



CA PORTABLE SKID TESTER (PST) COMPARISON AGAINST CFMES

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RPUG
Road Profile Users' Group

OUTLINE



1 INTRODUCTION & BACKGROUND

2 DATA COLLECTION (FIELD & LAB)

3 DATA PROCESSING & ANALYSIS

4 CONCLUSIONS

5 RECOMMENDATIONS

BACKGROUND



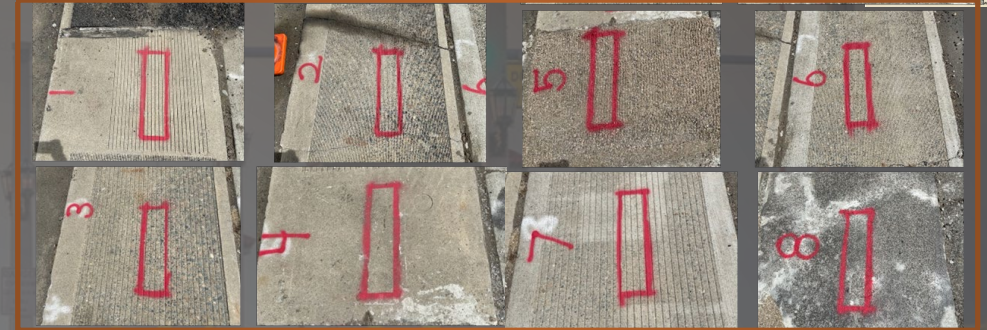
California Portable Skid Tester (CA PST)



July 2021

Phase I Study

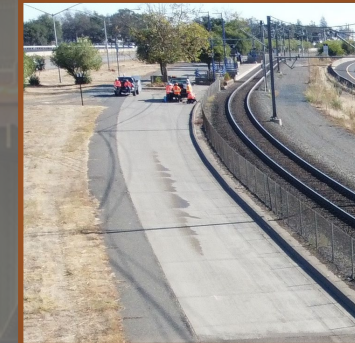
- Equipment Evaluation
- Recommendations



July 2022

Phase II Study

- Continued Evaluations
- Longer Test Sections



August 2022

February 2023

Phase III Study

- Lab Evaluation
- Field Evaluation
- Usability Study

Lab Study



Field Study



December 2023

TIMELINE



Test Preparation
(May 2023)



Lab & Field Testing
(Sep-Oct 2023)



Reports & Phase III Close-Out
(Dec 2023)

Training

(Started May 2023)

