An Evaluation of a Weigh-In-Motion System Utilizing Quartz- Piezoelectric Sensor Technology

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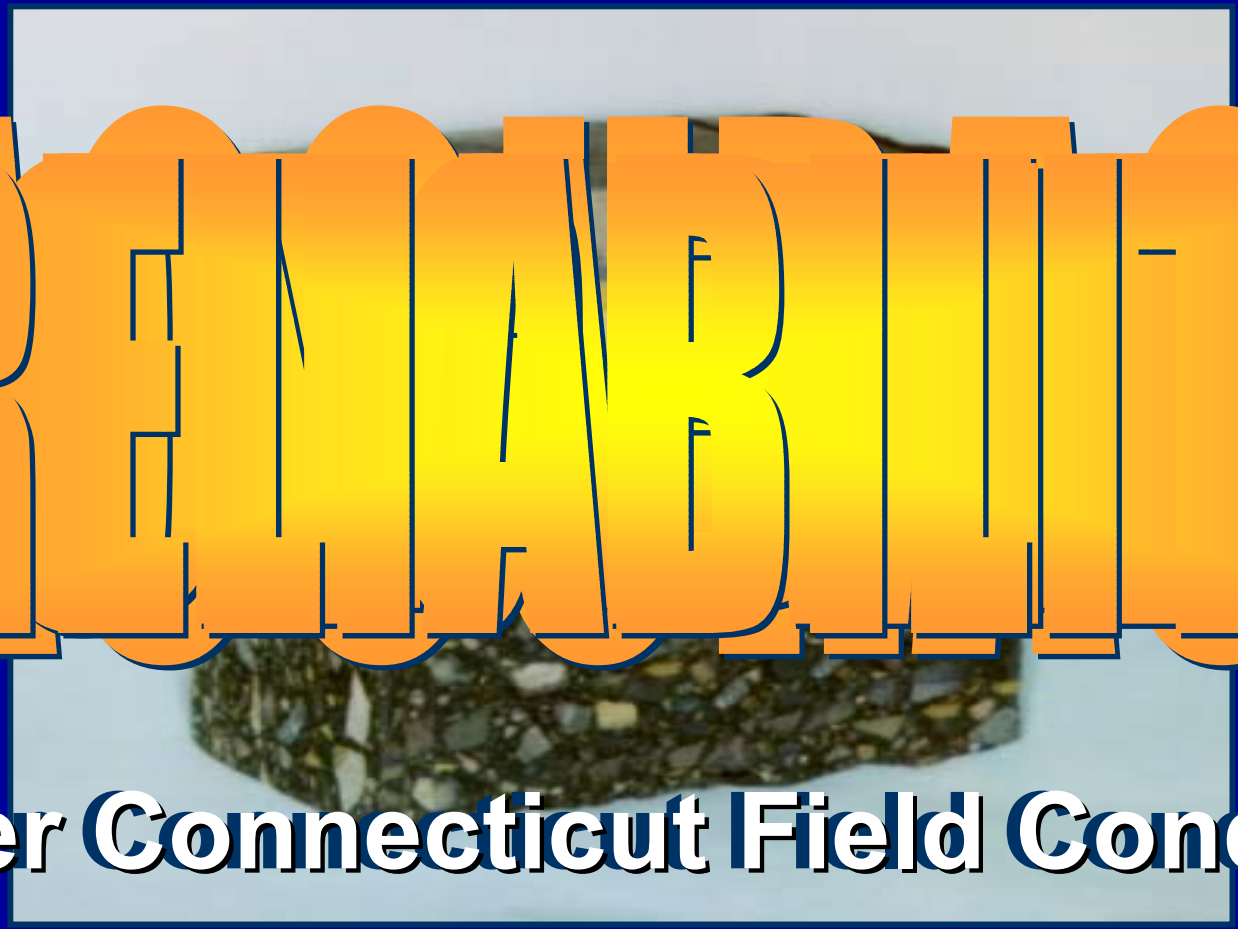
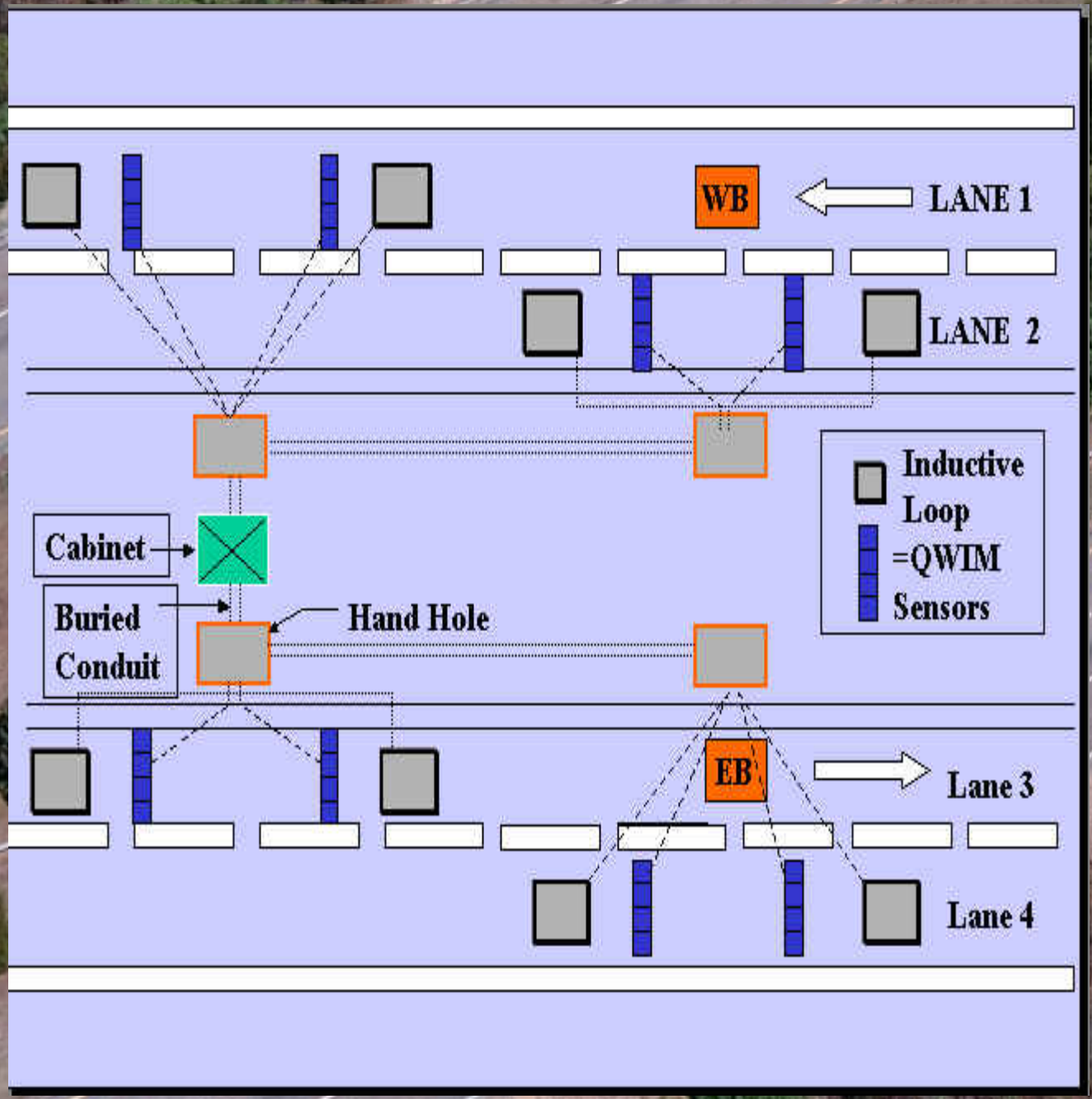
OBJECTIVES
TO EVALUATE SENSOR :



