QUALITY MANAGEMENT OF PAVEMENT-CONDITION DATA

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Overview

- Data collection at Connecticut DOT (Brad Overturf)
- Automated cracking survey
- Uses of cracking data
- Quality assurance of distress data
- Formalized QA plan
- Opportunities for regional cooperation

Data Collection at Connecticut DOT

- Two ARAN vehicles
  - Roughness (IRI)
  - Rutting (rut bar, 8 ft for network level)
  - Cracking
  - Cross-slope and grade
  - Global Positioning (Lat, Long)
  - Heading (azimuth)

Data Collection (continued)

- 100% sampling in one lane
- 4,5,10 meter data-collection interval

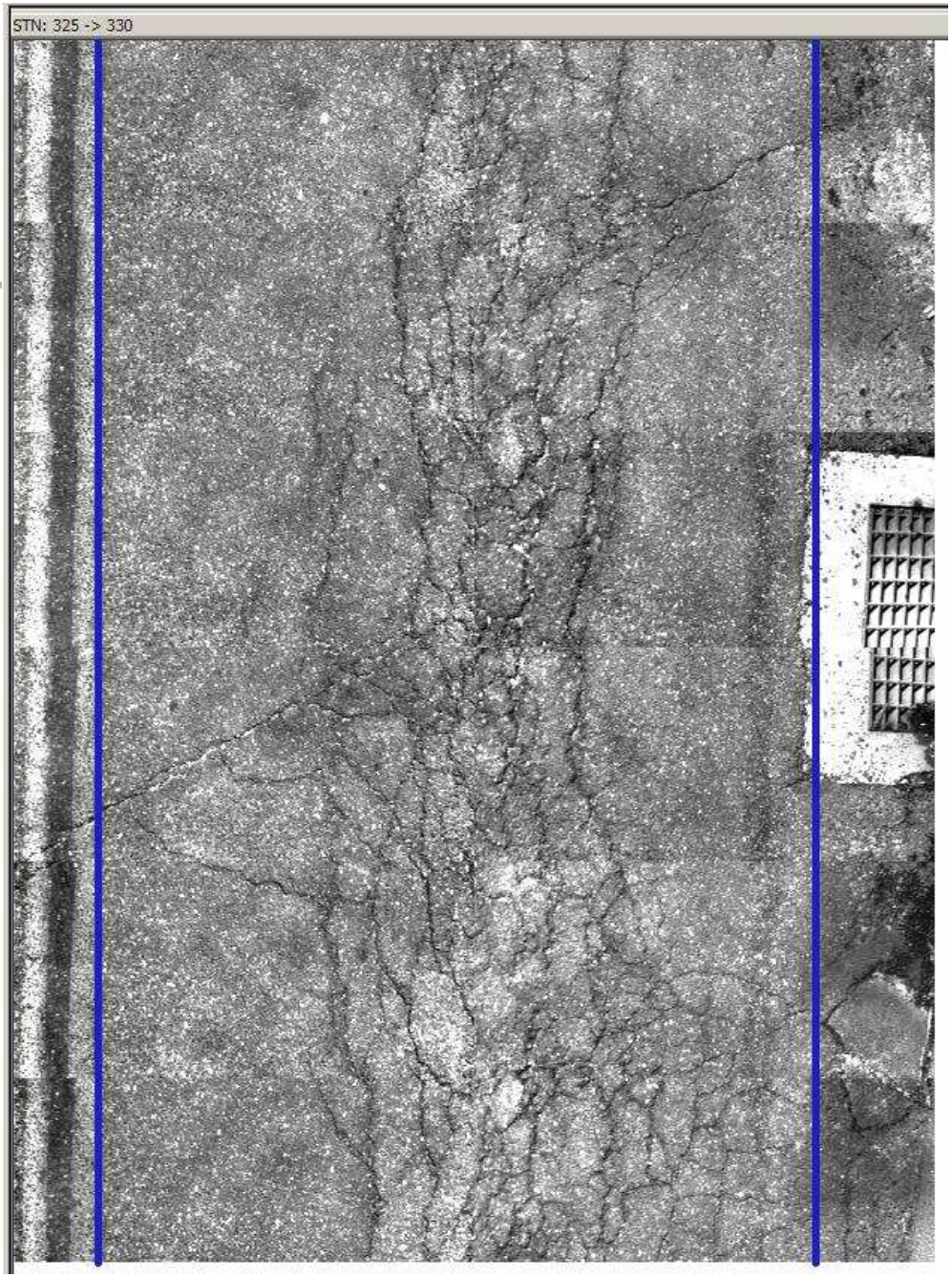
“Automated” Cracking Survey

- Wisecrax ®
- 4-step process
  - Acquisition
    - 3-mm resolution digital images
  - Detection
    - Image-processing algorithm to locate cracks

