# Automated Collection for Distress Data: Getting What You Need

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# Agenda

- 1. Introduction
- 2. Needs Assessment
- 3. Verification
- 4. Questions?

# Introduction

- Need to ensure consistent, accurate data
- Why is this a challenge?
  - Subjectivity inherent to rating schemes
  - Different providers year to year
  - "Black Box" or "Blind" condition assessments
- Steps to ensure that data fits expectations

## **Needs Assessment**

### **Definition of Protocols**

- Standard or regional preference
  - ASTM D6433
  - ► SHRP
  - ► MTO, MTC, MDOT, etc.

### **Needs Assessment**

#### **Definition of Protocols**

Severities: Moderate? Severe?





# **Needs Assessment**

- Define Rating Protocols
- Select and Define Benchmark/Verification Sites
- Collect and Compare

# **Verification - Benchmark Sites**

- Define Benchmarks
- Criteria Represented
- Define Rated Area
  - Section Start/End
  - Lane Width



# Verification

#### Data Analysis Tools

- Improve Year to Year comparisons
- Section Verification (QA/QC)



# **Distress Rating Options**

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- Automated Distress Analysis
- Semi-automated Distress Analysis
- Visual Distress Analysis
- Windshield Rating

Distress Description	ARAN Sensors	Windshield	Data Processing	WseCrax	DV-Rate	Comments
1. Route ID	-		-			Table provided by Client will all Route labels
2. Date Tested	-					
3. Maintenance Jurisdiction	-		-			Table provided by Client will all Route labels
4. Number of Lanes		-				
5. Survey Direction		-				
6. Begin Mile Point	-		-			
7. End Mile Point	-		-			
8. Length in Mile	-					
9. Collection Speed	-			•••••••		
10. Rougimess Left WP	-					
11. Roughness Right WP	-			•••••••		
12. Roughness Average	-		-			
13. Average Deeper Rit in Inch			-	•••••••		
14. Roit Severity Percent (3 Severities)	-	-	-			3 Severity Levels
15. Rut None Percent (<0.25")		-	-	•••••••••••••••••••••••••••••••••••••••		
16. Pavement Type		-			-	DV-Rate will verify all pavement types
17. Index Value Load Distress		-		•••••••		
18. Index Value Non Load Distress		-				
				-		Severity 1 = Longitudinal: Area
19. Alligator Cracking (WPs)				-		Severity 2 = Alligator with Adjacent. Cik'g; Area
				-		Severity 3 = Alligator with Adj. Cik'g & Spalling, Area
20. Block Cracking				-		Sev1= > 3' x 3' blocks; Sev2= < 3' x 3' w Adj. Crk'g; Area
21. Longitudinal Cracking (NonWPs)				-		Sev1 = Sealant & Cracking, Sev2 = Cik'g; Linear Feet
22. Transverse Cracking				-		Sev1 = Sealant & Cracking, Sev2 = Cik'g; Linear Feet
23. Reflective Longitudinal Cik'g				-		2 Severity Levels; Post Process to ID as Reflective (LF)
24. Reflective Transverse Crk'g				-		2 Severity Levels; Post Process to ID as Reflective (LF)
25. Patching					-	Reported as Area and Count
26. Potholes					-	Reported as Count
27. Delaminations					-	Reported as Area and Count
28. Bleeding					-	2 Severity Levels; Reported as Area
29. Shoulder Type					-	
30. Shoulder Width					-	Reported as Linear Feet
31. Shoulder Condition					1	3 Severity Levels
32. Crack Sealant					-	Sev1= Sealed, Sev2 = Unsealed/not completely

# **Distress Rating Options**

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# **Rater Calibration**

Block or Longitudinal and Transverse? Fatigue in wheel path?



# **Software - Automated**

• Distress detected and classified through userdefined criteria

 Results can be reviewed and manually modified



## **Software – Semi-Automated**

• Distress identified and rated by user

• Results can be reviewed and modified



# **Benchmark Site Comparisons**

- Easy to use comparison software
- Data Pass/Fail
- Benchmark
- History
- Charting
- Tolorences



# **Distress Rating Quality Assurance**

#### Customer Calibration

 Distress interpretation verified between the Lead rater on the project and the Client

### Rater Approval

 Rating team must compare accurately to the Lead rater before rating the network

### • Inter-rater Consistency

 Daily comparison between the rating team and the Lead rater to ensure inter-rater consistency

# **Distress Rating Quality Assurance**

- Ideally: Rate from same collected data
  - Same timeframe of collection
  - Eliminate error of varied perspective
- Timely Feedback

# Results - DOT vs. Lead Rater

#### REFERENCE STANDARD (Lead Rater results)

RATER	FILENAME	site	SECT	CSECT	Dir	NBLOWOUT	BLOWOUT	TRANSC_H	TRANSC_M	TRANSC_L
300	47T09B00	2	902040	06002	1	0	0	0	0	0
300	47T0OB00	1	901030	25502	1	0	0	0	0	0
300	47T10B00	7	907010	01902	2	0	0	0	0	0
300	47T18B00	6	906010	01903	1	0	0	0	0	0
300	47T24B00	4	904010	25204	1	0	0	0	0	0
300	47U0AB00	3	903050	25001	1	0	0	0	0	0
300	47U0MB00	5	905050	01931	1	0	0	0	0	0