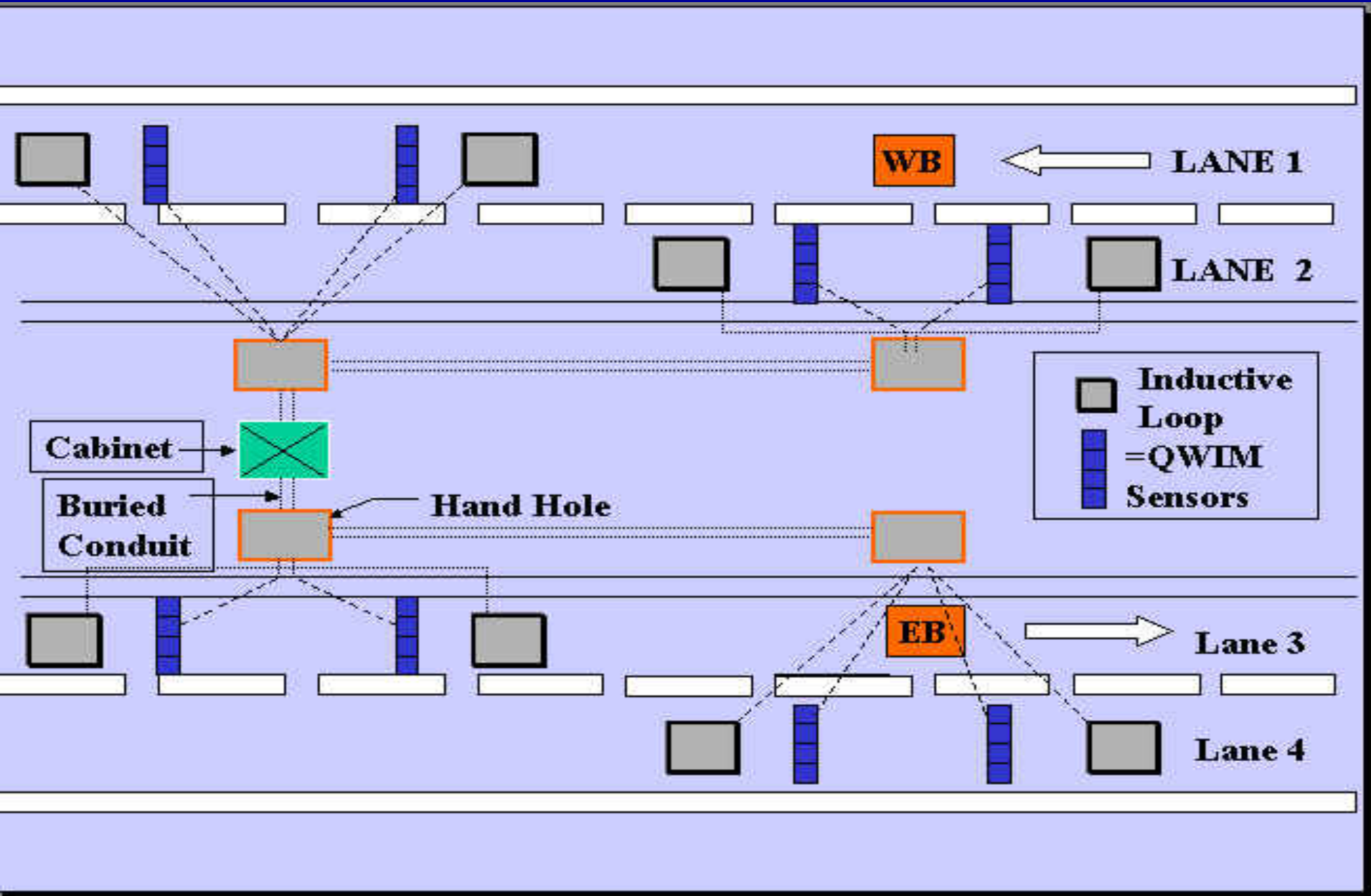
RELIABILITY

under Connecticut Field Conditions

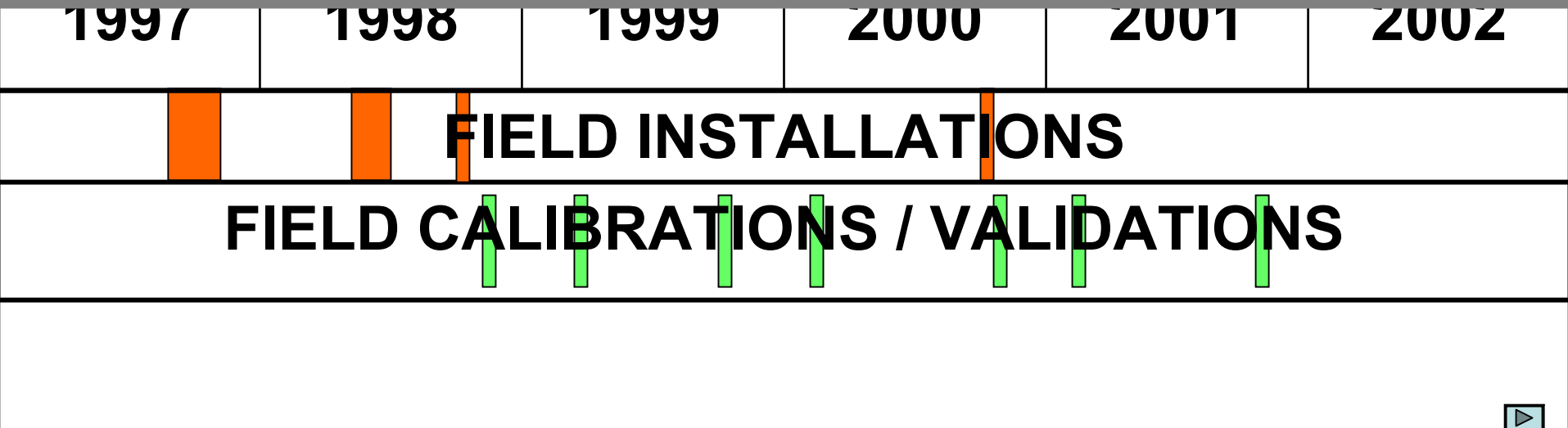
QUARTZ-PIEZO W-I-M TEST LOCATION


WB
LANE 1
LANE 2
Inductive Loop
=QWIM Sensors
Cabinet
Buried Conduit
Hand Hole
EB
Lane 3
Lane 4

SITE LAYOUT


WB
LANE 1
LANE 2
Inductive Loop =QWIM Sensors
Cabinet
Buried Conduit
Hand Hole
EB
Lane 3
Lane 4