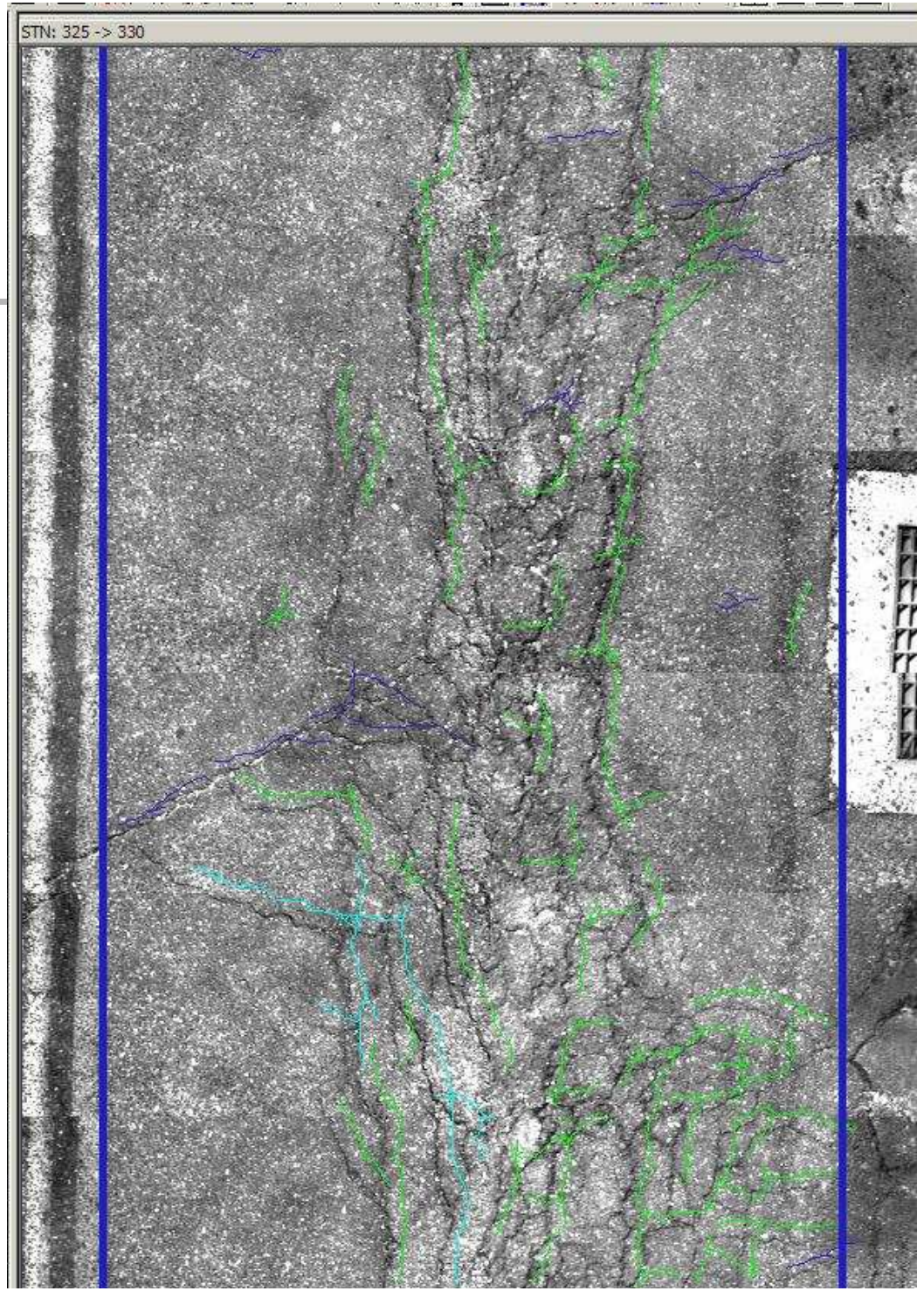
"Automated" Cracking Survey

- Wisecrax ®
- 4-step process
  - Classification
    - Orientation (Transverse, longitudinal)
    - Location within the lane
