



Report No. 1029

Soils Proficiency Testing Program

Round 22

June 2017

Acknowledgments

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PO Box 7507 SILVERWATER NSW 2128, Australia

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1. FOREWORD

This report summarises the results of a proficiency testing program on the determination of Classification and California Bearing Ratio (CBR) on two soil samples. It constitutes the twenty second round of an ongoing series of programs.

The program was conducted in March 2017 by Proficiency Testing Australia (PTA). The aim of the program was to assess laboratories' abilities to competently perform the prescribed analyses.

The Program Coordinator was Ms S To and the Technical Adviser was Mr M Rheinberger of Soil Engineering Services. This report was authorised by Mrs K Cividin, PTA Quality Coordinator/Senior Scientific Officer.

2. FEATURES OF THE PROGRAM

- (a) Participants were provided with two samples labelled PTA Sample A and PTA Sample B containing clay gravel sample and road base gravel respectively.
- (b) A total of 59 laboratories received samples, comprising:
 - 49 Australian participants; and
 - 10 overseas participants, including:
 - Argentina
 - Colombia
 - Jordan
 - Malaysia (2)
 - New Zealand
 - Peru (2)
 - Philippines (2)

Of these 59 laboratories, 11 were unable to submit results by the due date.

- (c) Laboratories were provided with the *Instructions to Participants* and *Results Sheet* (see Appendix C). Laboratories were requested to perform the tests according to their routine methods and to record their results on the *Results Sheet*.
- (d) Prior to sample distribution, a number of randomly selected samples were analysed for homogeneity. Based on the results of this testing (see Appendix B), the homogeneity of the samples was established.
- (e) Each laboratory was randomly allocated a unique code number for the program to ensure confidentiality of results. Reference to each laboratory in this report is by code number only. Please note that a number of laboratories reported more than one set of results and, therefore, their code numbers (with letter) could appear several times in the same data set.
- (f) Results (as reported by participants) with corresponding summary statistics (i.e. number of results, median, uncertainty of the median, normalised interquartile range, robust coefficient of variation, minimum, maximum and range) are presented in Appendix A (for each sample and for each of the analyses performed). Measurement Uncertainty (MU) is also presented where supplied by participants. Please note that this information is presented for information purposes only and has not been used for the formal evaluation of results.
- (g) A robust statistical approach, using z-scores, was utilised to assess laboratories' testing performance (see Section 4). Robust z-scores, z-score charts relevant to each test are presented in Appendix A.

- (h) The document entitled *Guide to Proficiency Testing Australia, 2016* (reference [1]) defines the statistical terms and details the statistical procedures referred to in this report.
- (i) A tabulated listing of laboratories (by code number) identified as having outlier results can be found on page 7.

3. FORMAT OF THE APPENDICES

- (a) Appendix A contains the analysis of results reported by laboratories for the samples. This section contains the following for each determinant, where appropriate:
 - A table of results and calculated z-scores;
 - A list of summary statistics;
 - Ordered z-score charts.
- (b) Appendix B contains details of the homogeneity testing.
- (c) Appendix C contains copies of the *Instructions to Participants and Results Sheet*.

4. STATISTICAL DESIGN OF THE PROGRAM

- (a) Outlier Results and Z-scores

In order to assess laboratories' testing performance, a robust statistical approach, using z-scores, was utilised. Z-scores give a measure of how far a result is from the consensus value (i.e. the median), and gives a "score" to each result relative to the other results in the group.

A z-score close to zero indicates that the result agrees well with those from other laboratories, whereas a z-score with an absolute value greater than or equal to 3.0 is considered to be an outlier and is marked by the symbol "S".

The table on page 7 summarises the outlier results detected.

- (b) Results Tables and Summary Statistics

Each of these tables contains the results returned by each laboratory, including the code number for the method used, and the robust z-score calculated for each result.

Results have been entered exactly as reported by participants. That is, laboratories which did not report results to the precision (i.e. number of decimal places) requested on the Results Sheet have **not** been rounded to the requested precision before being included in the statistical analysis.

A list of summary statistics appears at the bottom of each of the tables of results and consists of:

- The number of results for that test/sample (*No. of Results*);
- The median of these results, i.e. the middle value (*Median*);
- The uncertainty of the median; a robust estimate of the standard deviation of the *Median*;
- The normalised interquartile range of the results (*Normalised IQR*);
- The robust coefficient of variation, expressed as a percentage (*Robust CV*) - i.e. $100 \times \text{Normalised IQR} / \text{Median}$;
- The minimum and maximum laboratory results; and
- The range (*Maximum - Minimum*).

The median is a measure of the centre of the data.

The normalised IQR is a measure of the spread of the results. It is calculated by multiplying the interquartile range (IQR) by a correction factor which converts the IQR to an estimate of the standard deviation. The IQR is the difference between the upper and lower quartiles (i.e. the values above and below which a quarter of the results lie, respectively).

For normally distributed data, the uncertainty of the median is approximated by:

$$\sqrt{\frac{\pi}{2}} \times \frac{\text{normIQR}}{\sqrt{n}} \quad n = \text{number of results}$$

Please see reference [1] for further details on these robust summary statistics.

(c) Ordered Z-Score Charts

On these charts each laboratory's robust z-score is shown, in order of magnitude, and is marked with its code number. From these charts, each laboratory can readily compare its performance relative to the other laboratories.

These charts contain solid lines at +3.0 and -3.0, so that outliers are clearly identifiable as those laboratories whose "bar" extends beyond these "cut-off" lines. The y-axis of these charts has been limited, so very large z-scores appear to extend beyond the chart boundary.

The following table summarises the results submitted by participants for the program.

TABLE A: SUMMARY STATISTICS

Tests	No. of Results	Median	Normalised IQR	Robust CV
Apparent Particle Density (Nearest 0.01 t/m³)	17	2.610	0.030	1.1%
Liquid Limit (Nearest 1%)	49	45.0	2.2	4.9%
Plastic Limit (Nearest 1%)	49	20.0	1.5	7.4%
Plasticity Index (Nearest 1%)	49	25.0	3.0	11.9%
Linear Shrinkage (0.5%)	45	9.50	1.48	15.6%
California Bearing Ratio Load 2.5 mm (1N) uncorrected	32	2385.0	844.9	35.4%
California Bearing Ratio Load 2.5 mm (1N) corrected	31	2678.0	1018.2	38.0%
California Bearing Ratio Load 5.0 mm (1N) uncorrected	32	3995.5	1253.0	31.4%
California Bearing Ratio Load 5.0 mm (1N) corrected	31	4554.0	1147.2	25.2%
California Bearing Ratio 2.5 mm (1%) uncorrected	33	18.0	6.7	37.1%
California Bearing Ratio 2.5 mm (1%) corrected	33	21.0	6.7	31.8%
California Bearing Ratio 5.0 mm (1%) uncorrected	33	20.0	6.7	33.4%
California Bearing Ratio 5.0 mm (1%) corrected	33	23.0	6.7	29.0%
Achieved Dry Density before soaking (0.001 t/m³)	40	2.014.0	0.0032	0.2%
Achieved Moisture Content before soaking (0.1%)	40	9.90	0.09	0.9%

5. PTA AND TECHNICAL ADVISER'S COMMENTS

Good performance was noted for both Samples A and B and results are quite consistent over Sample A. It has been noted that the Emersion Class test for Sample A may have been somewhat unclear according to the standard AS1289.3.8.1 in which regards to how long it might take for the sample to fizz or change colour. For homogeneity testing, Sample A did fizz and change colour after 10 minutes and thus was assigned as Class 4 in Appendix B.

CBR has returned with a wide range of results. This has also been the case in previous rounds. Thus Z-Score analysis may not truly reflect the acceptable range from a practical perspective. It is recommended that laboratories self examine their processes in these test and not rely wholly on the Z-Scores.

There were a total of 17 outlier results out of the 547 results submitted; resulting in 3.11% of outliers for this round. Laboratories with a symbol “?” or “§” are recommended to review their procedures, and test methods. Participants should take care when recording results and note the units and calculations when testing the samples.

Some processes to look out for may include and not limited to:

- Compaction patterns and procedures
- Seating load at time of penetration
- Thickness of each layer
- Calibration of equipment
- Tester competence
- Software program for CBR
- Calculations, especially units of measurements, examination of application to any correction applied to penetration graph
- Reporting and Training

Overall, the results are as expected with good accuracy. This is depicted by the low robust CVs for Sample A. Sample B displayed a diverse range of results resulting in higher robust CV values which are in keeping with previous rounds.

Metrological Traceability and Measurement Uncertainty of Assigned Values

Consensus values (median) derived from participants' results are used in this program. These values are not metrologically traceable to an external reference.

Round 22 consisted of two samples. Sample A was a potter's clay and Sample B was sampled from a single batch of loose road based gravel.

As the assigned value for this program is the median of the results submitted by the participants, the uncertainty of the median has been calculated and is presented in the tables in Appendix A for each test.

Analysis of Results by Method Groups

In order for methods to be grouped for analysis, PTA requires at least 11 sets of results from the same method group. These results are tabulated below.

TABLE B: ANALYSIS OF GROUPED METHODS

Tests	Method	No. of Results	Median	Uncertainty of the Median
Apparent Particle Density (Nearest 0.01 t/m³)	AS1289.3.5.1	12	2.610	0.017
Liquid Limit (Nearest 1%)	AS1289.3.1.1	33	45	0.6
Plastic Limit (Nearest 1%)	AS1289.3.2.1	34	20	0.3
Plasticity Index (Nearest 1%)	AS1289.3.3.1	34	25.5	0.7
Linear Shrinkage (0.5%)	AS1289.3.4.1	35	9.5	0.35
California Bearing Ratio Load 2.5 mm (1N) uncorrected	AS1289.6.1.1	23	2307	206.8
California Bearing Ratio Load 2.5 mm (1N) corrected	AS1289.6.1.1	22	2619	252.0
California Bearing Ratio Load 5.0 mm (1N) uncorrected	AS1289.6.1.1	23	3756	266.6
California Bearing Ratio Load 5.0 mm (1N) corrected	AS1289.6.1.1	23	3940	264.1
California Bearing Ratio 2.5 mm (1%) uncorrected	AS1289.6.1.1	22	17.5	1.6
California Bearing Ratio 2.5 mm (1%) corrected	AS1289.6.1.1	22	19.8	1.7
California Bearing Ratio 5.0 mm (1%) uncorrected	AS1289.6.1.1	22	19	1.4
California Bearing Ratio 5.0 mm (1%) corrected	AS1289.6.1.1	22	21.5	1.3
Achieved Dry Density before soaking (0.001 t/m³)	AS1289.6.1.1	21	2.014	0.0008
Achieved Moisture Content before soaking (0.1%)	AS1289.6.1.1	21	9.9	0.04

6. OUTLIER RESULTS

Laboratories reporting outlier results are listed in the following table:

TABLE C: SUMMARY OF STATISTICAL OUTLIERS

Test	Laboratory Code No.
Apparent Particle Density (Nearest 0.01 t/m³)	59
Liquid Limit (Nearest 1%)	2, 10, 49, 78
Plastic Limit (Nearest 1%)	15
Plasticity Index (Nearest 1%)	78
Linear Shrinkage (0.5%)	83
California Bearing Ratio Load 5.0 mm (1N) corrected	2, 84
Achieved Dry Density before soaking (0.001 t/m³)	44, 47, 78, 84
Achieved Moisture Content before soaking (0.1%)	9, 74, 88A

TABLE D: CBR RESULTS OUTSIDE +/- 5 OF THE MEDIAN

Test	Laboratory Code No.
California Bearing Ratio 2.5 mm (1%) uncorrected	2, 7, 9, 12, 13, 18, 50, 58, 84, 85, 86, 88A
California Bearing Ratio 2.5 mm (1%) corrected	2, 7, 12, 19, 24, 26, 28, 44, 50, 57, 74, 76B, 84, 85,
California Bearing Ratio 5.0 mm (1%) uncorrected	2, 19, 44, 76B, 78, 84, 85, 88A
California Bearing Ratio 5.0 mm (1%) corrected	2, 19, 24, 26, 28, 42, 44, 50, 57, 76B, 78, 84, 85

7. REFERENCES

- [1] *Guide to Proficiency Testing Australia*, 2016 (This document can be found on the PTA website, www.pta.asn.au)

- [2] AS1289.6.1.1:2014: Methods of testing soils for engineering purposes - Soil strength and consolidation tests - Determination of the California Bearing Ratio of a soil - Standard laboratory method for a remoulded specimen. Available from Standards Australia - online [30th October 2014]

- [3] AS 1289.6.1.1:2014/Amt 1:2017: Methods of testing soils for engineering purposes - Soil Strength and consolidation tests - Determination of California Bearing Ratio of a soil - Standard laboratory method for a remoulded specimen Available from Standards Australia - online [26th April 2017]

- [4] National Association of Testing Authorities (NATA) 2016, Information Paper 9 - *Soils testing technical issues*. Available from:
<https://www.nata.com.au/nata/accreditation-publication/nata-accreditation-guidance-and-information/category/50-nata-tech-notes-info-papers> [6th April 2016]

APPENDIX A

Results and Data Analysis

Apparent Particle Density (Nearest 0.01 t/m ³).....	A1
Liquid Limit (Nearest 1%).....	A3
Plastic Limit (Nearest 1%).....	A5
Plasticity Index (Nearest 1%).....	A7
Emersion Class.....	A10
Linear Shrinkage (0.5%).....	A11
Linear Shrinkage Mould Length (Nearest 1.0 mm).....	A14
California Bearing Ratio Load 2.5 mm (1N) uncorrected.....	A15
California Bearing Ratio Load 2.5 mm (1N) corrected.....	A17
California Bearing Ratio Load 5.0 mm (1N) uncorrected.....	A19
California Bearing Ratio Load 5.0 mm (1N) corrected.....	A21
California Bearing Ratio 2.5 mm (1%) uncorrected.....	A23
California Bearing Ratio 2.5 mm (1%) corrected.....	A25
California Bearing Ratio 5.0 mm (1%) uncorrected.....	A27
California Bearing Ratio 5.0 mm (1%) corrected.....	A29
Penetration Correction if Applied (0.1 mm).....	A31
Achieved Dry Density before soaking (0.001 t/m ³).....	A32
Achieved Moisture Content before soaking (0.1%).....	A35
Compaction Apparatus Type.....	A37
Swell Measurements (%).....	A38

Notes for Appendix A

“#” indicates no response was provided by the Laboratory.