FIELD INSTALLATIONS

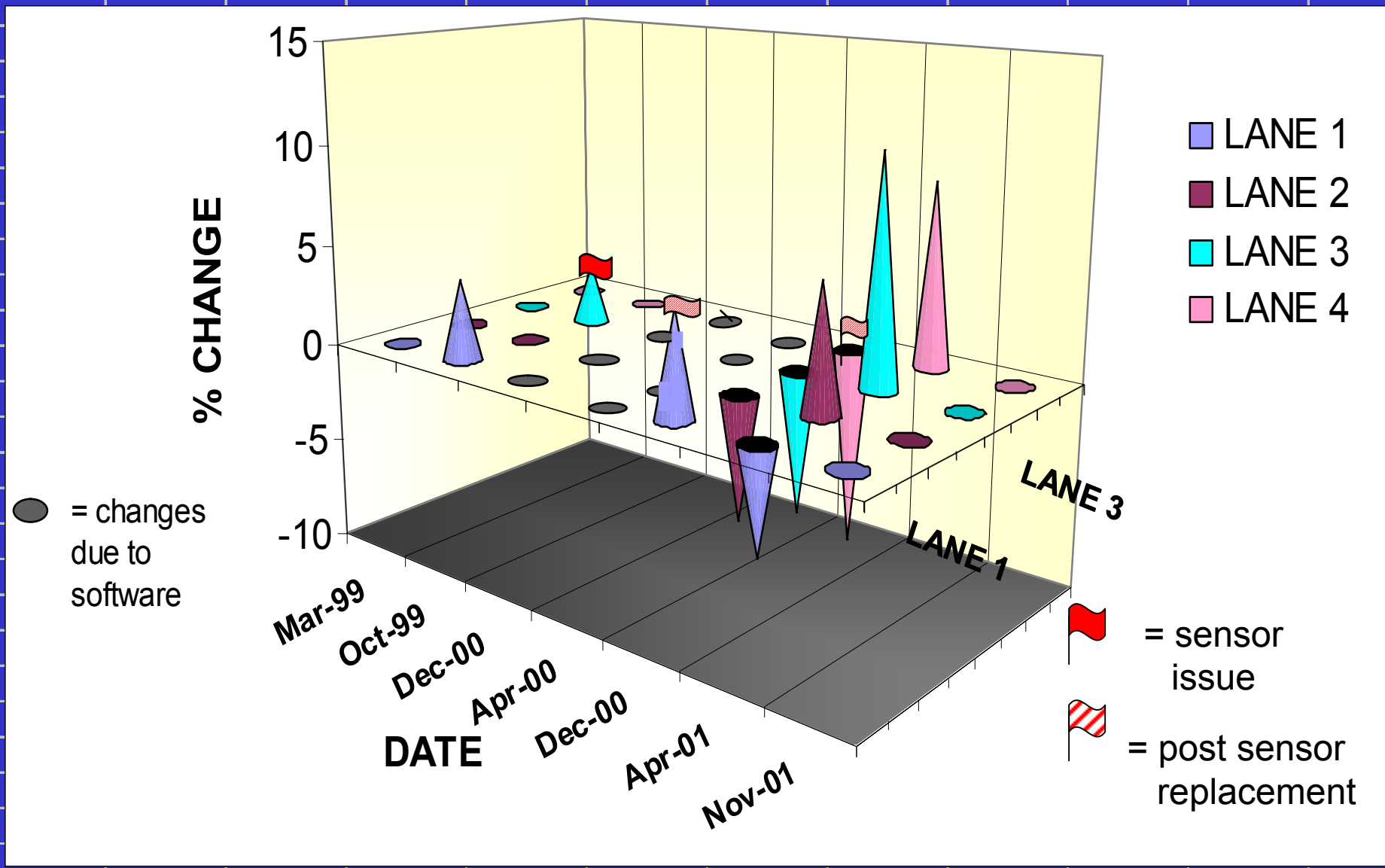


FIELD CALIBRATIONS

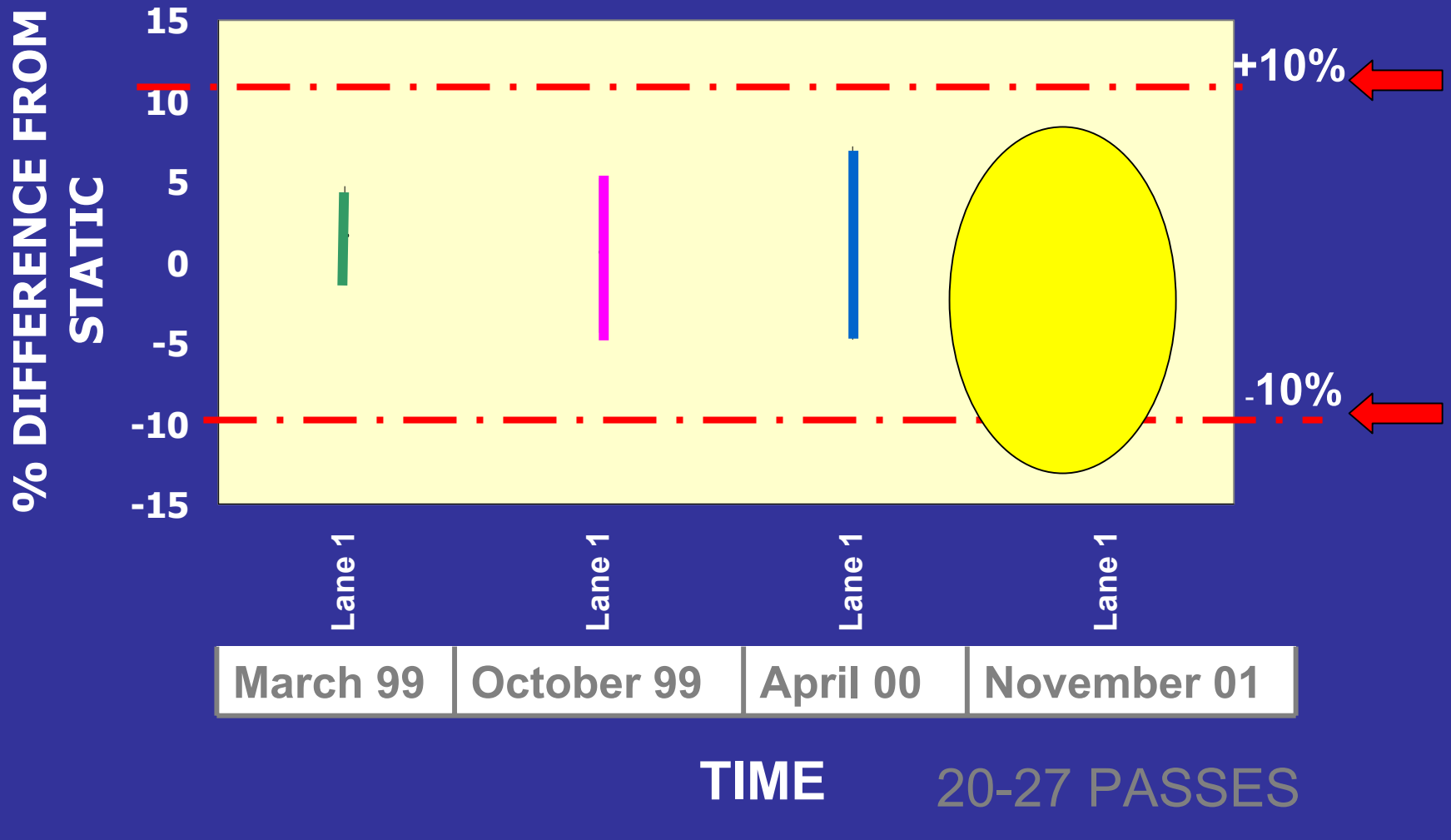
TEST VEHICLES

CALIBRATION ADJUSTMENTS

1999-2001



GVW LANE 1, 5-AXLE AIR RIDE
95% CONFIDENCE INTERVAL



SUMMARY VALIDATION DATA

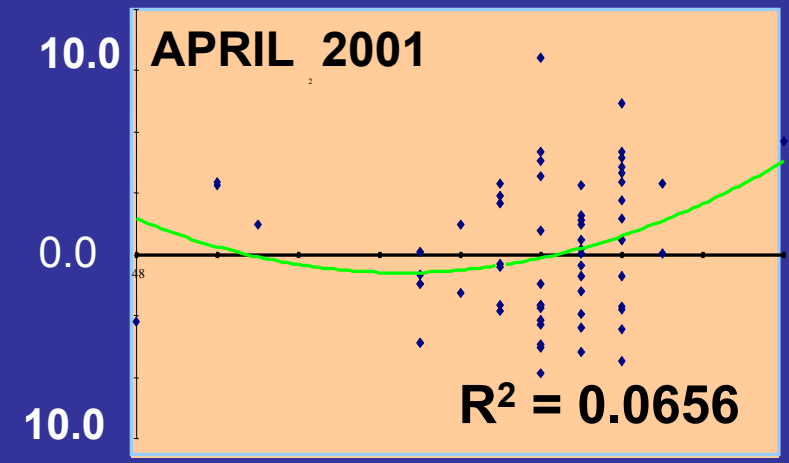
Date	Truck	GW		Steer		Drive		Trailer	
		Error	StdDev	Error	StdDev	Error	StdDev	Error	StdDev
		%	%	%	%	%	%	%	%
Oct-98	AIR	-0.55	1.5	-3.32	1.4	0.17	1.85	-0.64	2.27
Oct-98	LEAF	-3.98	2.39	-5	3.34	-4.91	2.89	-3.08	2.5
Mar-99	AIR	-0.03	1.77	-3.23	2.63	-1.18	1.88	1.98	1.88
Oct-99	AIR	1.00	2.02	-3.92	1.75	-0.10	2.74	3.81	2.03
Oct-99	LEAF	-0.29	1.48	-3.61	1.43	-2.42	2.38	3.12	1.75
Apr-00	AIR	0.19	3.35	-4.27	3.08	1.26	3.59	0.84	3.45
Dec-00	AIR	0.87	5.22	-	-	-	-	-	-
Dec-00	AIR2	-3.71	5.83	-	-	-	-	-	-
Apr-01	LEAF	3.14	5.22	-4.12	3.15	-4.14	2.78	10.5	9.88
Apr-01	AIR2	1.3	1.49	-0.55	2.29	1.81	1.78	1.5	1.98
Apr-01	AIR	-3.41	3.42	-0.89	4.06	-4.7	4.01	-3.02	4.13
Nov-01	AIR	-1.7	1.34	-5.02	1.61	-0.32	1.77	-1.65	1.89
Nov-01	AIR2	-2.26	1.75	-1.94	1.94	-3.1	2.12	-2.32	3.06