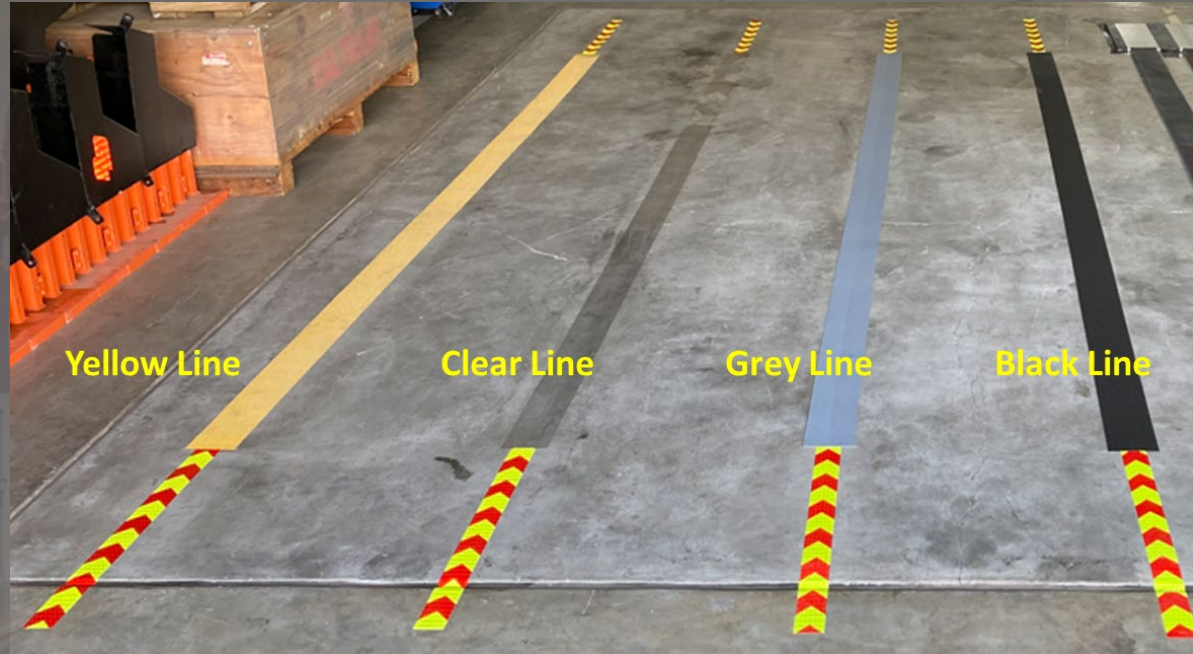


Data Processing & Analysis

(Nov-Dec 2023)



LABORATORY EVALUATION



Yellow Tape



Clear Tape



Gray Tape



Black Tape

FIELD TESTING LOCATIONS



Location	Test Date	Last Resurfaced	Length	Traffic Level	Surface Type		
					Methacrylate	PCC	Polyester
Auburn Blvd Site	9/6/23	2001	12'	No Active Traffic*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Whitney Over Hwy 65	9/13/23	2016	12'	No Active Traffic*		<input checked="" type="checkbox"/>	
Markham Bridge	9/13/23	2012	12'	Heavy**	<input checked="" type="checkbox"/>		
Jackson Road	9/19/23	2023	10'	No Active Traffic*			<input checked="" type="checkbox"/>
Jackson Road	9/19/23	2023	8'	No Active Traffic*	<input checked="" type="checkbox"/>		
Translab EV-Pad	10/11/23	2022	12'	No Active Traffic*		<input checked="" type="checkbox"/>	

*No active traffic/parking, outside of active traffic path

** Heavy traffic load (18 wheelers/farm loaders)

FIELD SURFACES: AUBURN BLVD SITE (ADJACENT TO THE RAMP INTO I-80)



Methacrylate



Polyester



Portland Cement
Concrete

DATA COLLECTION: FIELD TESTING



Lab Tests Summary

Test Date	Test Material	Test Length/Location	Test Surface	Replicates			
				CA PST	Three-Wheel	Two-Wheel Type A	Two-Wheel Type B
9/5/23	3M Tapes	10'10" (Ground)	Black Tape	5	8	1	7
			Clear Tape	5	13	1	7
			Gray Tape	5	9	1	7
			Yellow Tape	5	9	1	7
9/5/23	Grooved Metal Plate	CFME: 10'10" (Ground) CA PST: 2'2" (Bench)	High FN Side	2	6	3	2
Low FN Side			2	7	3	2	
9/15/23			High FN Side	5	6	3	6
			Low FN Side	5	6	3	6
			Flat Side	5	12	10	10

