QA/QC: Virginia Experience

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Outline

- VDOT QA/QC Process Historical Review
- 2005 Data Collection and Processing Contract
- Control Site Evaluations
- Independent Verification & Validation
- Data Analysis
- Roadway Treatment Cost Implications
- Conclusions

- Large infrastructure data collection contract in 2000 with ICAS
- Consensus-based windshield ratings utilized 1999-2005
- IRI QA/QC addressed 1999 - 2001
- Semi-automated imaging systems 1995-98
- Automated imaging/ distress contract in 2005 & 2006

Lessons learned along the way:

- Personnel certification training

- Validation of equipment accuracy & precision

- Daily QC procedures

- On-going QC process

- Independent validation & verification of results

State-of-the-practice technologies in capture and analysis of pavement data

- Digital imaging of pavement surface
- Laser measurements of longitudinal & transverse profiles
- Automated/Semi-automated distress quantification

569 miles of Concrete Pavements

- Combination of JRCP & CRCP

2600 miles of Asphalt Pavements

- ~1900 miles Interstate
- ~700 miles ramps & loops

Data Collection and Processing Contract

- Contractor had an established in-house QC/QA
- IV&V was conducted by an independent sub-contractor
- Vendor used automated and semi-automated distress identification software
- Calibrated using VDOT selected control sites
- VDOT data used as "ground truth"

- Establish precision & bias for
  - Roughness
  - Rutting
  - Distress

- Use to calibrate the distress rating process
  - Automated
  - Semi/Automated
  - Manual

- 13 Control Sites
  - Selected by VDOT
  - Various lengths
  - Various roughness & distresses
- VDOT 10 runs
- Vendor 3 to 5 runs

- Distress Calibrations
  - Based upon distress index values
  - Limit of +/- 10 index points from VDOT value
- Purpose
  - Training
  - Calibrate automated/semi-automated processes
    - One iteration for CRCP
    - Two iterations for JRCP
    - Three iterations for ACP
- Must complete prior to production rating

Independent Verification & Validation

- Performed after vendor in-house QC/QA process completed
- 10% of all production ratings reviewed
- 95% of deliverable must pass the IV&V review before acceptance

JRCP deliverable

- 38% of the 26 sections reviewed failed
- Feedback to vendor resulted in slight changes to their rating protocols
- New 5% sample of revised deliverable
- 100% passed the IV&V check
- Deliverable accepted

CRCP deliverable

- 100% of the 29 sections reviewed passed
- Deliverable accepted

Index Value	Original % Pass	Final % Pass
NDR	70.0	95.0
LDR	82.8	97.8

Six ACP deliverables

– Feedback to vendor resulted in changes to their rating protocols

– Entire deliverable resubmitted

– Deliverable accepted

Initial benefits of IV&V

- Increases the confidence level VDOT has in the reported data
- Provided enhanced QC/QA for vendor
    - Modifications to rating protocols to suit project
    - Increased QA checks prior to delivery

Condition data used for the determination of

- Condition state of the pavements
- Recommended maintenance treatments
- Zero-based budget
- Selection of sections for project-level evaluations
- Planning future work needs

- Maintenance treatments are recommended using decision tree approach
- Distresses and distress combinations are considered at various severity levels
- Each maintenance group has an associated unit cost
- Unconstrained needs determined

Data Analysis

- Condition states determined based on critical condition index on a scale of 0-100

