South Dakota's Experiences on DQMP

By

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Question 1: The Transportation Performance Management (TPM) for Pavements required each SHA to develop a Data Quality Management Program (DQMP) with five elements:

- Data collection equipment calibration and certification;
- Certification process for persons performing manual data collection;
- Data quality control measures to be conducted before data collection begins and periodically during the data collection program;
- Data sampling, review and checking processes; and
- Error resolution procedures and data acceptance criteria

Which of the five elements has been the most challenging to accomplish?

SDDOT's DQMP - Equipment Calibration & Certification

- Annual Preventive Maintenance – system upgrades, calibration, maintenance.
- IRI – AASHTO Standards M328-14, R57-14, R43-13, R56-14.
- Rut – AASHTO Standard R48-10 with modifications specified in the HPMS Field Manual.
- Faulting – Calculated with data from LCMS™ with parameters specified in the HPMS Field Manual.
- Cracking Percent – AASHTO Standard R55-10 and Provisional Standards PP67-14 & PP68-14 with modifications specified in the HPMS Field Manual.

SDDOT's DQMP - Data collection equipment calibration and certification

EVOC

SDDOT's DQMP - Data collection equipment calibration and certification

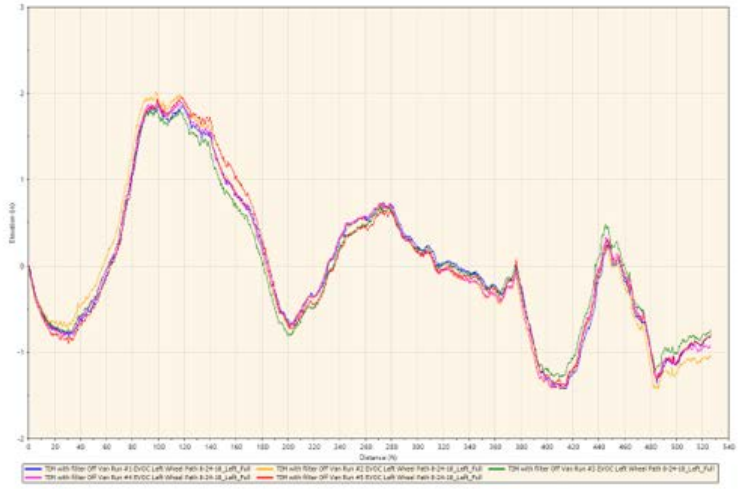

Figure 1: EVOC TIM Van Left Wheel Path

Figure 2: EVOC TIM Van Right Wheel Path

Profiler Certification: Summary Results

Statistics

Statistic	Repeatability - Left	Repeatability - Right	Accuracy - Left
Comparison Count	10	10	5
% Passing	100.00	100.00	100.00
Mean	95.02	94.49	93.62
Minimum	92.66	92.15	93.03
Maximum	98.07	96.66	94.27
Standard Deviation	1.6	1.5	0.6
Grade	Passed	Passed	Passed

Accuracy

Run	Left
1	94.18
2	94.27
3	93.03
4	93.45
5	93.18

Repeatability - Left Correlations (%)

Run	2	3	4	5
1	93.90	96.16	94.13	94.35
2		93.92	98.07	96.28
3			94.89	92.66
4				95.79

Repeatability - Left Offsets (ft)

Run	2	3	4	5
1	1.6	1.4	0.9	0.2
2		-0.2	-0.7	-1.3
3			-0.5	-1.2
4				-0.6

Repeatability - Right Correlations (%)

Run	2	3	4	5
1	93.35	92.99	92.15	94.31
2		93.86	96.57	94.73
3			96.66	94.68
4				95.59

Repeatability - Right Offsets (ft)

Run	2	3	4	5
1	1.6	1.5	0.8	0.2
2		-0.1	-0.7	-1.2
3			-0.7	-1.2
4				-0.5

Figure 9: EVOC TIM Van vs. Surpro Left Wheel Path (Cross-Correlation)

Profiler Certification: Summary Results

Statistics

Statistic	Repeatability - Left	Repeatability - Right	Accuracy - Right
Comparison Count	10	10	5
% Passing	100.00	100.00	100.00
Mean	95.02	94.49	92.71
Minimum	92.66	92.15	92.10
Maximum	98.07	96.66	94.44
Standard Deviation	1.6	1.5	1.0
Grade	Passed	Passed	Passed