      - 5 road zones: LE, LWP, C, RWP, RE
    - Severity
      - Avg. crack width (<5mm, 5-12mm, >12mm)
  - "Rating"
    - Way of summarizing the data

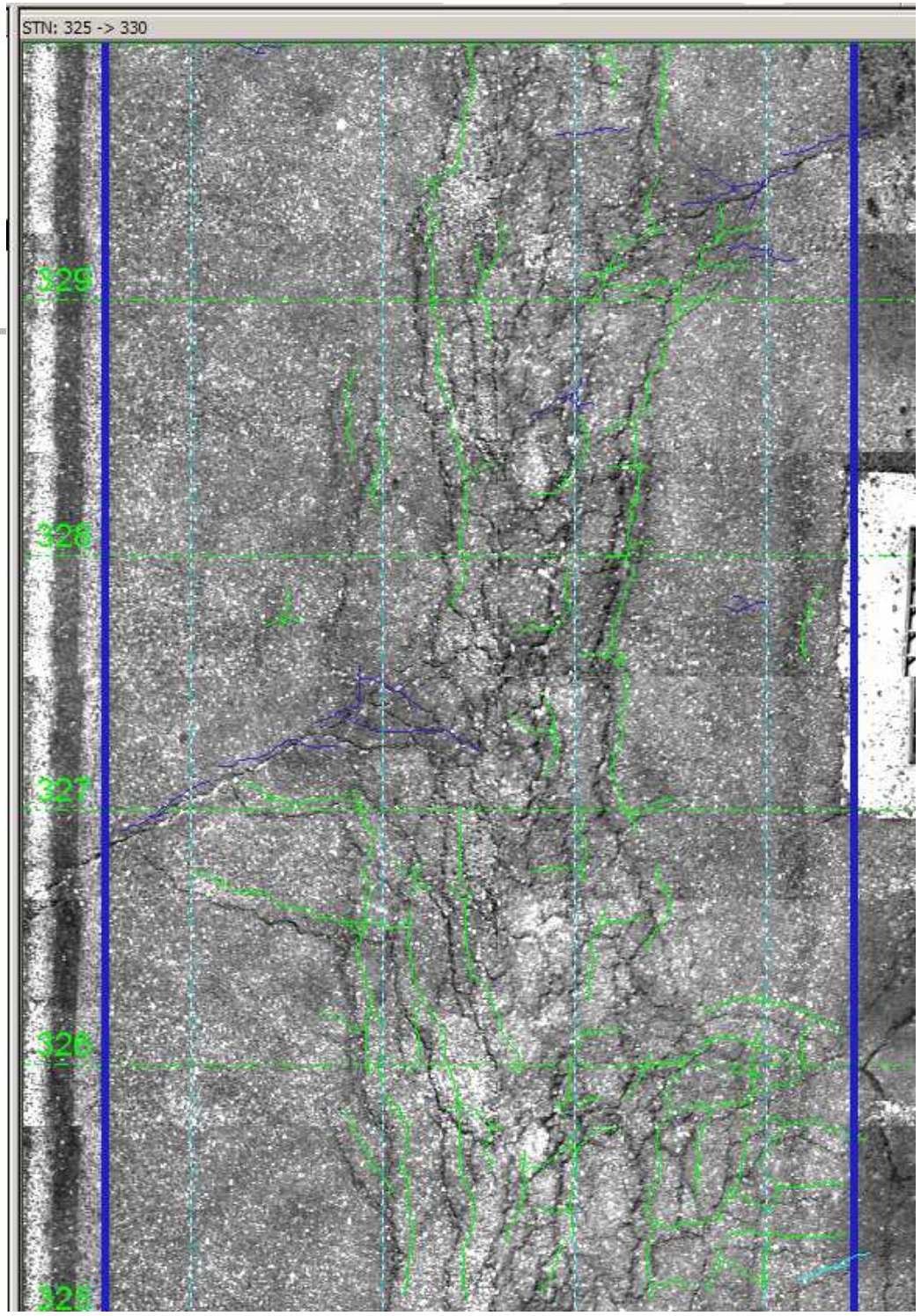
WISECRAX PROCESS (1)



