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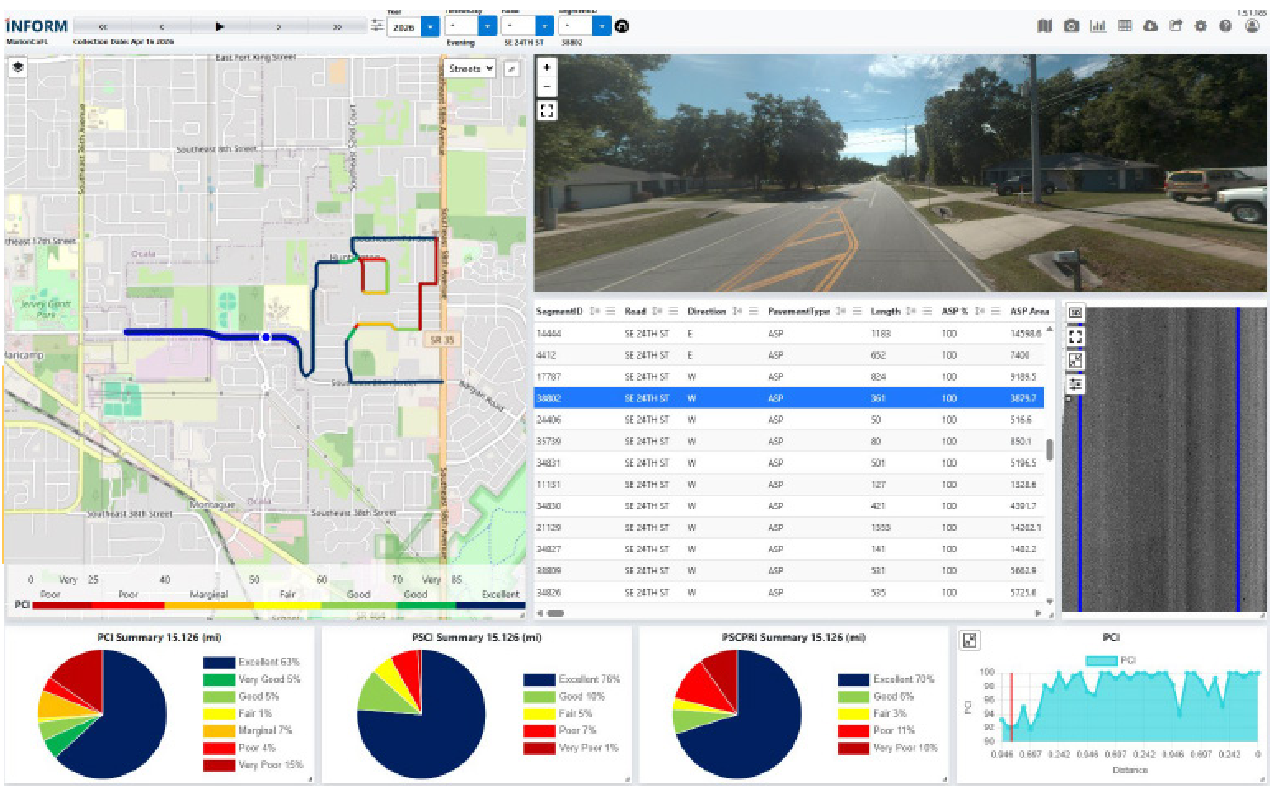
White Paper

Validating Road Condition Data Quality

A Practical Guide on Pilot Projects for Municipalities and Counties Evaluating Vendor Accuracy, Repeatability, and Data Quality



Key Recommendation:
A well-designed pilot includes a representative set of roadways and collects the same roadway sample under morning, afternoon, and evening lighting conditions, then evaluates whether the vendor produces stable, defensible pavement condition results across those collections. The pilot project performed by Marion County, Florida demonstrates how agencies can assess repeatability using condition metrics like PCI, PSCI, PSCPRI, and IRI.

Executive Summary

Municipal and county agencies increasingly rely on automated pavement data collection to support pavement management, capital planning, maintenance prioritization, and public-facing reporting. Because these decisions depend on the quality of collected data, agencies should require vendors to validate accuracy, repeatability, and operational robustness before committing to a full-network survey.

This whitepaper provides a practical pilot project framework that agencies can use to evaluate vendor data quality. The recommended approach is intentionally simple: select a representative subset of roads, collect the roads **three times** under **different ambient lighting conditions** (morning, afternoon, and evening), and compare the resulting condition indices, distress quantities, and roughness values.