Accuracy

Run	Right
1	92.20
2	92.10
3	92.16
4	92.67
5	94.44

Repeatability - Left Correlations (%)

Run	2	3	4	5
1	93.90	96.16	94.13	94.35
2		93.92	98.07	96.28
3			94.89	92.66
4				95.79

Repeatability - Left Offsets (ft)

Run	2	3	4	5
1	1.6	1.4	0.9	0.2
2		-0.2	-0.7	-1.3
3			-0.5	-1.2
4				-0.6

Repeatability - Right Correlations (%)

Run	2	3	4	5
1	93.35	92.99	92.15	94.31
2		93.86	96.57	94.73
3			96.66	94.68
4				95.59

Repeatability - Right Offsets (ft)

Run	2	3	4	5
1	1.6	1.5	0.8	0.2
2		-0.1	-0.7	-1.2
3			-0.7	-1.2
4				-0.5

Figure 11: EVOC TIM Van vs. Surpro Right Wheel Path (Cross-Correlation)

30 years on the Road To Progressively Better Data

RPUG Road Profile Users' Group

SDDOT's DQMP – Staff Certification

- Training – Operators, Processors, Distress Raters
- Yearly Staff Certification – Equipment Operators & Distress raters.
  Includes Written Test and Proficiency of Skills
- Documented what we have been doing for years

SDDOT's DQMP – Data Quality Control

Daily

- Inspection of tires
- Inspect/clean LCMS lasers
- Inspect/clean Roughness lasers
- Inspect/clean camera lens
- Run computer system checks
- Run End of day Report, export data and back up the database
- Monitor real-time displays for out of range data/malfunctioning equipment

Weekly

- Two quality control test sites
- Check Tire pressure with a Tire Gauge

Monthly

- Run the calibration of the DMI
- Run the calibration with the bounce test
- Run the calibration with the block test
- Run de-fragment software, to keep systems running properly

SDDOT's DQMP – Data Quality Control

PROFILER EQUIPMENT CHECKLIST LOG

	Daily	Mon	Tue	Wed	Thur	Fri
1	Inspection of tires	☐	☐	☐	☐	☐
2	Clean LCMS lasers, check they are dust free and clear of obstructions	☐	☐	☐	☐	☐
3	Clean Roughness lasers, check they are dust free and clear of obstructions	☐	☐	☐	☐	☐
4	Clean the camera lens, check they are clear of obstructions	☐	☐	☐	☐	☐
5	Run checks on computer system for the LCMS, POS LV, Roughness and camera	☐	☐	☐	☐	☐
6	Run End of day Report, Export data and back up the database	☐	☐	☐	☐	☐
7	Monitor real-time displays for out of range data/malfunctioning equipment	☐	☐	☐	☐	☐
	Weekly					
1	Check Tire pressure with a Tire Gauge	☐	☐	☐	☐	☐
	Monthly					
1	Run the calibration of the DMI	☐	☐	☐	☐	☐
2	Run the calibration with the bounce test	☐	☐	☐	☐	☐
3	Run the calibration with the block test	☐	☐	☐	☐	☐
4	Run de-fragment software, to keep systems running properly	☐	☐	☐	☐	☐

