2020 WEBINAR SERIES

RPUG Road Profile Users' Group

ILDOT's Journey from Manually Rated Roads to The Automated Data Collection and Automated Rating World

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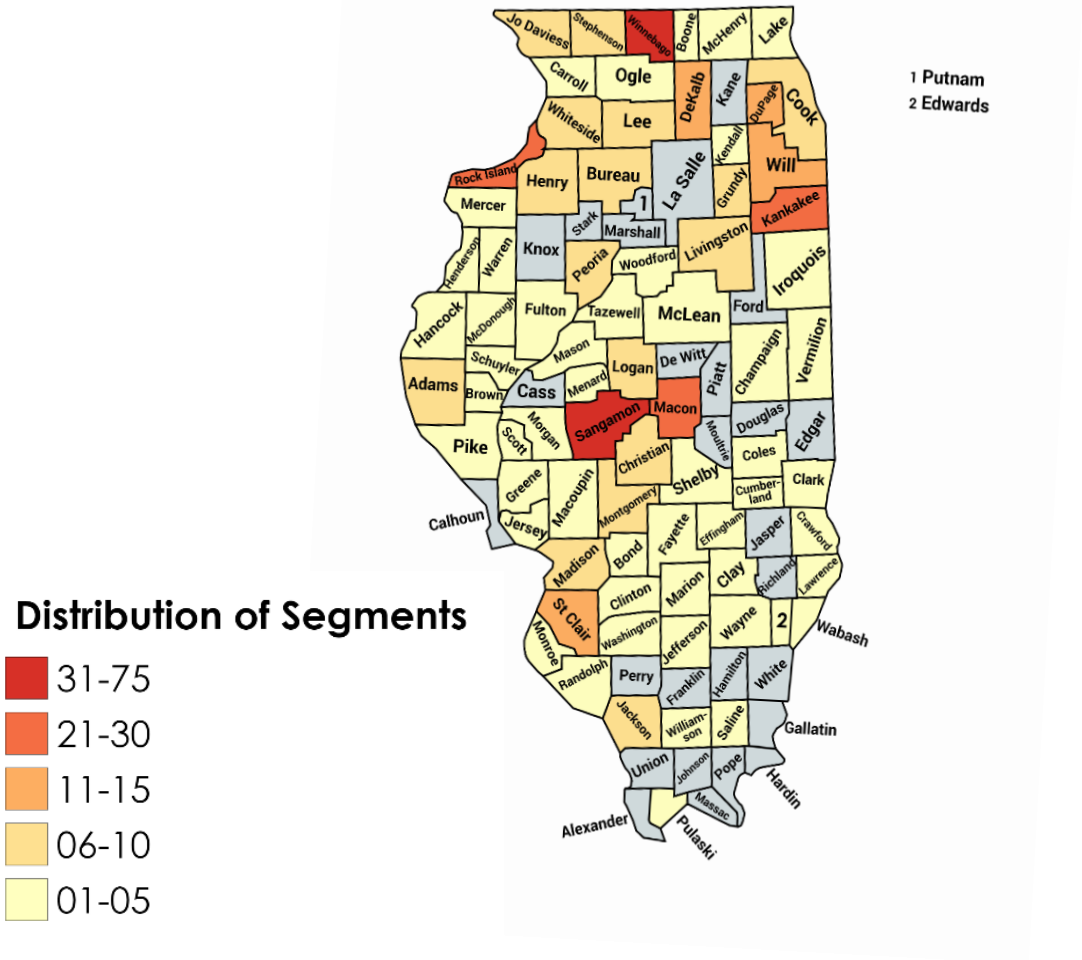
Introduction

- **IDOT- Investigate incorporating auto distress ratings into manual system**
- **First phase involved only full depth asphalt pavements**
- **474 routes & 2,841 miles analyzed**



Project Goals

- **Assess viability of automating Condition Rating Score (CRS), starting with full-depth asphalt.**
- **Evaluate automated data quality and impact of processing settings**
- **Identify potential usage to bolster existing manual rating methodology**

Condition Survey Methodology

Condition Rating System
Surveyed per mile
Top 5 distresses
Distress Type /Severity/Extent estimated
1-9 scale
Developed by IDOT
Mostly used only in Illinois

CRS rating	General pavement condition
7.5 - 9.0	Excellent
6.5 - 7.4	Acceptable
6.0 - 6.4	Transitional
4.5 - 5.9	Fair
1.0 - 4.4	Poor