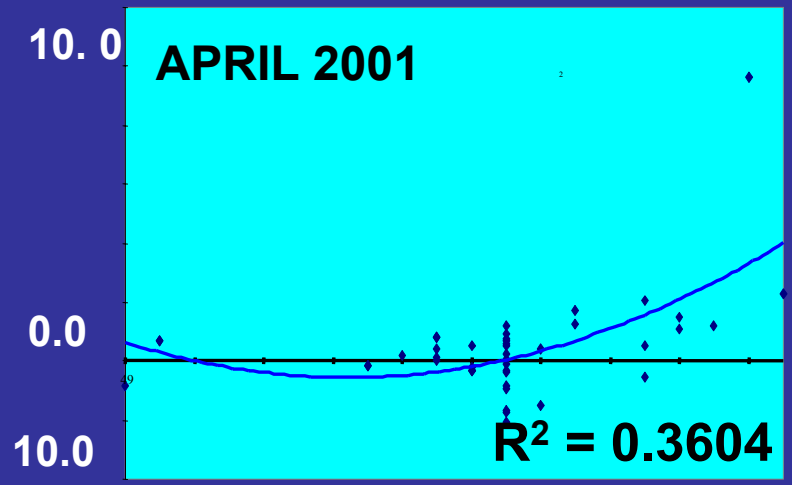
SPEED ANALYSIS

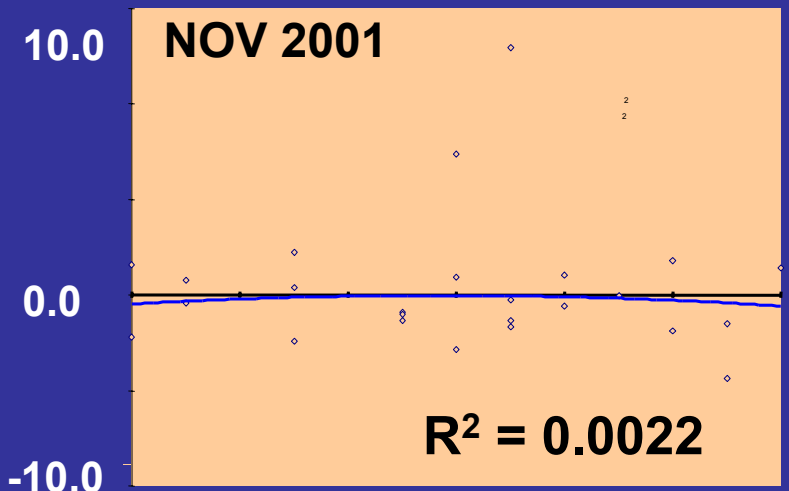
LANE 1

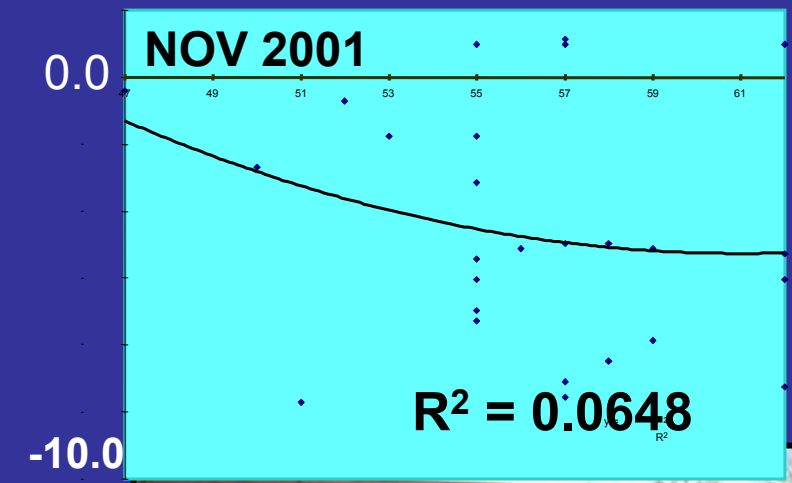
LANE 4

% ERROR









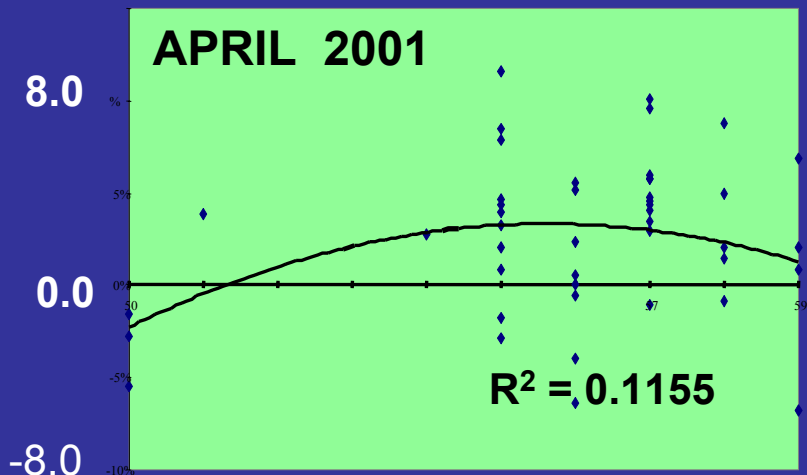
SPEED

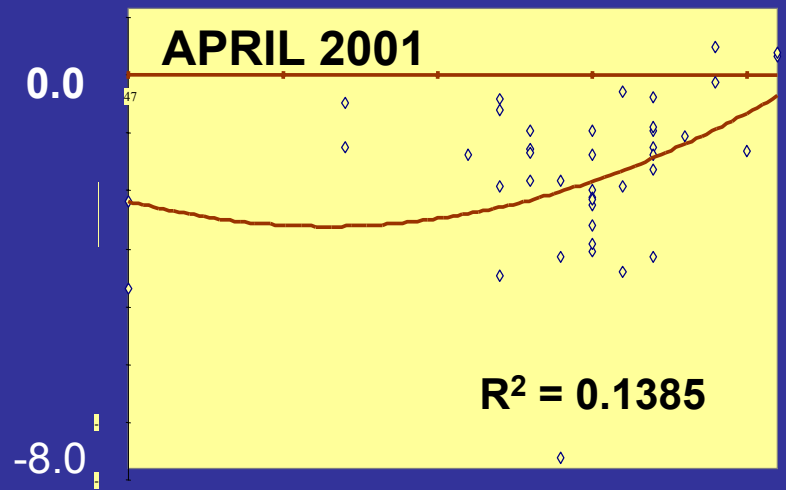
SPEED ANALYSIS

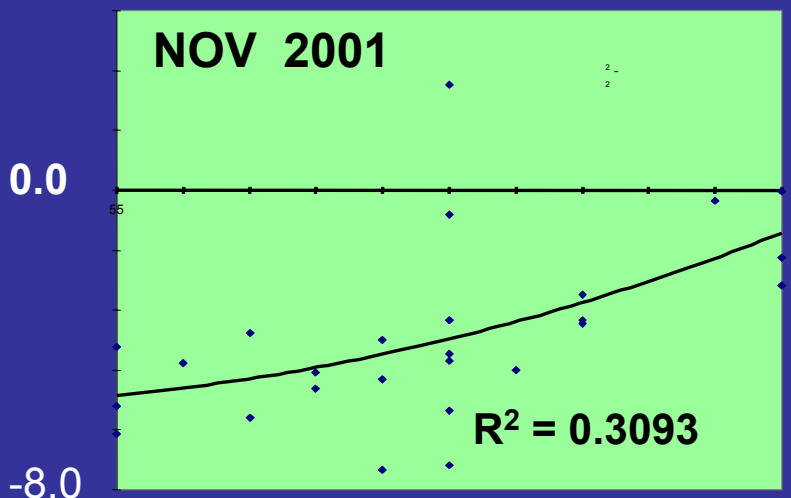