Operator Name _____

Week of _____

SDDOT's DQMP – Data Quality Control

	Highway	Test Date	Run #	LRUT_WIRE	RRUT_WIRE	LRUT_SE	RRUT_SE	LRUT_3PT	RRUT_3PT	IRI L	IRI R	Grt400 CountL	Grt400 CountR	2018 Fatigue Cracking
001_014 _237_239_I	US 14	04/10/2018	001	0.058	0.109	0.057	0.109	0.056	0.056	63	67	0	0	0.10%
002_014 _237_239_I		04/10/2018	002	0.057	0.112	0.056	0.112	0.057	0.057	64	67	0	0	0.13%
003_014 _237_239_I		04/19/2018	003	0.060	0.113	0.059	0.113	0.055	0.055	61	66	0	0	0.12%
004_014 _237_239_I		04/19/2018	004	0.060	0.110	0.059	0.110	0.050	0.050	62	65	0	0	0.07%
005_014 _237_239_I		04/23/2018	005	0.061	0.108	0.061	0.108	0.049	0.049	62	67	0	0	0.24%
006_014 _237_239_I		04/23/2018	006	0.062	0.110	0.061	0.110	0.050	0.050	62	66	0	0	0.13%
007_014 _237_239_I		04/30/2018	007	0.067	0.110	0.066	0.110	0.061	0.061	61	65	0	0	0.33%
008_014 _237_239_I		04/30/2018	008	0.067	0.110	0.066	0.110	0.060	0.060	61	65	0	0	0.30%
009_014 _237_239_I		05/14/2018	009	0.068	0.112	0.067	0.111	0.074	0.074	59	65	0	0	0.16%
010_014 _237_239_I		05/14/2018	010	0.067	0.113	0.066	0.113	0.072	0.072	59	65	0	0	0.15%
011_014 _237_239_I		05/21/2018	011	0.065	0.117	0.065	0.117	0.072	0.072	58	64	0	0	0.04%
012_014 _237_239_I		05/21/2018	012	0.065	0.119	0.065	0.119	0.069	0.069	57	64	0	0	0.07%
013_014 _237_239_I		05/29/2018	013	0.065	0.118	0.065	0.118	0.071	0.071	56	63	0	0	0.03%
014_014 _237_239_I		05/29/2018	014	0.064	0.116	0.063	0.116	0.071	0.071	55	62	0	0	0.04%
015_014 _237_239_I		06/04/2018	015	0.071	0.116	0.071	0.116	0.075	0.075	58	65	0	0	0.06%
016_014 _237_239_I		06/04/2018	016	0.072	0.117	0.071	0.116	0.077	0.077	58	65	0	0	0.08%
017_014 _237_239_I		06/11/2018	017	0.073	0.117	0.072	0.116	0.052	0.052	56	64	0	0	0.08%
018_014 _237_239_I		06/11/2018	018	0.072	0.121	0.071	0.121	0.052	0.052	55	63	0	0	0.10%
019_014 _237_239_I		06/18/2018	019	0.067	0.115	0.067	0.114	0.050	0.050	57	63	0	0	0.03%
020_014 _237_239_I		06/18/2018	020	0.067	0.113	0.067	0.112	0.049	0.049	57	63	0	0	0.04%
021_014 _237_239_I		06/25/2018	021	0.068	0.121	0.067	0.121	0.048	0.048	54	62	0	0	0.11%
022_014 _237_239_I		06/25/2018	022	0.066	0.119	0.066	0.119	0.050	0.050	55	62	0	0	0.07%
023_014 _237_239_I		07/09/2018	023	0.065	0.113	0.065	0.113	0.056	0.056	54	62	0	0	0.05%
024_014 _237_239_I		07/09/2018	024	0.068	0.113	0.067	0.113	0.058	0.058	55	62	0	0	0.03%

SDDOT's DQMP – Data Sampling, Acceptance Review, and Error Resolution

- Checked for data completeness (90%).
- Compared to historical results.
    - IRI: Data flagged for review if;
        - Difference exceeds 25%
        - Right/left balance exceeds 25%
        - More than 1% of data > 400 in/mi
        - More than 1% of data < 25 in/mi
    - Rut: Data flagged for review if;
        - Difference exceeds 0.08”
    - Faulting: Data flagged for review if;
        - Difference exceeds 0.06”
- If flagged results cannot be explained, recollect.