- Five condition states: Excellent, Good, Fair, Poor, and Very Poor

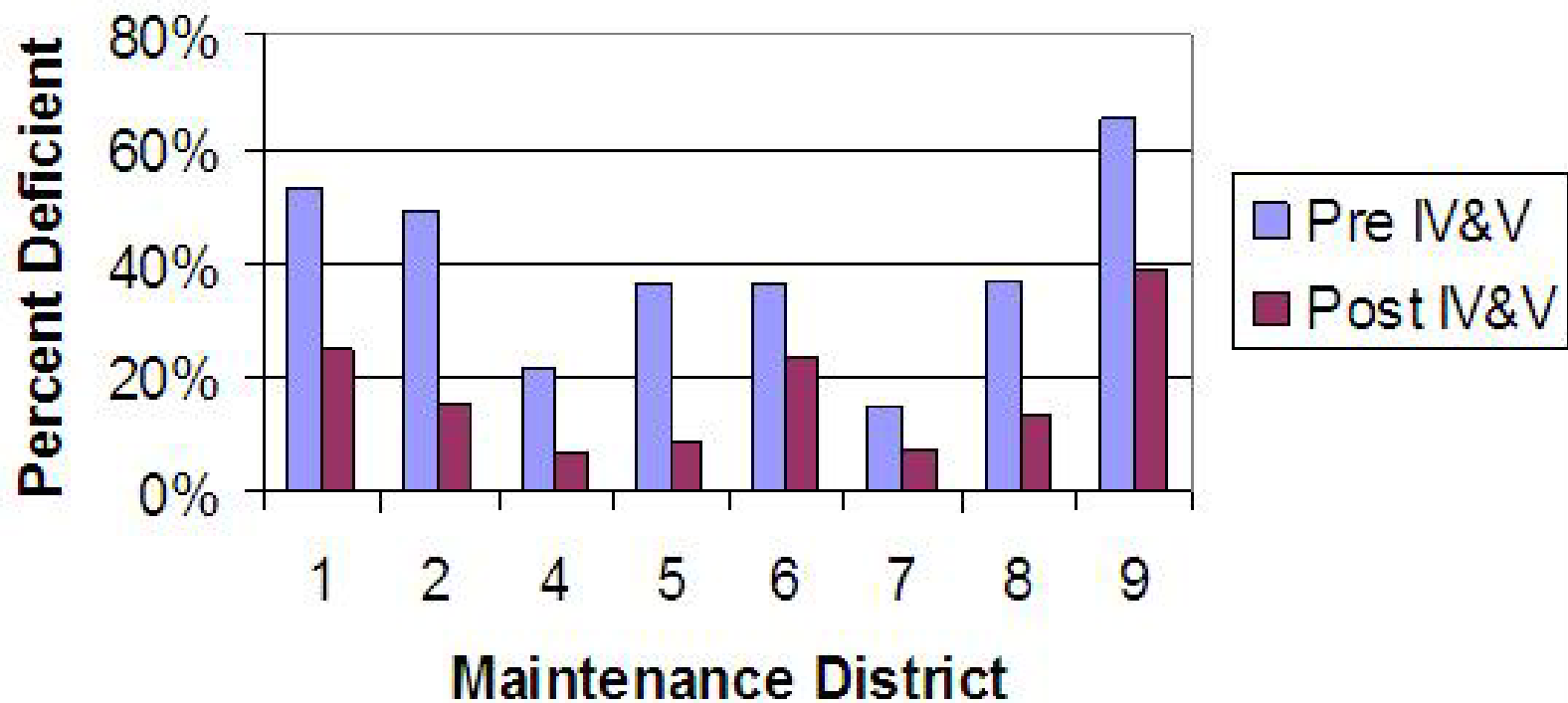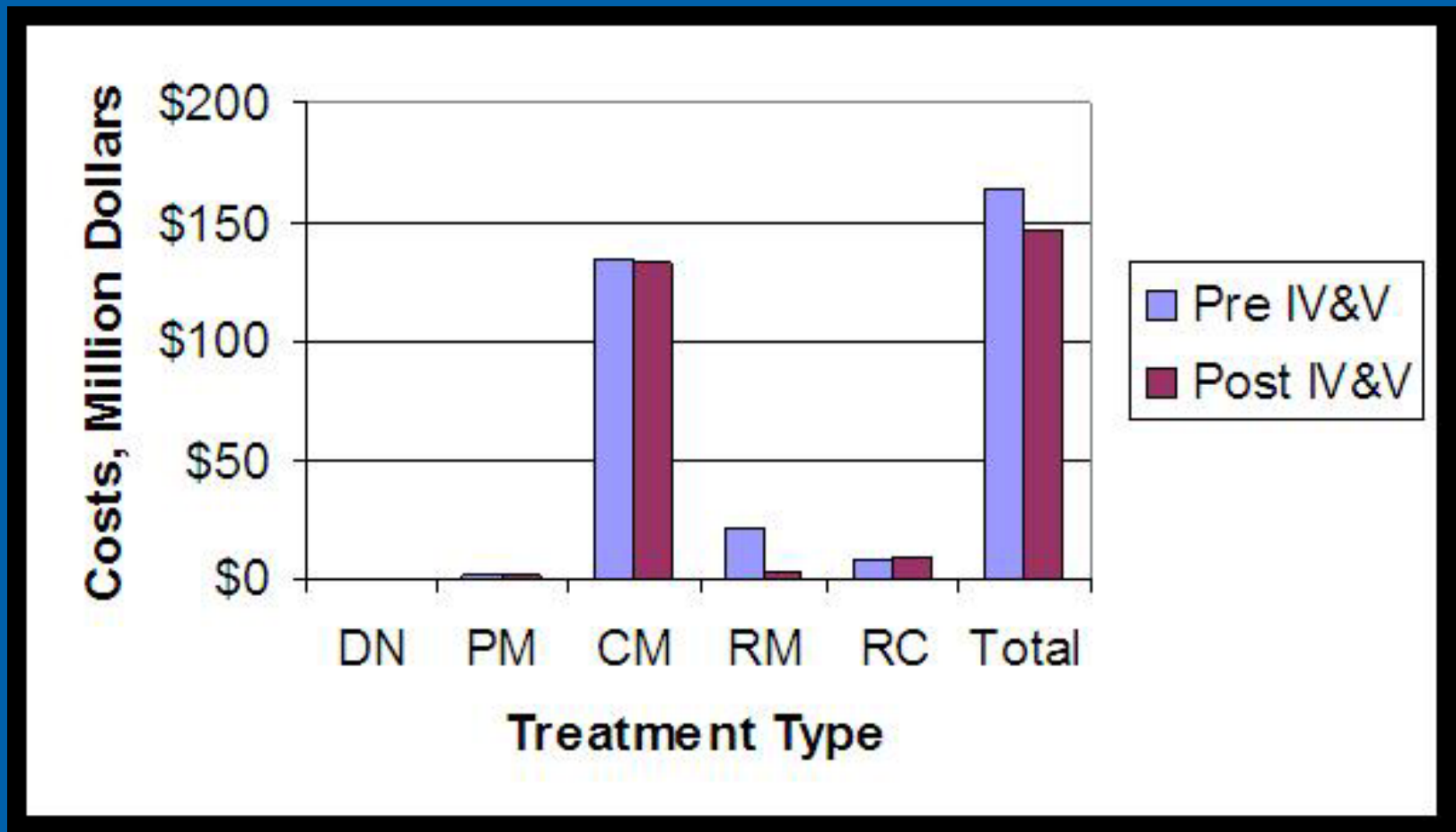- Deficient pavement sections are those in poor and very poor condition
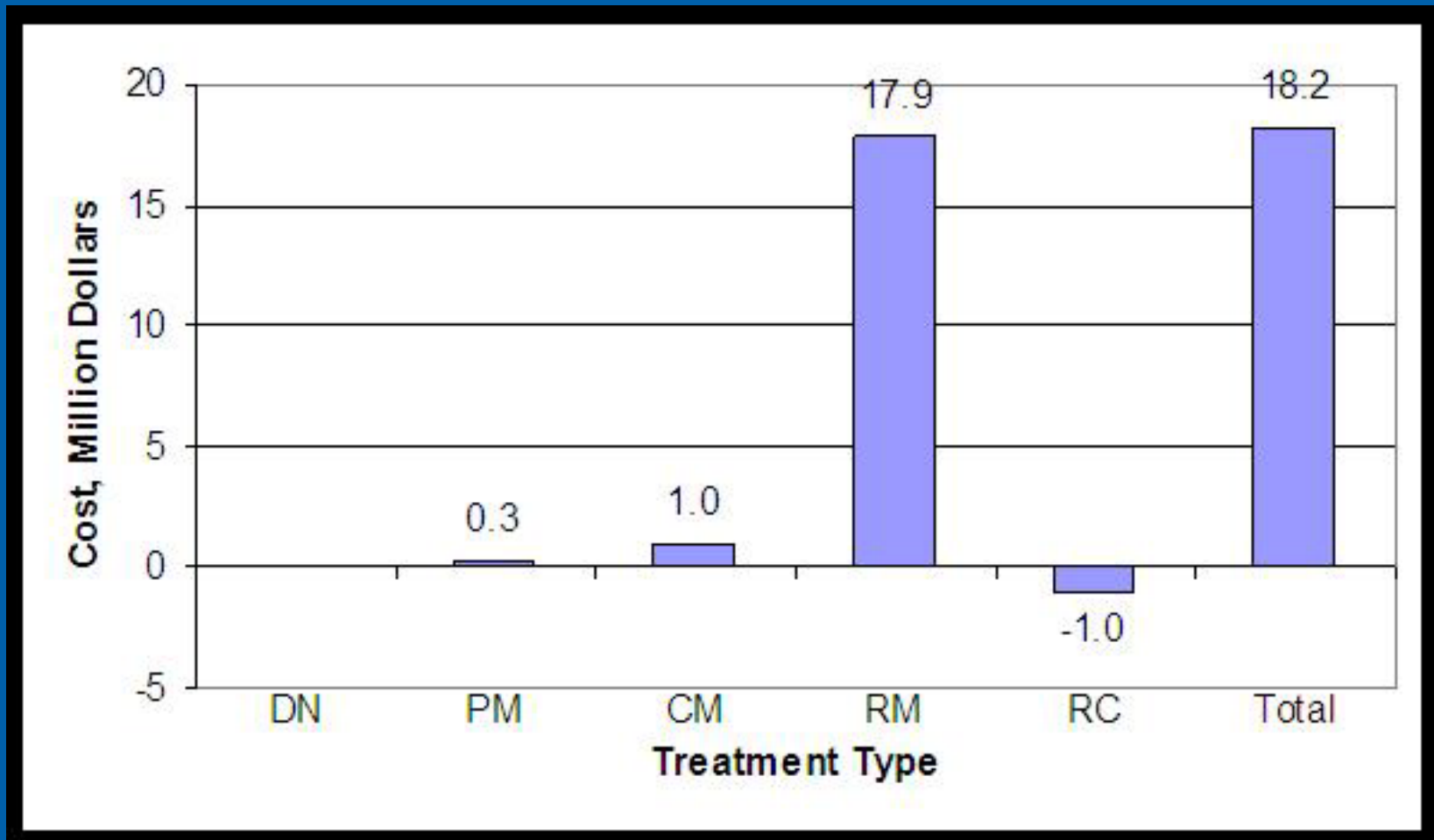