The Marion County, Florida pilot is used as an illustrative sample. The pilot covered approximately 5 centerline miles divided into 51 reporting sections and compared three collection passes covering these segments. ICC-IMS collected these sections in April 2026 using an IrisPRO Pave survey van. In the delivered data, network-level PCI (ASTM D6433) varied only 1.1 points across the three collections, PSCI (ASTM E3303) was reported at 93 on each pass, and IRI varied only 4 in/mi in spite of the stop-and-go nature of collection. These results show how a pilot project can present repeatability in a concise and decision-ready format.

Collection	Survey Date	PCI	Backlog	PSCI	PSCPRI	IRI (in/mi)
Morning	April 17, 2026	75.2	18.7%	92.9	87.4	139
Afternoon	April 17, 2026	74.3	18.7%	92.9	87.3	143
Evening	April 16, 2026	75.4	18.7%	92.9	87.2	142

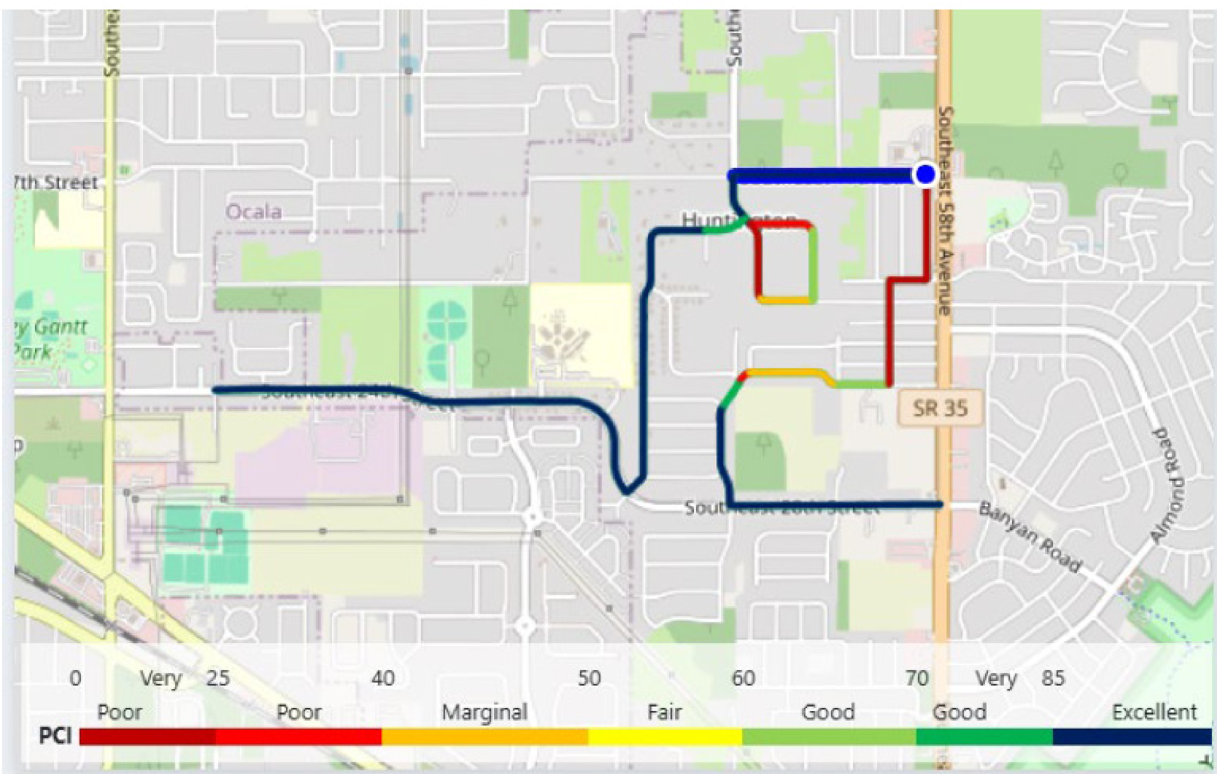


Figure 1: 5-mile pilot selected by Marion County, FL

Purpose of a Data Quality Pilot

A pavement data quality pilot should answer three questions: Is the vendor measuring the right roads and defects? Are the results repeatable when collection conditions change, especially lighting? Can the resulting information support practical pavement management decisions?

The pilot should be structured as a controlled validation exercise with defined locations, defined collection windows, consistent reporting units, objective evaluation criteria, and transparent identification of exceptions such as construction zones, bridges, railroad crossings, dirt/debris, and inaccessible pavement.

