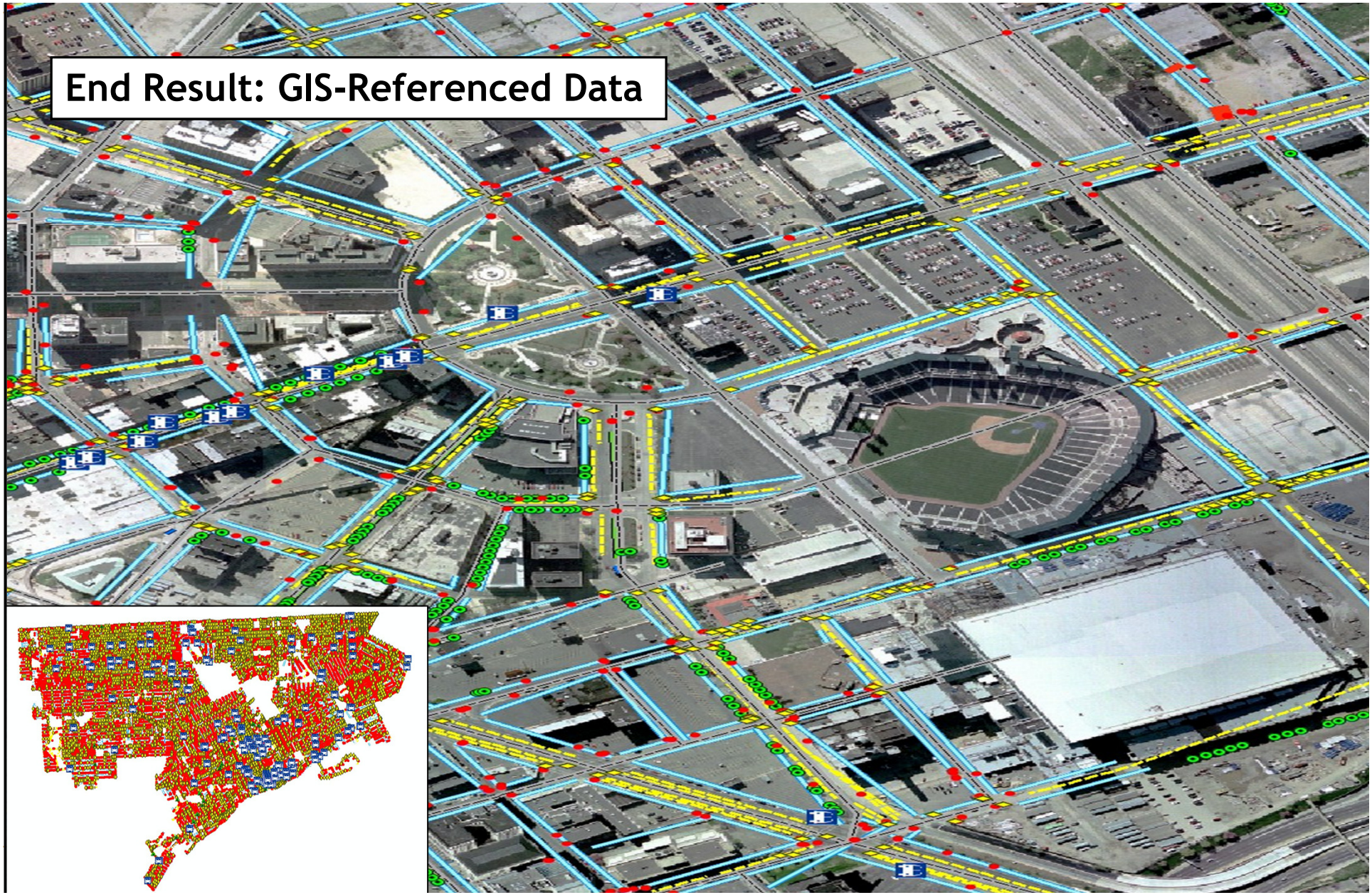
Asset Inventory



- **Features:**
  - Point-and-click interface
  - GPS tagging for GIS import
  - Attributes and image recorded for each asset
  - Use any calibrated camera
    - Rear facing, left, right, etc.