LANE 1

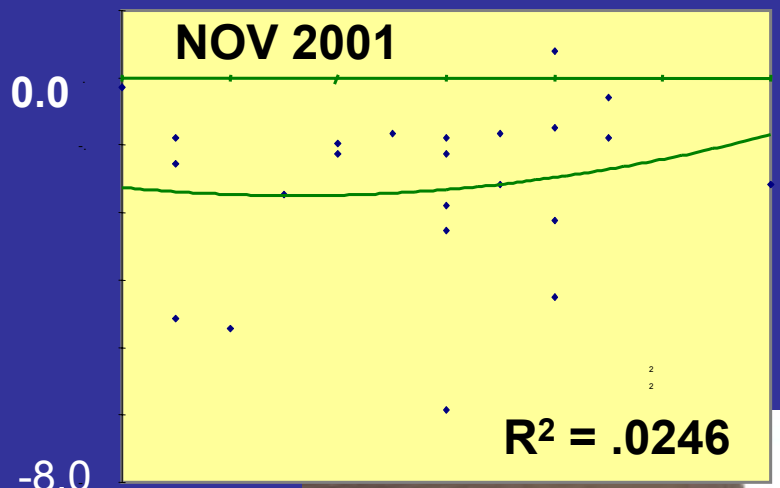
LANE 4

% ERROR









SPEED

EUROPEAN WIM SPECIFICATION

*LIMITED REPRODUCIBILITY CONDITION (R1)
FULL ENVIRONMENTAL REPRODUCIBILITY CONDITION (III)

ACCEPTED CLASS RESULTS *

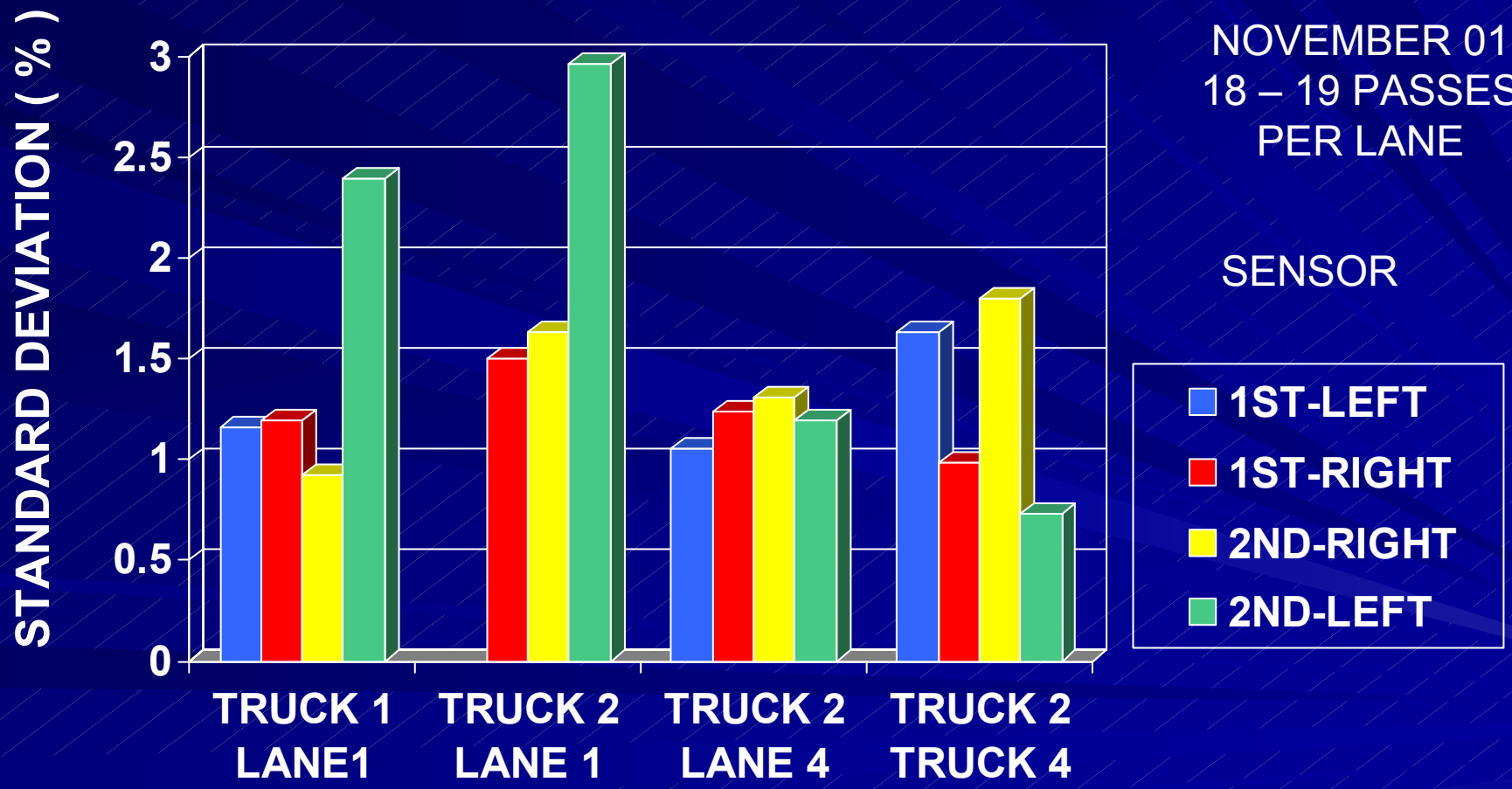
LANE 1	B (10)
LANE 2	C (15)
LANE 3	C (15)
LANE 4	B+(7)

