Iowa PEM Shadow Project

Todd Hanson, PE Concrete Materials Engineer

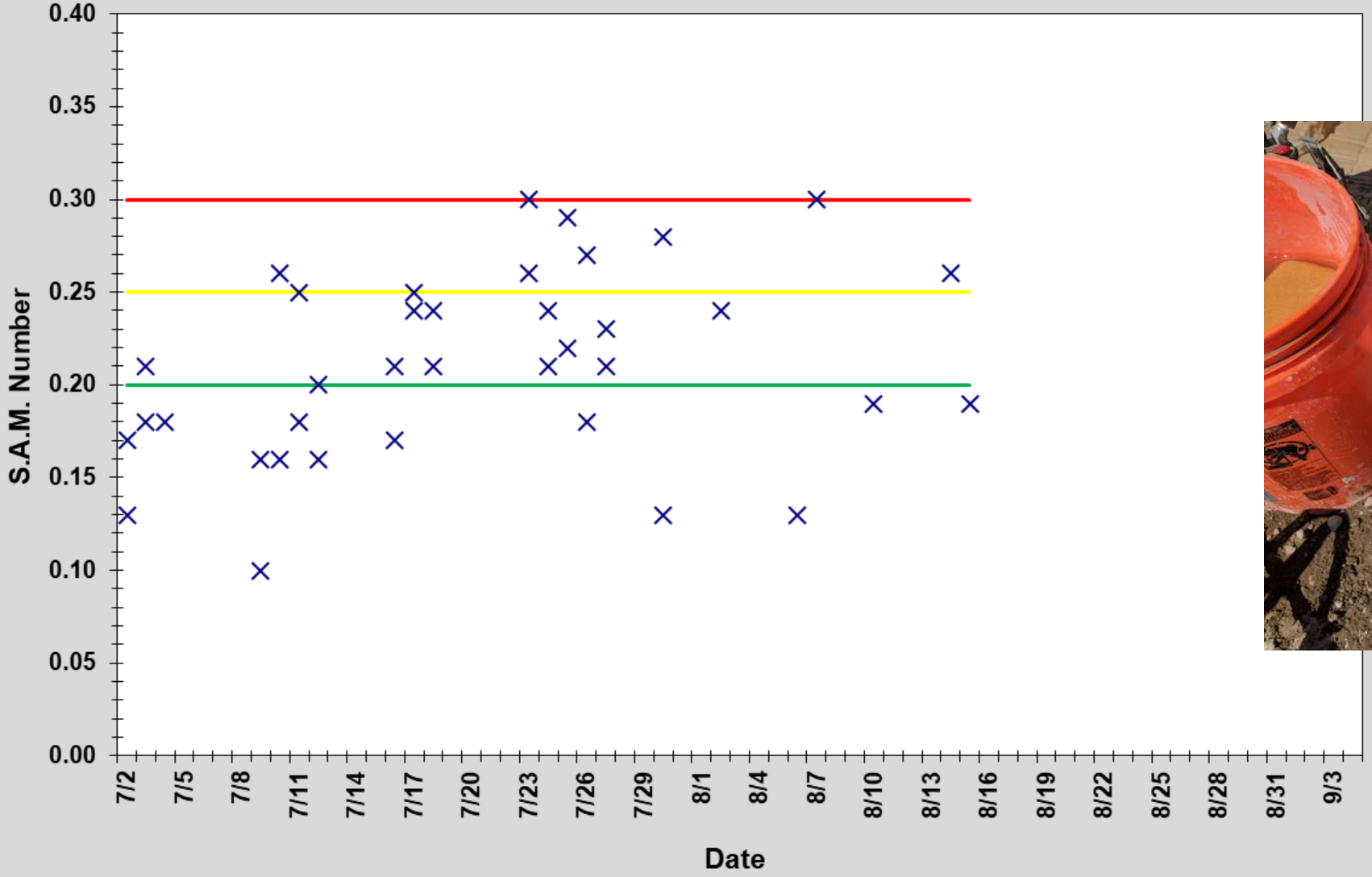
Iowa PEM Shadow Project

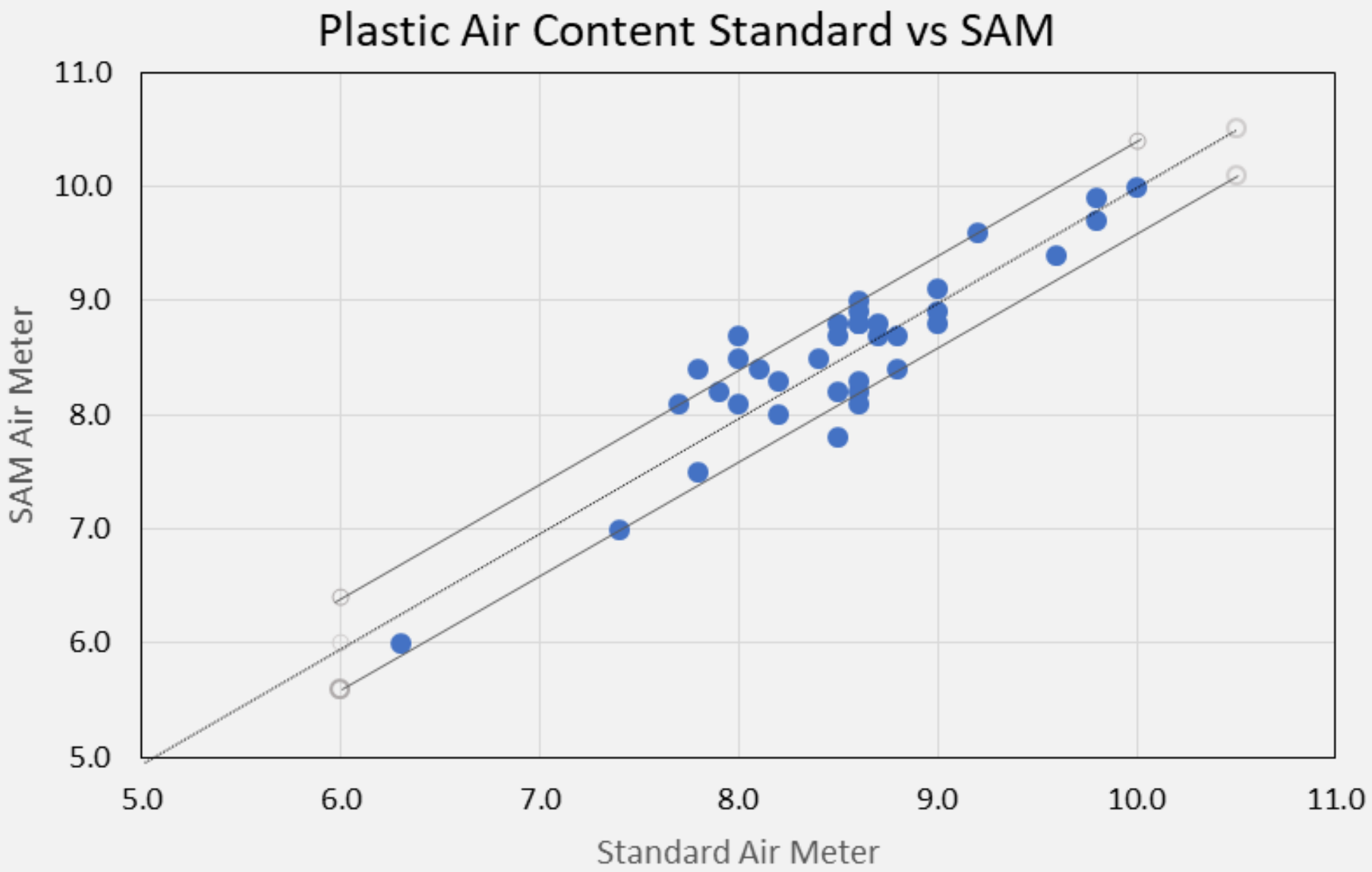
- US 20 Woodbury Co.
- Contractor
  - Comprehensive QC Plan
    - Control Charts
    - Air PWL
  - Trial batch mix design
  - SAM Test
  - Box Test
  - Bucket/Resistivity