- **Benefits:**
  - Assets can be inventoried quickly
  - Minimal training requirements
  - Eliminates dangerous field work
  - Low per-asset-inventoried cost

Asset Inventory



Summary

- Pavement condition data
  - Key factors in providing satisfactory product to users
  - Key metrics for evaluating and reporting condition of network
  - Used to decide on M&R activities and budget
- Inaccurate data can lead to incorrect conclusions / decisions…**"Garbage in, garbage out"**
- High-quality data critical for meeting pavement management needs
- Achieving high-quality data requires that processes be put in place

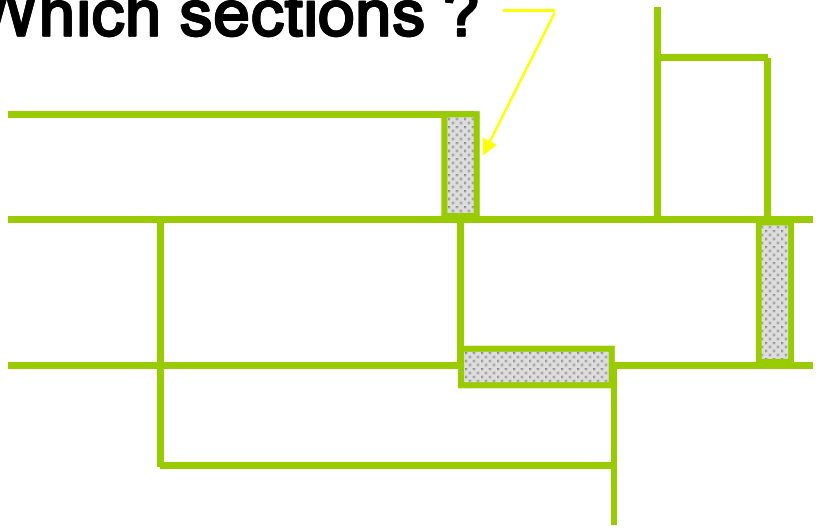
Bucketing Micro Data

- Start with mm Level
- Place into ranges –
  - Low Medium High
  - Good Fair Poor
  - 0-100 Scales
- Select Priority Rankings
- Distribute (districts, political)
- Apply

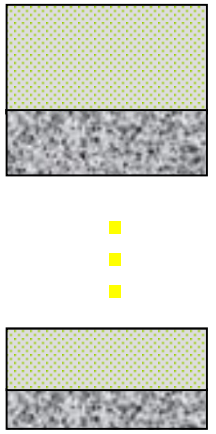
NETWORK LEVEL, MULTI-YEAR PRIORITIZATION

Optimal Combination of:

Which sections ?