“?” indicates an absolute Z-Score greater than 2 but less than 3, i.e. $2 < |Z\text{-Score}| < 3$

“\$” indicates an outlier, i.e. $|Z\text{-Score}| \geq 3.0$

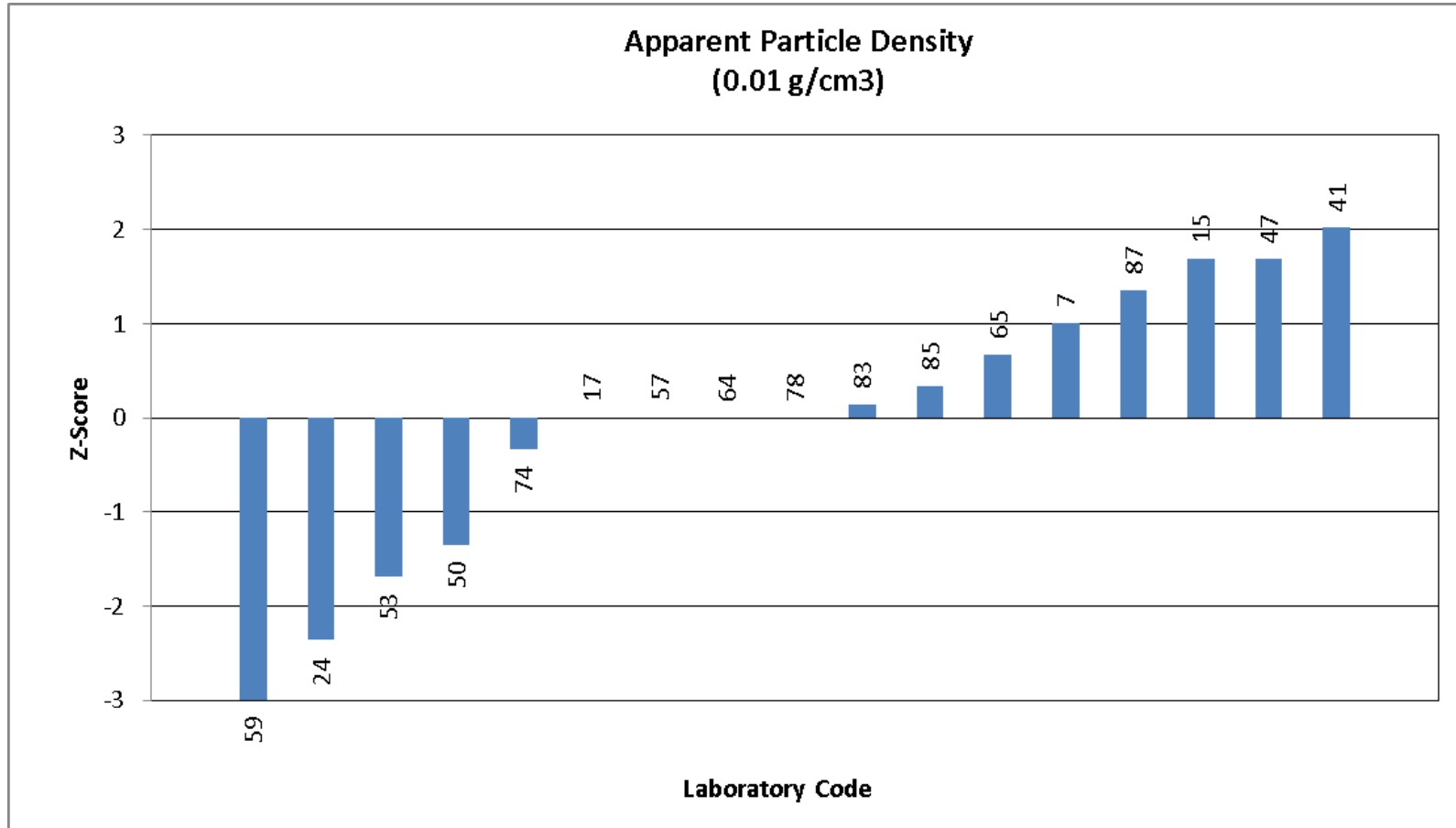
Apparent Particle Density (0.01 g/cm ³)			
Lab Code	Result	Z-Score	Method
7	2.64	1.01	AS1289.3.5.1
15	2.66	1.69	Q109/Q109A
17	2.61	0.00	AS1289.3.5.1
24	2.54	-2.36 ?	AS1289.3.5.1
41	2.67	2.02 ?	AS1289.3.5.1
47	2.66	1.69	ASTM D854
50	2.57	-1.35	AS1289.3.5.1
53	2.56	-1.69	AS1289.3.5.1
57	2.61	0.00	1289.3.5.1
59	2.45	-5.40 §	AS1289.3.5.1
64	2.61	0.00	AS1289.3.5.1
65	2.63	0.67	AS1289.3.5.1
74	2.6	-0.34	ASTM D 854
78	2.61	0.00	1289.3.5.1
83	2.614	0.13	INV E-128-2013
85	2.62	0.34	Q109A
87	2.65	1.35	AS1289.3.5.1

Notes:

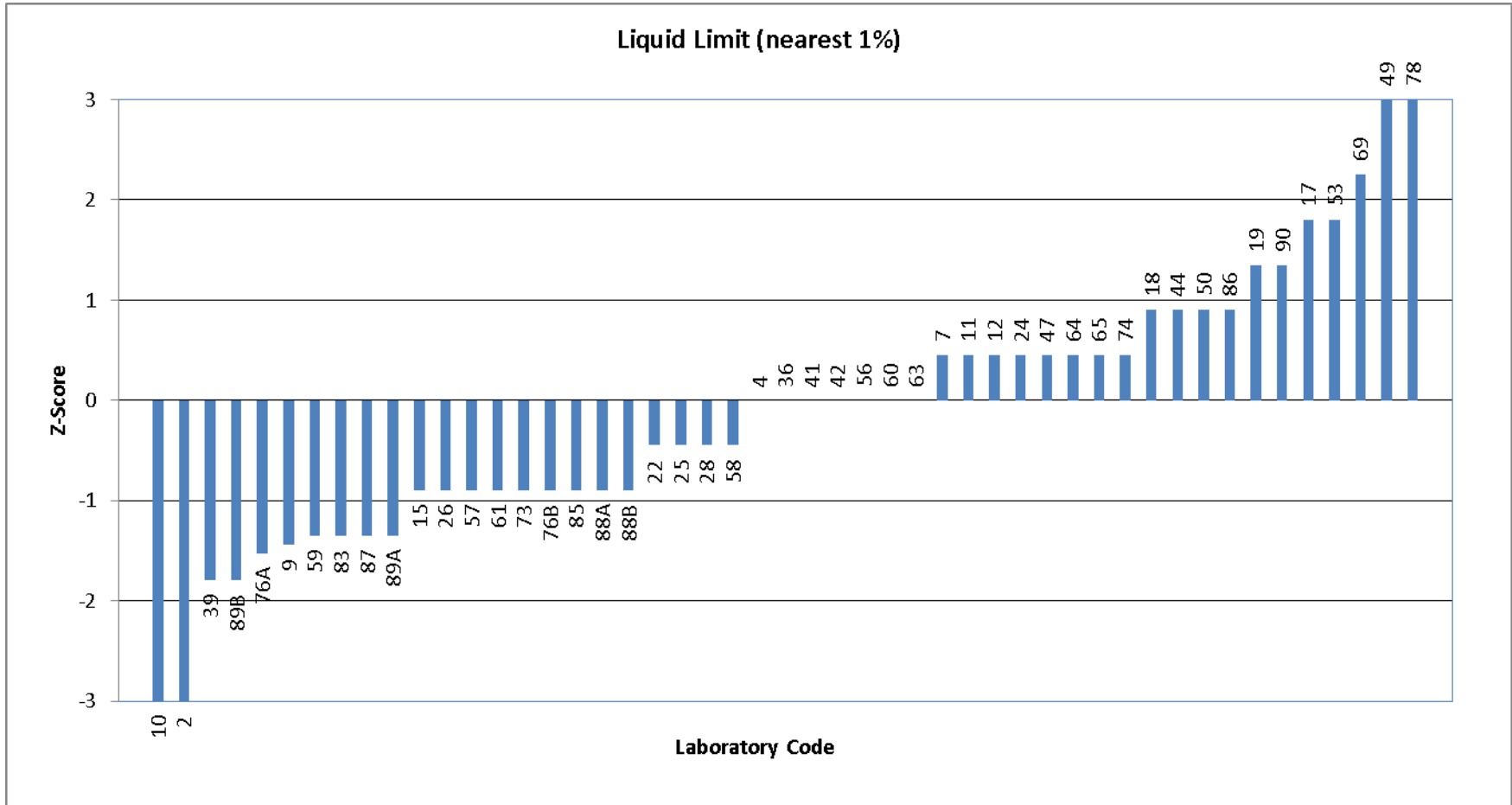
'?' indicates an absolute Z-Score greater than 2 but less than 3, i.e. $2 < |Z\text{-Score}| < 3$

'§' indicates an outlier, i.e. $|Z\text{-Score}| \geq 3.0$

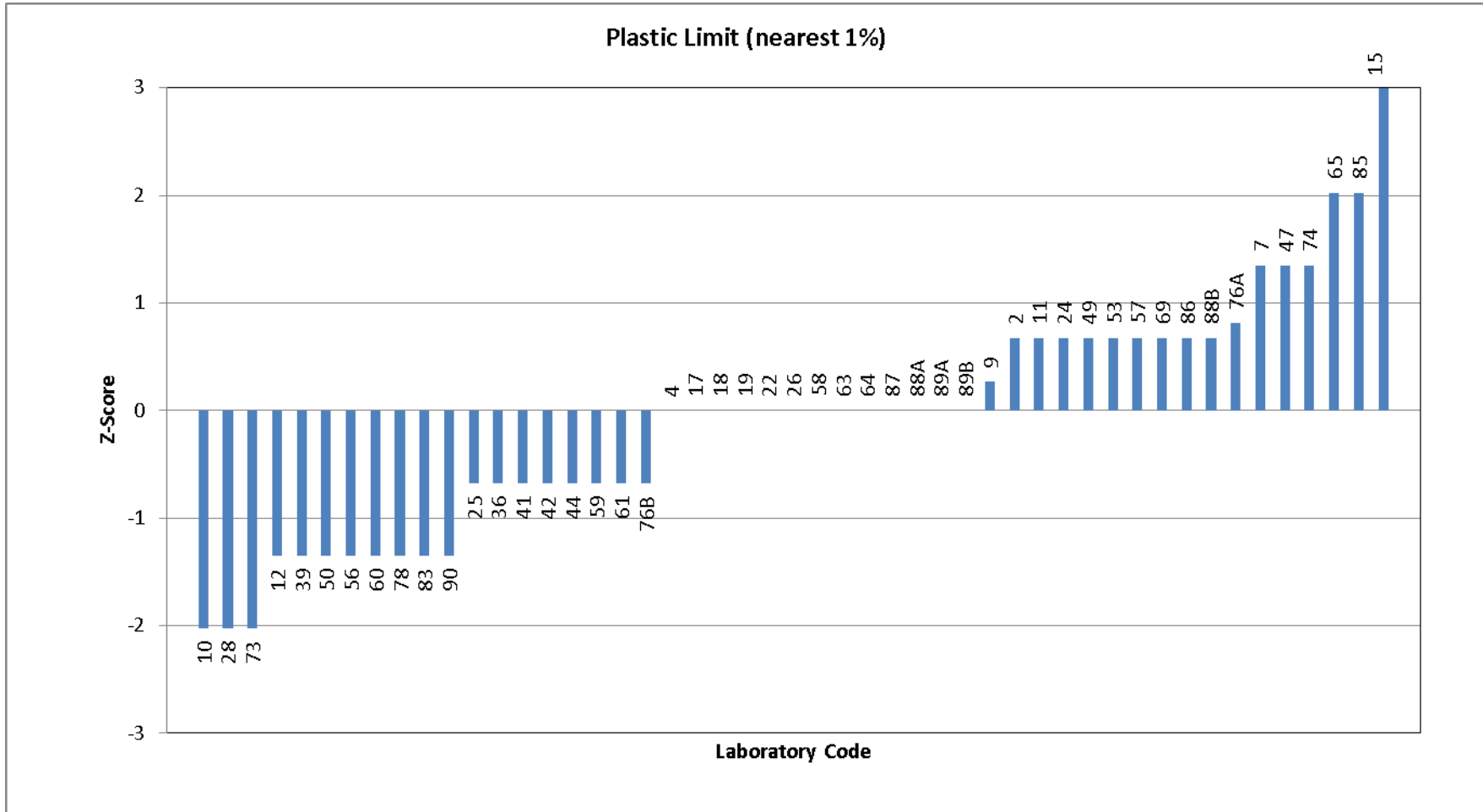
No. of Results	17
Median	2.610
Uncertainty of the Median	0.009
Normalised IQR	0.030
Robust CV	1.1%
Minimum	2.45
Maximum	2.67
Range	0.22