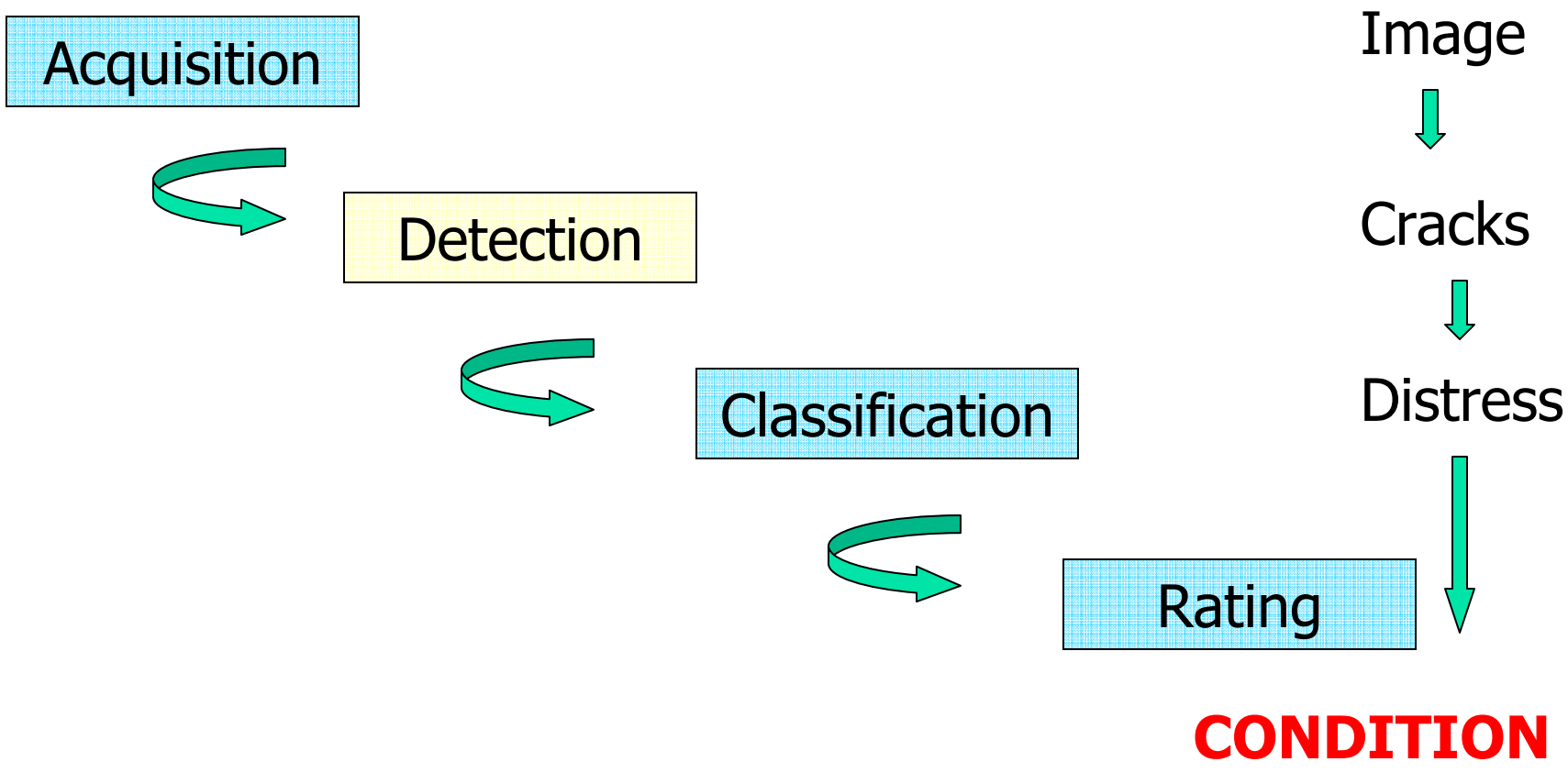
WISECRAX PROCESS (2)