RATER	FILENAME	site	SECT	CSECT	Dir	N_PATCH_L	N_PATCH_M	N_PATCH_H	PATCH_L	PATCH_M
300	47T09B00	2	902040	06002	1	1	0	0	0	0
300	47T0OB00	1	901030	25502	1	0	0	0	0	0
300	47T10B00	7	907010	01902	2	0	0	0	0	0
300	47T18B00	6	906010	01903	1	0	0	0	0	0
300	47T24B00	4	904010	25204	1	15	0	0	5	74
300	47U0AB00	3	903050	25001	1	1	0	0	5	0
300	47U0MB00	5	905050	01931	1	0	3	0	0	26

RATER	FILENAME	site	SECT	CSECT	Dir	PATCH_H	N_POTHOLE	A_POTHOLE	ALGCRK_L	ALGCRK_M
300	47T09B00	2	902040	06002	1	2	0	0	0	0
300	47T0OB00	1	901030	25502	1	0	0	0	0	0
300	47T10B00	7	907010	01902	2	0	0	0	0	0
300	47T18B00	6	906010	01903	1	0	0	0	0	0
300	47T24B00	4	904010	25204	1	105	5	13.4	1435	4432
300	47U0AB00	3	903050	25001	1	0	0	0	246	0
300	47U0MB00	5	905050	01931	1	0	5	5.79	0	1612

### **Results - Lead Rater vs. Raters**

							_		
							·		
						-			
RATER C	OMPARISONS	(Raters in	training)				100.00		
ATER	FILENAME	1678	SECT	CSECT	PASS 1	PASS 2	PASS 3	PASS 4	PASS :
3200	00800010	10	802040	00000	pane		pass.	Post	poses.
200	#7100880	L.	901030	10000	pass	p-ces	p.005	pans.	posts.
		12	90/010	01902	parss.	2005	10015	pass	pass.
		- C	000000	01200	perce a		#*****	1000	10000
200	17 114 1000	12	1004010	100000	pulse.		aparts.	Contra Contra	Done of
200	- 104 Eco	12	and the	11000	and a second sec		anara .	in the second	in the
ATER	FI ENAME	1 site	ISECT	CSECT	P4951	P455 2	P499.1	2495.4	PASS
200	147T08-800	15	14120AD	06000	1200	CASE	dints.	10.005	loans.
800	=7ToOB00	1	901030	25502	0825	0.005	0.025	0000	0.000
800	0.08017710800	7	907010	01902	pharton cks	phantoni oka	0.415	0.005	0.000
800	047718800	6	906010	01902	Dates -	C-048	CR15	DAGS -	pass.
800	0#7T2#800	4	904010	25204	missed cks	missed dks	G-105.0	G-0055	0.000
800	04730AB80	2.	903050	25001	missed oxs	missed dks	#315.S	passs.	0.355
800	47.004800	15	905050	01991	no gator wibi and bi seys too low		-	-	-
ATER	FILENAME	1478	SECT	CSECT	PASS 1	PASS 2	PASS 3	PASS 4	PASS 1
	012/109800	100	902040	CROCK	Servis 100 /08	poor a	2-013	pass	pass
980	2710C800	12	9010.30	19900	pess	2223	2455	pass	poss.
		1.2	0000010	Diama.	praticetors	programme to the	press.	parto p	pers.
0.800	17734800	- E	904010	04004	with a story line	a constant a	- 10 C	0.000	in the second
	or the state of the second	E	an sector	100000	an and the	Contract of Contra	and a second	Come of	
- 6400		16 C	approx.	01921	int a total a bi	names little	mana a	Canon L	in the second
RATER	FILENAME	1170	SECT	CSECT	P4551	PASS 2	PASS 3	PASS 4	PASS 2
6000	47109800	12	902040	06902	sevs too high	0.035	0435	0000	D4355
-6000	0/#770/0800	1	991030	25502	page	p.0.93	\$-038	pass -	D-355
60.00	047710800	7	967010	01902	pharton cks	phantom oks	0.000	DAVE.	0.000
6000	47718800	10	906010	01903	pass	C-111	Coles 6	Contra Co	pass.
6000	17124B00	10	204010	40404	Secol Sevia Inte	0.000	P-025	poss	pass.
8000	Contraction of the local division of the loc	1.		Coope.	Servis ION	page 1	place.	Press.	Posts.
11700	THE CALL DOC	-	100.00	00000	BAC GALLAR INCOM	10000	2400 2	10.000	Daces
alley.	127T09R00	10	NATIONAL ST	04000	adat	0.001	antes a	0.500 4	Include a
850	TOORDO	1	401030	205510	Canon .	0.005	mores	Cares.	CO. A.
ato	DOROTTOROG	1 - C	907010	01900	of arrow can	enanters can	antes.	in and a	loans.
	27T18800	les .	906010	01900	2451	C-028	pess.	Didda S	0.000
8500	008457724900	4	904010	26204	gator says low	C-COL	mins.	DAV5	0.255
8000	006A0U74	2.2	900000	25001	0495	0.443	P435	0465	0.0215
850	DOGMON THE O	85.0	005050	15921	no gator ie bi		cores.	DANS.	pose.
DATE O	THE RALLING	Dis Pre-	ISPECT	ICSECT.	122551	10455 1	10455.1	10455.4	10155.1







Overall: +/- 4%

## **Alternate Implementation**

#### Benchmark Sites

- Each site tested numerous times
  - Before and after project data collection
  - Verify data is still within tolerances (every 4 weeks)

#### • Blind sites – Verification Sites

- Random sites tested throughout the project
- Data comparison (DOT vs. Data Collector)
- External Verification (Independent Quality Firm)
  - Verifies 10% all rated data

# Summary

- Interpretive differences cause discrepancies in rated sections
- A program of parallel rating on defined sections ensures that expectations are met for the duration of a project.
  - Benchmark Sites
  - Blind Sites

### **Questions?**