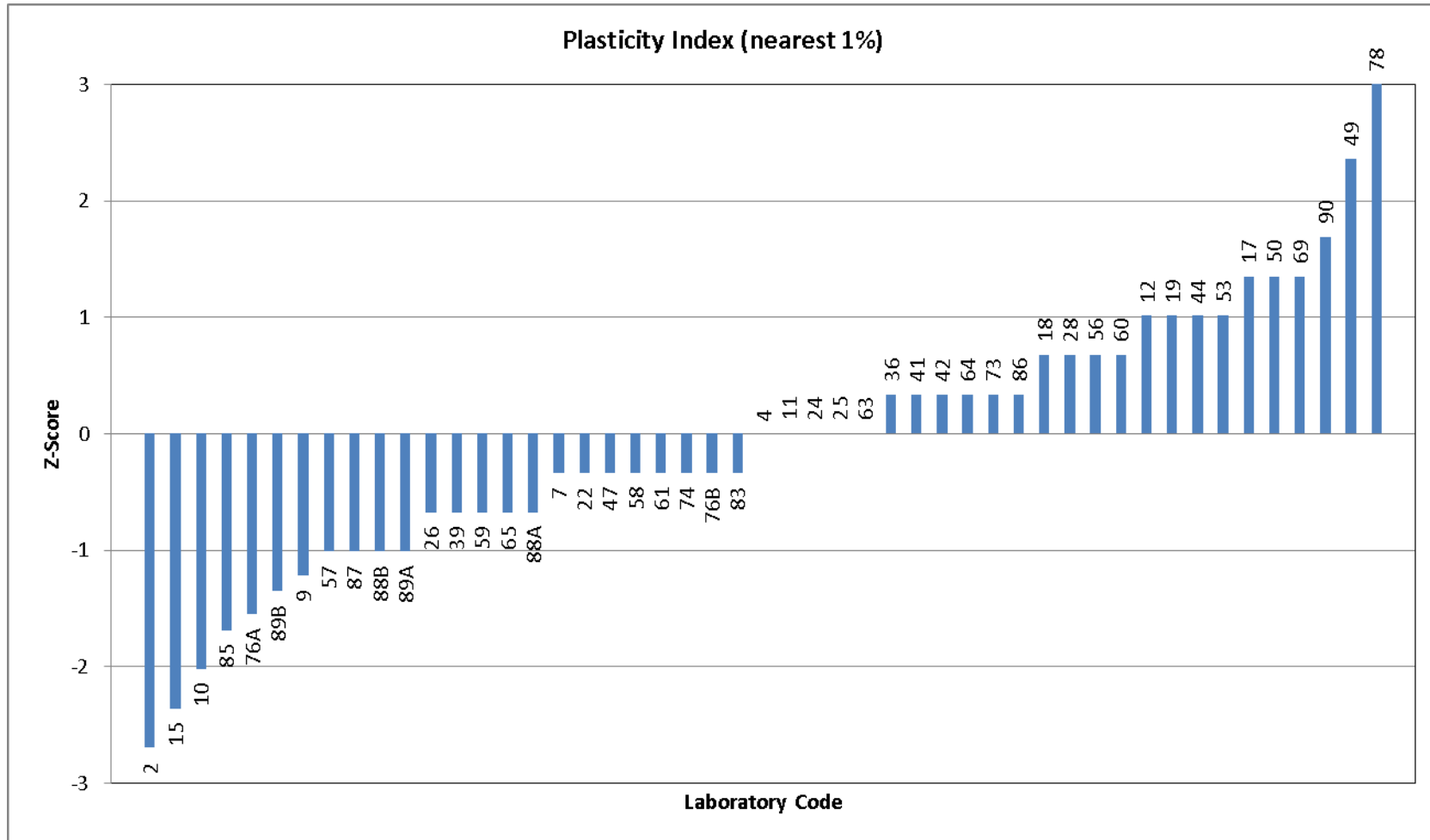
Liquid Limit (nearest 1%)			
Lab Code	Result	Z-Score	Method
2	38	-3.15 §	Q104A
4	45	0.00	AS1289.3.1.1
7	46	0.45	AS1289.3.1.1
9	41.8	-1.44	Q104A
10	36	-4.05 §	ASTM d 4318
11	46	0.45	In house P2B/2 one point casagrande based on AS1289.3.1.2
12	46	0.45	AS1289.3.1.1
15	43	-0.90	Q104D
17	49	1.80	AS1289.3.1.1
18	47	0.90	RMS T108
19	48	1.35	AS1289.3.1.1
22	44	-0.45	AS1289.3.1.1
24	46	0.45	AS1289.3.1.1
25	44	-0.45	AS1289.3.1.1
26	43	-0.90	AS1289.3.1.1
28	44	-0.45	3.1.1
36	45	0.00	BS 1377: Part 2:1990 clause 4 & 5
39	41	-1.80	AS1289.3.1.1
41	45	0.00	AS1289.3.1.1
42	45	0.00	AS1289.3.1.2
44	47	0.90	AS1289.3.1.1
47	46	0.45	ASTM D4318
49	53	3.60 §	AS1289.3.1.1
50	47	0.90	AS1289.3.1.1
53	49	1.80	AS1289.3.1.1
56	45	0.00	AS1289.3.1.1
57	43	-0.90	AS1289.3.1.1
58	44	-0.45	AS1289.3.1.1
59	42	-1.35	AS1289.3.1.1
60	45	0.00	1289.3.1.1
61	43	-0.90	AS1289.3.1.1
63	45	0.00	RMS T108
64	46	0.45	AS1289.3.1.1
65	46	0.45	AS1289.3.1.1
69	50	2.25 ?	AS1289.3.1.1
73	43	-0.90	AS1289.3.1.1
74	46	0.45	ASTM D 4318
76A	41.6	-1.53	Q104A
76B	43	-0.90	Q104A
78	53	3.60 §	1289.3.1.1
83	42	-1.35	INV E-125-2013
85	43	-0.90	Q104A
86	47	0.90	3.1.1
87	42	-1.35	AS1289.3.1.1
88A	43	-0.90	AS1289.3.1.1
88B	43	-0.90	#
89A	42	-1.35	AS1289.3.1.1-2009
89B	41	-1.80	AS1289.3.1.1-2009
90	48	1.35	T108 (RMS)



Plastic Limit (nearest 1%)			
Lab Code	Result	Z-Score	Method
2	21	0.67	Q105
4	20	0.00	AS1289.3.2.1
7	22	1.35	AS1289.3.2.1
9	20.4	0.27	Q105
10	17	-2.02 ?	ASTM d 4318
11	21	0.67	In house P3A/2 ref AS1289.3.2.1
12	18	-1.35	AS1289.3.2.1
15	25	3.37 §	Q105
17	20	0.00	AS1289.3.2.1
18	20	0.00	RMS T109
19	20	0.00	AS1289.3.2.1
22	20	0.00	AS1289.3.2.1
24	21	0.67	AS1289.3.2.1
25	19	-0.67	AS1289.3.2.1
26	20	0.00	AS1289.3.2.1
28	17	-2.02 ?	3.2.1
36	19	-0.67	BS 1377: Part 2: 1990 clause 4 & 5
39	18	-1.35	AS1289.3.2.1
41	19	-0.67	AS1289.3.2.1
42	19	-0.67	AS1289.3.2.1
44	19	-0.67	AS1289.3.2.1
47	22	1.35	ASTM D4318
49	21	0.67	AS1289.3.2.1
50	18	-1.35	AS1289.3.2.1
53	21	0.67	AS1289.3.2.1
56	18	-1.35	AS1289.3.2.1
57	21	0.67	AS1289.3.2.1
58	20	0.00	AS1289.3.2.1
59	19	-0.67	AS1289.3.2.1
60	18	-1.35	1289.3.2.1
61	19	-0.67	AS1289.3.2.1
63	20	0.00	RMS T109
64	20	0.00	AS1289.3.2.1
65	23	2.02 ?	AS1289.3.2.1
69	21	0.67	AS1289.3.2.1
73	17	-2.02 ?	AS1289.3.2.1
74	22	1.35	ASTM D 4318
76A	21.2	0.81	Q105
76B	19	-0.67	Q105
78	18	-1.35	1289.3.2.1
83	18	-1.35	INV E-126-2013
85	23	2.02 ?	Q105
86	21	0.67	3.2.1
87	20	0.00	AS1289.3.2.1
88A	20	0.00	AS1289.3.2.1
88B	21	0.67	#
89A	20	0.00	AS1289.3.2.1-2009
89B	20	0.00	AS1289.3.2.1-2009
90	18	-1.35	T109 (RMS)



Plasticity Index (nearest 1%)			
Lab	Result	Z-Score	Method
2	17	-2.70 ?	#
4	25	0.00	AS1289.3.3.1
7	24	-0.34	AS1289.3.3.1
9	21.4	-1.21	#
10	19	-2.02 ?	ASTM d 4318
11	25	0.00	In house P4A/1 ref AS1289.3.3.1
12	28	1.01	AS1289.3.3.1
15	18	-2.36 ?	Q105
17	29	1.35	AS1289.3.3.1
18	27	0.67	RMS T109
19	28	1.01	AS1289.3.3.1
22	24	-0.34	AS1289.3.3.1
24	25	0.00	AS1289.3.3.1
25	25	0.00	AS1289.3.3.1
26	23	-0.67	AS1289.3.3.1
28	27	0.67	3.3.1
36	26	0.34	BS 1377: Part 2: 1990 clause 4 & 5
39	23	-0.67	AS1289.3.3.1
41	26	0.34	AS1289.3.3.1
42	26	0.34	AS1289.3.3.1
44	28	1.01	AS1289.3.3.1
47	24	-0.34	ASTM D4318
49	32	2.36 ?	AS1289.3.3.1
50	29	1.35	AS1289.3.3.1
53	28	1.01	AS1289.3.3.1
56	27	0.67	AS1289.3.3.1
57	22	-1.01	AS1289.3.3.1
58	24	-0.34	AS1289.3.3.1
59	23	-0.67	AS1289.3.3.1
60	27	0.67	1289.3.3.1
61	24	-0.34	AS1289.3.3.1
63	25	0.00	RMS T109
64	26	0.34	AS1289.3.3.1
65	23	-0.67	AS1289.3.3.1
69	29	1.35	AS1289.3.3.1
73	26	0.34	AS1289.3.3.1
74	24	-0.34	ASTM D 4318
76A	20.4	-1.55	Q105
76B	24	-0.34	Q105
78	35	3.37 §	1289.3.3.1
83	24	-0.34	INV E-126-2013
85	20	-1.69	Q105
86	26	0.34	3.3.1
87	22	-1.01	AS1289.3.3.1
88A	23	-0.67	AS1289.3.3.1
88B	22	-1.01	#
89A	22	-1.01	AS1289.3.3.1-2009
89B	21	-1.35	AS1289.3.3.1-2009
90	30	1.69	T108/9 (RMS)



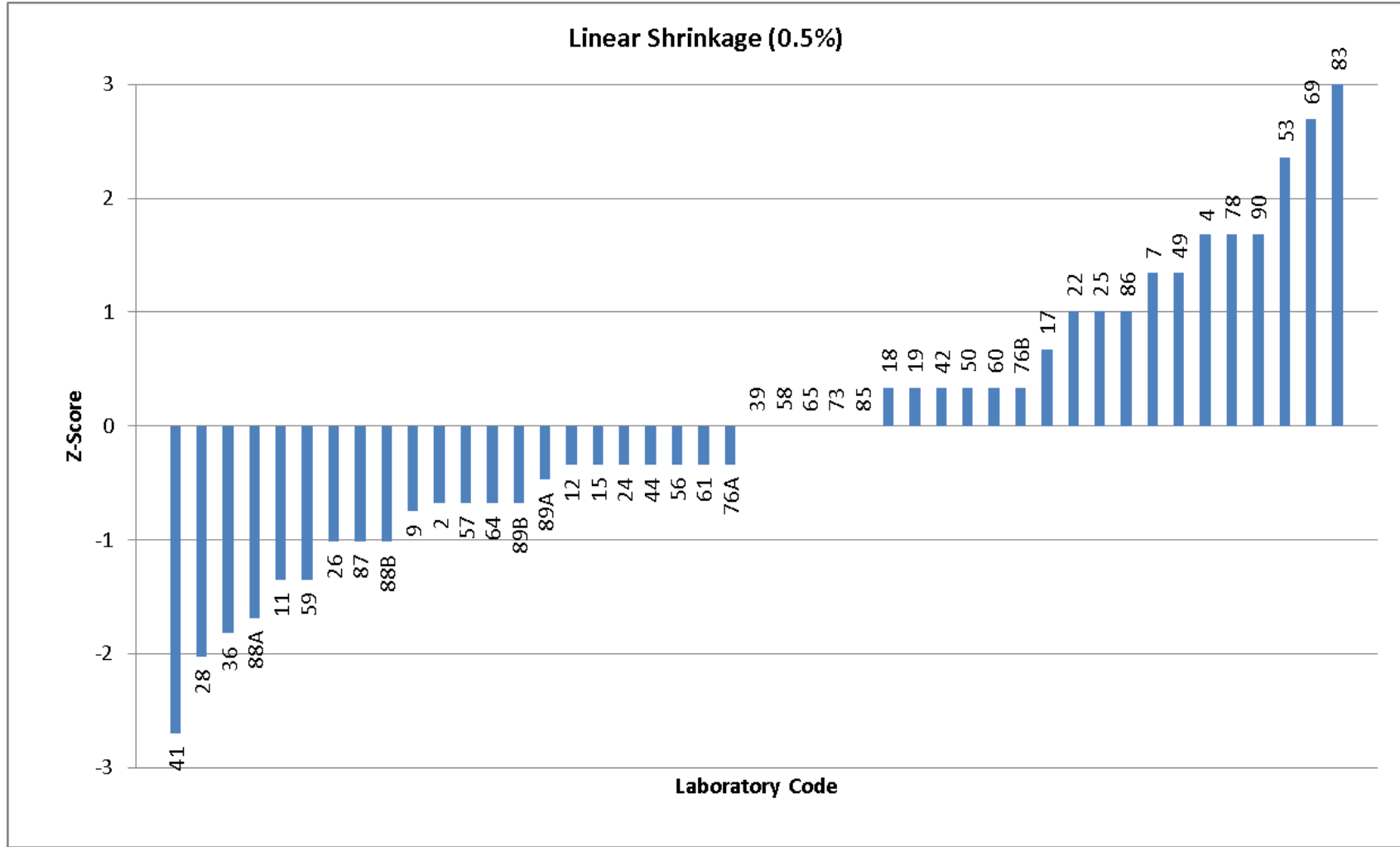
	Liquid Limit (Nearest 1%)	Plastic Limit (Nearest 1%)	Plasticity Index (Nearest 1%)
No. of Results	49	49	49
Median	45	20	25
Uncertainty of the Median	0.4	0.3	0.5
Normalised IQR	2.2	1.5	3.0
Robust CV	4.9%	7.4%	11.9%
Minimum	36	17	17
Maximum	53	25	35
Range	17	8	18