Condition Survey Methodology

Alligator Cracking

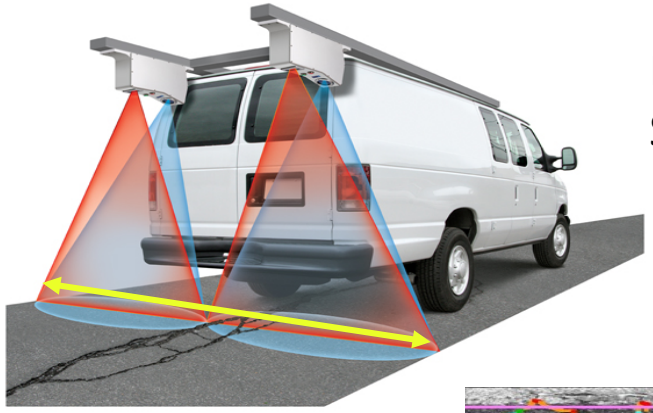
- **L1 – Low level: Hairline cracks with none or only a few interconnecting cracks. Cracks are not spalled.**
- **L2 – Medium level: Further development of interconnecting cracks into a pattern. Cracks may be lightly spalled.**
- **L3 – High level – Infrequent: Cracks have progressed so that the pieces are well defined and/or spalled at the edges.**
- **L4 – High level – Frequent: Cracks have progressed so that the pieces are well defined and/or spalled at the edges.**

$$CRS = 9.0 - (IRI\ Coeff \times IRI) - (RUT\ Coeff \times RUT) - (FLT\ Coeff \times FLT) - (A\ Coeff \times A) - (B\ Coeff \times B) \ldots \ldots$$

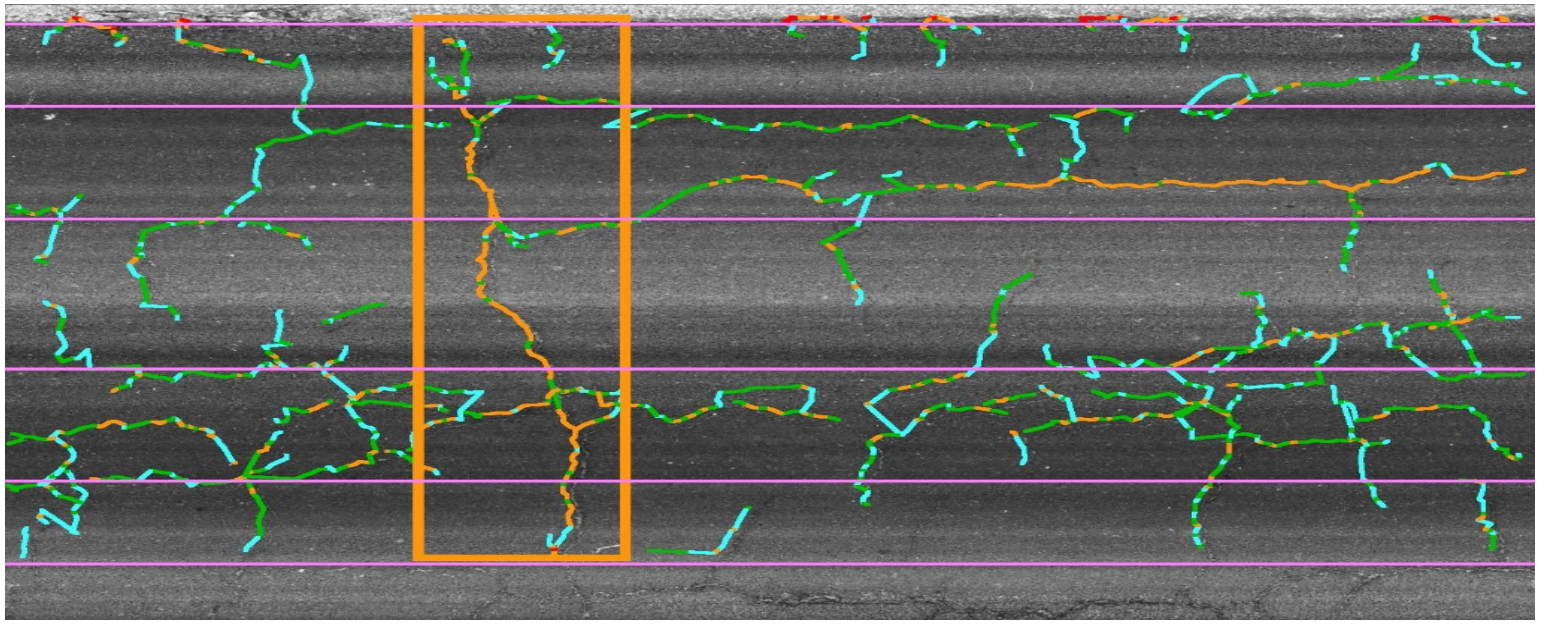
where:

A, B... = Values of distresses recorded by raters

Data Collection and Analysis



Pavemetrics Software → .xml → Custom Algorithms → Aggregate cracking → CRS



Data Collection and Analysis

Parameter	Value
LaneMarkingModule_RoadMarkingPosOffset_mm	-250
LaneMarkingModule_RoadWidth_mm	3657
MacroTextureModule_ReportingMode	0
MarkingContourModule_ExcludeCracksOnMarking	1
PotholeModule_MinWidth_mm	125
ResultRenderer_CrackSeverity0_MaxWidth_mm	**3**
ResultRenderer_CrackSeverity1_MaxWidth_mm	**6**
ResultRenderer_CrackSeverity2_MaxWidth_mm	**20**
ResultRenderer_Display_Alligator_Cracks	1
RuttingModule_EvaluationInterval_m	1
RuttingModule_FirstEvalPosition_m	0
RuttingModule_GageWidth_mm	25
RuttingModule_Method	0
RumbleModule_RumbleStripEnable	1
RumbleModule_ExcludeCracksOnRumble	1
RuttingModule_ExportRutProfileData	1
GeneralParam_Wheel pathWidth_mm	991
GeneralParam_CentralBandWidth_mm	762
RavelingModule_Threshold_cm3_m2	100
ResultRenderer_EnableSealedCrackSkeletonDisplay	1