Condition States
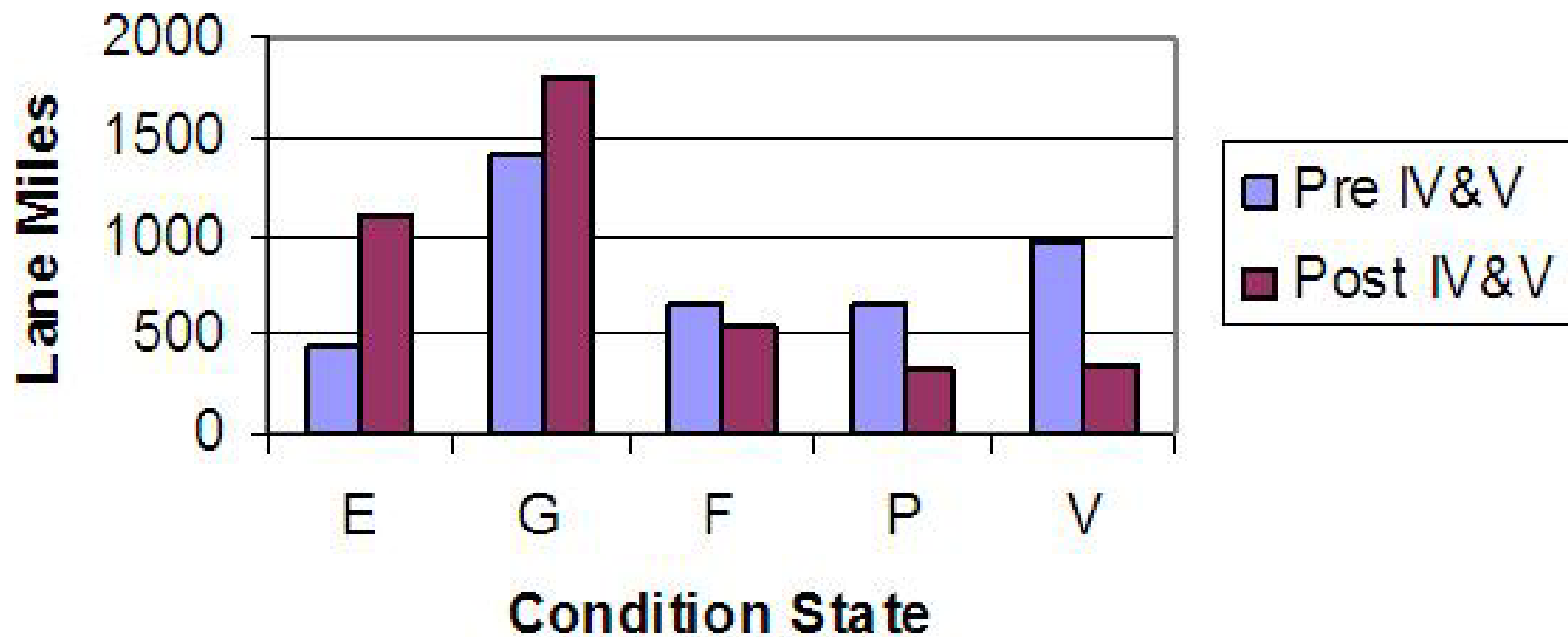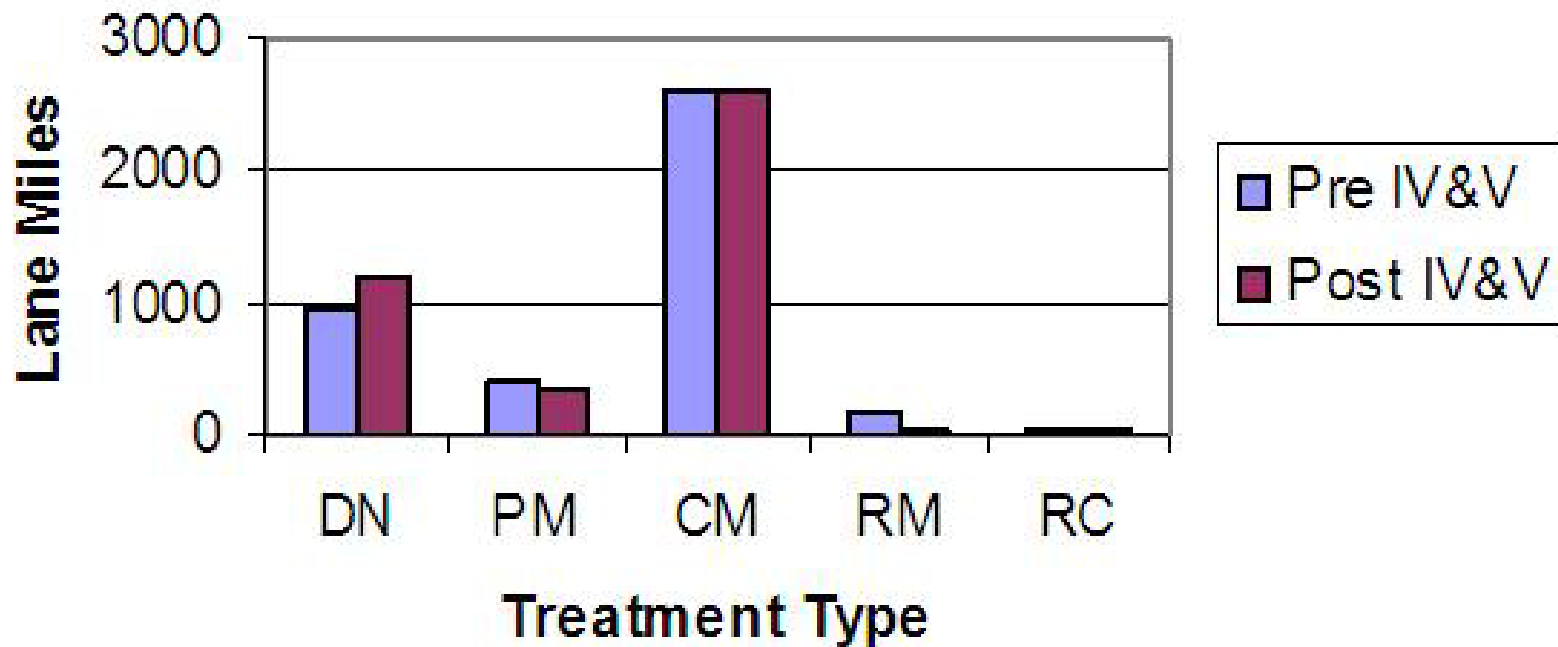
Cost Differences

Conclusions

A comprehensive QA/QC includes:

- Agency participation
- Vendor certification/validation
- Control sites
- Vendor in-house QC/QA
- Independent verification & validation

Conclusions

IV&V in Virginia has resulted in:

– Increased accuracy in reporting existing condition indices (changes by as much as 25%)

– Increased accuracy in reporting deficient pavements by district (20 to 25% change)

– Increased accuracy in the prediction of a needs based budget (changes as much as 21%)

Without IV&V, maintenance and rehabilitation needs may be under or over estimated by 25% or more!

Thank You