SDDOT's DQMP – Data Sampling, Acceptance Review, and Error Resolution

RouteID	Length	Date	Count		MissingRut	Prev_Year_LRUTSE	LRUTSE	LRUTSE_Diff	Prev_Year_RRUTSE	RRUTSE	RRUTSE_Diff	MissingIRI	Prev_Year_IRIL	Ave_IRIL	IRIL_Diff	Prev_Year_IRIR	Ave_IRIR	IRIR_Diff	R_L_Balance_2017	R_L_Balance_2018	AC_Cracking_2018	AC_Cracking_2017	Ave__Spee	IRIL_Grt_400	Percent>400	AveSpeed_400	IRIL_Less_25	Percent<25	Recollect	OK	Comment
083 _11952_11646_D	3.099	4/10/18 11:14 AM	313	101%	0%	0.08	0.07	-0.01	0.11	0.10	-0.01	0%	76	72	-5%	78	72	-8%	3%	0%	1%	1%	45	2	0.6%	36	0	0.0%	No	Yes	In Fort Pierre
083 S _11646_08819_D	28.248	4/10/18 11:14 AM	2,846	101%	0%	0.09	0.07	-0.02	0.11	0.10	-0.01	0%	56	55	-2%	50	52	4%	-12%	-6%	1%	1%	58	0	0.0%		15	0.5%	No	Yes	
083 S _11979_11952_D	0.221	4/10/18 11:14 AM	23	104%	0%		0.08			0.09		0%	115	115	0%	117	109	-7%	2%	-6%	1%	1%	34	0	0.0%		0	0.0%	No	Yes	
090 W _21281_19115_D	21.632	4/10/18 11:52 AM	2,183	101%	0%	0.14	0.10	-0.04	0.17	0.16	-0.01	0%	58	61	5%	61	66	8%	5%	8%	1%	1%	58	1	0.0%	59	0	0.0%	No	Yes	
090 W _01030_00000_D	10.167	4/10/18 1:02 PM	1,011	99%	0%	0.12	0.10	-0.02	0.13	0.13	0.00	0%	45	47	4%	48	49	2%	6%	4%	1%	1%	58	1	0.1%	58	48	4.7%	No	Yes	
090 W _03028_01030_D	19.926	4/10/18 1:02 PM	2,012	101%	0%		0.09			0.11		-1%	74	75	1%	74	77	4%	0%	3%	1%	1%	57	1	0.0%	58	0	0.0%	No	Yes	
090 W _05231_03028_D	22.136	4/10/18 1:02 PM	2,234	101%	0%	0.10	0.10	0.00	0.12	0.12	0.00	0%	82	71	-13%	83	72	-13%	1%	1%	1%		58	1	0.0%	58	0	0.0%	No	Yes	
090 W _06715_05231_D	14.953	4/10/18 1:02 PM	1,442	96%	0%	0.14	0.11	-0.03	0.17	0.14	-0.03	0%	80	80	0%	77	79	3%	-4%	-1%	1%	1%	58	3	0.2%	58	0	0.0%	No	Yes	
090 W _09025_06715_D	23.266	4/10/18 1:02 PM	2,346	101%	0%	0.22	0.23	0.01	0.17	0.20	0.03	0%	86	86	0%	67	73	9%	-28%	-18%	1%	1%	58	0	0.0%		0	0.0%	No	Yes	Cracking in wheelpath
090 W _10982_09025_D	19.598	4/10/18 1:02 PM	1,979	101%	0%	0.16	0.15	-0.01	0.12	0.13	0.01	0%	59	60	2%	51	56	10%	-16%	-7%	1%	1%	58	2	0.1%	58	0	0.0%	No	Yes	
090 W _13127_10982_D	21.508	4/10/18 1:02 PM	2,166	101%	0%	0.12	0.12	0.00	0.12	0.13	0.01	0%	51	52	2%	43	46	7%	-19%	-13%	1%	1%	58	0	0.0%		4	0.2%	No	Yes	
090 W _15020_13127_D	18.909	4/10/18 1:02 PM	1,912	101%	0%	0.15	0.14	-0.01	0.18	0.18	0.00	0%	59	61	3%	63	67	6%	6%	9%	1%	1%	58	3	0.2%	58	6	0.3%	No	Yes	
090 W _17748_15020_D	27.309	4/10/18 1:02 PM	2,707	99%	0%	0.14	0.08	-0.06	0.14	0.10	-0.04	0%	97	101	4%	102	107	5%	5%	6%	1%	1%	58	3	0.1%	57	0	0.0%	No	Yes	
090 W _19115_17748_D	13.695	4/10/18 1:02 PM	1,382	101%	0%		0.08			0.13		0%	53	62	17%	58	69	19%	9%	10%	1%	1%	58	1	0.1%	59	0	0.0%	No	Yes	
090 E _00000_01030_I	10.165	4/10/18 4:33 PM	1,027	101%	0%	0.11	0.11	0.00	0.14	0.14	0.00	-1%	45	47	4%	48	49	2%	6%	4%	1%	1%	58	0	0.0%		55	5.4%	No	Yes	
090 E _01030_03028_I	19.898	4/10/18 4:33 PM	2,010	101%	0%		0.09			0.12		0%	77	78	1%	76	79	4%	-1%	1%	1%	1%	58	0	0.0%		8	0.0%	No	Yes	
090 E _03028_05238_I	22.112	4/10/18 4:33 PM	1,312	59%	0%	0.09	0.15	0.06	0.14	0.17	0.03	-1%	83	91	10%	80	91	14%	-4%	0%	1%	1%	57	1	0.1%	58	0	0.0%	No	Yes	Construction