PAVEMENT SMOOTHNESS

LANE	AVG IRI (m/km)	MAX DIVOTS
1	1.35 -1.46	18
2	1.34 - 1.51	18
3	0.90 - 1.06	7
4	1.01 – 1.06	7

LANE 1
LANE 2
LANE 3
LANE 4

INDIVIDUAL SENSOR REPEATABILITY



PROJECT HISTORY

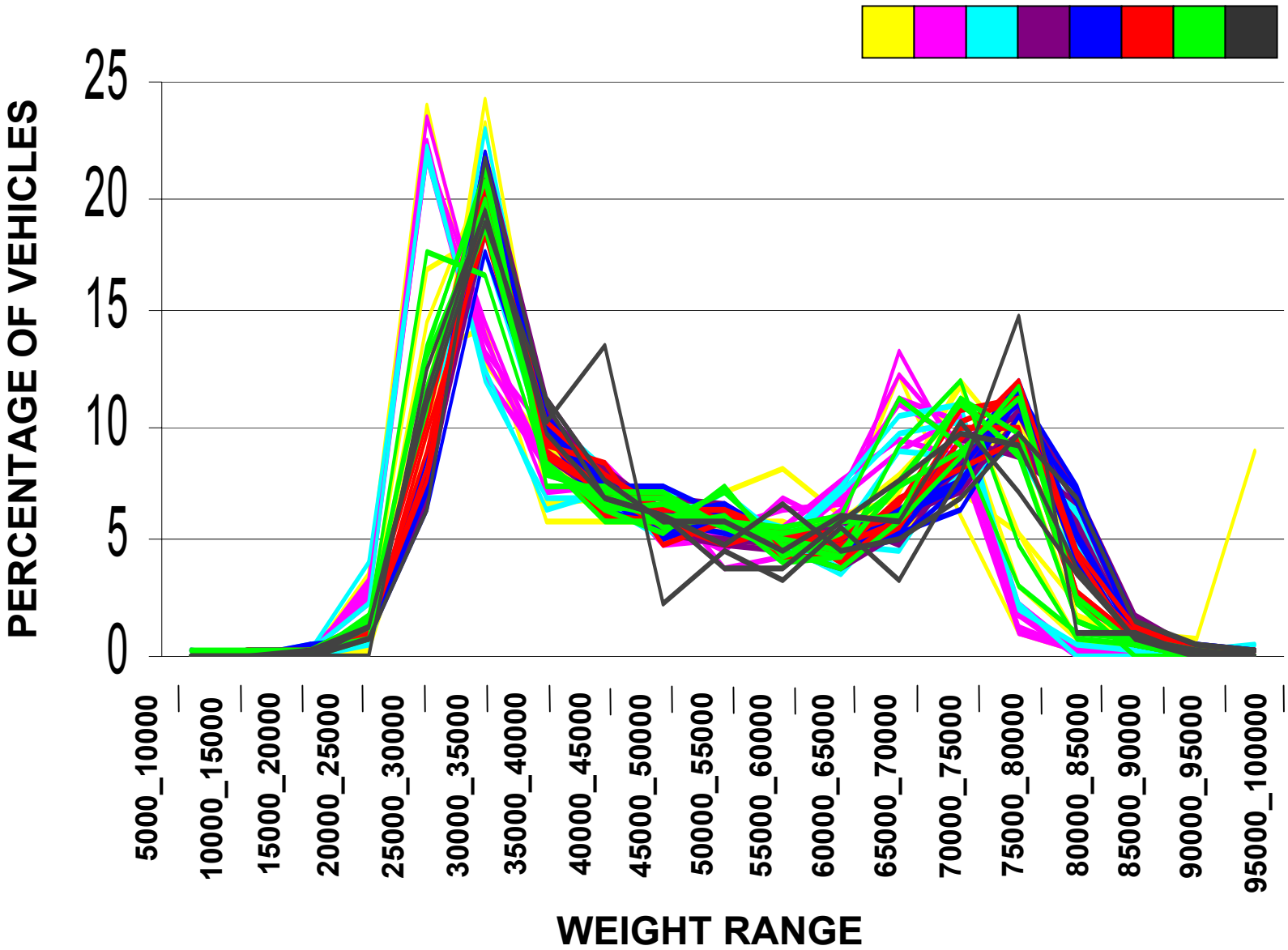
1997	1998	1999	2000	2001	2002

