



SPS-2 MIT Scan Results

Ohio SPS-2 Tech Day

Delaware, OH

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Jack H. Springer

FHWA

Senior Highway Research Engineer



U.S. Department of Transportation

Federal Highway Administration



LONG TERM
pavement
PERFORMANCE



Take Home Message (Dowel Alignment)

Good

No direct impact on performance because it is what is expected by most agencies

Incentives to encourage quality

Moderate

Increased risk (but no certainty) of reduced performance

Disincentives to discourage frequency of occurrences

Poor

Very high to high risk of poor performance

Remove/replace or other mitigation measures





Take Home Message (Good to Moderate Dowel Alignment)

Faulting and Roughness (IRI)

- Dowel misalignment has the potential to increase dowel looseness over time
- This reduces load transfer across the joint and can result in increased faulting and roughness
- Affected by factors such as mix characteristics (concrete strength, gradation, aggregate type, etc.) and design characteristics (base, subgrade, layer thicknesses, etc.)





Dowel Bars

Placed at transverse joints in jointed concrete pavements

Provides shear load transfer
Allows for slab expansion and contraction

Reduces slab deflections and stresses

Reduces pumping
Reduces base erosion

Reduces transverse joint faulting
Improves smoothness

Increases pavement life



Inserters



Baskets





Dowel Alignment Testing

Magnetic Imaging Tomography Scan

Weak, pulsating magnetic signal

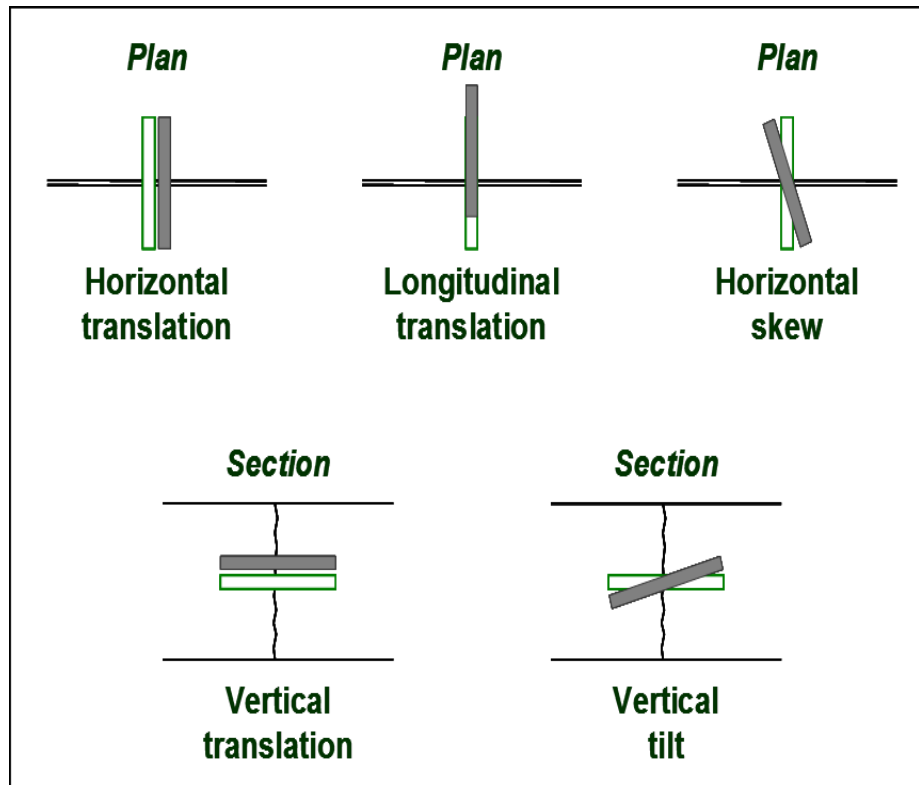
Multiple sensors detect the transient magnetic response signal induced in metal bars

Software analyzes signal and outputs alignment results





Dowel Alignment



To function effectively:

Minimize longitudinal restraint

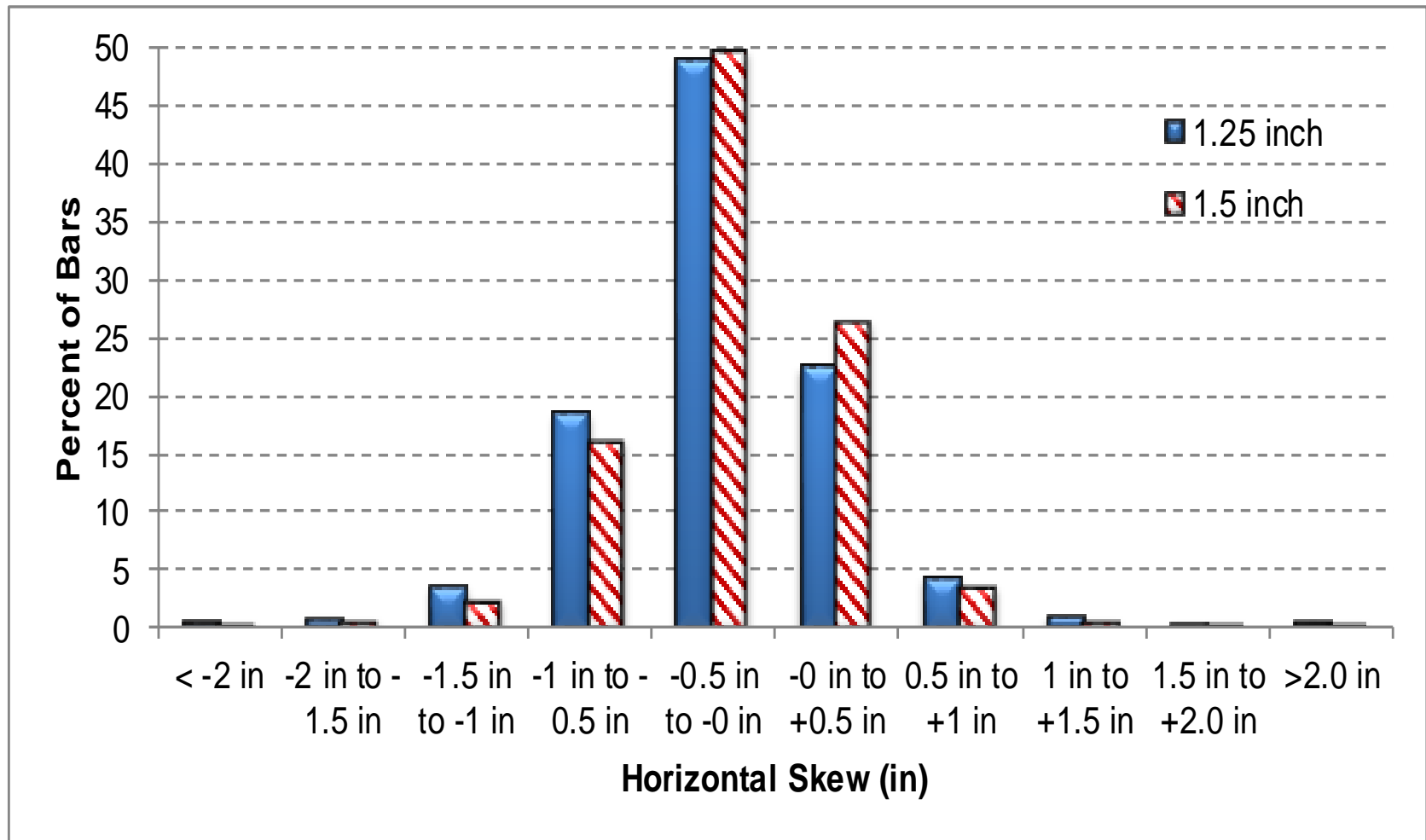
- Placed parallel pavement surface
- Placed parallel to the longitudinal axis