Guiding Principle	Recommended Practice	Why It Matters
Representative sample	Include a mix of pavement ages, surface types, distress severities, neighborhood streets, collectors, and edge cases.	A vendor can appear accurate on easy segments but fail on distressed, shaded, patched, or visually complex pavement.
Repeat collection	Collect the same roads in the morning, afternoon, and evening.	Changing sun angle, glare, shadows, and contrast can affect image quality and automated distress detection.
Stable segmentation	Use the same GIS centerline and reporting segmentation for every collection.	Repeatability should reflect measurement quality, not inconsistent segmentation or route definitions.
Transparent metrics	Report network-level and segment-level results using agency-understandable metrics.	Decision-makers need to see whether differences are meaningful for budgeting and treatment selection.
Exception tracking	Flag invalid or non-assessable areas consistently.	Construction, bridges, rail crossings, and other exceptional conditions should not distort performance conclusions.

Recommended Pilot Project Setup

The following setup is recommended for agencies evaluating vendor claims before a full-network program.

Pilot Component	Recommended Guideline
Pilot size	Select a corridor or small network large enough to include varied pavement conditions. A 3–10 centerline mile pilot is typically sufficient for a meaningful evaluation, provided the selected roads are representative.
Collection windows	Require three collections of the same routes: morning, afternoon, and evening. Document date, approximate time, weather, camera/vehicle configuration, and any known operational exceptions.
Routes and segmentation	Use the agency's GIS network as the control. Confirm segment IDs, road names, direction, beginning and ending chainage, and reporting interval before field collection.
Reporting interval	Require both segment-level results and a short-interval view, such as 100 ft or 200 ft reporting, so reviewers can compare localized distress findings.
Core metrics	At a minimum, compare PCI or equivalent condition score, roughness/IRI, rutting where available, distress quantities by type and severity, and treatment recommendation outputs.
Acceptance criteria	Define acceptable variation before collection begins. Suggested network-level targets include small variation in PCI/condition score, stable backlog classification, stable treatment category, and explainable segment-level differences.
Review workflow	Include a dashboard review, tabular QA/QC review, image/video spot checks, and a final findings discussion to decide whether the vendor is ready for full-network deployment.

Evaluation Framework

A good pilot evaluation should separate four related but distinct concepts:

Completeness: Did the vendor collect the required roads, lanes, directions, and reporting sections, and were invalid areas clearly identified? Was the vendor able to measure the metrics required by the agency's pavement management program, including individual distress quantities, PCI, PSCI, PSCIPRI, IRI, Rutting, and other measures as applicable?

Accuracy: Do detected distresses, surface types, roughness trends, and condition scores align with agency review, field observations, or independent reference data?

Repeatability: Are results materially consistent across morning, afternoon, and evening runs of the same network?

Decision usefulness: Do the resulting condition categories, backlog estimates, and treatment recommendations support the agency's pavement management decisions?

Metric	Recommended Comparison	Decision Question
PCI / Condition Index	Compare network average, range, and segment-level differences across the three collection times.	Would lighting differences change the agency's interpretation of pavement condition?
Backlog	Compare percentage of network below the agency's rehabilitation threshold.	Would the same network produce different funding needs depending on collection time?
IRI / Roughness	Compare average IRI and identify outlier segments.	Are ride-quality results stable and operationally plausible?
Distress quantities	Compare type/severity quantities for key defects such as alligator cracking, longitudinal/transverse cracking, edge cracking, patching, potholes, and rutting.	Are automated detections consistent enough to support treatment selection?
Treatment recommendations	Compare treatment categories and cost-driving outputs.	Would the vendor's data lead to the same maintenance or rehabilitation plan?

Sample Pilot: Marion County, Florida

Pilot Setup

The Marion County pilot illustrates how the recommended guideline can be implemented and reported. The pilot dataset was collected using the IrisPRO Pave system and summarized in a dashboard format for client review.

Sample Pilot Attribute	Marion County Example
Agency / location	Marion County, FL
Pilot network size	5.03 centerline miles
Reporting sections	51 sections
Pavement area	32,618 yd^2
Collection design	Three repeated runs: morning, afternoon, and evening
Survey dates shown in dashboard	April 16, 2026, April 17, 2026
Selected roadways	SE 17TH ST, SE 18TH LN, SE 18TH ST, SE 20TH ST, SE 21ST LN, SE 24TH ST, SE 28TH ST, SE 49TH AVE, SE 50TH TER, SE 52ND AVE, SE 52ND CT, SE 54TH TER, and others

Pilot Results

The overall condition scores reported for the pilot are shown in the table below.