FIELD INSTALLATIONS

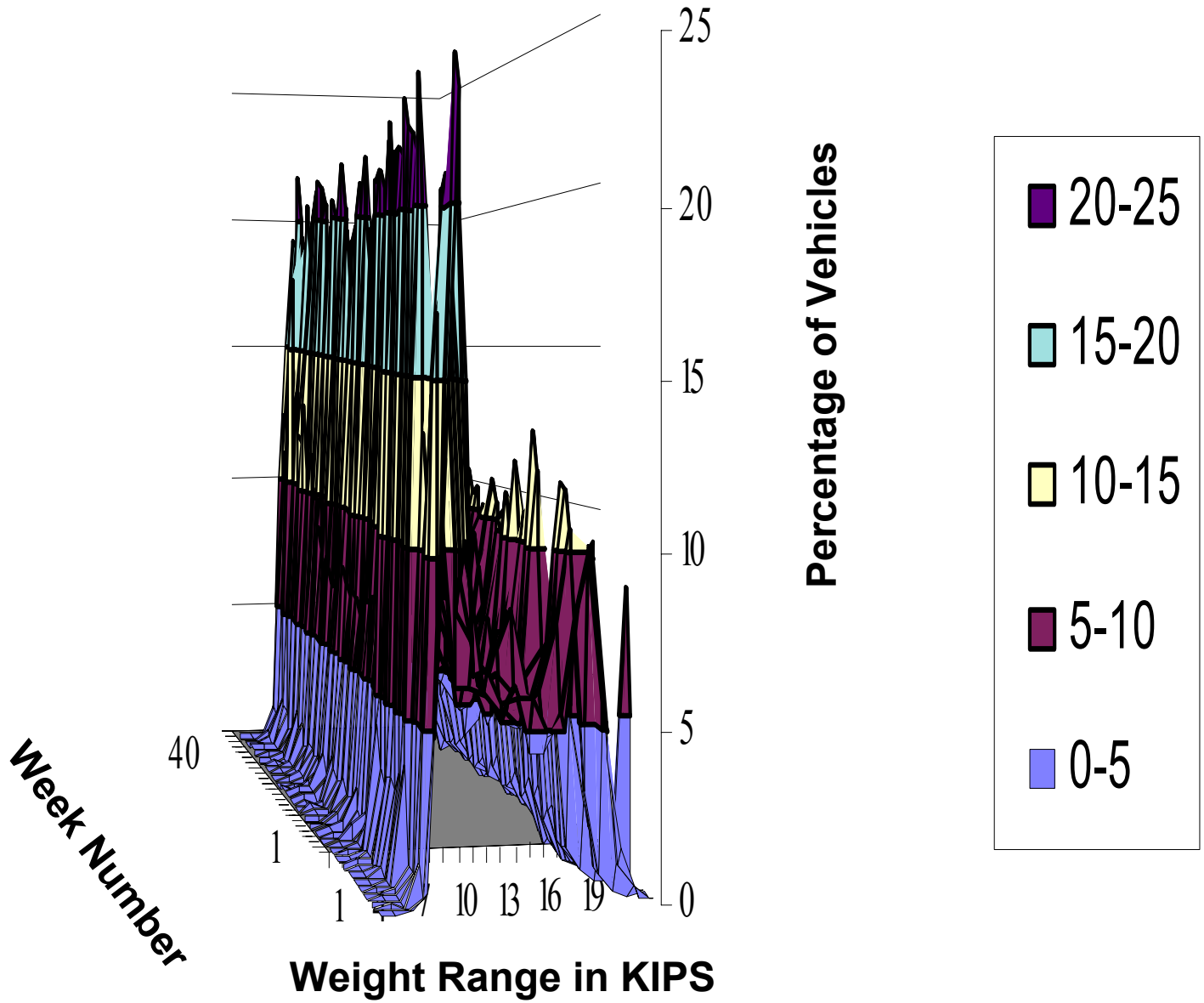
FIELD CALIBRATIONS / VALIDATIONS

ANALYSES

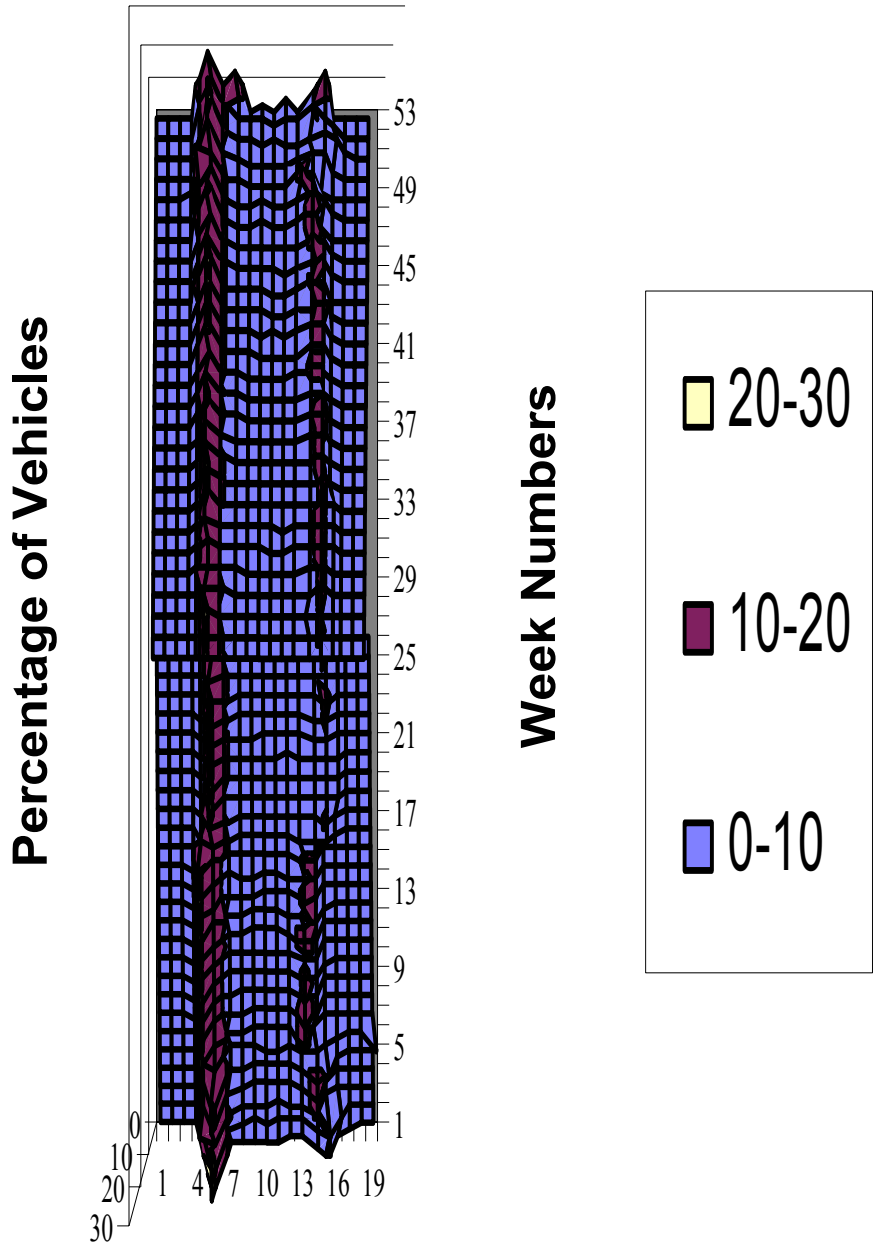
GVW DISTRIBUTION, YEAR - 2000



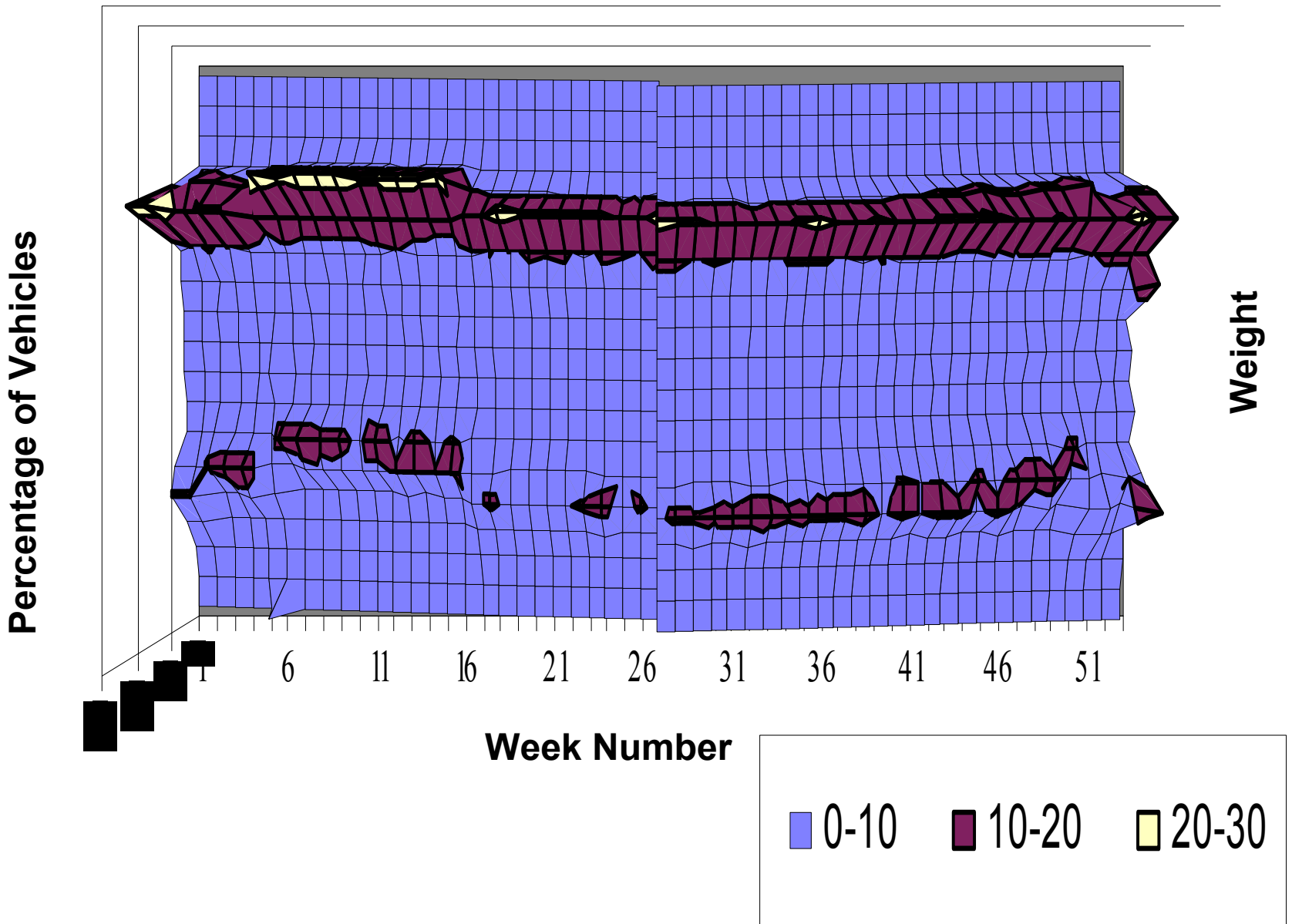
GVW Distribution (Lane 4) Year -2000, Lebanon