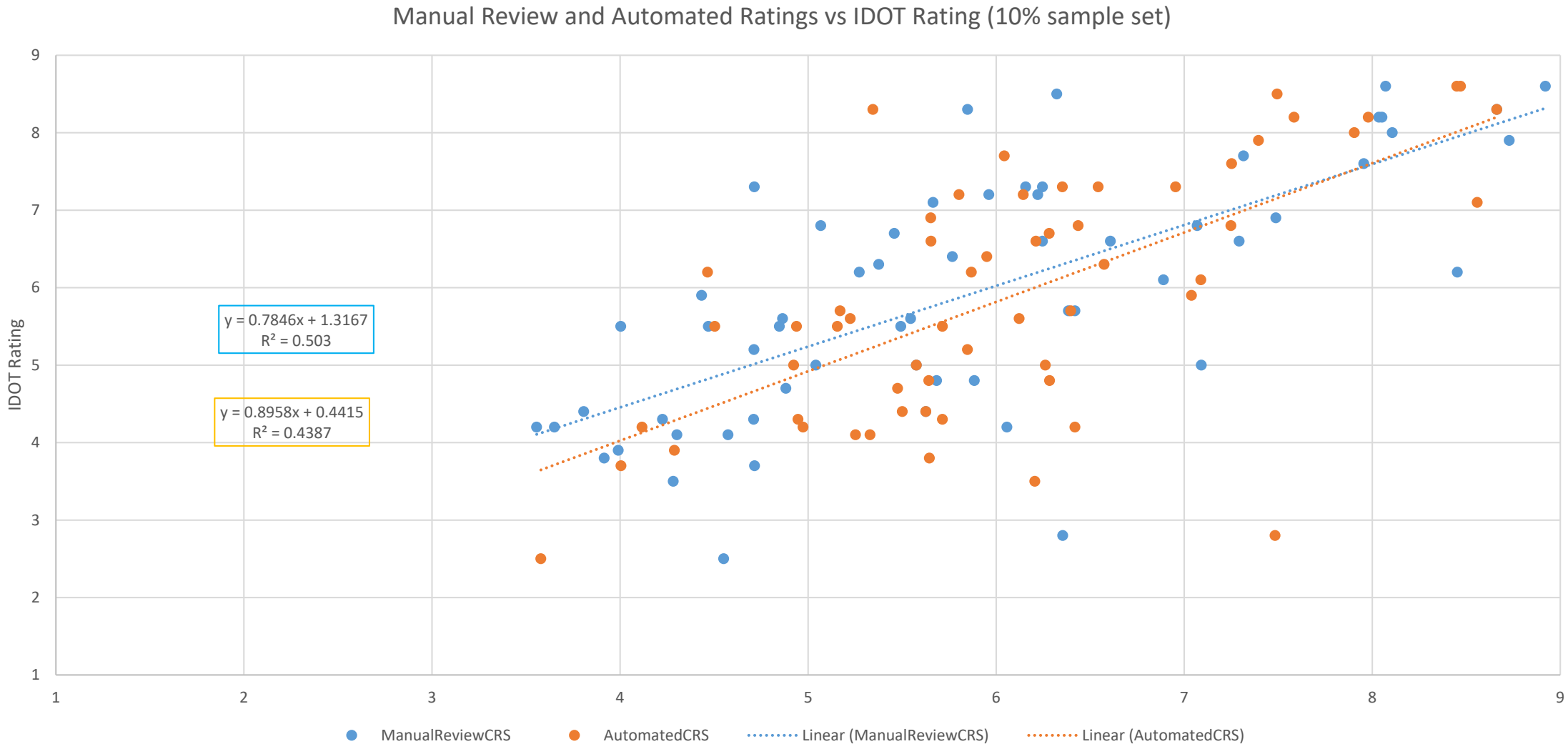
Final CRS Distress List

Distress Type	Description	Base Deduct	Status
L	Alligator Cracking	0.236	Uses Pavemetrics Load Cracking analysis.
M	Block Cracking	0.271	Not considered. (Not an output of Pavemetrics processing)
N	Rutting	*	Not assigned rating, but section average is used for final CRS score.
O	Transverse Cracking	0.378	Uses Pavemetrics Transverse Cracking analysis.
P	Overlayed Patch Reflective Cracking	0	Removed from rating due to poor performance of approximation. Will get called as transverse cracking.
Q	Longitudinal Cracking	0.199	Uses Pavemetrics Longitudinal analysis
R	Reflective Widening Crack	0.088	Not considered. (Not an output of Pavemetrics processing)
S	Centerline Deterioration	0.252	Based on cracking reported in "Band 1" (outside of left wheelpath) by Pavemetrics software. Adjustable in processing options in their software.
T	Edge Cracking	0.208	Based on cracking reported in "Band 5" (outside of right wheelpath) by Pavemetrics software. Unconfined/confined edge data added to CRS Calculations.

Final CRS Distress List

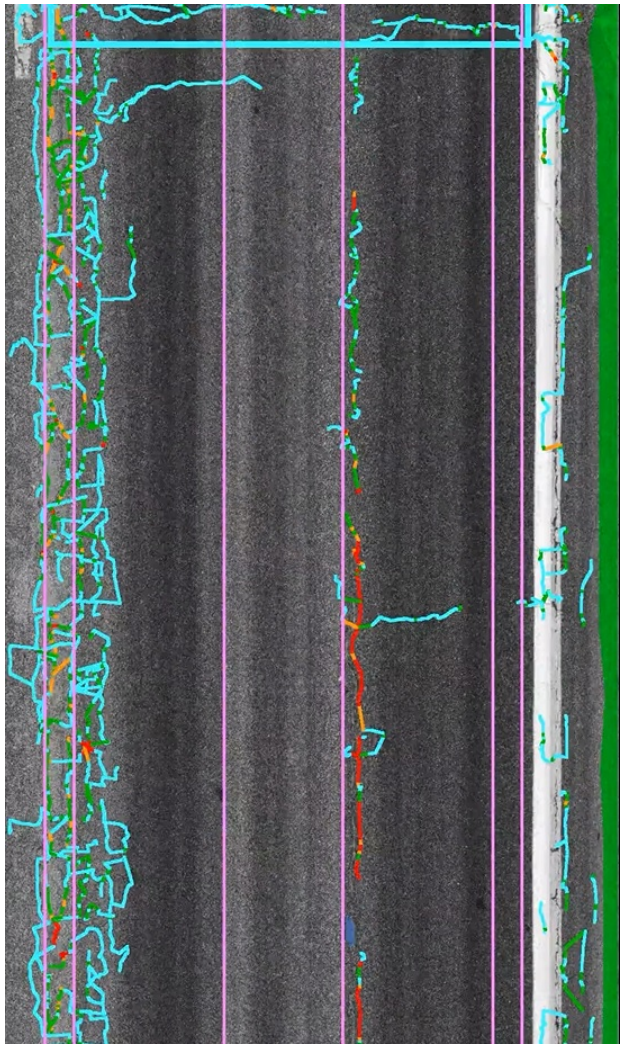
Distress Type	Description	Base Deduct	Status
U	Permanent Patch Reflective Cracking	0.146	Not considered. Possibly counted as part of O/P.
V	Shoving, Bumps, Sags, and Corrugation	0.253	Not considered. (Not an output of Pavemetrics Processing)
W	Weathering/Raveling/ Segregation/Oxidation	0.311	Uses Pavemetrics raveling indication analysis. Added to ARA's software.
X	Reflective D-Cracking	0	Not considered. (Not an output of Pavemetrics Processing)
n/a	IRI	*	Not assigned rating, but section average is used for final CRS score.