Emersion Class Number		
Lab	Result	Method
4	3	AS1289.3.8.1
7	4	AS1289.3.8.1
12	6	AS1289.3.8.1
15	5	AS1289.3.8.1-2006
17	6	AS1289.3.8.1
18	6	AS1289.3.8.1
19	4	AS1289.3.8.1
24	4	AS1289.3.8.1
28	4	3.8.1
41	4	AS1289.3.8.1
42	2	AS1289.3.8.1
44	5	AS1289.3.8.1
50	6	AS1289.3.8.1
53	4	AS1289.3.8.1
56	6	AS1289.3.8.1
57	6	1289.3.8.1 2017
58	5	AS1289.3.8.1
59	6	AS1289.3.8.1
61	4	AS1289.3.8.1
64	4	AS1289.3.8.1
65	5	AS1289.3.8.1
73	4	AS1289.3.8.1
78	6	1289.3.8.1
85	6	AS1289.3.8.1
86	4	3.8.1
87	5	AS1289.3.8.1
88A	6	AS1289.3.8.1
89A	6	AS1289.3.8.1-2006
89B	6	AS1289.3.8.1-2006

No. of Results	29
Class 2	1
Class 3	1
Class 4	10
Class 5	5
Class 6	12

Linear Shrinkage (0.5%)			
Lab	Result	Z-Score	Method
2	8.5	-0.67	Q106
4	12	1.69	AS1289.3.4.1
7	11.5	1.35	AS1289.3.4.1
9	8.4	-0.74	Q106
11	7.5	-1.35	In house P6A/1 ref AS1289.3.4.1
12	9	-0.34	AS1289.3.4.1
15	9	-0.34	Q106
17	10.5	0.67	AS1289.3.4.1
18	10	0.34	AS1289.3.4.1
19	10	0.34	AS1289.3.4.1
22	11	1.01	AS1289.3.4.1
24	9	-0.34	AS1289.3.4.1
25	11	1.01	AS1289.3.4.1
26	8	-1.01	AS1289.3.4.1
28	6.5	-2.02 ?	3.4.1
36	6.8	-1.82	BS 1377: Part 2: 1990 clause 6.5
39	9.5	0.00	AS1289.3.4.1
41	5.5	-2.70 ?	AS1289.3.4.1
42	10	0.34	AS1289.3.4.1
44	9	-0.34	AS1289.3.4.1
49	11.5	1.35	AS1289.3.4.1
50	10	0.34	AS1289.3.4.1
53	13	2.36 ?	AS1289.3.4.1
56	9	-0.34	AS1289.3.4.1
57	8.5	-0.67	AS1289.3.4.1
58	9.5	0.00	AS1289.3.4.1
59	7.5	-1.35	AS1289.3.4.1
60	10	0.34	1289.3.4.1
61	9	-0.34	AS1289.3.4.1
64	8.5	-0.67	AS1289.3.4.1
65	9.5	0.00	AS1289.3.4.1
69	13.5	2.70 ?	AS1289.3.4.1
73	9.5	0.00	AS1289.3.4.1
76A	9	-0.34	Q106
76B	10	0.34	Q106
78	12	1.69	AS1289.3.4.1
83	16.4	4.65 §	INV E-127-2013
85	9.5	0.00	Q106
86	11	1.01	3.4.1
87	8	-1.01	AS1289.3.4.1
88A	7	-1.69	AS1289.3.4.1
88B	8	-1.01	#
89A	8.8	-0.47	AS1289.3.4.1-2008
89B	8.5	-0.67	AS1289.3.4.1-2008
90	12	1.69	T113 (RMS)

Linear Shrinkage (0.5%)	
No. of Results	45
Median	9.5
Uncertainty of the Median	0.28
Normalised IQR	1.48
Robust CV	15.6%
Minimum	5.5
Maximum	16.4
Range	10.9

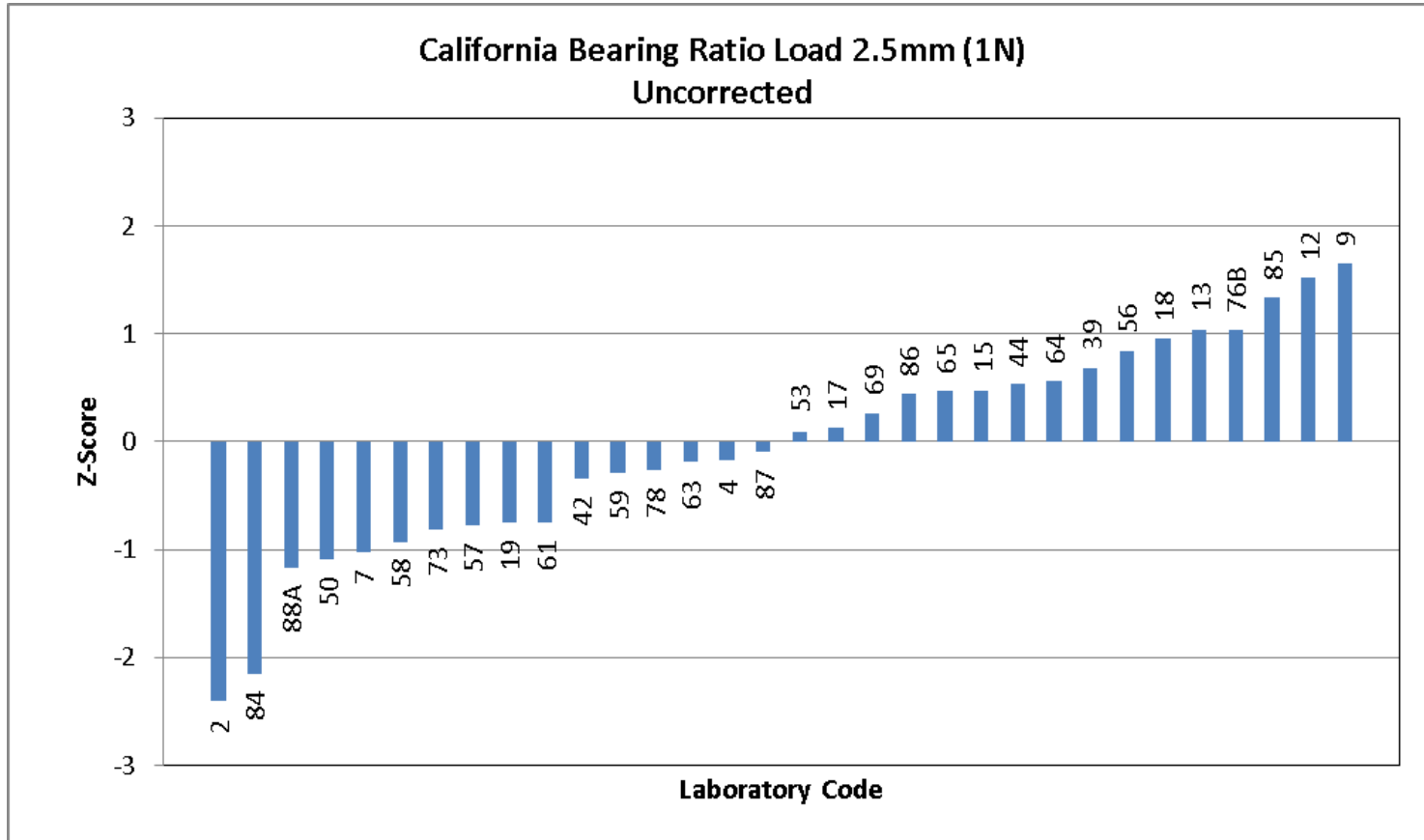


Linear Shrinkage Mould Length (nearest 1.0mm) - AS Method		
Lab	Result	Method
2	150	#
4	253	AS1289.3.4.1
7	251	AS1289.3.4.1
9	149.13	Q106
11	250	#
12	250	#
15	150	Q106
17	250	#
18	254	AS1289.3.4.1
19	253	AS1289.3.4.1
22	250	AS1289.3.4.1
24	250	#
25	250	AS1289.3.4.1
26	254	#
28	250	#
36	140	BS 1377: Part 2: 1990 clause 6.5
39	250	AS1289.3.4.1
41	250	#
42	250	#
44	250	AS1289.3.4.1
49	150	#
50	150	AS1289.3.4.1
53	250	AS1289.3.4.1
56	250	AS1289.3.4.1
57	250	#
58	251	AS1289.3.4.1
59	250	#
60	250	#
61	250	AS1289.3.4.1
64	254	AS1289.3.4.1
65	125	AS1289.3.4.1
69	250	AS1289.3.4.1
73	250	AS1289.3.4.1
76A	149.96	Q106
76B	150	Q106
78	250	1289.3.4.1
85	150	Q106
86	250	#
87	255	N/A
88A	250	#
88B	250	#
89A	250	AS1289.3.4.1-2008
89B	250	AS1289.3.4.1-2008

Total No. of Results	43
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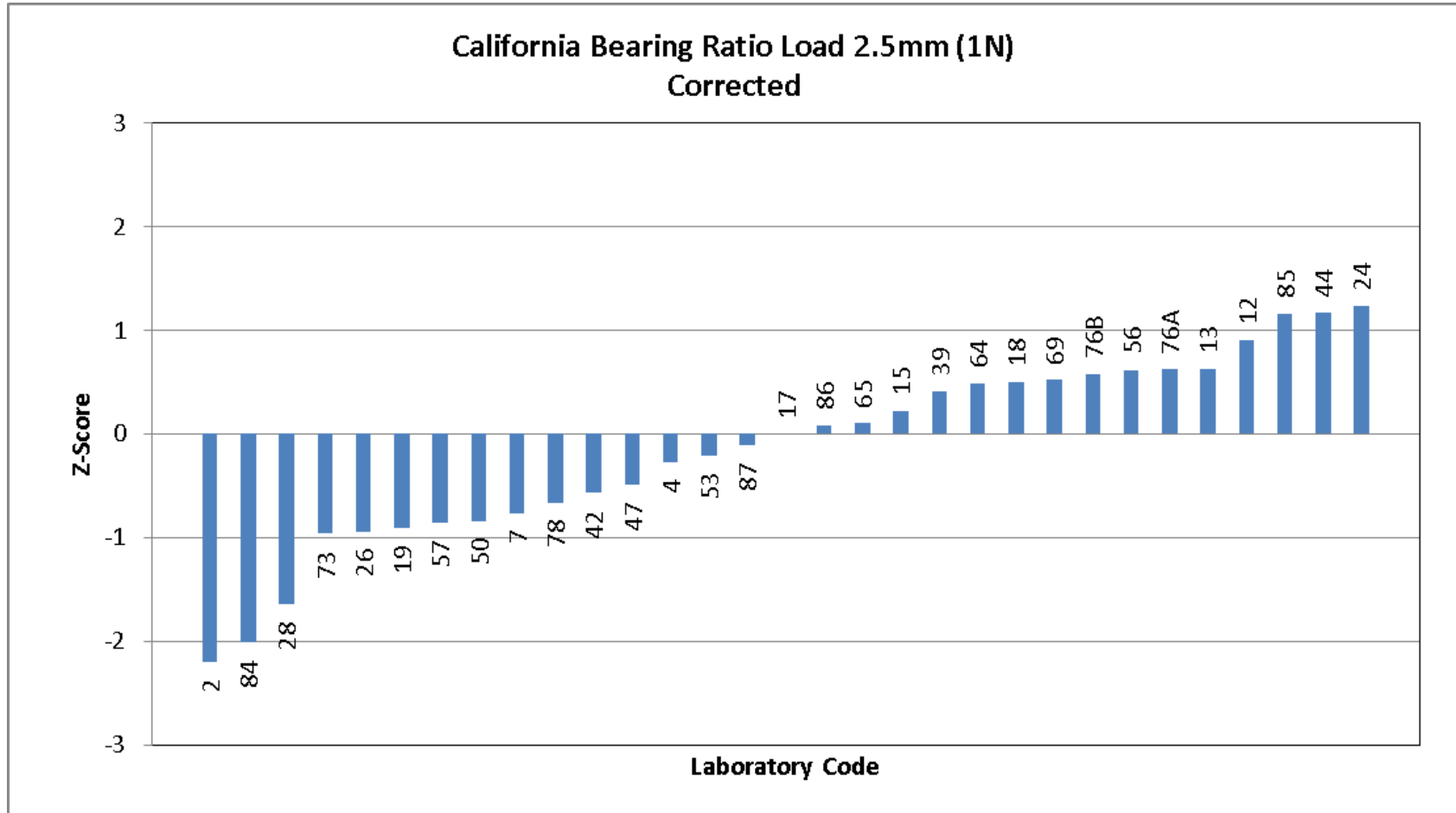
California Bearing Ratio Load 2.5mm (1N) Uncorrected			
Lab Code	Result	Z-Score	Method
2	357	-2.40 ?	Q113C
4	2239	-0.17	AS1289.6.1.1
7	1520	-1.02	AS1289.6.1.1
9	3780	1.65	Q113C
12	3666	1.52	AS1289.6.1.1
13	3261	1.04	AS1289.6.1.1
15	2785	0.47	Q113C
17	2495	0.13	AS1289.6.1.1
18	3187	0.95	RMS T117
19	1747	-0.76	T117
39	2962	0.68	AS1289.6.1.1
42	2100	-0.34	AS1289.6.1.1
44	2838	0.54	AS1289.6.1.1
50	1460	-1.09	AS1289.6.1.1 (2014)
53	2463	0.09	AS1289.6.1
56	3091	0.84	AS1289.6.1.1
57	1730	-0.78	AS1289.6.1.1
58	1601	-0.93	AS1289.6.1.1
59	2139	-0.29	AS1289.6.1.1
61	1753	-0.75	AS1289.6.1.1
63	2225	-0.19	RMS T117
64	2856	0.56	AS1289.6.1.1
65	2780	0.47	AS1289.6.1.1
69	2607	0.26	AS1289.6.1.1
73	1700	-0.81	AS1289.6.1.1
76B	3264	1.04	Q113C
78	2160	-0.27	AS1289.6.1.1
84	569	-2.15 ?	AASHTO T193
85	3511	1.33	Q113C
86	2757	0.44	6.1.1
87	2307	-0.09	AS1289.6.1.1
88A	1400	-1.17	AS1289.6.1.1

No. of Results	32
Median	2385
Uncertainty of the Median	187.2
Normalised IQR	844.9
Robust CV	35.4%
Minimum	357
Maximum	3780
Range	3423