090 E _05238_06715_I	14.976	4/10/18 5:27 PM	1,512	101%	0%	0.17	0.12	-0.05	0.14	0.14	0.00	-1%	81	79	-2%	78	79	1%	-4%	0%	1%	1%	58	2	0.1%	59	0	0.0%	No	Yes	
090 E _06715_09025_I	23.260	4/11/18 1:59 PM	2,347	101%	0%	0.22	0.22	0.00	0.18	0.20	0.02	-1%	78	78	0%	70	74	6%	-11%	-5%	1%	1%	58	1	0.0%	58	0	0.0%	No	Yes	
090 E _09025_10982_I	19.623	4/11/18 1:59 PM	1,981	101%	0%	0.15	0.15	0.00	0.13	0.14	0.01	-1%	54	55	2%	50	54	8%	-8%	-2%	1%	1%	58	0	0.0%		0	0.0%	No	Yes	
090 E _10982_13127_I	21.542	4/11/18 1:59 PM	2,175	101%	0%	0.13	0.09	-0.04	0.13	0.10	-0.03	0%	61	64	5%	65	68	5%	6%	6%	1%	1%	58	2	0.1%	58	0	0.0%	No	Yes	
1806 _15531_13845_D	16.459	4/20/18 9:01 AM	1,663	101%	0%	0.19	0.17	-0.02	0.23	0.26	0.03	-1%	151	155	3%	169	174	3%	11%	11%	14%	9%	56	16	1.0%	57	0	0.0%	No	Yes	
1806 _18005_15531_D	24.711	4/20/18 9:01 AM	2,487	101%	0%	0.13	0.11	-0.02	0.15	0.16	0.01	0%	119	129	8%	126	130	3%	6%	1%	6%	3%	56	19	0.8%	51	0	0.0%	No	Yes	
273 _07400_06125_D	12.723	4/20/18 9:01 AM	1,282	101%	0%	0.08	0.08	0.00	0.07	0.12	0.05	0%	73	81	11%	84	88	5%	13%	8%	1%	1%	55	5	0.4%	25	0	0.0%	No	Yes	
248 _22534_20550_D	19.813	4/20/18 10:04 AM	1,971	99%	0%	0.11	0.10	-0.01	0.13	0.12	-0.01	0%	105	103	-2%	105	109	4%	0%	6%	2%	1%	53	3	0.2%	53	0	0.0%	No	Yes	
248 _24842_22534_D	23.013	4/20/18 10:04 AM	2,325	101%	0%	0.18	0.13	-0.05	0.16	0.15	-0.01	0%	186	181	-3%	172	180	5%	-8%	-1%	9%	6%	52	46	2.0%	51	0	0.0%	No	Yes	Reliance Turn
248 _24842_26257_I	14.110	4/20/18 10:04 AM	1,424	101%	0%	0.14	0.10	-0.04	0.15	0.14	-0.01	0%	137	139	1%	156	154	-1%	12%	10%	8%	5%	52	25	1.8%	44	0	0.0%	No	Yes	Stop Sign at Kennebec
248 _26257_24842_D	14.110	4/20/18 10:04 AM	1,424	101%	0%	0.13	0.10	-0.03	0.16	0.16	0.00	0%	132	135	2%	144	146	1%	8%	8%	7%	4%	52	13	0.9%	37	0	0.0%	No	Yes	
248 _20550_22534_I	19.813	4/20/18 11:44 AM	1,998	101%	0%	0.11	0.10	-0.01	0.14	0.13	-0.01	0%	105	101	-4%	112	115	3%	6%	12%	1%	1%	52	5	0.3%	36	0	0.0%	No	Yes	
273 _06125_07400_I	12.723	4/20/18 12:36 PM	1,282	101%	0%	0.09	0.09	0.00	0.06	0.11	0.05	0%	67	79	18%	78	84	8%	14%	6%	1%	1%	56	5	0.4%	25	0	0.0%	No	Yes	
063 _08336_09693_I	13.567	4/23/18 12:38 PM	1,369	101%	0%	0.15	0.05	-0.10	0.25	0.07	-0.18	0%	172	66	-62%	167	62	-63%	-3%	-6%	1%	3%	56	7	0.5%	16	0	0.0%	No	Yes	2017 Overlay
063 _09693_08336_D	13.567	4/23/18 12:38 PM	1,369	101%	0%	0.14	0.05	-0.09	0.26	0.06	-0.20	0%	171	63	-63%	151	60	-60%	-3%	-5%	1%	3%	56	5	0.4%	19	0	0.0%	No	Yes	2017 Overlay
090 E _15020_17748_I	27.295	4/23/18 2:05 PM	2,754	101%	0%	0.12	0.09	-0.03	0.16	0.10	-0.06	-1%	79	83	5%	86	93	7%	8%	10%	1%	1%	58	6	0.2%	58	0	0.0%	No	Yes	
090 E _17748_19115_I	13.670	4/23/18 2:05 PM	1,381	101%	0%	0.09	0.11	0.02	0.14	0.12	-0.02	-1%	68	71	4%	67	71	6%	-1%	0%	1%	1%	58	0	0.0%		0	0.0%	No	Yes	
090 E _19115_21281_I	21.667	4/23/18 2:05 PM	2,182	101%	0%	0.13	0.09	-0.04	0.23	0.17	-0.06	0%	84	68	-19%	86	69	-20%	2%	1%	1%	1%	58	0	0.0%		0	0.0%	No	Yes	2017 New PCC MRM 19
090 E _21281_23543_I	22.609	4/23/18 2:05 PM	2,281	101%	0%	0.16	0.14	-0.02	0.14	0.14	0.00	0%	66	68	3%	72	73	1%	8%	7%	1%	1%	58	3	0.1%	58	0	0.0%	No	Yes	