Iowa PEM Shadow Project

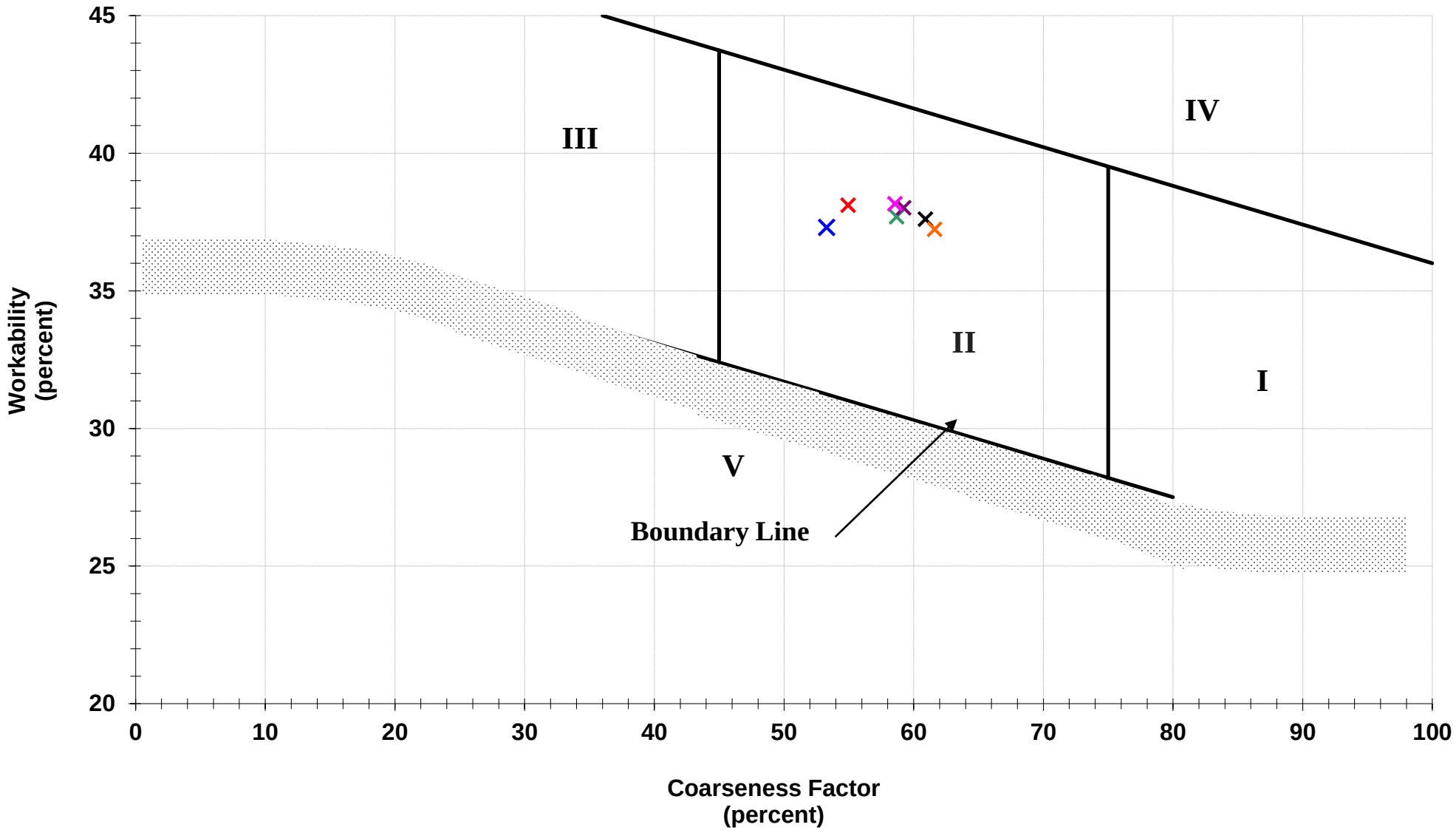
- FHWA Mobile Lab Trailer
- ISU
  - Oxy Chloride Potential
  - Mix Design Development
- Iowa DOT
  - Complete Bucket Testing
  - Hardened air cylinders
  - Reporting