Manual QC

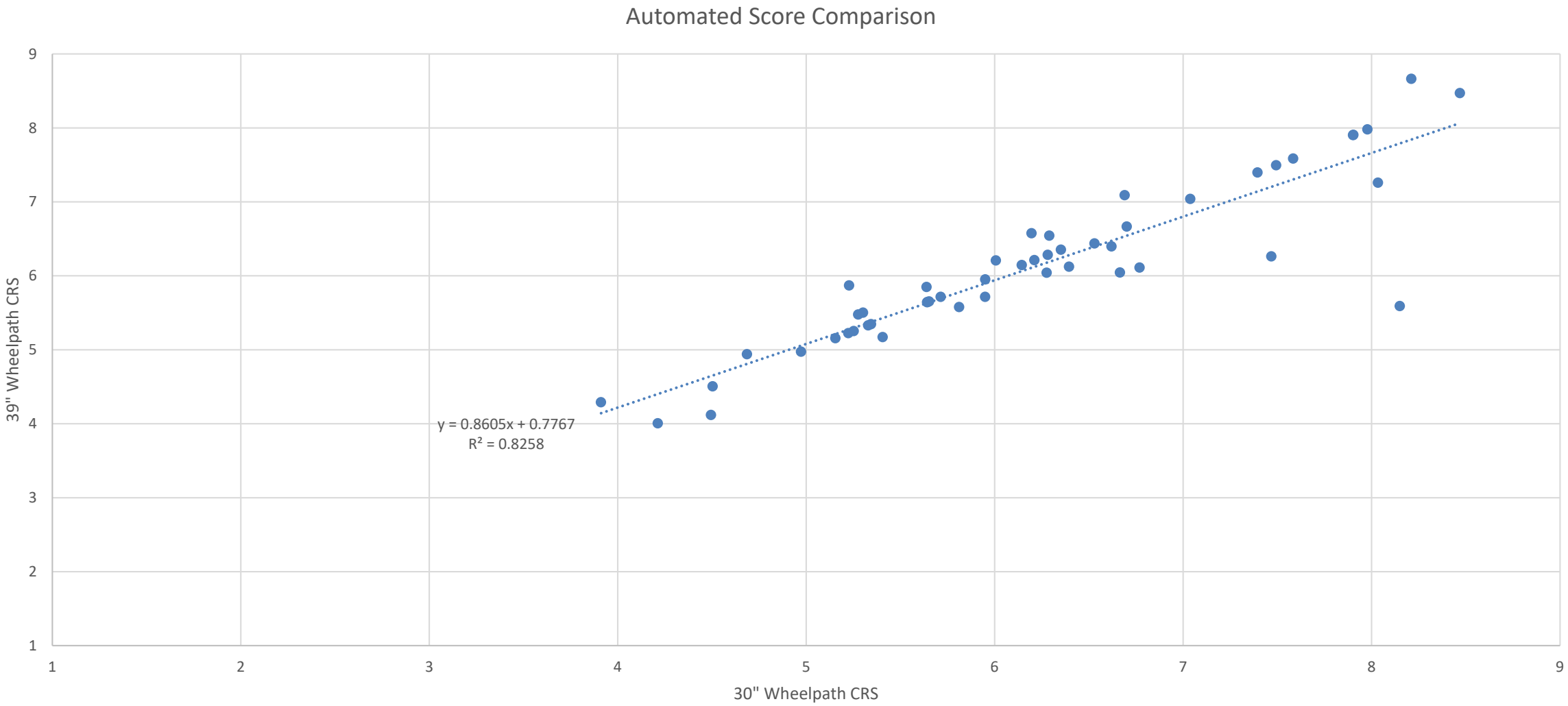

Manual Review and Automated Ratings vs IDOT Rating (10% sample set)
IDOT Rating
y = 0.7846x + 1.3167
R² = 0.503
y = 0.8958x + 0.4415
R² = 0.4387
ManualReviewCRS
AutomatedCRS
Linear (ManualReviewCRS)
Linear (AutomatedCRS)