Collection	Survey Date	PCI	Backlog	PSCI	PSCPRI	IRI (in/mi)
Morning	April 17, 2026	75.2	18.7%	92.9	87.4	139
Afternoon	April 17, 2026	74.3	18.7%	92.9	87.3	143
Evening	April 16, 2026	75.4	18.7%	92.9	87.2	142

In the delivered data, network-level PCI (ASTM D6433) varied only 1.1 points across the three collections and the PSCI (ASTM E3303) was reported at 93 on each pass. The Roughness (IRI) varied only 4 in/mi in spite of the stop-and-go nature of collection thanks to the use of the ICC-IMS Every Speed Profiler (ESP).

Repeatability Check	Observed Marion County Result	How to Interpret
PCI repeatability	Average PCI 75.0; range 1.1 points across morning, afternoon, and evening.	A narrow range indicates that overall condition scoring was stable across the three lighting conditions.
Backlog stability	Backlog remained 18.7% for all three collections.	Stable backlog indicates that lighting differences did not change the high-level rehabilitation need estimate.
PSCI stability	PSCI range was 0.0 points.	No meaningful variation was observed in this network-level surface condition metric.
PSCPRI stability	PSCPRI range was 0.2 points.	A small variation suggests stable combined pavement condition/priority scoring.
IRI repeatability	Average IRI 141 in/mi; range 4 in/mi.	Roughness results were consistent at the network level across repeated runs.

However, it is critically important not just to look at PCI scores because this high-level metric is not sufficient to develop treatment recommendations. The distresses behind the score must also be measured by the vendor and assessed for accuracy. The following table shows a comparison of the key distress types, grouped by each collection run (morning, afternoon, and evening). **The results show high equivalence between all runs.**

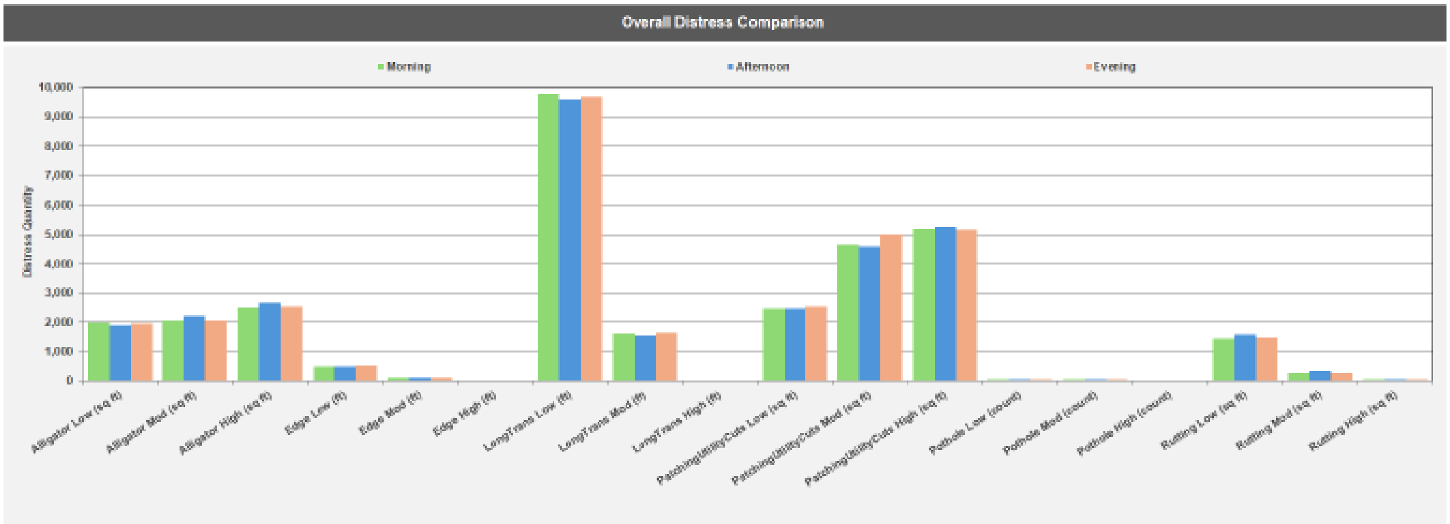


Figure 2: Overall distress quantities comparison

The results were also evaluated by segment, not just overall for the whole 5-mile pilot. The results show excellent agreement in the PCI score for each individual segment.