*Data Connectivity issues for Two-Wheel Type A in red

DATA COLLECTION: FIELD TESTING



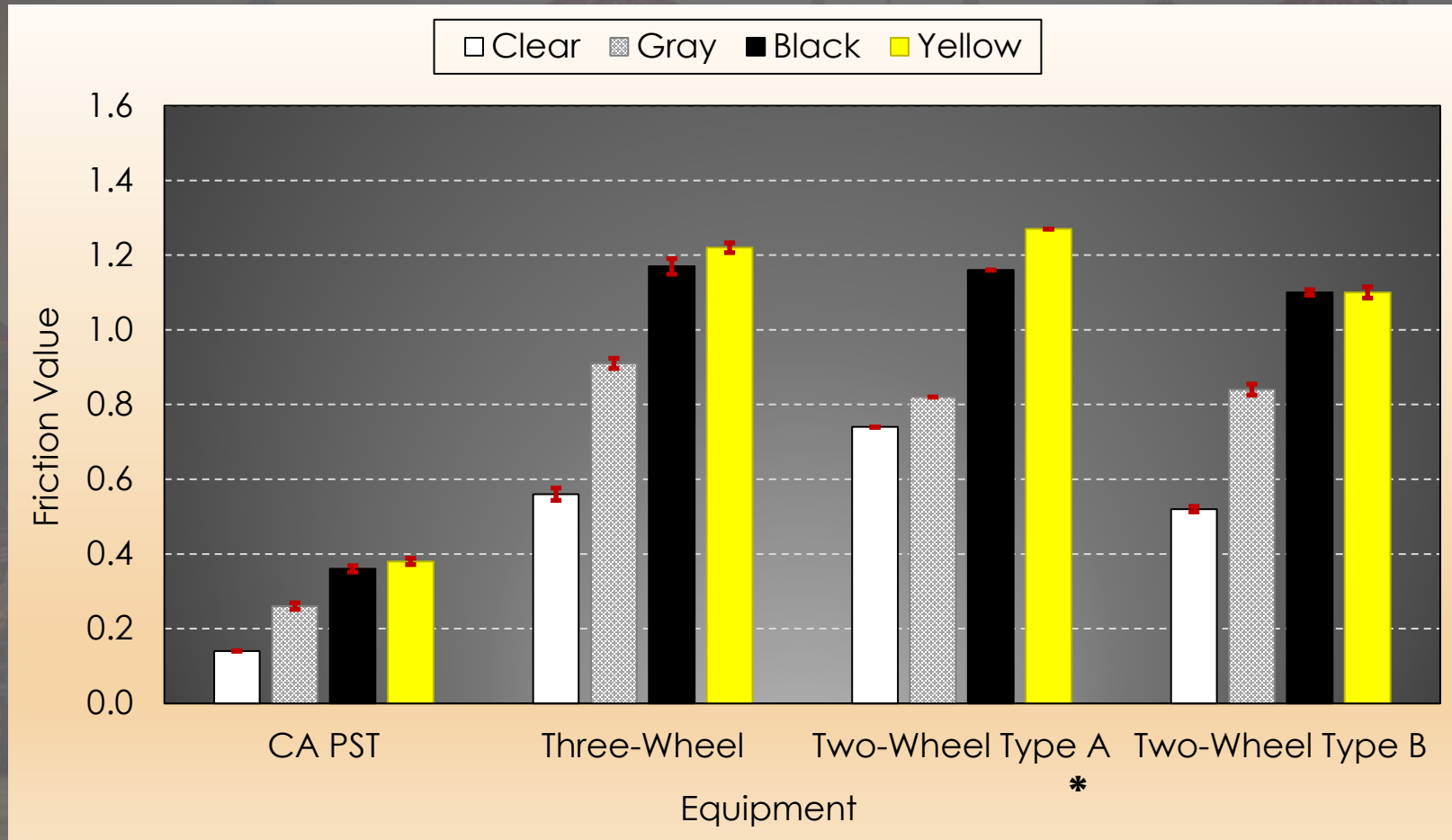
Auburn Blvd Site Adjacent to the Ramp into I-80

Test Date	Test Site	Test Length	Test Surface	Test Lane	Replicates			
					CA PST	Three-Wheel	Two-Wheel Type A	Two-Wheel Type B
9/6/2023	Auburn Blvd Ramp into I-80	12'	Methacrylate	1	5	5	6	6
				2	5	5	6	6
				3	5	6	4	6
			Polyester	4	5	5	7	6
				5	5	4	5	6
				6	5	5	6	8
			PCC	7	5	2	6	5
				8	5	3	6	2
				9	5	3	6	12