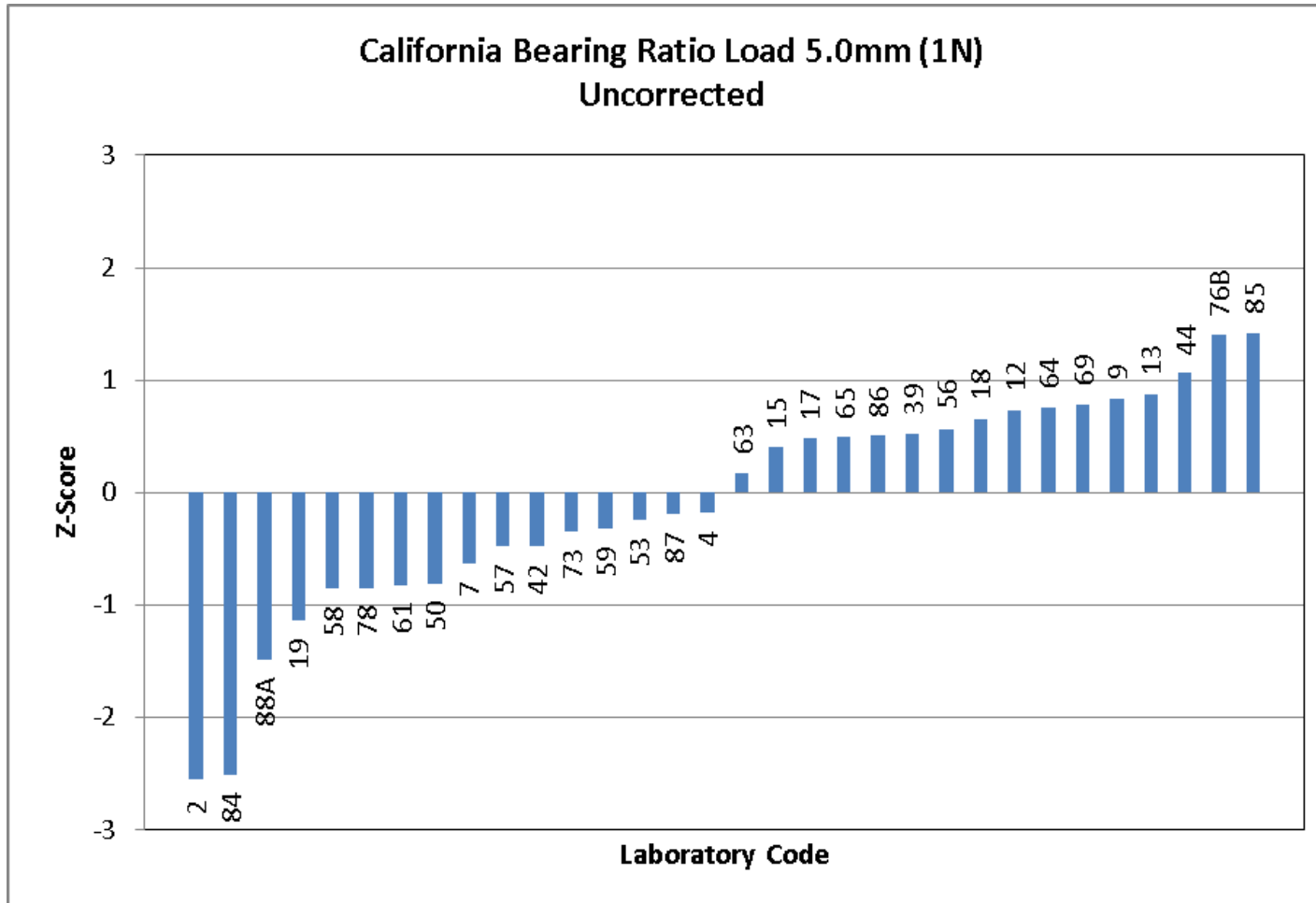
California Bearing Ratio Load 2.5mm (1N) Corrected			
Lab	Result	Z-Score	Method
2	436	-2.20 ?	Q113C
4	2400	-0.27	AS1289.6.1.1
7	1900	-0.76	AS1289.6.1.1
12	3596	0.90	AS1289.6.1.1
13	3314	0.62	AS1289.6.1.1
15	2904	0.22	Q113C
17	2678	0.00	AS1289.6.1.1
18	3187	0.50	RMS T117
19	1747	-0.91	T117
24	3935	1.23	AS1289.6.1.1
26	1720	-0.94	AS1289.6.1.1
28	1004	-1.64	6.1.1
39	3100	0.41	AS1289.6.1.1
42	2100	-0.57	AS1289.6.1.1
44	3870	1.17	AS1289.6.1.1
47	2178	-0.49	ASTM D1883
50	1822	-0.84	AS1289.6.1.1 (2014)
53	2463	-0.21	AS1289.6.1
56	3300	0.61	AS1289.6.1.1
57	1804	-0.86	AS1289.6.1.1
64	3173	0.49	AS1289.6.1.1
65	2780	0.10	AS1289.6.1.1
69	3205	0.52	AS1289.6.1.1
73	1700	-0.96	AS1289.6.1.1
76A	3308	0.62	Q113C
76B	3264	0.58	Q113C
78	2000	-0.67	AS1289.6.1.1
84	626	-2.02 ?	AASHTO T193
85	3860	1.16	Q113C
86	2760	0.08	6.1.1
87	2560	-0.12	AS1289.6.1.1

No. of Results	31
Median	2678
Uncertainty of the Median	229.2
Normalised IQR	1018.2
Robust CV	38.0%
Minimum	436
Maximum	3935
Range	3499



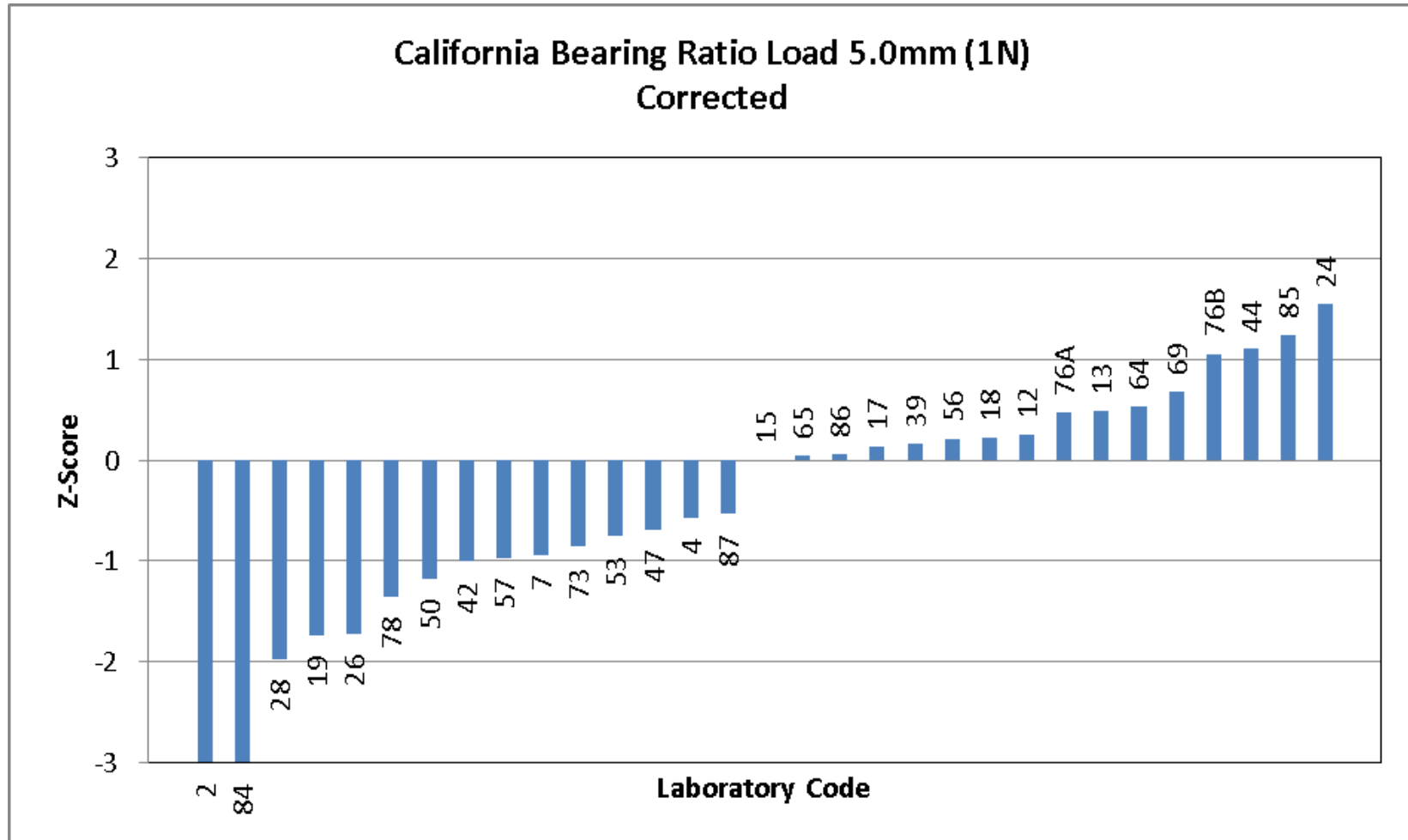
California Bearing Ratio Load 5.0mm (1N) Uncorrected			
Lab	Result	Z-Score	Method
2	796	-2.55 ?	Q113C
4	3773	-0.18	AS1289.6.1.1
7	3210	-0.63	AS1289.6.1.1
9	5045	0.84	Q113C
12	4913	0.73	AS1289.6.1.1
13	5090	0.87	AS1289.6.1.1
15	4500	0.40	Q113C
17	4599	0.48	AS1289.6.1.1
18	4819	0.66	RMS T117
19	2567	-1.14	T117
39	4651	0.52	AS1289.6.1.1
42	3400	-0.48	AS1289.6.1.1
44	5326	1.06	AS1289.6.1.1
50	2979	-0.81	AS1289.6.1.1 (2014)
53	3698	-0.24	AS1289.6.1
56	4707	0.57	AS1289.6.1.1
57	3396	-0.48	AS1289.6.1.1
58	2926	-0.85	AS1289.6.1.1
59	3590	-0.32	AS1289.6.1.1
61	2967	-0.82	AS1289.6.1.1
63	4218	0.18	RMS T117
64	4950	0.76	AS1289.6.1.1
65	4610	0.49	AS1289.6.1.1
69	4979	0.78	AS1289.6.1.1
73	3567	-0.34	AS1289.6.1.1
76B	5758	1.41	Q113C
78	2930	-0.85	AS1289.6.1.1
84	854	-2.51 ?	AASHTO T193
85	5775	1.42	Q113C
86	4629	0.51	6.1.1
87	3756	-0.19	AS1289.6.1.1
88A	2130	-1.49	AS1289.6.1.1

No. of Results	32
Median	3995.5
Uncertainty of the Median	277.6
Normalised IQR	1253.0
Robust CV	31.4%
Minimum	796
Maximum	5775
Range	4979



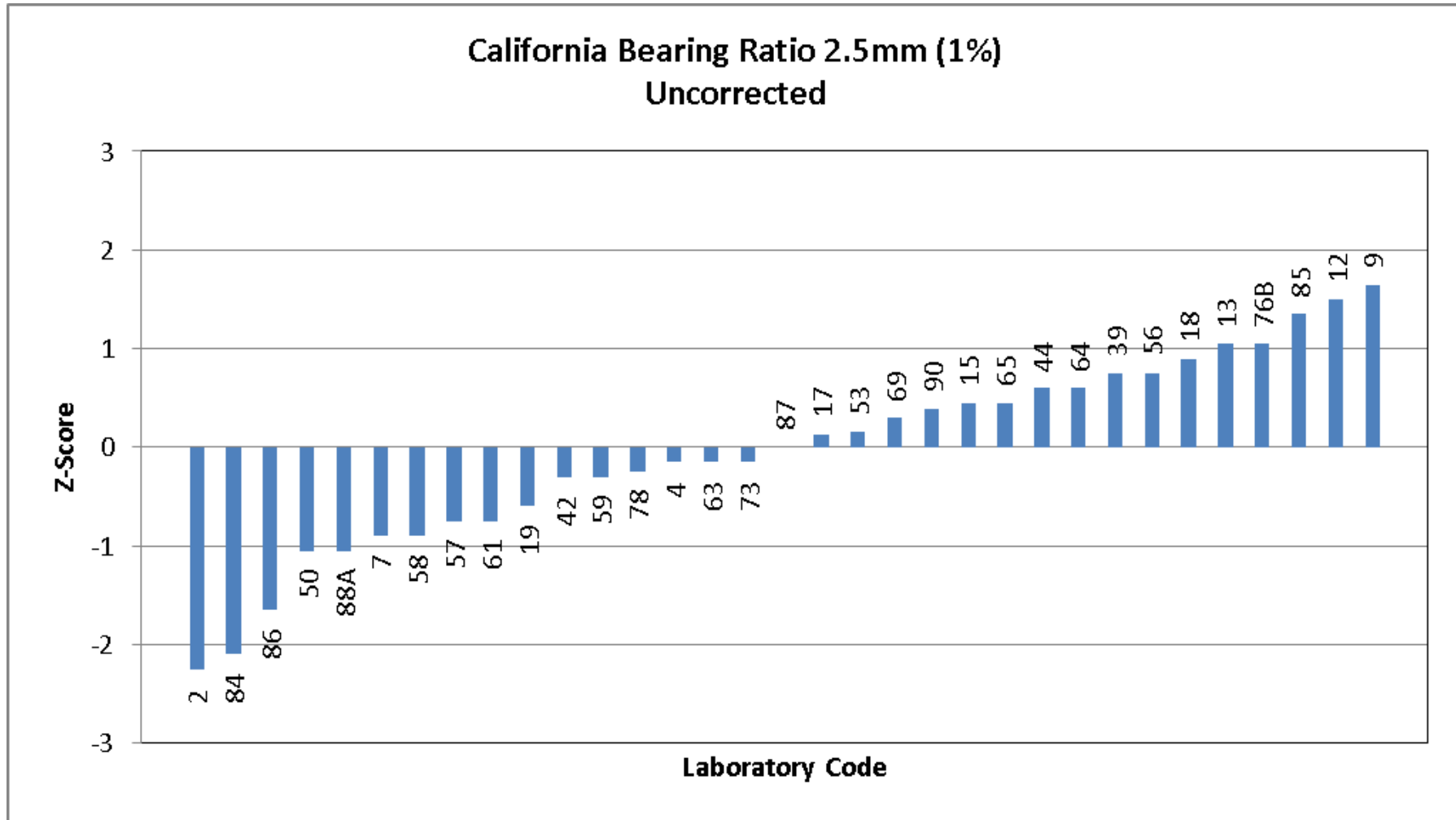
California Bearing Ratio Load 5.0mm (1N) Corrected			
Lab Code	Result	Z-Score	Method
2	894	-3.19 §	Q113C
4	3900	-0.57	AS1289.6.1.1
7	3470	-0.94	AS1289.6.1.1
12	4843	0.25	AS1289.6.1.1
13	5120	0.49	AS1289.6.1.1
15	4554	0.00	Q113C
17	4712	0.14	AS1289.6.1.1
18	4819	0.23	RMS T117
19	2567	-1.73	T117
24	6339	1.56	AS1289.6.1.1
26	2570	-1.73	AS1289.6.1.1
28	2290	-1.97	6.1.1
39	4751	0.17	AS1289.6.1.1
42	3400	-1.01	AS1289.6.1.1
44	5821	1.10	AS1289.6.1.1
47	3767	-0.69	ASTM D1883
50	3200	-1.18	AS1289.6.1.1 (2014)
53	3698	-0.75	AS1289.6.1
56	4800	0.21	AS1289.6.1.1
57	3446	-0.97	AS1289.6.1.1
64	5171	0.54	AS1289.6.1.1
65	4610	0.05	AS1289.6.1.1
69	5329	0.68	AS1289.6.1.1
73	3567	-0.86	AS1289.6.1.1
76A	5098	0.47	Q113C
76B	5758	1.05	Q113C
78	3000	-1.35	AS1289.6.1.1
84	911	-3.18 §	AASHTO T193
85	5980	1.24	Q113C
86	4630	0.07	6.1.1
87	3940	-0.54	AS1289.6.1.1