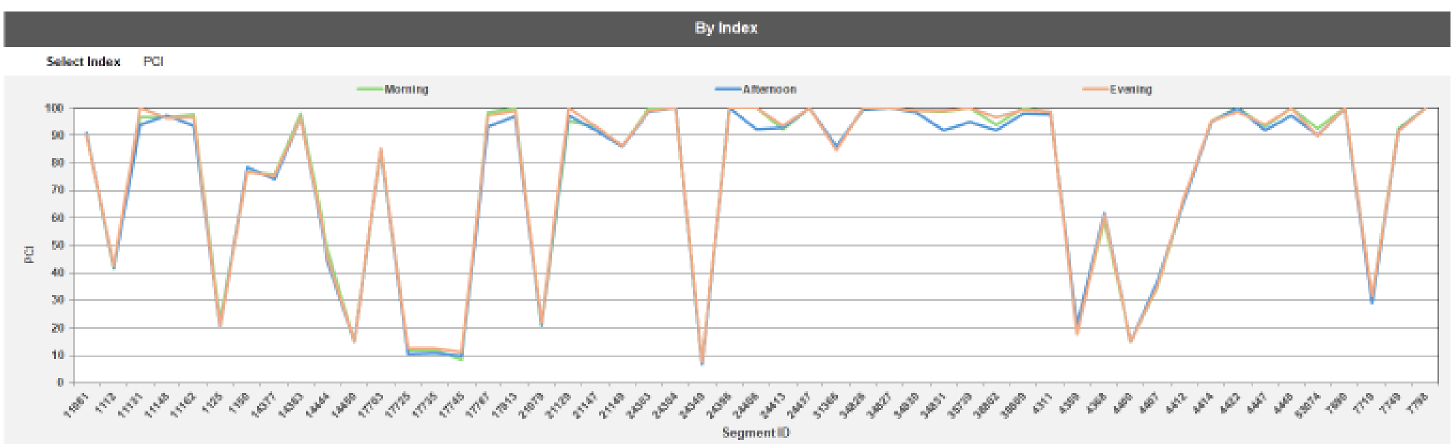


Figure 3: Condition index comparison for each segment

The distress results can also be evaluated by segment and by distress type. The following shows the comparisons of Alligator Cracking at Low, Moderate, and High severities. This distress has a high impact on the PCI score. Excellent correspondence is seen for all segments and runs.