DATA ANALYSIS: LAB



3M Tapes

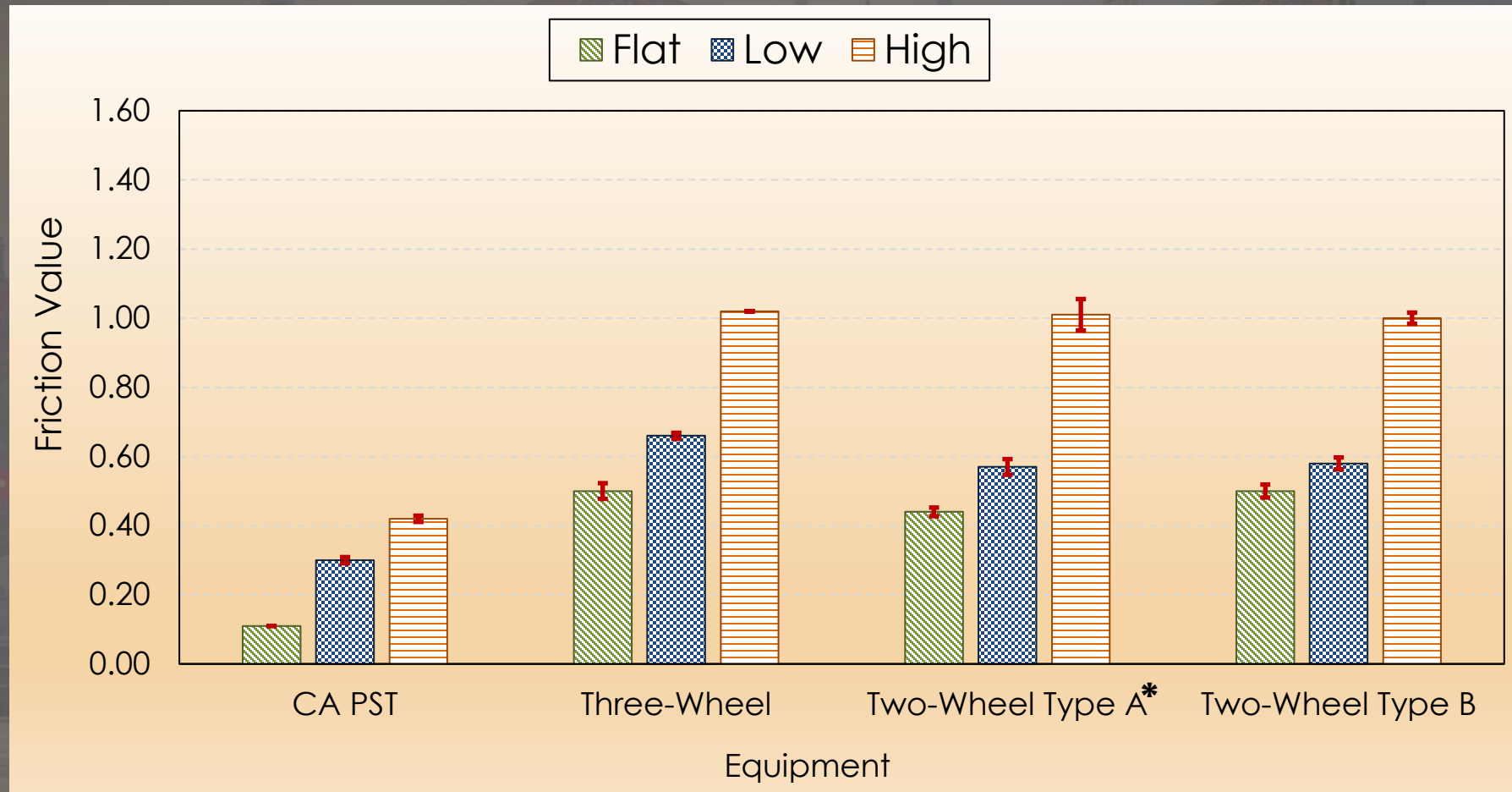


*No confidence interval.