WISECRAX PROCESS (3)



Quality?


Acquisition
Detection
Classification
Rating
Image
Cracks
Distress
CONDITION

Why focus on detection?

- Most critical and uncontrolled element of 4-step process
- The detection level (length, width of cracking, location within lane) may be a useful "common point" for talking to other agencies to compare and leverage data (eventually performance!)

Pavement Condition Data

- 5 Road Zones
  - L. Edge, Left WP, Ctr, Right WP, R. Edge
- 2 Orientations
  - Transverse, Longitudinal
- 3 Severity Levels
  - Width-based (<6mm, 6-12mm, >12mm)
- 30 fields (the sum of them = total cracks)

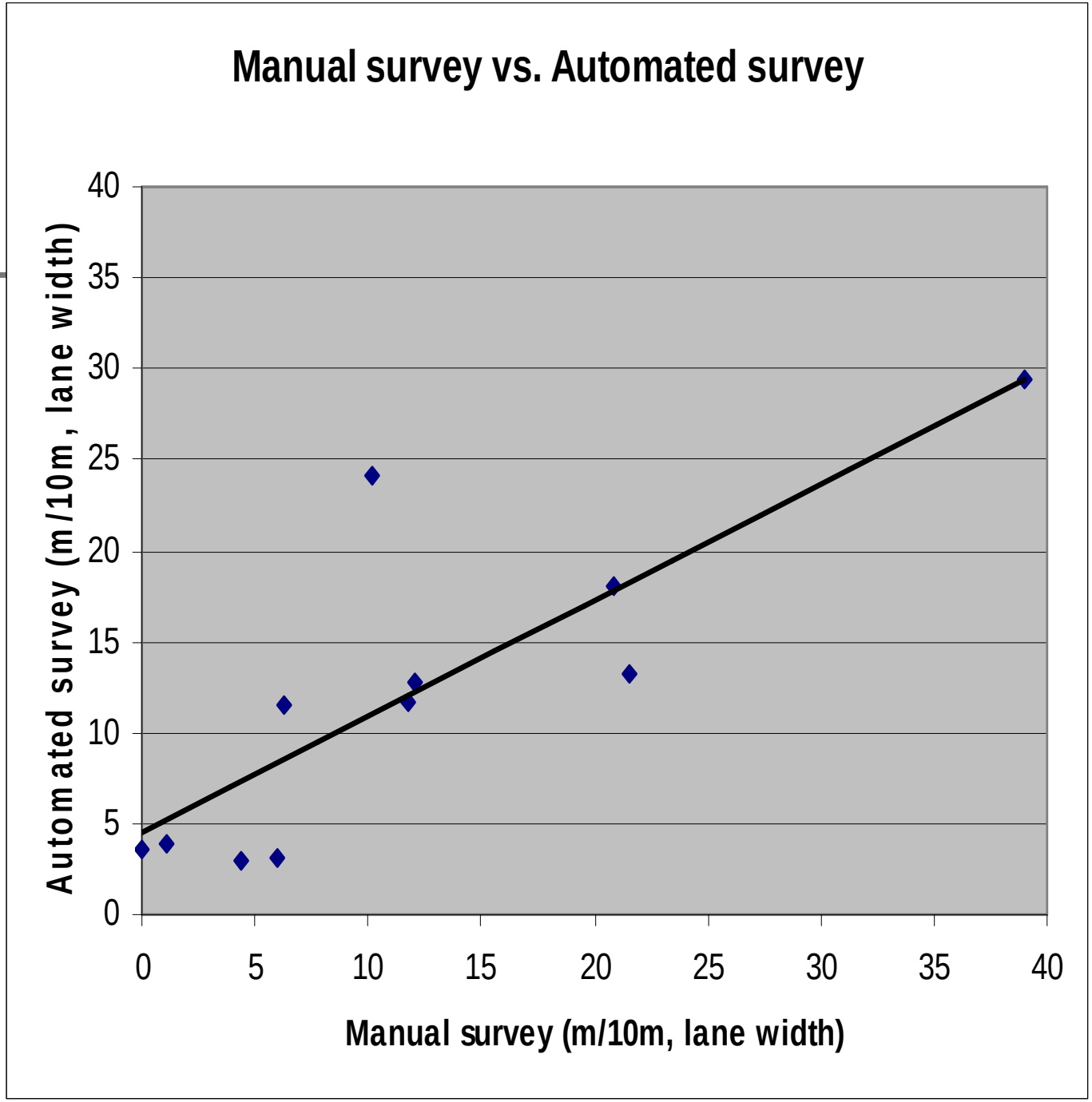
How to Approach the QA Issue

- Follow equipment-manufacturer recommendations for QC procedures
- Set up control segments (QC)
- Establish “manual truth”, check data against this benchmark (QC)
  - Develop a model to produce estimated cracking

How to Approach the QA Issue

- Establish “manual truth”, check data against this benchmark (QC)
  - Select segments over sufficient range of condition
  - Use software, fill in the blanks
  - Then run the software
  - Begin with total length of cracking
    - Issues can be identified right away

Total Length of Cracking



How to Approach the QA Issue

- Take advantage of built-in opportunity
  - Route Overlaps
    - 2 Vans
    - Different lane (sometimes)
    - Seasonal change (time of year)
    - Weather conditions
- Many combinations
- Route overlaps exceed 75 miles (120 km), many in both directions (twice the data)

How to Approach the QA Issue

- Route Overlaps
  - Have located these and obtained coordinates

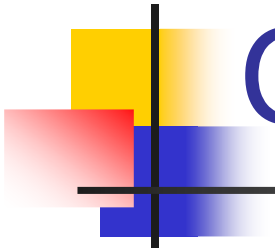
How to Approach the QA Issue

- Next steps
  - Data from previous years
  - Forward/reverse direction in undivided highways
- Working on overlaps
- Would like to begin sharing experiences and leveraging efforts with surrounding states/agencies

Known Variables Affecting Data Quality

- Detection sensitivity parameters
- Sand (“white” cracks)
- Seasonal crack-width variation
- Moisture in pavement
- Pavement texture, age
- Artifacts
- Cracking extent and severity
- Software capability

Plan for Software Version Control



- Report estimated cracks (true cracking)
- Find statistical model for estimating true crack length
- Can always report estimated length of cracking