No. of Results	31
Median	4554
Uncertainty of the Median	258.2
Normalised IQR	1147.2
Robust CV	25.2%
Minimum	894
Maximum	6339
Range	5445



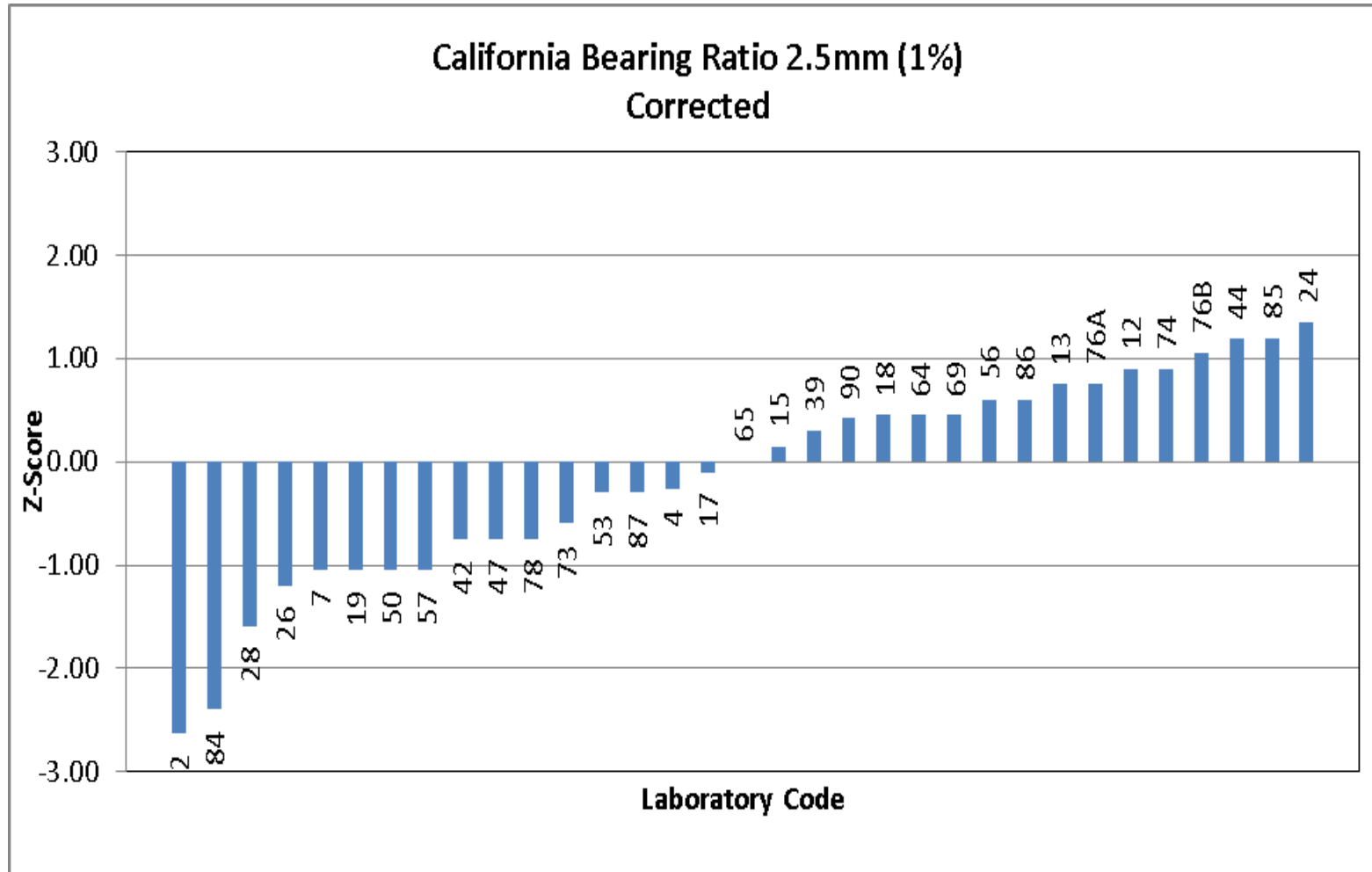
California Bearing Ratio 2.5mm (1%) Uncorrected			
Lab Code	Result	Z-Score	Method
2	3	-2.25 ?	Q113C
4	17	-0.15	AS1289.6.1.1
7	12	-0.90	AS1289.6.1.1
9	29	1.65	Q113C
12	28	1.50	AS1289.6.1.1
13	25	1.05	AS1289.6.1.1
15	21	0.45	Q113C
17	18.9	0.13	AS1289.6.1.1
18	24	0.90	RMS T117
19	14	-0.60	T117
39	23	0.75	AS1289.6.1.1
42	16	-0.30	AS1289.6.1.1
44	22	0.60	AS1289.6.1.1
50	11	-1.05	AS1289.6.1.1 (2014)
53	19	0.15	AS1289.6.1.1
56	23	0.75	AS1289.6.1.1
57	13	-0.75	AS1289.6.1.1
58	12	-0.90	AS1289.6.1.1
59	16	-0.30	AS1289.6.1.1
61	13	-0.75	#
63	17	-0.15	RMS T117
64	22	0.60	AS1289.6.1.1
65	21	0.45	AS1289.6.1.1
69	20	0.30	AS1289.6.1.1
73	17	-0.15	AS1289.6.1.1
76B	25	1.05	Q113C
78	16.36	-0.25	AS1289.6.1.1
84	4	-2.10 ?	AASHTO T193
85	27	1.35	Q113C
86	7	-1.65	6.1.1
87	18	0.00	AS1289.6.1.1
88A	11	-1.05	AS1289.6.1.1
90	20.6	0.39	T117 (RMS)

No. of Results	33
Median	18
Uncertainty of the Median	1.5
Normalised IQR	6.7
Robust CV	37.1%
Minimum	3
Maximum	29
Range	26



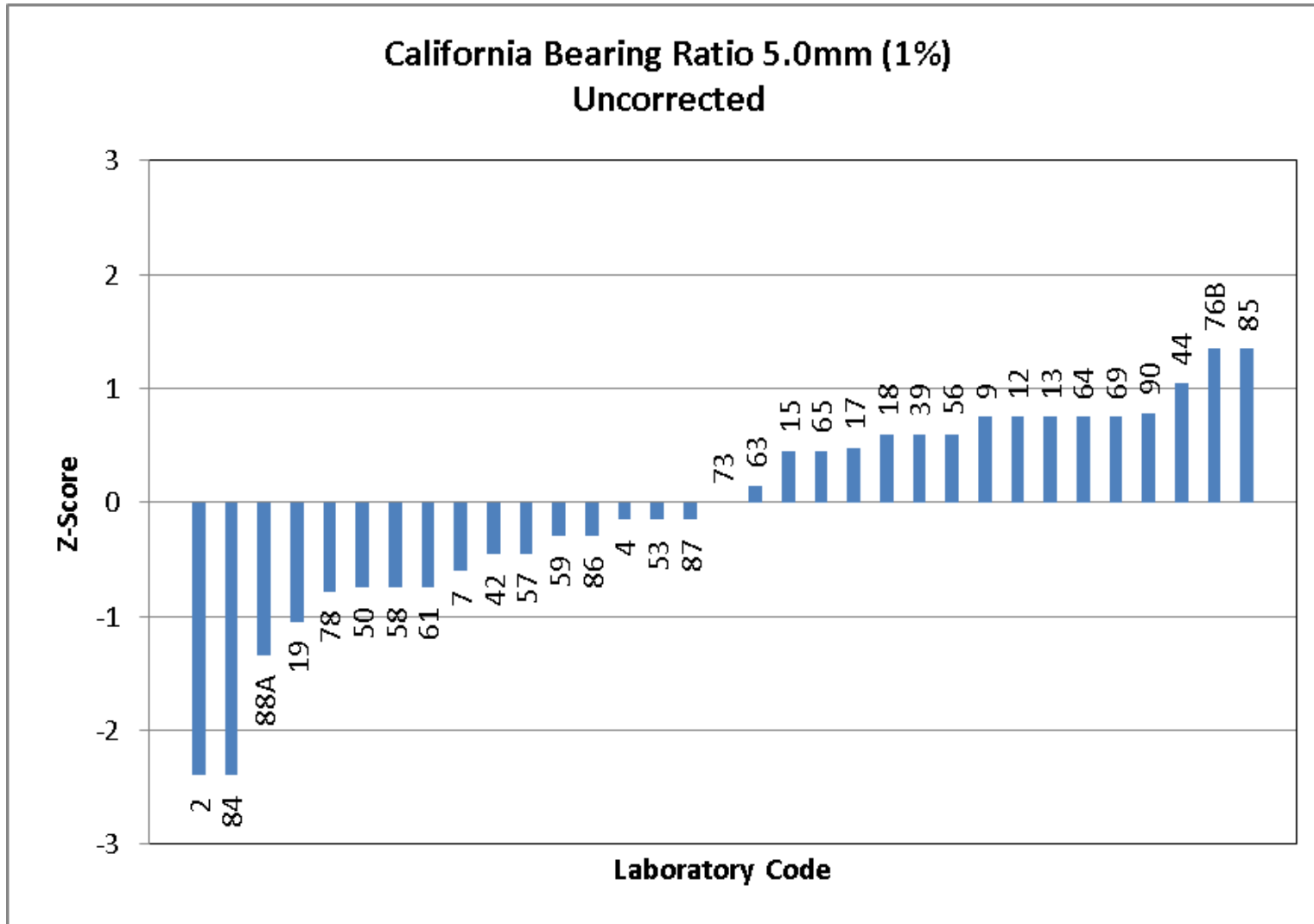
California Bearing Ratio 2.5mm (1%) Corrected			
Lab Code	Result	Z-Score	Method
2	3.5	-2.62 ?	Q113C
4	19.2	-0.27	AS1289.6.1.1
7	14	-1.05	AS1289.6.1.1
12	27	0.90	AS1289.6.1.1
13	26	0.75	AS1289.6.1.1
15	22	0.15	Q113C
17	20.3	-0.10	AS1289.6.1.1
18	24	0.45	RMS T117
19	14	-1.05	T117
24	30	1.35	AS1289.6.1.1
26	13	-1.20	#
28	10.4	-1.59	6.1.1
39	23	0.30	AS1289.6.1.1
42	16	-0.75	AS1289.6.1.1
44	29	1.20	AS1289.6.1.1
47	16	-0.75	ASTM D1883
50	14	-1.05	AS1289.6.1.1 (2014)
53	19	-0.30	AS1289.6.1.1
56	25	0.60	AS1289.6.1.1
57	14	-1.05	AS1289.6.1.1
64	24	0.45	AS1289.6.1.1
65	21	0.00	AS1289.6.1.1
69	24	0.45	AS1289.6.1.1
73	17	-0.60	AS1289.6.1.1
74	27	0.90	ASTM D 1883
76A	26	0.75	Q113C
76B	28	1.05	Q113C
78	16	-0.75	AS1289.6.1.1
84	5	-2.40 ?	AASHTO T193
85	29	1.20	Q113C
86	25	0.60	6.1.1
87	19	-0.30	AS1289.6.1.1
90	23.8	0.42	T117 (RMS)

No. of Results	33
Median	21
Uncertainty of the Median	1.5
Normalised IQR	6.7
Robust CV	31.8%
Minimum	3.5
Maximum	30
Range	26.5