S.A.M. Number
Before Paver

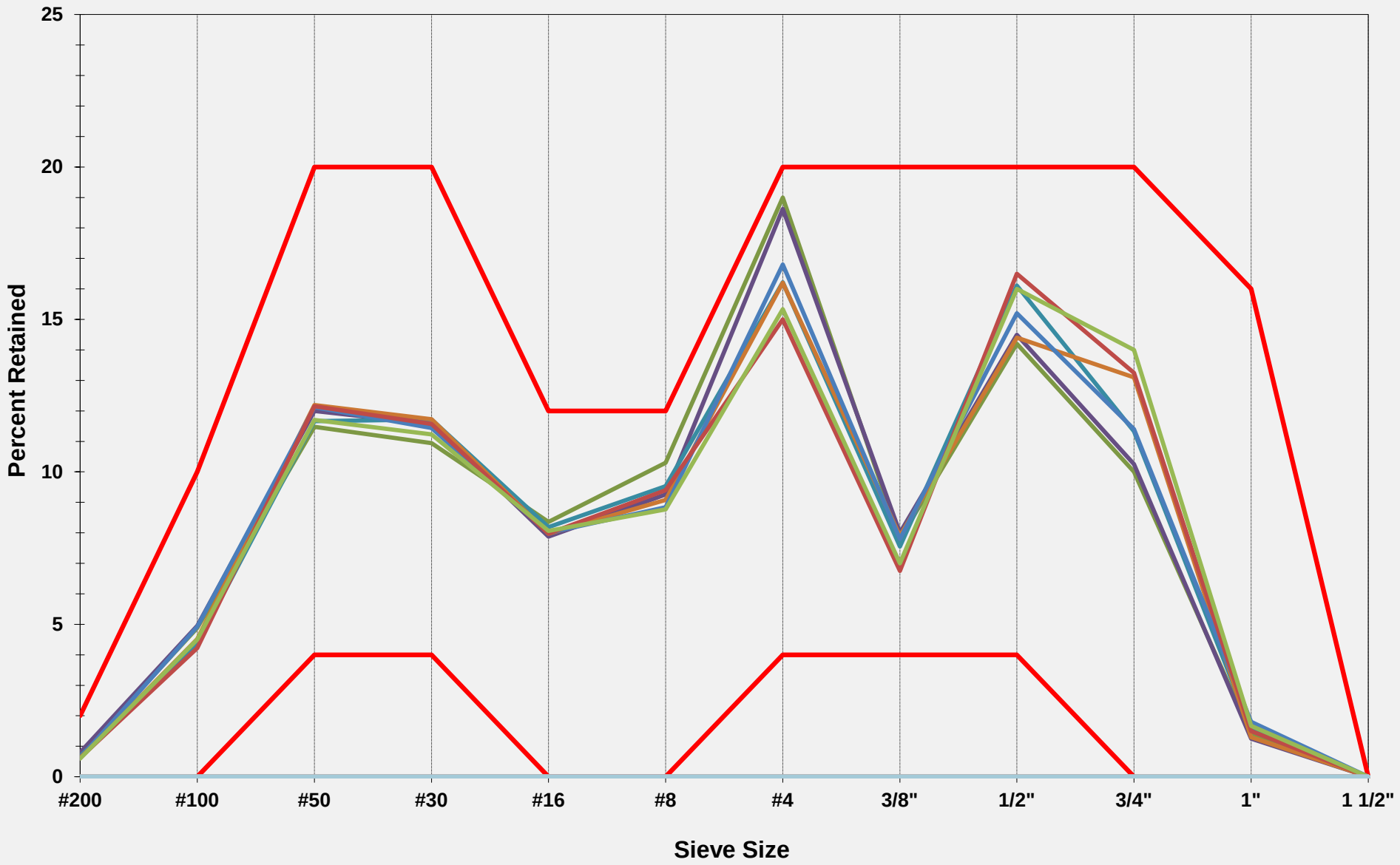


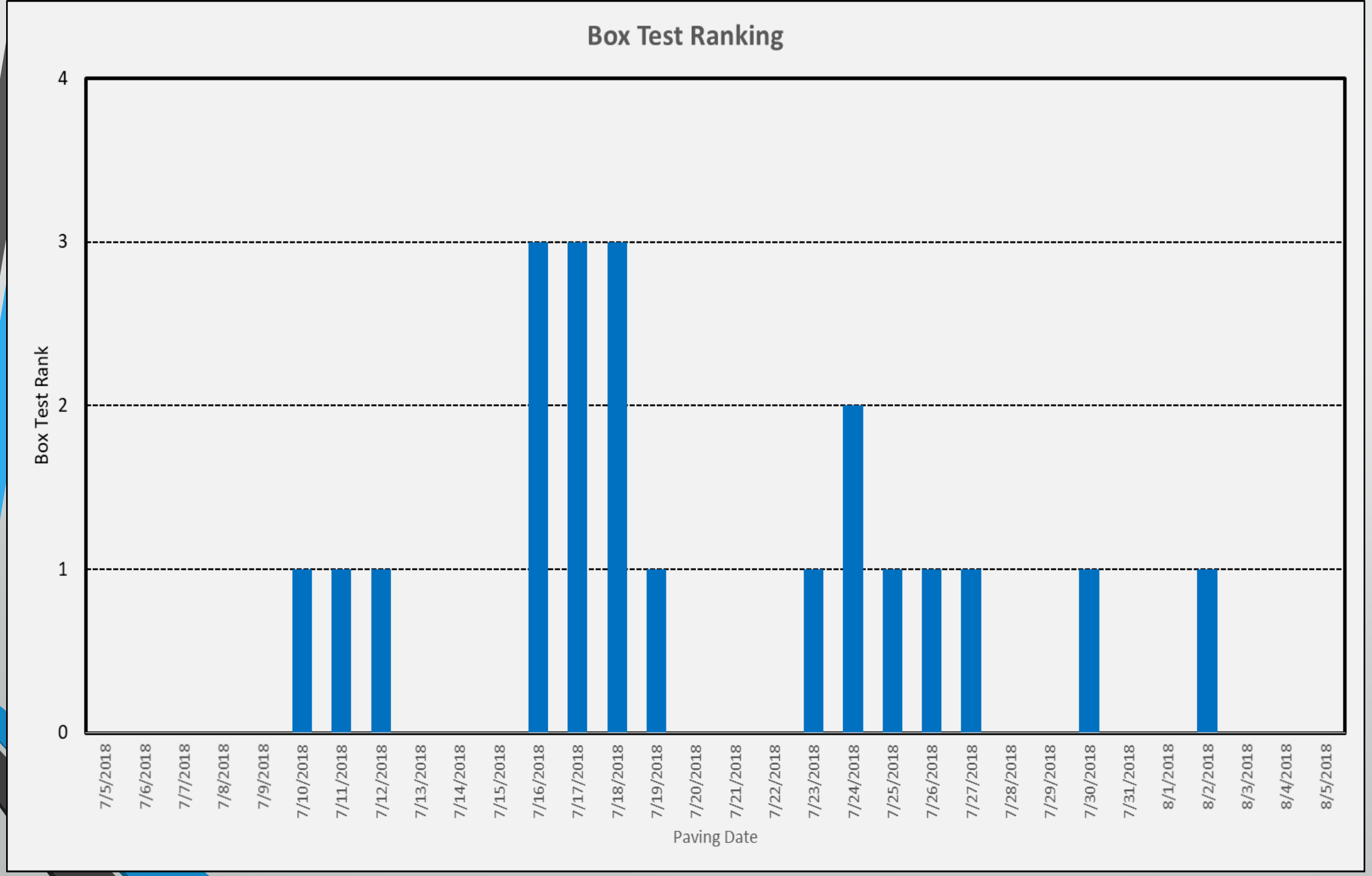

Plastic Air Content Standard vs SAM
11.0
10.0
9.0
8.0
7.0
6.0
5.0
SAM Air Meter
5.0
6.0
7.0
8.0
9.0
10.0
11.0
Standard Air Meter

Average Project Workability Factor VS Coarseness Factor



Tarantula Curve Combined Aggregate Gradation, % Retained




Box Test Ranking
Box Test Rank
4
3
2
1
0
7/5/2018
7/6/2018
7/7/2018
7/8/2018
7/9/2018
7/10/2018
7/11/2018
7/12/2018
7/13/2018
7/14/2018
7/15/2018
7/16/2018
7/17/2018
7/18/2018
7/19/2018
7/20/2018
7/21/2018
7/22/2018
7/23/2018
7/24/2018
7/25/2018
7/26/2018
7/27/2018
7/28/2018
7/29/2018
7/30/2018
7/31/2018
8/1/2018
8/2/2018
8/3/2018
8/4/2018
8/5/2018
Paving Date

PEM Mix Design

A Mix	Abs. Vol.	lbs/CY
CEMENT:	0.083	440
FLY ASH:	0.025	110
WATER: w/c=0.474	0.155	261
FINE AGGREGATE (45%):	0.305	1357
COARSE AGGREGATE (55%):	0.372	1680
INTERMEDIATE AGG.:	0	0
AIR:	0.06	0
Paste Content, %	26.3	