Provide maximum shear load transfer capacity

- Centered longitudinally
- Placed at mid depth

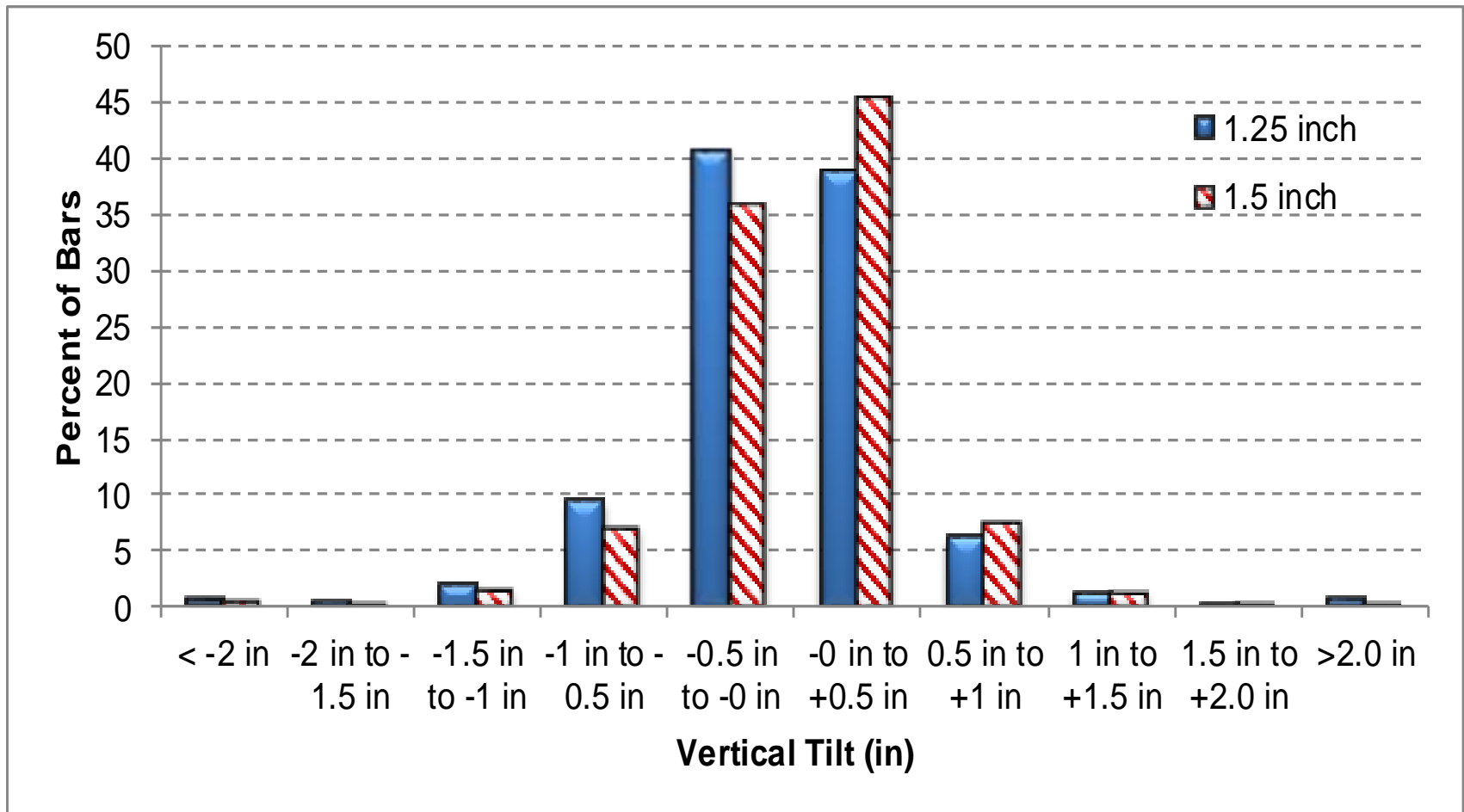


Horizontal skew distribution



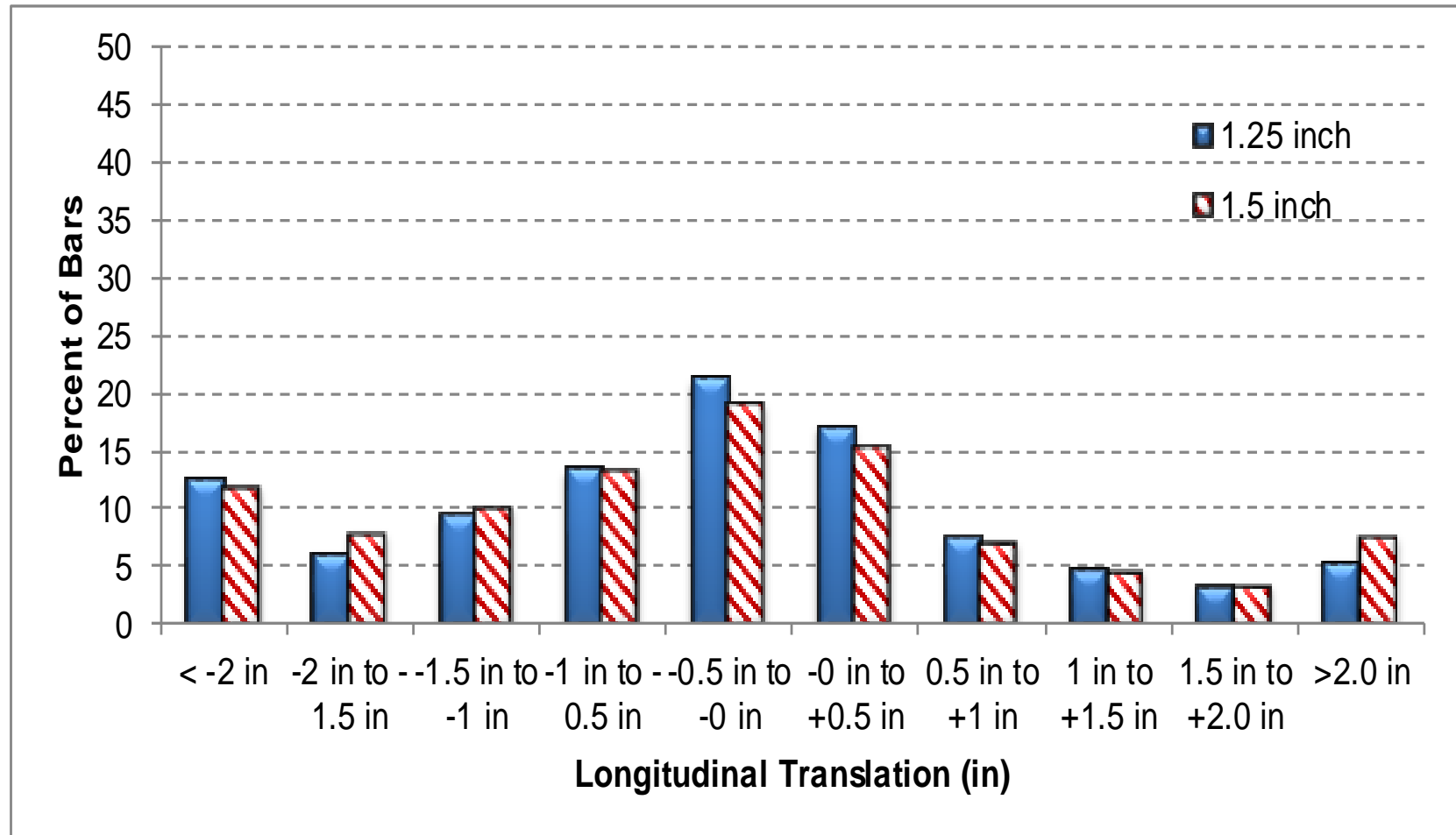


Vertical tilt distribution



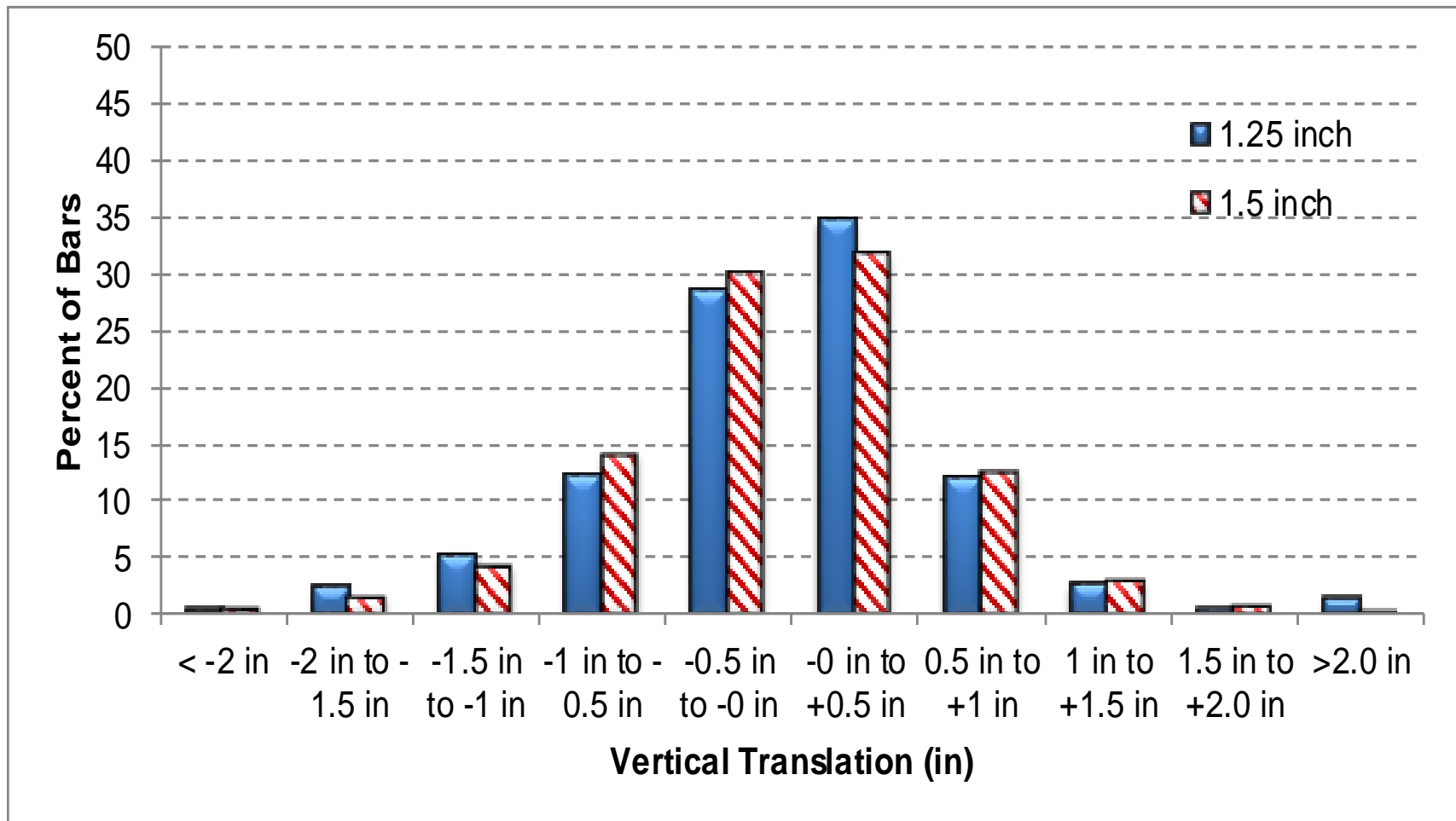


Longitudinal translation distribution





Vertical translation distribution





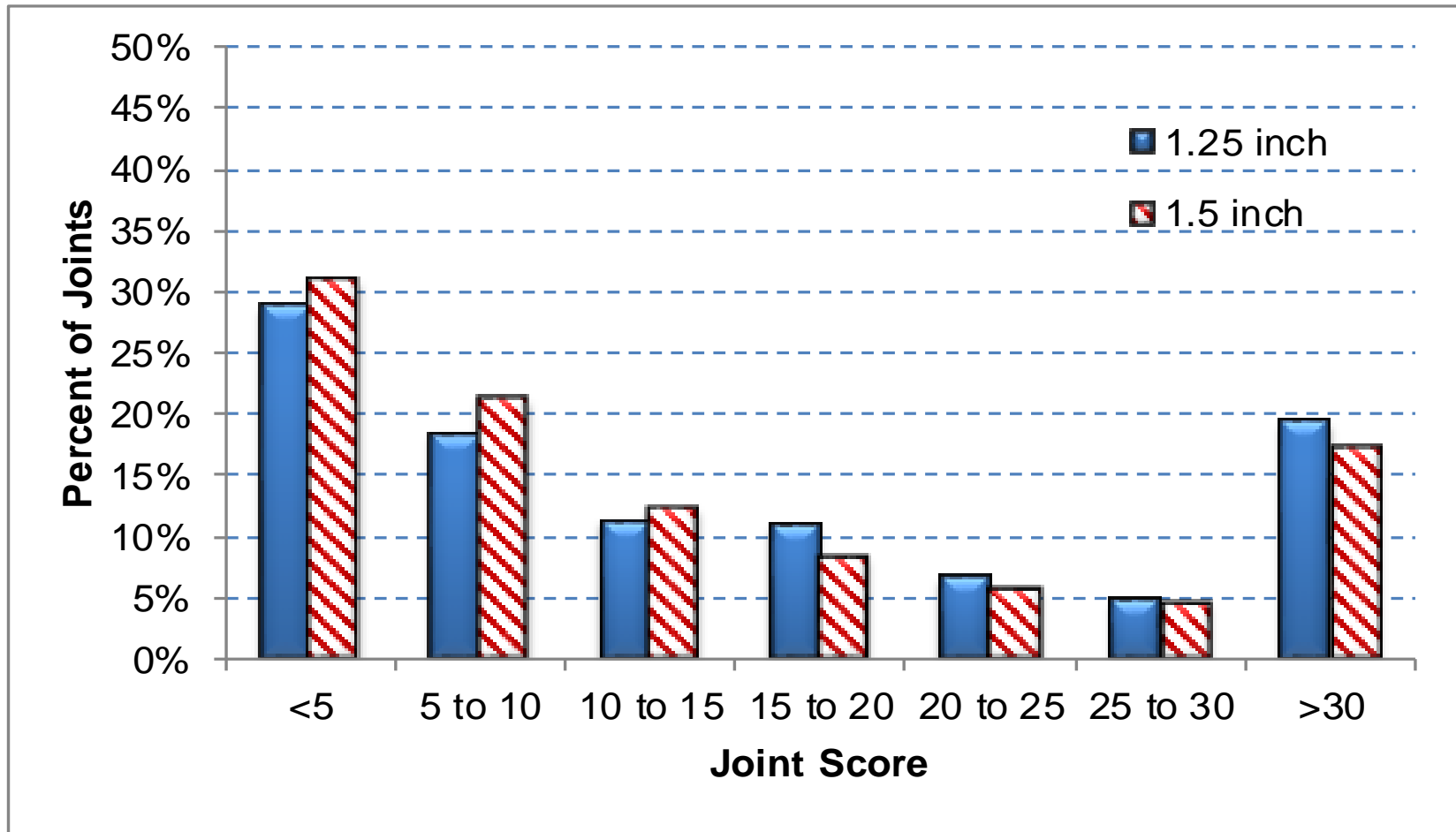
Joint Score

- ◆ Combining dowel rotational misalignment