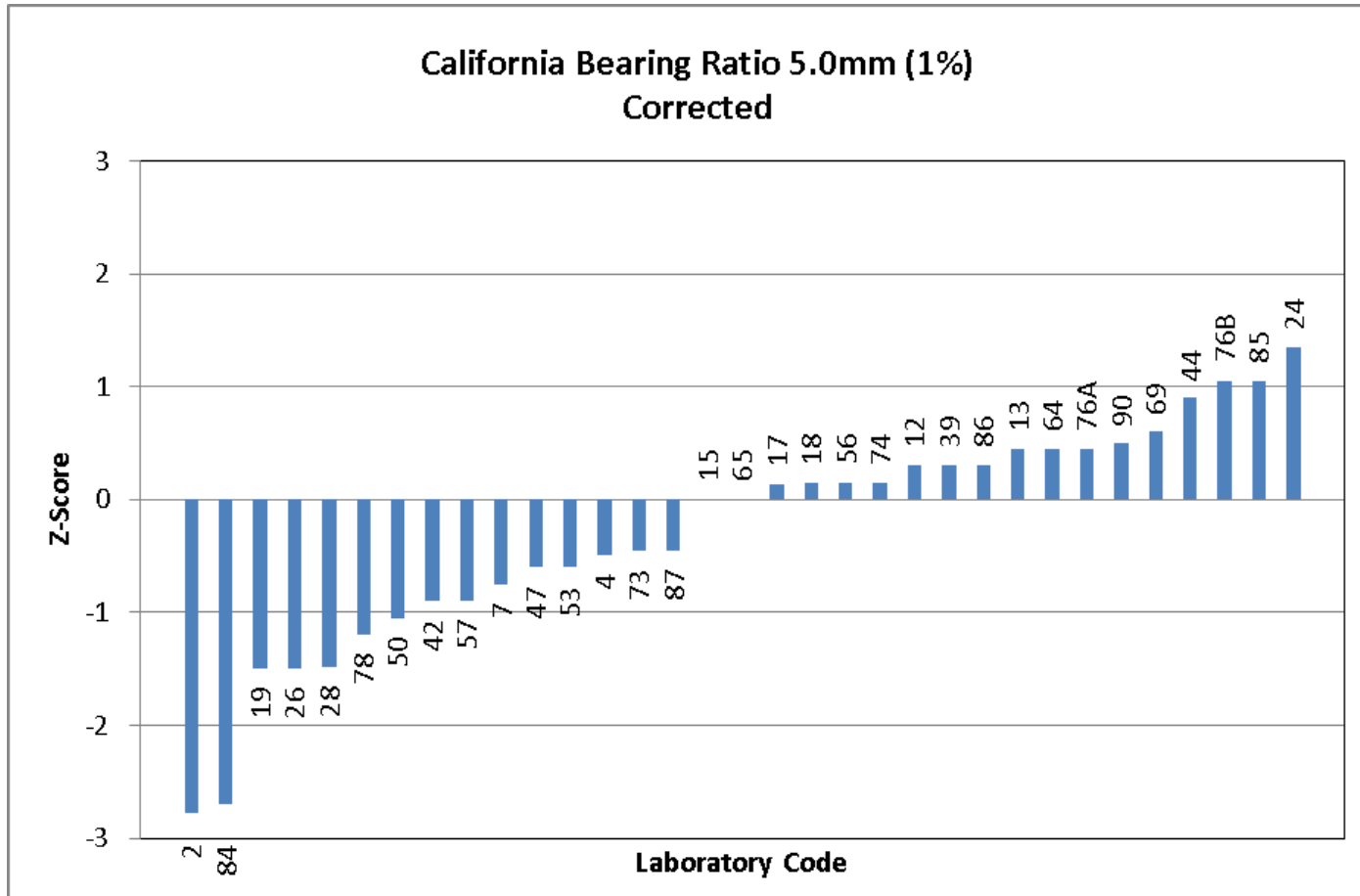
California Bearing Ratio 5.0mm (1%) Uncorrected			
Lab Code	Result	Z-Score	Method
2	4	-2.40 ?	Q113C
4	19	-0.15	AS1289.6.1.1
7	16	-0.60	AS1289.6.1.1
9	25	0.75	Q113C
12	25	0.75	AS1289.6.1.1
13	25	0.75	AS1289.6.1.1
15	23	0.45	Q113C
17	23.2	0.48	AS1289.6.1.1
18	24	0.60	RMS T117
19	13	-1.05	T117
39	24	0.60	AS1289.6.1.1
42	17	-0.45	AS1289.6.1.1
44	27	1.05	AS1289.6.1.1
50	15	-0.75	AS1289.6.1.1 (2014)
53	19	-0.15	AS1289.6.1.1
56	24	0.60	AS1289.6.1.1
57	17	-0.45	AS1289.6.1.1
58	15	-0.75	AS1289.6.1.1
59	18	-0.30	AS1289.6.1.1
61	15	-0.75	#
63	21	0.15	RMS T117
64	25	0.75	AS1289.6.1.1
65	23	0.45	AS1289.6.1.1
69	25	0.75	AS1289.6.1.1
73	20	0.00	AS1289.6.1.1
76B	29	1.35	Q113C
78	14.79	-0.78	AS1289.6.1.1
84	4	-2.40 ?	AASHTO T193
85	29	1.35	Q113C
86	18	-0.30	6.1.1
87	19	-0.15	AS1289.6.1.1
88A	11	-1.35	AS1289.6.1.1
90	25.2	0.78	T117 (RMS)

No. of Results	33
Median	20
Uncertainty of the Median	1.5
Normalised IQR	6.7
Robust CV	33.4%
Minimum	4
Maximum	29
Range	25



California Bearing Ratio 5.0mm (1%) Corrected				
Lab Code	Result	Z-Score		Method
2	4.5	-2.77	?	Q113C
4	19.7	-0.49		AS1289.6.1.1
7	18	-0.75		AS1289.6.1.1
12	25	0.30		AS1289.6.1.1
13	26	0.45		AS1289.6.1.1
15	23	0.00		Q113C
17	23.9	0.13		AS1289.6.1.1
18	24	0.15		RMS T117
19	13	-1.50		T117
24	32	1.35		AS1289.6.1.1
26	13	-1.50		#
28	13.1	-1.48		6.1.1
39	25	0.30		AS1289.6.1.1
42	17	-0.90		AS1289.6.1.1
44	29	0.90		AS1289.6.1.1
47	19	-0.60		ASTM D1883
50	16	-1.05		AS1289.6.1.1 (2014)
53	19	-0.60		AS1289.6.1.1
56	24	0.15		AS1289.6.1.1
57	17	-0.90		AS1289.6.1.1
64	26	0.45		AS1289.6.1.1
65	23	0.00		AS1289.6.1.1
69	27	0.60		AS1289.6.1.1
73	20	-0.45		AS1289.6.1.1
74	24	0.15		ASTM D 1883
76A	26	0.45		Q113C
76B	30	1.05		Q113C
78	15	-1.20		AS1289.6.1.1
84	5	-2.70	?	AASHTO T193
85	30	1.05		Q113C
86	25	0.30		6.1.1
87	20	-0.45		AS1289.6.1.1
90	26.3	0.49		T117 (RMS)

No. of Results	33
Median	23
Uncertainty of the Median	1.5
Normalised IQR	6.7
Robust CV	29.0%
Minimum	4.5
Maximum	32
Range	27.5

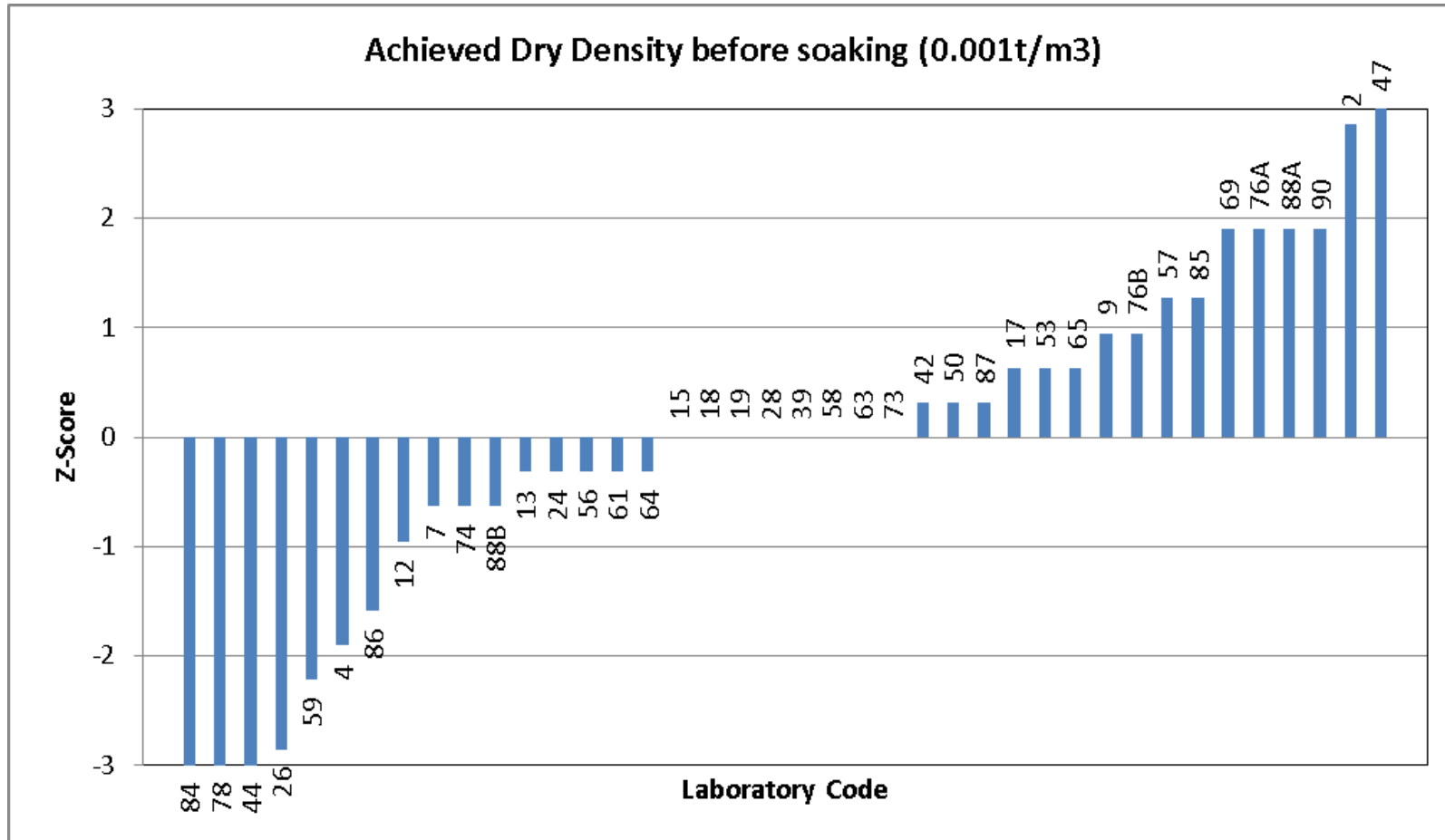


Penetration Correction if applied (0.1mm)		
Lab Code	Result	Method
2	0.5	Q113C
4	0.3	AS1289.6.1.1
7	0.5	AS1289.6.1.1
12	0	AS1289.6.1.1
13	0.12	AS1289.6.1.1
15	0.1	Q113C
17	0.22	AS1289.6.1.1
18	0	RMS T117
19	0.2	T117
24	0.4	#
26	0.474	#
28	0.7	#
39	0.1	AS1289.6.1.1
44	0.8	AS1289.6.1.1
47	0	ASTM D1883
50	0.5	AS1289.6.1.1 (2014)
53	0	AS1289.6.1.1
56	0	AS1289.6.1.1
57	0.1	AS1289.6.1.1
63	0	RMS T117
64	0.3	AS1289.6.1.1
69	0.5	AS1289.6.1.1
73	0	AS1289.6.1.1
74	1.7	ASTM D 1883
76A	0.161	Q113C
76B	0.4	Q113C
84	0.3	AASHTO T193
85	0.3	Q113C
86	0.3	#
87	0.4	AS1289.6.1.1
90	0.33	T117 (RMS)

No. of Results	31
Minimum	0
Maximum	1.7
Range	1.7

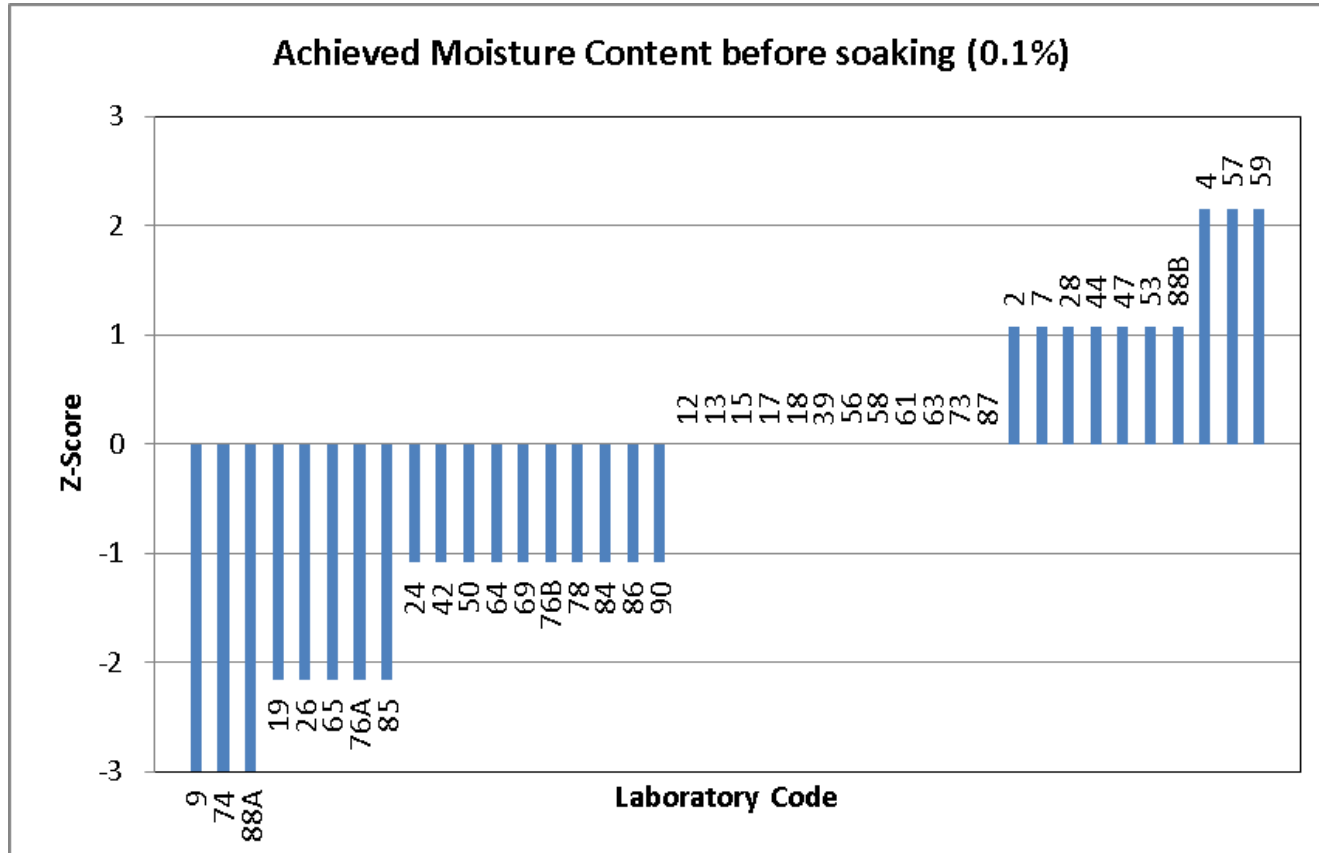
Achieved Dry Density before soaking (0.001t/m ³)			
Lab Code	Result	Z-Score	Method
2	2.023	2.86 ?	Q113C
4	2.008	-1.90	AS1289.6.1.1
7	2.012	-0.63	AS1289.6.1.1
9	2.017	0.95	Q113C
12	2.011	-0.95	AS1289.6.1.1
13	2.013	-0.32	AS1289.6.1.1
15	2.014	0.00	Q113C
17	2.016	0.63	AS1289.6.1.1
18	2.014	0.00	RMS T117
19	2.014	0.00	T117
24	2.013	-0.32	#
26	2.005	-2.86 ?	#
28	2.014	0.00	#
39	2.014	0.00	AS1289.6.1.1
42	2.015	0.32	AS1289.6.1.1
44	1.996	-5.71 §	AS1289.6.1.1
47	2.024	3.17 §	ASTM D1883
50	2.015	0.32	AS1289.5.1.1
53	2.016	0.63	AS1289.6.1.1
56	2.013	-0.32	AS1289.6.1.1
57	2.018	1.27	AS1289.6.1.1
58	2.014	0.00	AS1289.6.1.1
59	2.007	-2.22 ?	AS1289.6.1.1
61	2.013	-0.32	#
63	2.014	0.00	RMS T117
64	2.013	-0.32	AS1289.6.1.1
65	2.016	0.63	AS1289.6.1.1
69	2.02	1.90	AS1289.6.1.1
73	2.014	0.00	AS1289.6.1.1
74	2.012	-0.63	ASTM D 1883
76A	2.02	1.90	Q113C
76B	2.017	0.95	Q113C
78	1.98	-10.79 §	AS1289.6.1.1
84	1.762	-79.99 §	AASHTO T193
85	2.018	1.27	Q145A
86	2.009	-1.59	#
87	2.015	0.32	AS1289.6.1.1
88A	2.02	1.90	AS1289.6.1.1
88B	2.012	-0.63	#
90	2.02	1.90	T117 (RMS)