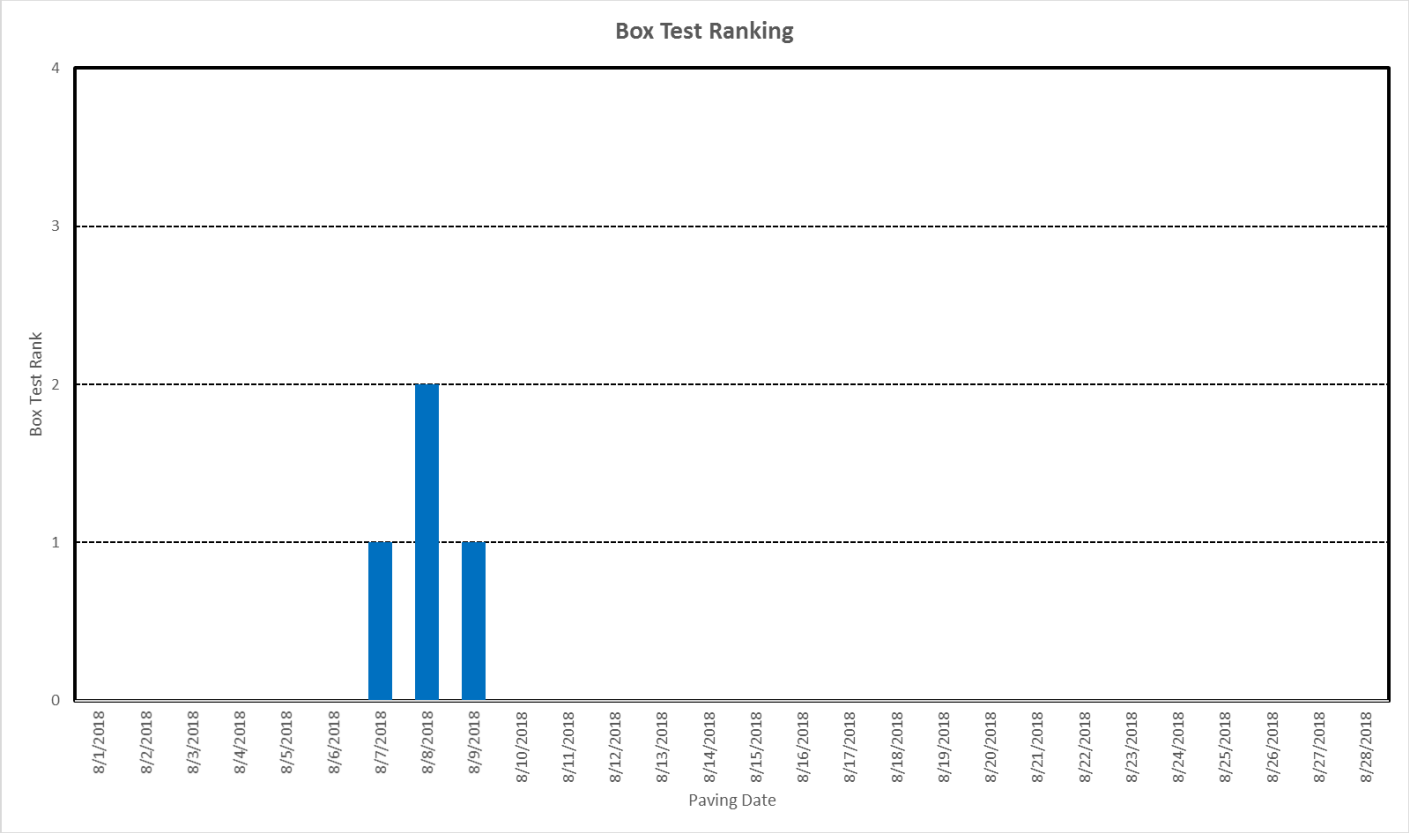
PEM Mix	Abs. Vol.	lbs/CY
CEMENT:	0.078	412
FLY ASH:	0.024	103
WATER: w/c=0.40	0.122	206
FINE AGGREGATE (44%):	0.315	1401
COARSE AGGREGATE (44%):	0.315	1422
INTERMEDIATE AGG. (12%):	0.086	387
AIR:	0.06	0
Paste Content, %	22.4	

Due to time constraints – Peter Taylor estimated cement content based on dry rodded unit weight of combined aggregate.