- ◆ Higher joint score correspond to more bars with higher levels of rotational misalignment
- ◆ Joint score does not consider longitudinal and vertical translations





Joint Score Distribution





Joint Score

State	Average Joint Score	Joint Score Standard Deviation	Number of 1.25-in Dowel Bar Joints	Number of 1.50-in Dowel Bar Joints
Arizona	11	12	197	195
Arkansas	18	16	169	202
California	27	20	196	194
Colorado	11	17	199	198
Delaware	19	22	228	219
Iowa	14	17	198	200
Kansas	18	19	198	203
North Carolina	11	15	26	232
North Dakota	11	13	190	194
South Dakota	18	8	25	0
Wisconsin	21	21	198	160





Effective Dowel Bar Dia.

State	Dowel Diameter (in)	Number of Joints	Average Effective Dowel Diameter (in)	Standard Deviation Effective Dowel Diameter (in)	Average Effective Reduction in Dowel Diameter (%)
Arizona	1.25	197	1.20	0.05	4.2
Arizona	1.5	195	1.40	0.09	6.4
Arkansas	1.25	169	1.13	0.18	9.3
Arkansas	1.5	202	1.42	0.11	5.5
California	1.25	196	0.94	0.26	25.0
California	1.5	194	1.25	0.24	17.8
Colorado	1.25	199	1.18	0.27	8.3
Colorado	1.5	198	1.44	0.13	4.1
Delaware	1.25	228	1.05	0.36	16.8
Delaware	1.5	219	1.46	0.11	2.7
Iowa	1.25	198	1.17	0.18	6.4
Iowa	1.5	200	1.43	0.15	4.4
Kansas	1.25	198	1.14	0.20	8.9
Kansas	1.5	203	1.44	0.11	4.3
North Carolina	1.25	26	1.20	0.14	3.8
North Carolina	1.5	232	1.42	0.24	6.1
North Dakota	1.25	190	1.23	0.06	1.8
North Dakota	1.5	194	1.46	0.07	2.7
South Dakota	1.25	25	1.21	0.03	3.5
Wisconsin	1.25	198	1.15	0.17	8.1
Wisconsin	1.5	160	1.39	0.21	7.2





Questions and Comments

Jack H. Springer

202-493-3144

Jack.springer@dot.gov