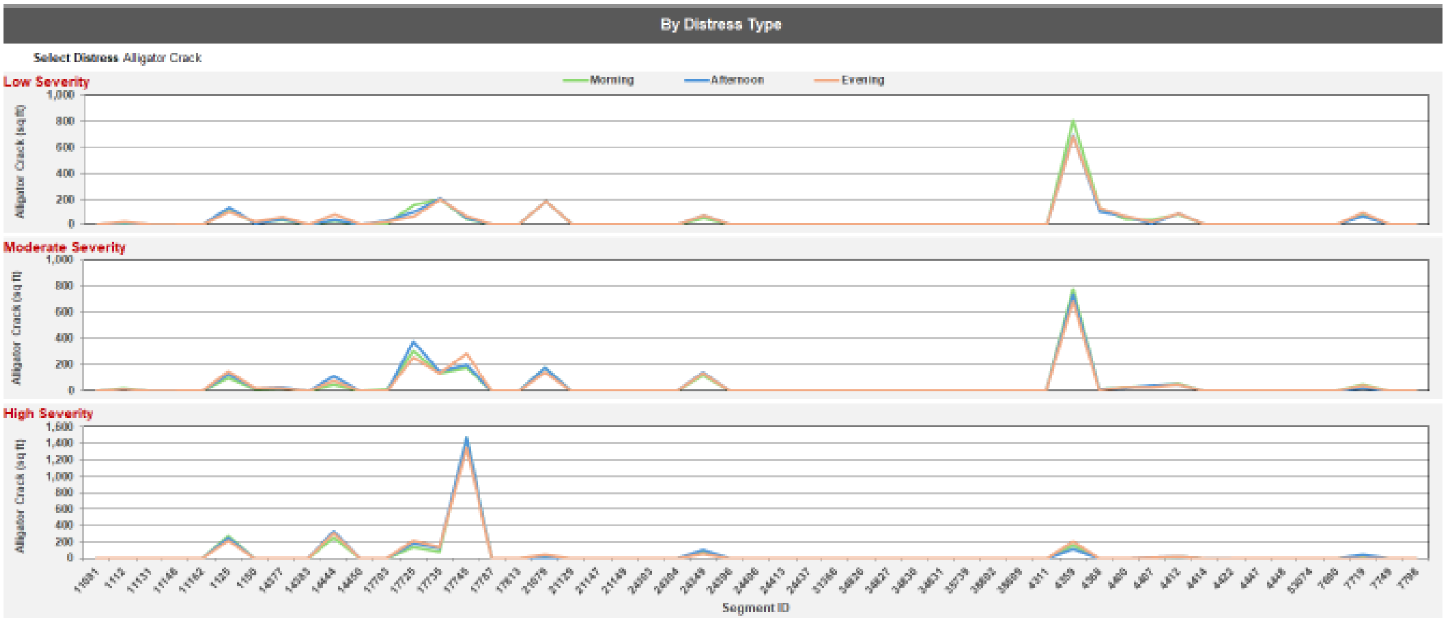


Figure 4: Alligator cracking comparison by segment

For any given section, the dashboard allows the PCI, PSCI, and PSCPRI for the segment to be seen, along with the comparison of the major constituent distresses.

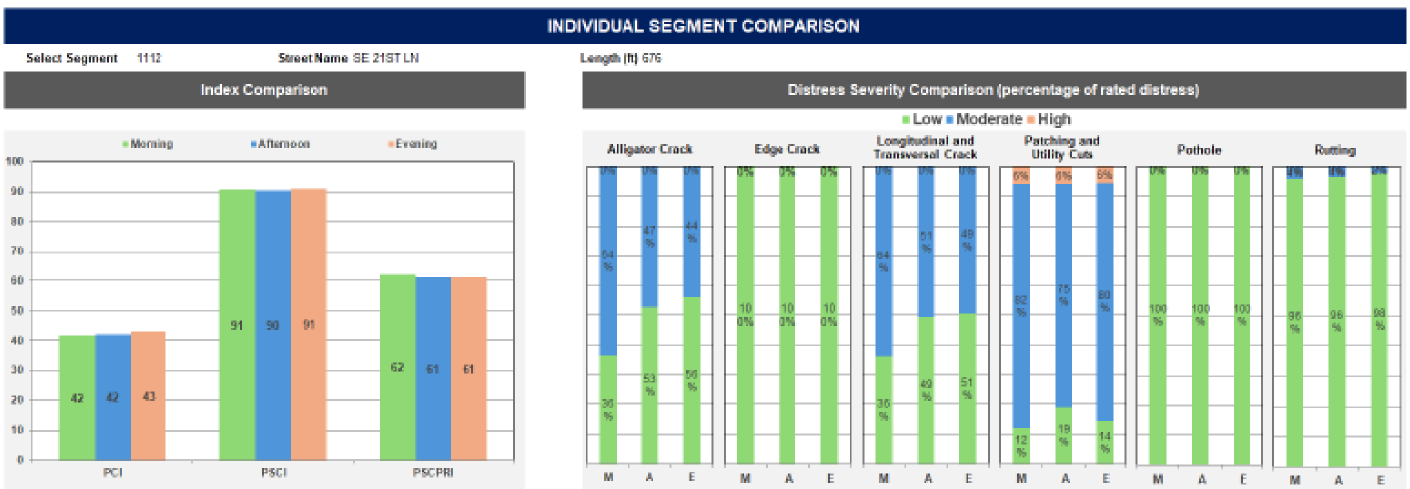


Figure 5: Summary condition index and detailed distress comparison for a single segment

The roughness (IRI) data for each segment is shown, with only a few segments having variation. This can occur if the segments have localized roughness and the collection path varies between the runs, similar to the way a driver's perception of roughness will depend on collection path in these situations.

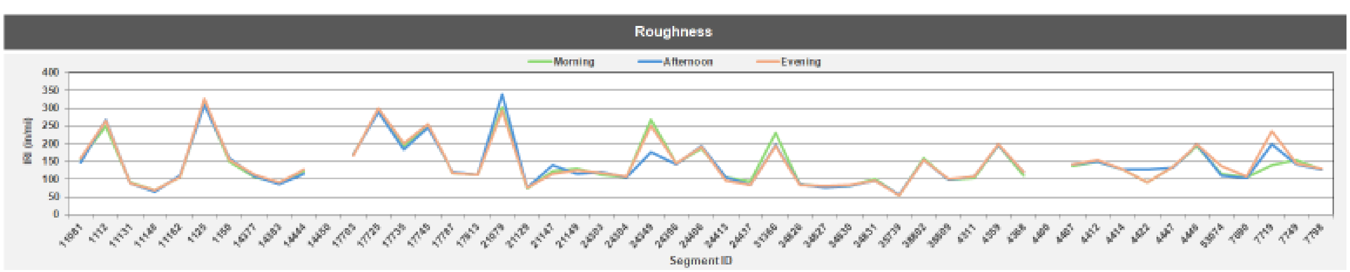


Figure 6: Roughness (IRI) data comparison for all segments

The right-of-way and pavement images along with the summarized and detailed data were also delivered in a web-based viewing software called Inform. A web-based viewer should be supplied by the vendor to make data browsing easy for the end users. It should also allow drill-down into the distress details so that any questions about the summary condition scores can be answered.