30 years on the Road To Progressively Better Data

RPUG Road Profile Users' Group

SDDOT's DQMP – Most challenging

Certification of equipment for IRI/Profile

- Big learning curve
- Many variables
  - Profiler operation
  - SurPro operation
  - Recording interval
  - Filtering

Question 2: Is your agency certifying data collection equipment for ride quality (IRI) using AASHTO R56-14 other than an inertial profiler?

No – Only using and certifying inertial profiler.

Question 3: Rutting, Faulting, and Cracking validation

Test site established

- Manually collected comparison data – Aberdeen US 12
  - Rut Depth (Straight edge with depth gauge)
  - Faulting (Fault Meter)
  - Cracking (Cracks manually mapped)

- Compared to equipment

Question 3: Rutting, Faulting, and Cracking validation

Question 3: Rutting, Faulting, and Cracking validation

US 12E Asphalt Concrete Certification Test Section

L_RouteID	Test Date	Run #	LRUT_WIRE	RRUT_WIRE	LRUT_SE	RRUT_SE	LRUT_3PT	RRUT_3PT
001_012_298_299_AC	5/16/18 11:33 AM	001	0.143	0.099	0.136	0.092	0.078	0.078
002_012_298_299_AC	5/16/18 11:48 AM	002	0.147	0.100	0.138	0.090	0.069	0.069
003_012_298_299_AC	5/16/18 11:51 AM	003	0.144	0.093	0.137	0.085	0.064	0.064
004_012_298_299_AC	5/16/18 11:54 AM	004	0.144	0.102	0.135	0.092	0.072	0.072
005_012_298_299_AC	5/16/18 11:57 AM	005	0.143	0.100	0.133	0.092	0.070	0.070
006_012_298_299_AC	5/16/18 12:00 PM	006	0.143	0.099	0.135	0.091	0.064	0.064
007_012_298_299_AC	5/16/18 12:03 PM	007	0.142	0.093	0.135	0.085	0.065	0.065
008_012_298_299_AC	5/16/18 12:06 PM	008	0.152	0.100	0.143	0.090	0.067	0.067
009_012_298_299_AC	5/16/18 12:09 PM	009	0.146	0.096	0.138	0.086	0.061	0.061
010_012_298_299_AC	5/16/18 12:12 PM	010	0.145	0.095	0.138	0.086	0.055	0.055
		Average	0.145	0.098	0.137	0.089	0.066	0.066
		Tolerance +/-	0.060	0.060	0.060	0.060	0.060	0.060
		Standard Deviation	0.003	0.003	0.003	0.003	0.006	0.006
		Average	*0.145*	*0.098*	*0.137*	*0.089*	*0.066*	*0.066*
		Number	10	10	10	10	10	10
		Min	0.142	0.093	0.133	0.085	0.055	0.055
		Max	0.152	0.102	0.143	0.092	0.078	0.078
		Equipment Average =	0.145	0.098				
		Manually Collected Average =	0.133	0.078				
			Passed	Passed				