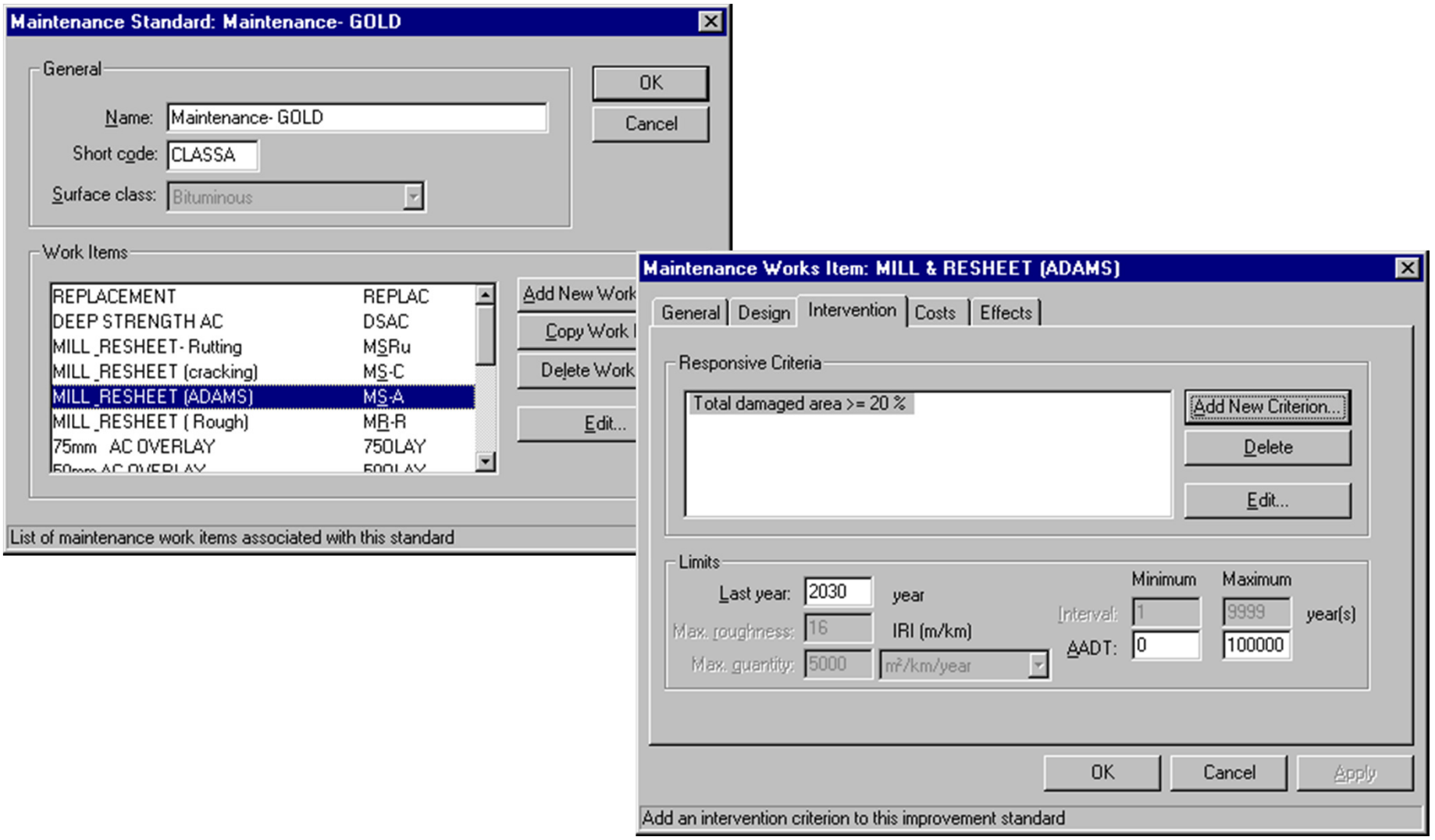


What treatments ?

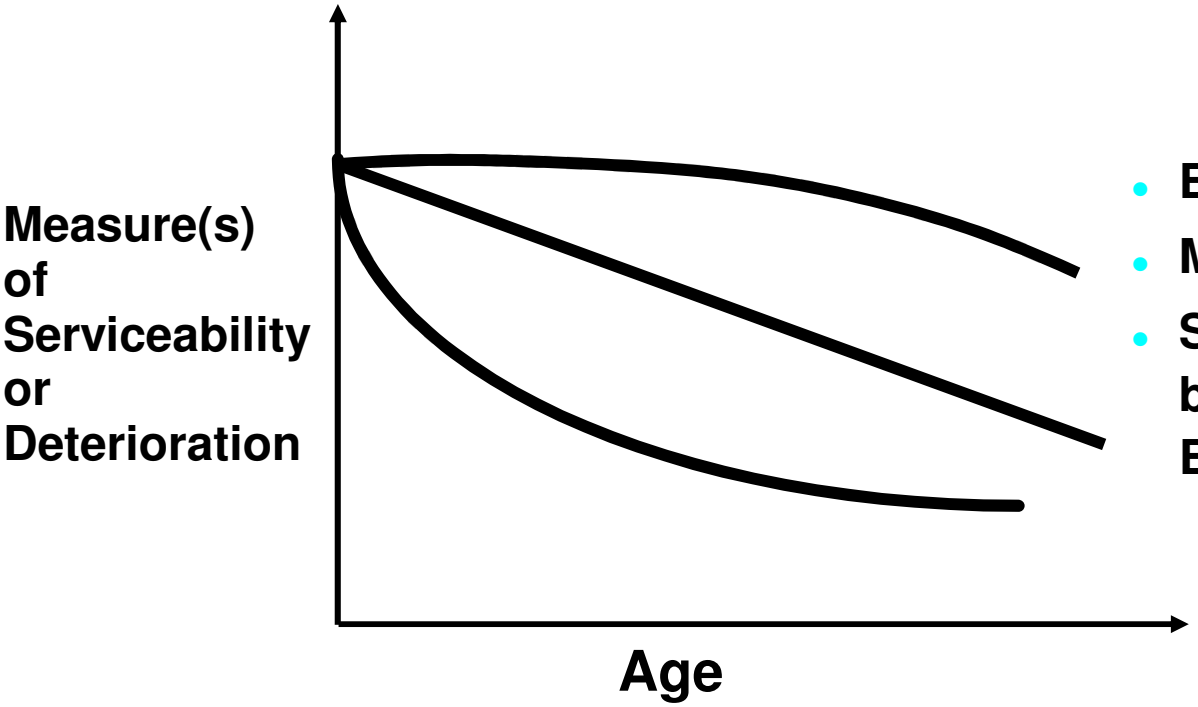


When (in program period), for funding level “i” ?

Reality is .....