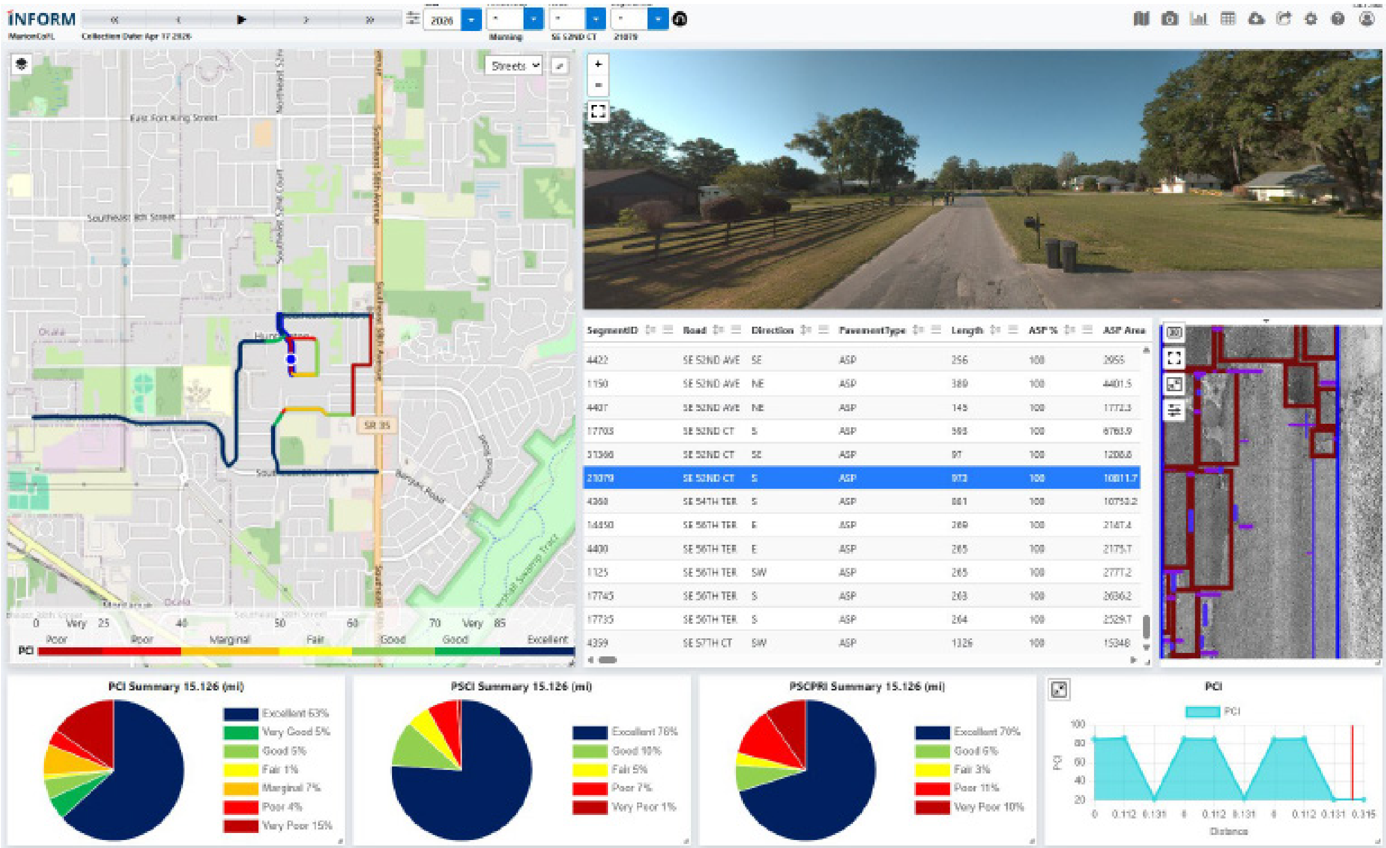
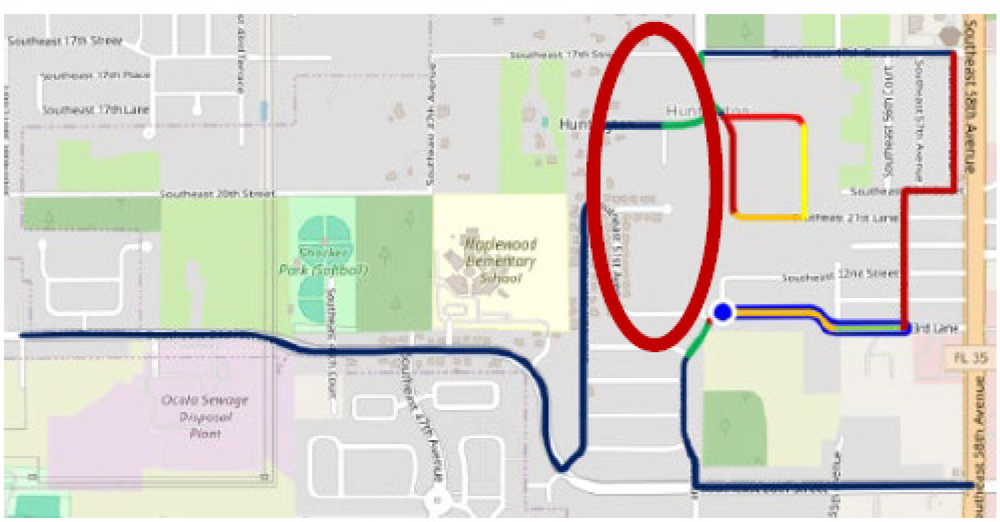