Manual QC

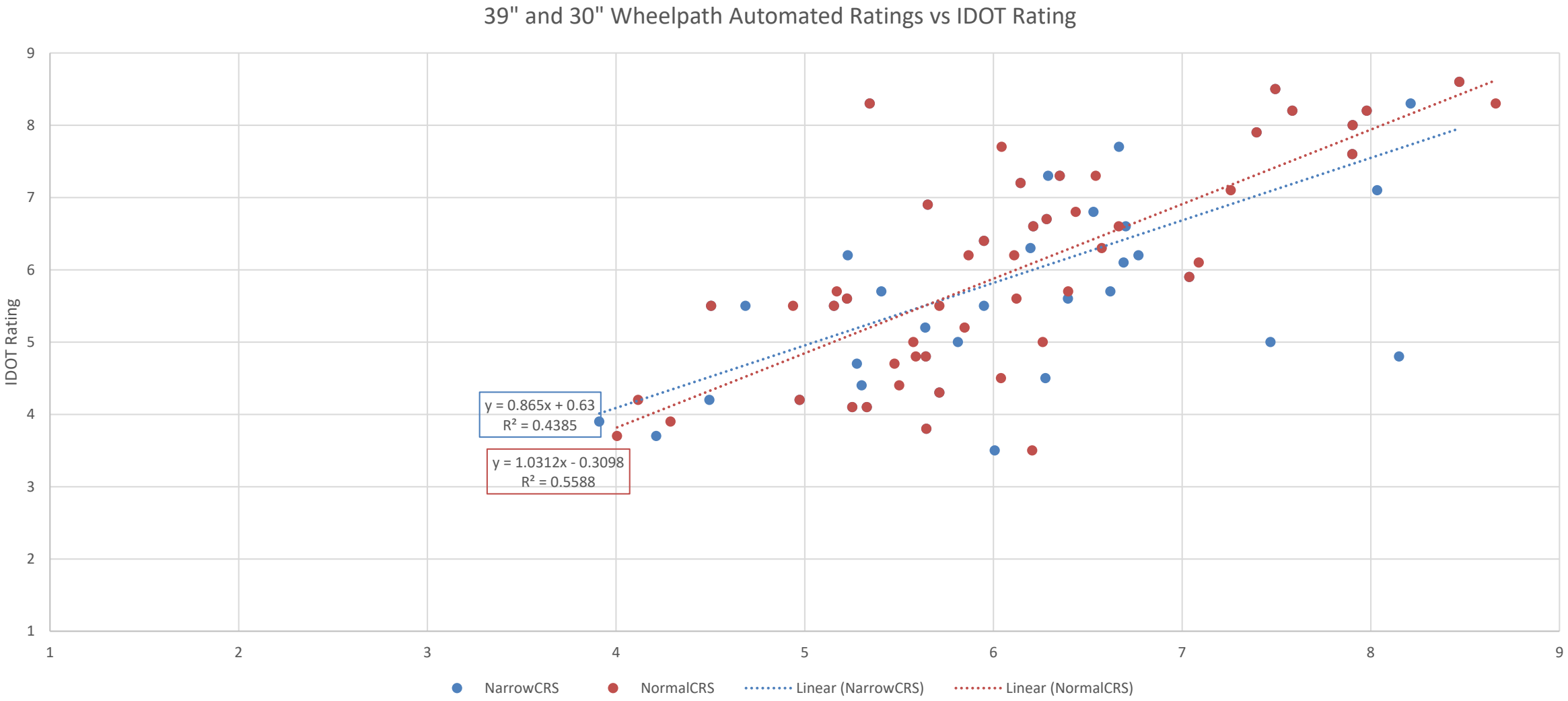

025_20828_000000_1_I_7.4
L Distress (Wheel Path)
IDOT: None
Manual QC: None
Automated: L4