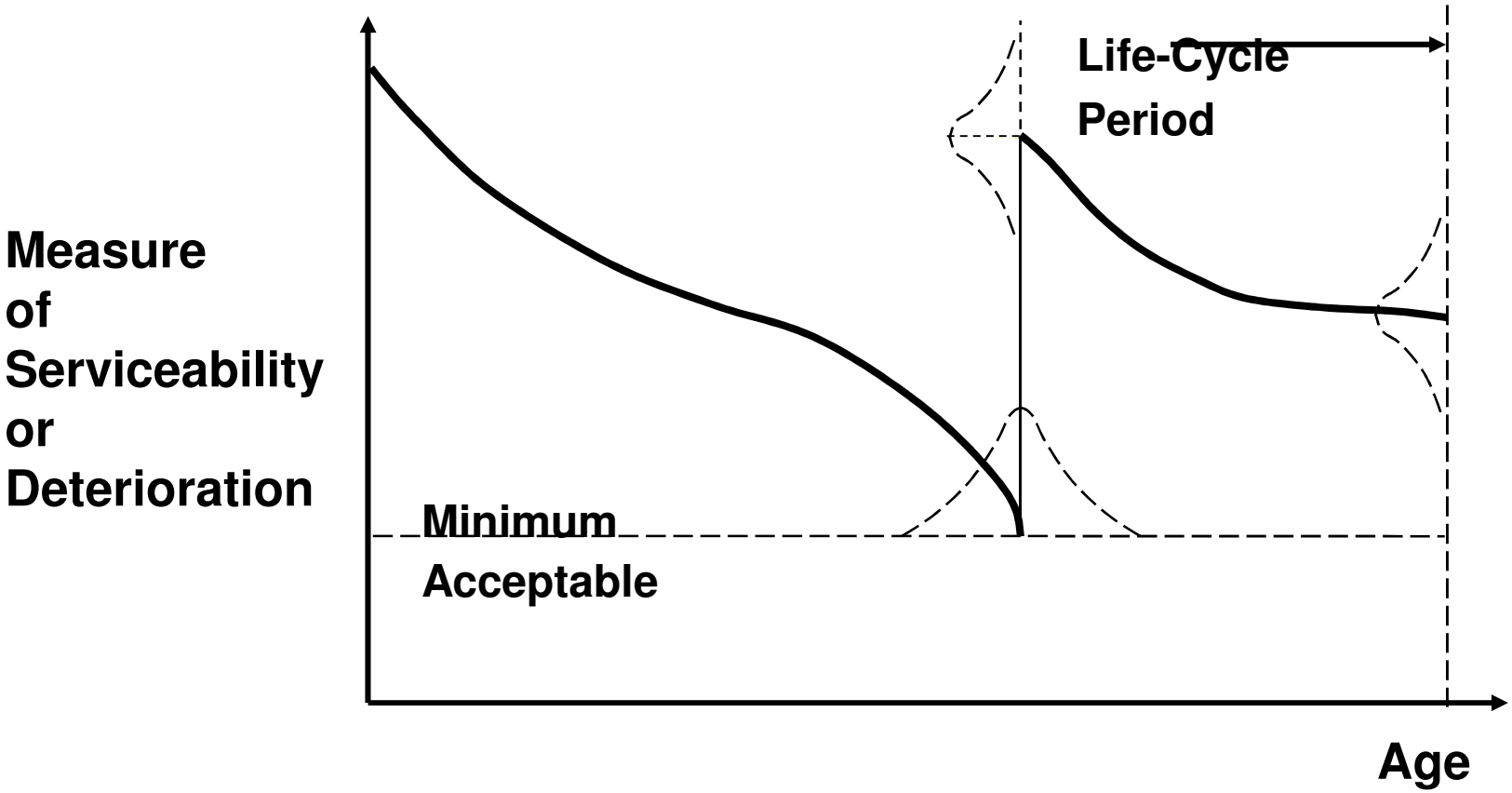

Maintenance Standard: Maintenance- GOLD
General
Name: Maintenance- GOLD
Short code: CLASSA
Surface class: Bituminous
OK
Cancel
Work Items
REPLACEMENT REPLAC
DEEP STRENGTH AC DSAC
MILL _RESHEET- Rutting MSRu
MILL _RESHEET (cracking) MS-C
MILL _RESHEET (ADAMS) MS-A
MILL _RESHEET (Rough) MR-R
75mm AC OVERLAY 75OLAY
Add New Work
Copy Work
Delete Work
Edit...
List of maintenance work items associated with this standard
Maintenance Works Item: MILL & RESHEET (ADAMS)
General
Design
Intervention
Costs
Effects
Responsive Criteria
Total damaged area >= 20 %
Add New Criterion...
Delete
Edit...
Limits
Last year: 2030 year
Max. roughness: 16 IRI (m/km)
Max. quantity: 5000 m²/km/year
Minimum
Maximum
Interval: 1 9999 year(s)
AADT: 0 100000
OK
Cancel
Apply
Add an intervention criterion to this improvement standard

PERFORMANCE MODELLING



- Empirical (e.g. regression)
- Mechanistic-empirical
- Subjective / experience based (e.g. Markov Bayesion)

LIFE CYCLE ANALYSIS



CHALLENGE FOR US

- Index – PSI, PQI, PDI, DI,CRS…..
- Low – Medium - High
- Homogenous
- Old School
- Budget

Close the Gap Between PMS Outputs and Actual M&R Actions

Thank You

Questions ?

Answers?