GVW DISTRIBUTION (Year -2000), Lebanon

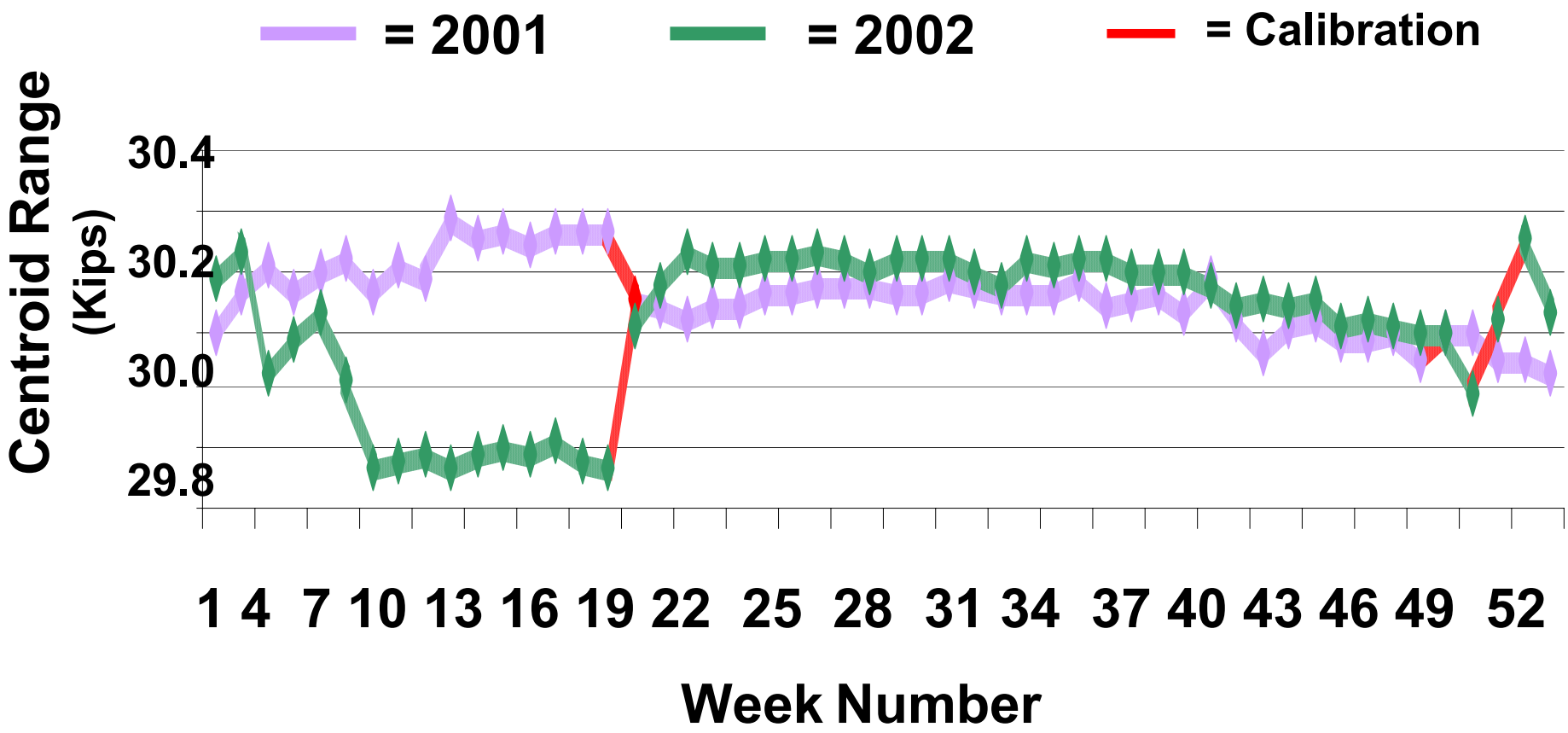


GVW DISTRIBUTION, LEBANON (LANE 4) YEAR - 2000



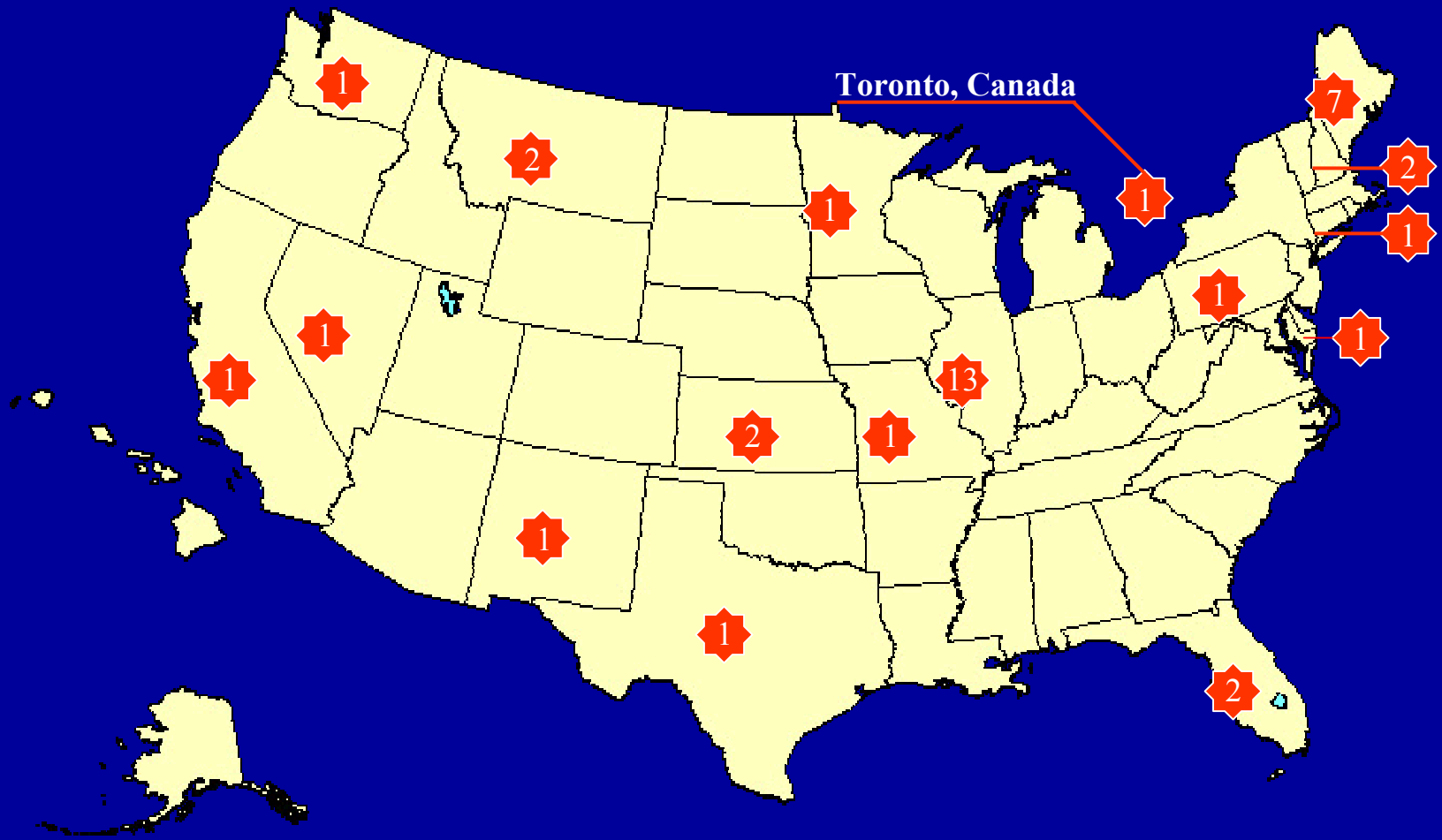
CENTROID ANALYSIS

Average Weekly GVW (28 - 36 Kips)



SITE ISSUES

QUARTZ-PIEZO INSTALLATIONS IN NORTH AMERICA



FOR FURTHER INFORMATION CONTACT

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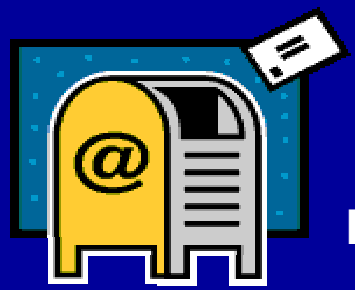

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