PEM Mix Design

- Contractor had concerns lowering cement content of standard A mix
- Performed trial batch
- Placement went very well
- Liked to had a chance to try on mainline

PEM Mix Design

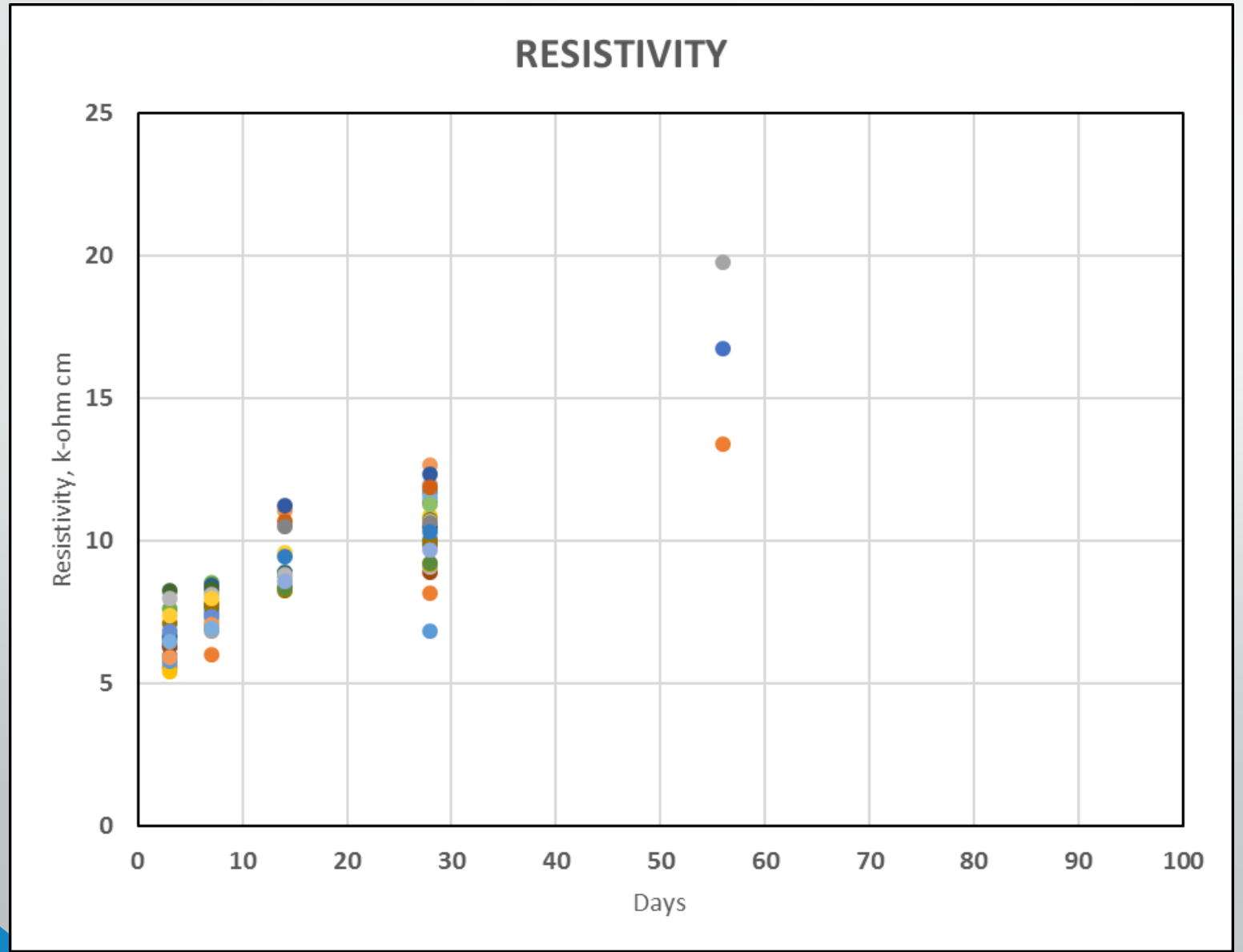


FHWA Mobile Lab PEM Open House

Testing Pending

- 25 Cylinders
  - Finish 91 day Resistivity
  - Hardened Air Void Analysis
- Oxy Chlorate Potential
- Reporting

Resistivity



Questions ?

Special Thanks to

Cedar Valley Corp. , LLC

Tech Center

IOWA CONCRETE PAVING ASSOCIATION