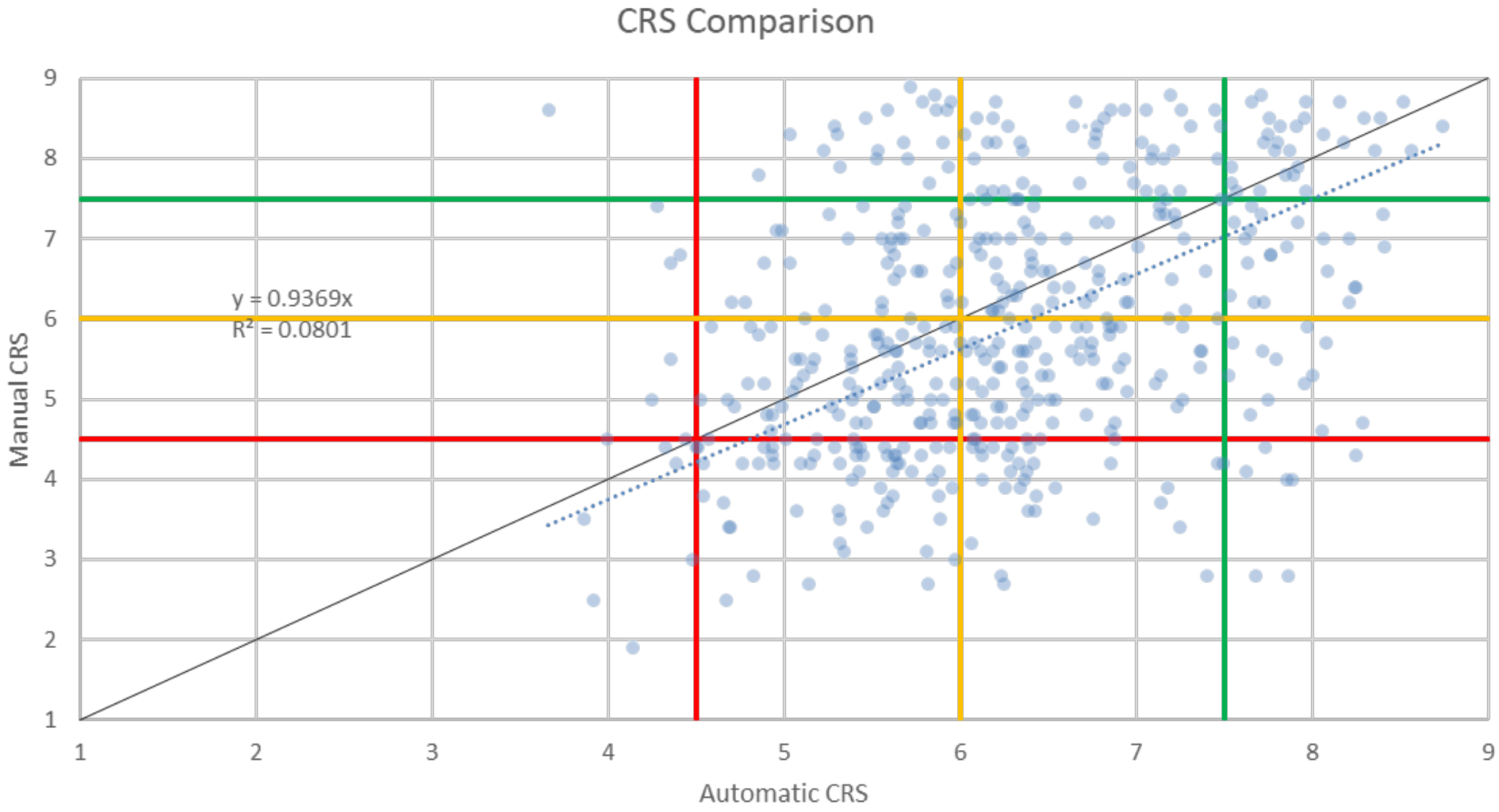
Narrow Wheelpath



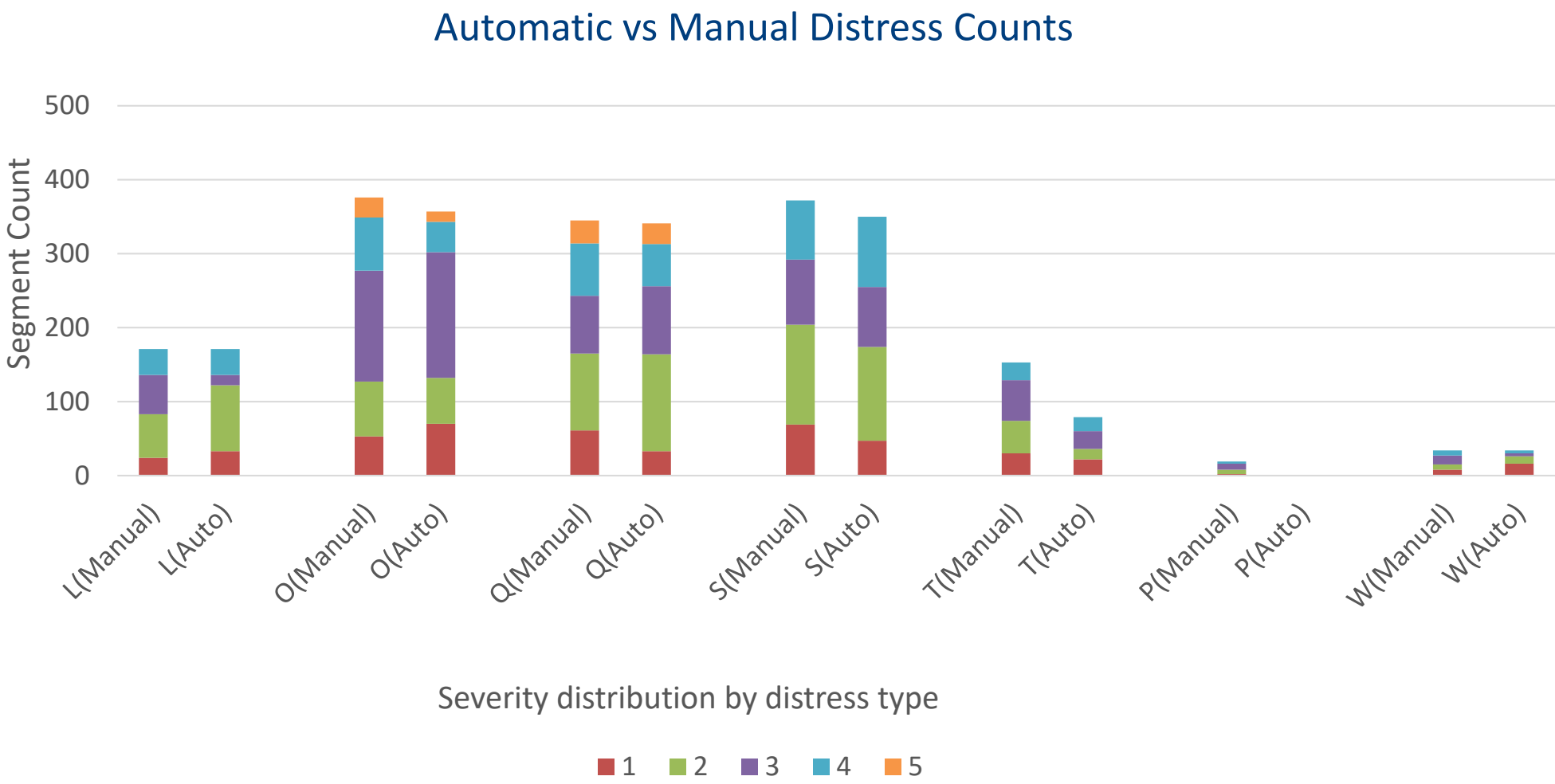
Narrow Wheelpath



Results By Rating



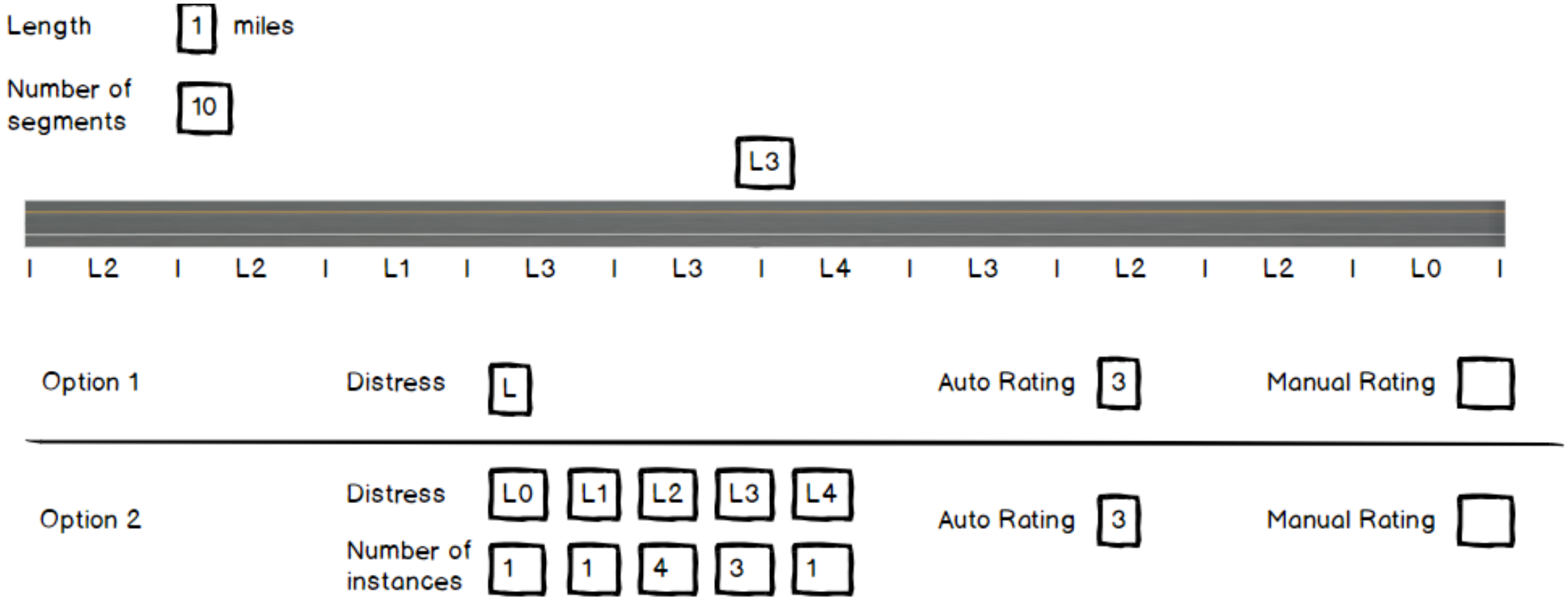
Results By Distress Distribution



Conclusions and Future Work

- **Comparison of manual and automated CRS ratings**
- **Platform to assist manual raters**
- **Phase 2- Composite Pavements**

Conclusions and Future Work



Thank You!

Questions??

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