DATA ANALYSIS: LAB



Calibration Steel Plates

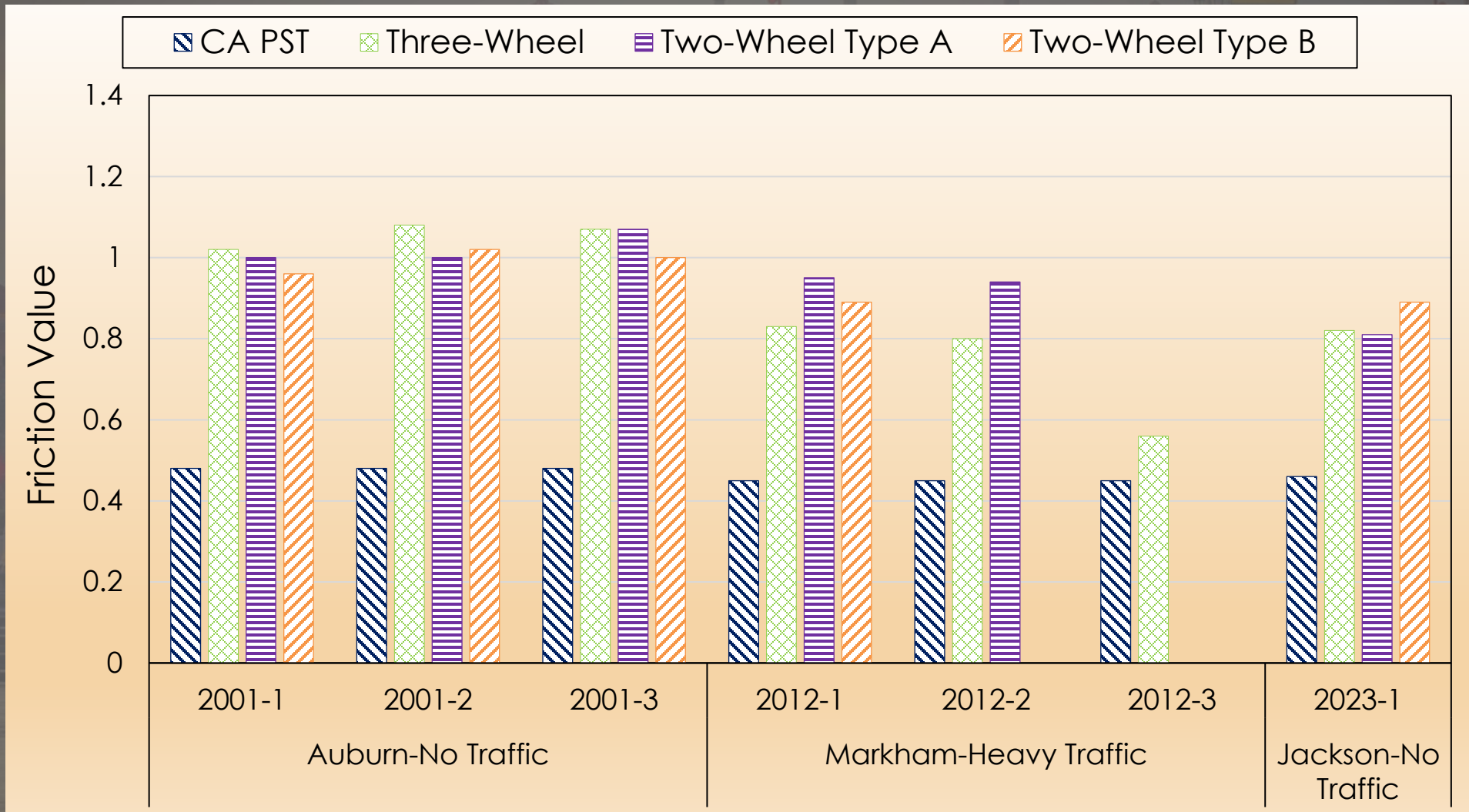


*No confidence interval.