Figure 7: Inform web-based viewing software showing Marion County pilot data

Finally, for illustrative purposes, the treatment recommendations for each section were supplied, assuming that all segments were selected for treatment provided a suitable treatment is found.

Example Treatment Recommendation: SE 20TH, SE 56TH TER and SE 57TH CT



These roads have an average PCI of 14, which represents a very poor pavement surface condition. Significant distress is present throughout most of the road's length, including extensive patching and alligator cracking, indicating that the pavement is already fatigued and near the end of its service life.

At a minimum, removal and replacement of the asphalt surface layer is necessary. Depending on the condition of the underlying layers, which can be determined by structural testing, full-depth pavement reconstruction or base rehabilitation may also be required. Cold in-place recycling could also be considered as a viable rehabilitation alternative.

Recommended Pilot Deliverables

The vendor should provide an easy-to-use dashboard that summarizes the pilot results.

- Dashboard summarizing network-level condition, roughness, backlog, and collection-to-collection variation.
- Segment-level spreadsheet with GIS identifiers, road names, direction, chainage, length, assessable area, surface type, distress quantities, and condition indices.
- Web-based viewing software with right-of-way and pavement images showing both summary condition metrics and detailed distress quantities.
- Short-interval data view, such as 100 or 200 ft increments, to support localized distress review and image spot checks.
- Exception log documenting bridges, construction, rail crossings, non-assessable pavement, and data validity flags.
- Treatment recommendation summary translating pilot results into maintenance and rehabilitation categories.
- Pilot project report summarizing repeatability results, acceptance criteria, and limitations.

Sample Specification Language

The selected vendor shall perform a pilot collection over an agency-designated roadway sample and shall collect the same routes under three ambient lighting conditions: morning, afternoon, and evening. The vendor shall use the same vehicle configuration, collection settings, segmentation, and reporting schema for each run. The vendor shall provide a pilot dashboard and supporting tabular data comparing condition scores, distress quantities, roughness, backlog, treatment categories, and exception flags across all three collections. The vendor shall provide a web-based viewing software to allow playback of high-resolution images and showing both summary condition metrics and detailed distress quantities for the pilot segments. The agency will evaluate the vendor's data quality based on completeness, accuracy, repeatability, consistency of treatment implications, and transparency of documented exceptions.

Conclusion

A roadway data collection pilot project can give agencies confidence that vendor data will be reliable under real-world operating conditions. Requiring morning, afternoon, and evening collection of the same network is a practical way to test the effect of ambient lighting on automated pavement assessment results. The Marion County, FL pilot project example demonstrates a concise approach: select a 5-mile representative subset of roads, collect the roads at 3 different times of day, compare core metrics across collection windows, explain observed variations, and connect the findings to defensible pavement management decisions.