Achieved Dry Density before soaking (0.001t/m³)	
No. of Results	40
Median	2.014
Uncertainty of the Median	0.0006
Normalised IQR	0.0032
Robust CV	0.2%
Minimum	1.762
Maximum	2.024
Range	0.262



Achieved Moisture Content before soaking (0.1%)			
Lab Code	Result	Z-Score	Method
2	10	1.08	Q113C
4	10.1	2.16 ?	AS1289.6.1.1
7	10	1.08	AS1289.6.1.1
9	9.6	-3.24 §	Q113C
12	9.9	0.00	AS1289.2.1.1
13	9.9	0.00	AS1289.6.1.1
15	9.9	0.00	Q113C
17	9.9	0.00	AS1289.2.1.1
18	9.9	0.00	RMS T117
19	9.7	-2.16 ?	T117
24	9.8	-1.08	#
26	9.7	-2.16 ?	#
28	10	1.08	#
39	9.9	0.00	AS1289.6.1.1 / AS1289.2.1.1
42	9.8	-1.08	AS1289.2.1.1
44	10	1.08	AS1289.2.1.1
47	10	1.08	ASTM D1883
50	9.8	-1.08	AS1289.2.1.1
53	10	1.08	AS1289.6.1.1
56	9.9	0.00	AS1289.2.1.1
57	10.1	2.16 ?	AS1289.2.1.1
58	9.9	0.00	AS1289.6.1.1
59	10.1	2.16 ?	AS1289.6.1.1
61	9.9	0.00	#
63	9.9	0.00	RMS T117
64	9.8	-1.08	AS1289.6.1.1
65	9.7	-2.16 ?	AS1289.6.1.1 / AS1289.2.1.1
69	9.8	-1.08	AS1289.6.1.1
73	9.9	0.00	AS1289.6.1.1
74	9.6	-3.24 §	ASTM D 1883
76A	9.7	-2.16 ?	Q113C
76B	9.8	-1.08	Q113C
78	9.8	-1.08	AS1289.6.1.1
84	9.8	-1.08	AASHTO T193
85	9.7	-2.16 ?	Q102A
86	9.8	-1.08	#
87	9.9	0.00	AS1289.6.1.1
88A	9.6	-3.24 §	AS1289.6.1.1
88B	10	1.08	#
90	9.8	-1.08	T120 (RMS)

No. of Results	40
Median	9.9
Uncertainty of the Median	0.02
Normalised IQR	0.09
Robust CV	0.9%
Minimum	9.6
Maximum	10.1
Range	0.5



Compaction Apparatus Type	
Lab Code	Result
2	Mechanical
4	Mechanical
7	Mechanical
12	Manual
13	Mechanical
15	Manual
18	Mechanical
19	Mechanical
24	Mechanical
26	Manual
28	Manual
39	Mechanical
42	Manual
44	Manual
47	Manual
50	Manual
52	Manual
57	Manual
58	Manual
59	Manual
61	Manual
63	Mechanical
64	Mechanical
65	Manual
69	Manual
73	Manual
74	Manual
76A	Manual
76B	Manual
78	Mechanical
84	Manual
85	Manual
86	Manual
87	Manual
90	Mechanical

No. of Results	35
Manual	23
Mechanical	12

Swell Measurements (%)		
Lab Code	Result	Method
2	-0.1	Q113C
4	0.2	AS1289.6.1.1
7	0.03	#
12	0.1	AS1289.6.1.1
13	0.2	#
15	0.3	Q113C
17	0.17	AS1289.6.1.1
18	0.1	RMS T117
19	0.8	#
24	0.0	#
26	0	#
28	1.23, 1.99, 0.65	#
39	0.3	AS1289.6.1.1
42	0.2	#
44	0.3	AS1289.6.1.1
47	0.063	ASTM D1883
50	0.4	AS1289.6.1.1 (2014)
53	0.0	AS1289.6.1.1
56	0.3	AS1289.6.1.1
57	0.6	AS1289.6.1.1
58	0.5	AS1289.6.1.1
59	0.0	#
61	0.5	#
63	0.2	RMS T117
64	0.3	AS1289.6.1.1
65	0.21	AS1289.6.1.1
69	0.1	AS1289.6.1.1
73	0.0	AS1289.6.1.1
74	0.06	ASTM D 1883
76A	0.2	Q113C
76B	0.2	Q113C
78	0.0	#
84	0.13	AASHTO T193
85	0.2	Q113C
86	0.5	#
87	0	AS1289.6.1.1
88A	0.0	#
88B	0	#
90	0.3	T117 (RMS)

No. of Results	39
Minimum	-0.1
Maximum	1.99

APPENDIX B

Homogeneity Testing

Homogeneity and Stability Testing**Sample A:**

Sample Number	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Emersion Class No.	Apparent Particle Density (t/m ³)	Linear Shrinkage Mould Length (Nearest 1.0mm)
23	40	18	22	9	4	2.60	250.8
27	41	19	22	9	4	2.66	250.8
8	41	19	22	10.5	4	2.61	250.8
48	41	17	24	10	4	2.62	250.0
51	41	15	26	10	4	2.69	250.8
29	40	18	22	10	4	2.68	250.6
37	41	18	23	11	4	2.60	249.6
71	41	18	23	9.5	4	2.69	250.6
33	41	18	23	9	4	2.57	249.8
81	42	19	23	9.5	4	2.70	250.5
Mean	40.9	17.9	23	9.75		2.64	250.43
Standard Deviation	0.54	1.14	1.18	0.64		0.04	0.43
Coefficient of Variation (CV) (%)	1.32%	6.35%	5.14%	6.59%		1.69%	0.17%
Lowest Value	40	15	22	9		2.57	249.6
Highest Value	42	19	26	11		2.70	250.8

Homogeneity and Stability Testing**Sample B**

Sample Number	Dry Density before soak (t/m ³)	Moisture Content before soak (%)	Density Ratio After soak (%)	Swell (%)	Bearing Ratio 2.5mm (%)	Bearing Ratio 5.0mm (%)	CBR Value (%)
23	2.035	9.7	101	0.0	13	16	16
27	2.017	9.8	100	0.0	20	20	20
8	2.010	10.0	100	0.5	12	14	14
48	2.013	10.1	100	0.0	9	12	12
51	2.010	9.9	100	0.0	17	20	20
29	2.014	10.0	100	0.0	13	15	15
37	2.021	9.8	100	0.5	14	17	17
71	2.018	9.8	100	0.0	12	14	14
33	2.016	9.9	100	0.0	13	16	16
81	2.022	9.8	100	0.5	10	13	13
Mean	2.018	9.88	100.1	0.2	13.3	15.7	15.7
Standard Deviation	0.01	0.12	0.3	0.23	3.03	2.57	2.57
Coefficient of Variation (CV) (%)	0.35%	1.18%	0.30%	152.75%	22.82%	16.38%	16.38%
Lowest Value	2.01	9.7	100	0.0	9	12	12
Highest Value	2.035	10.1	101	0.5	20	20	20

APPENDIX C

Documentation

Instructions to Participants	
Sample A.....	C1
Sample B.....	C2
Results Sheet	
Sample A.....	C3
Sample B.....	C4

PROFICIENCY TESTING AUSTRALIA
Proficiency Testing Program
Soils Round 22 Part A: Classification

INSTRUCTIONS TO PARTICIPANTS

Please read instructions carefully BEFORE commencing testing.

To ensure that the results of this program can be analysed properly, participants are asked to carefully note the following:

1. The following tests are to be conducted:

- Apparent Particle Density
- Liquid Limit
- Plastic Limit
- Plasticity Index
- Emersion Class
- Linear Shrinkage
- Linear Shrinkage Mould Length

2. These tests are based on AS1289; however other methods may be used.

Apparent Particle Density

AS1289.3.5.1 Determination of the soil particle density of a soil – standard method.
The -2.36mm fraction only to be tested

Liquid Limit

AS1289.3.1.1. Determination of the liquid limit of a soil – Four point Casagrande Method.

Plastic Limit

AS1289.3.2.1. Determination of the plastic limit of a soil – standard method.

Plasticity Index

AS1289.3.3.1. Calculation of the plasticity index of a soil.

Emerson Class

AS1289.3.8.1. Methods of testing soils for engineering purposes.

Linear Shrinkage

AS1289.3.4.1. Determination of the linear shrinkage of a soil – standard method.

3. For each test on the sample, the result is to be reported on the results sheet to the accuracy and reporting basis indicated.

4. Testing may commence as soon as the sample is received. All laboratories must return the result sheet no later than 28th April 2017 to:

Sheren To
Proficiency Testing Australia
PO Box 7507,
SILVERWATER NSW 2128
Phone: 02 9736 8397
Fax: 02 9743 6664
Email: sheren.to@pta.asn.au

PROFICIENCY TESTING AUSTRALIA
Soils Round 22 Part A : Classification

Results Sheet

 Lab Code:

Test (report to)	Result	Method
Apparent Particle Density (0.01 g/cm ³)		
Liquid Limit (nearest 1%)		
Plastic Limit (nearest 1%)		
Plasticity Index (nearest 1%)		
Emerson Class Number		
Linear Shrinkage (0.5%)		
Linear Shrinkage Mould Length (nearest 1.0mm)		

Signed: _____

Date: _____

 Return no later than **28th April 2017** to:

Sheren To
Proficiency Testing Australia
PO Box 7507,
Silverwater, NSW, 2128
Fax: 02 9743 6664
Email: sheren.to@pta.asn.au

PROFICIENCY TESTING AUSTRALIA
Proficiency Testing Program
Soils Round 22 Part B: California Bearing Ratio

INSTRUCTIONS TO PARTICIPANTS

Please read instructions carefully BEFORE commencing testing.

To ensure that the results of this program can be analysed properly, participants are asked to carefully note the following:

1. **Prepare Sample by sieving over a 9.5mm sieve and DISCARD MATERIAL RETAINED on the sieve.**
2. Adjust the **-9.5mm** sample moisture content to **9.9%** and allow to cure for a minimum period of 48 hours prior to remoulding (compaction).
3. **Perform AS 1289.6.1.1 (2014) - preferable, or equivalent:**
Determination of the California Bearing Ratio of a soil, following the criteria set out below:
 - Standard laboratory method for a remoulded specimen soaked.
 - Standard Compactive Effort to be used.
 - Sample to be remoulded in 3 layers to a **2.014 t/m³** dry density.
 - The surcharge mass to be applied = **4.5 kg**.
 - **4 day** soaked Test.
 - Swell Measurements to be recorded and Swell % calculated.
4. Report results (to the accuracy indicated) on the provided "Results Sheet". **Results are to include an attached plot of the penetration data.**
 - Laboratories are to perform tests according to their accredited method.
 - After all testing has been completed, laboratories are asked to seal and retain any of the remaining samples for at least 3 months.
 - Testing may commence as soon as the sample and documentation are received. Please return results no later than **28th April 2017** to:

Sheren To
Proficiency Testing Australia
PO Box 7507
SILVERWATER NSW 2128
Phone: 02 9736 8397
Fax: 02 9743 666
Email: sheren.to@pta.asn.au

PROFICIENCY TESTING AUSTRALIA
Soils Round 22 Part B: CBR

Results Sheet

Lab Code:

Test (report to)	Result		Method
	Uncorrected	Corrected	
California Bearing Ratio Load @ 2.5mm (1N)			
California Bearing Ratio Load @ 5.0mm (1N)			
California Bearing Ratio @ 2.5mm (1%)			
California Bearing Ratio @ 5.0mm (1%)			
Penetration Correction if applied (0.1mm)			
Achieved Dry Density before soaking (0.001 t/m ³)			
Achieved Moisture Content before soaking (0.1%)			
Compaction Apparatus Type (Please circle type used)	Manual		Mechanical
Swell Measurements (%)			

Signed: _____

Date: _____

Return to:

Sheren To
Proficiency Testing Australia
PO Box 7507, Silverwater, NSW, 2128
Fax: 02 9743 6664
Email: sheren.to@pta.asn.au

- *End of Report* -