DATA ANALYSIS: FIELD



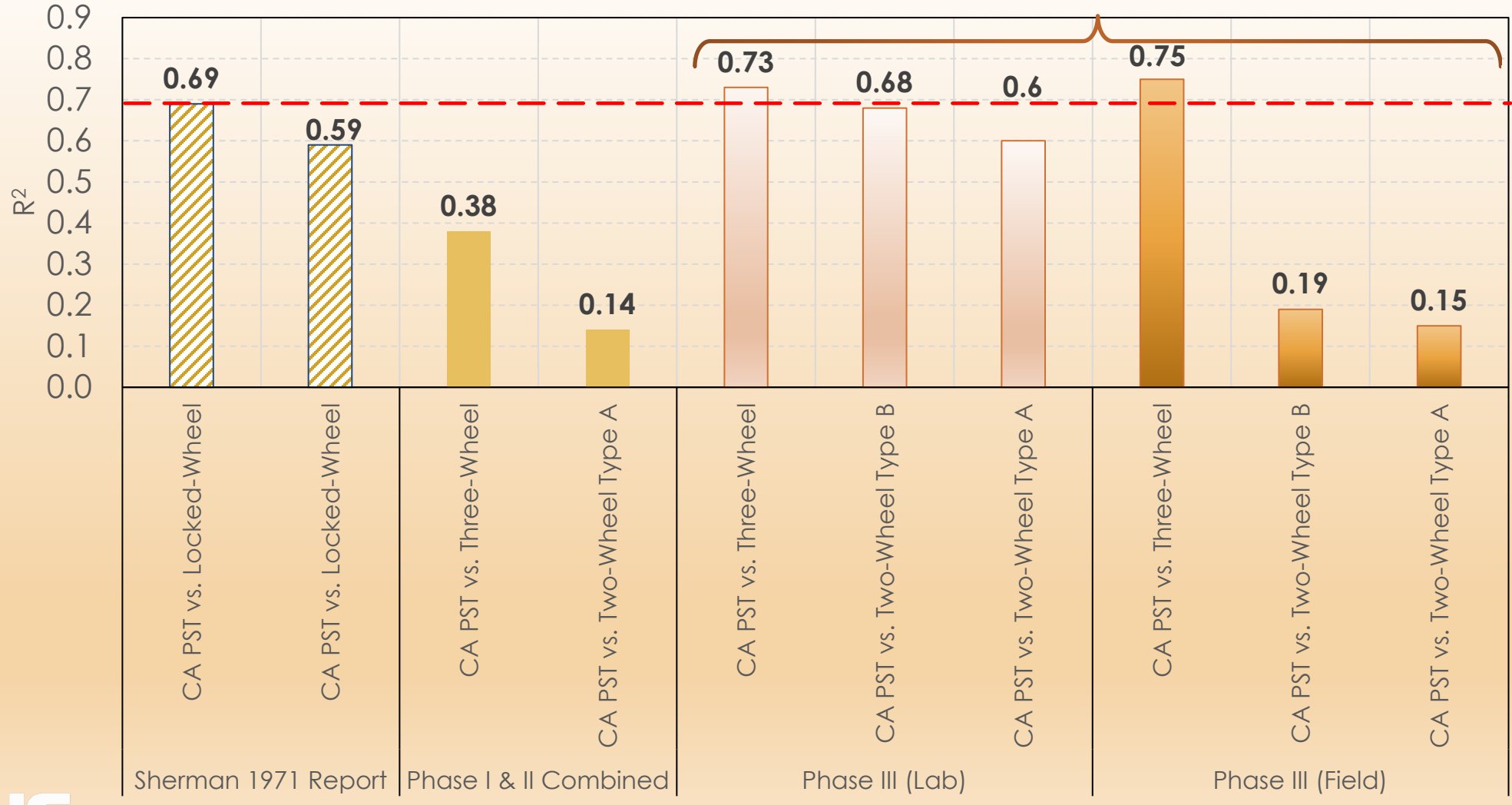
Methacrylate



DATA ANALYSIS: R² SUMMARY








Phase III



EQUIPMENT USABILITY



		CFME Three-Wheel Setup	CFME Two-Wheel Setup (Type A & Type B)
	Output Files	Excel Output	PDF/Excel Output Requires Excel File Conversion
	Data Transfer	Direct USB recording, or Transfer after Data Collection	Manual Transfer to USB (After Data Collection Only)
	Charging	Main Unit (~1 hr. battery life)	Main Unit (~2 hr. battery life) Tablet Water Tank
	Water Supply	Light & Easy to Carry Needs more frequent fill-ups	Heavy if fully loaded Less need for fill-ups
	Relocation to Field/Lab	Self-standing Easy to Handle	Easy to Fall Difficult to Carry without the Box

CONCLUSIONS

- The Three-Wheel CFME ranked better in usability than the Two-Wheel CFMEs
- CA PST, Three-Wheel CFME, and Two-Wheel CFME Type B exhibited good repeability
- All four-equipment showed good sensitivity on steel plates and 3M tapes

CORRELATION WITH CA PST

	Correlation	R ² (Lab)	R ² (Field)
Phase III	CA PST vs. Three-Wheel	0.73	0.75
	CA PST vs. Two-Wheel Type B	0.68	0.19
	CA PST vs. Two-Wheel Type A	0.60*	0.15

* Based on one measurement on 3M Tapes



RECOMMENDATIONS

- Modify test methods and procedures for CFMEs: ASTM/CT & Vendors
- Continue efforts on field testing of candidate CFMEs for replacement of CA PST by collecting additional field data
 - Target CFME data (CA PST values below 0.30)
 - Failing sections/Crash sites



ACKNOWLEDGEMENTS

- Caltrans
 - Materials Testing and Engineering Services (METS)
 - Field and Forensics Services Branch
- Skid Testing Correlation Study Review Committee
- FHWA
- Atlas Technical Consultants



QUESTIONS