NOTE: WIRE rutting is used for reporting.

Question 3: Rutting, Faulting, and Cracking validation

US 12E Jointed PPC Certification Test Section

			Left Faulting Data_From ARAN					Right Faulting Data_From ARAN				
L_RouteID	Test Date	Run #	#	AveABS	AveMax	AveAve	AveMin	#	AveABS	AveMax	AveAve	AveMin
101_012_298_299_PCC	5/16/18 12:35 PM	001	23	0.03	-0.03	-0.02	0.01	23	0.04	0.00	0.00	0.01
102_012_298_299_PCC	5/16/18 12:37 PM	002	24	0.04	-0.02	-0.02	0.00	25	0.04	-0.01	-0.01	0.02
103_012_298_299_PCC	5/16/18 12:40 PM	003	23	0.03	-0.02	-0.02	0.01	22	0.04	-0.01	-0.01	0.01
104_012_298_299_PCC	5/16/18 12:43 PM	004	20	0.03	-0.02	-0.02	0.00	22	0.04	-0.01	-0.01	0.01
105_012_298_299_PCC	5/16/18 12:46 PM	005	22	0.03	-0.02	-0.02	0.00	22	0.03	-0.01	-0.01	0.01
106_012_298_299_PCC	5/16/18 12:49 PM	006	24	0.03	-0.02	-0.02	0.00	25	0.04	-0.01	-0.01	0.01
107_012_298_299_PCC	5/16/18 12:51 PM	007	24	0.03	-0.03	-0.02	0.00	24	0.04	0.00	0.00	0.02
108_012_298_299_PCC	5/16/18 12:54 PM	008	23	0.03	-0.01	-0.01	0.01	21	0.04	-0.02	-0.01	0.02
109_012_298_299_PCC	5/16/18 12:57 PM	009	24	0.04	-0.02	-0.02	0.00	21	0.04	-0.01	-0.01	0.02
110_012_298_299_PCC	5/16/18 1:00 PM	010	22	0.03	-0.02	-0.02	0.01	25	0.04	-0.01	-0.01	0.03
		Average	23	0.033	-0.020	-0.017	0.003	23	0.036	-0.009	-0.008	0.016
		Tolerance +/-		0.06	0.06	0.06	0.06		0.06	0.06	0.06	0.06
		Standard Deviation	1	0.004	0.005	0.003	0.005	2	0.001	0.007	0.005	0.006
		Average	*23*	*0.033*	*-0.020*	*-0.017*	*0.003*	*23*	*0.036*	*-0.009*	*-0.008*	*0.016*
		Number	10	10	0	0	7	10	10	1	1	10
		Min	20	0.027	-0.027	-0.023	-0.004	21	0.035	-0.023	-0.013	0.005
		Max	24	0.041	-0.012	-0.011	0.011	25	0.038	0.001	0.001	0.026
		Average of 26 Joints	26	0.029	-0.017	-0.015	0.003		0.032	-0.008	-0.007	0.014

	Left WP	Right WP
Equipment Average =	0.029	0.032
Manually Collected Average =	0.027	0.022
	Passed	Passed

NOTE: Ave ABS is used for reporting

Question 4: Error resolution and data acceptance

Quality checks in-place (Documented what we have been doing for years)

- Flagged data reviewed
- Scheduled for recollection

Question 5: Recommendations on how to improve future DQMP initiatives

- Better method to verify IRI/Profile accuracy
  - Too many variables in current practice
- Develop a device for equipment certification
- Establish test sites to certify All data (IRI, Rutting, Faulting and Cracking) (Similar to FWD Regional Calibration Centers).