



## **CETANZ PROFICIENCY TEST REPORT**

### **Test Method TNZ T1 1977 Benkelman Beam Test**

Dear CETANZ Member,

Please find attached the results from the Benkelman Proficiency testing organised by CETANZ in May 2008.

Nine laboratories took part in the Benkelman Beam Proficiency Test. Three sites were chosen in the Auckland domain. Ten tests were carried out at each test spot. Testing was carried out on sealed roads within the domain. Two of the Laboratories that took part used the same Beam Truck to carry out testing.

Each spot has been marked on the road surface providing for future retests subject to seasonal variance.

#### **Invited Laboratories**

Babbage geotechnical Laboratory  
Beca Geotest Ltd  
Civil Lab Ltd  
Downer EDI Works – Auckland  
Fulton Hogan – Auckland  
Fulton Hogan – Hamilton  
Geotechnics Ltd – Auckland  
Opus International Consultants – Auckland  
Opus International Consultants – Hamilton

Participating Laboratories were assigned a unique identifier by IANZ in order to maintain anonymity. You will need to refer to this to identify your results.

#### **Results**

Data highlighted in **Blue** are outside of  $-2sd$ , those in **Red** are outside of  $+2sd$ . Data presented in excel spread sheet format is available upon request.

## **Observations**

The majority of the results seem to be within  $\pm 2$  standard deviations, although there are a number that would qualify as Outliers and could be removed from analysis.

Doing so will halve the Standard Deviations on sites 2 and 3 bringing them down to approximately 0.13mm for each site.

Axle Distance, Axle Load and Date Tested do not seem to indicate any trends. Further analysis may have to be undertaken to understand fully the effect of the possible Outliers on these variables.

## **Conclusions**

Overall the Proficiency Round went well, scatter of results was small. Organisation and execution and return of results appear to have been done well.

The success of future Proficiency rounds on this test method will need to consider the following:

- Location and stability of test spots
- Timing, and frequency of truck movements.
- Organisation and instructions.

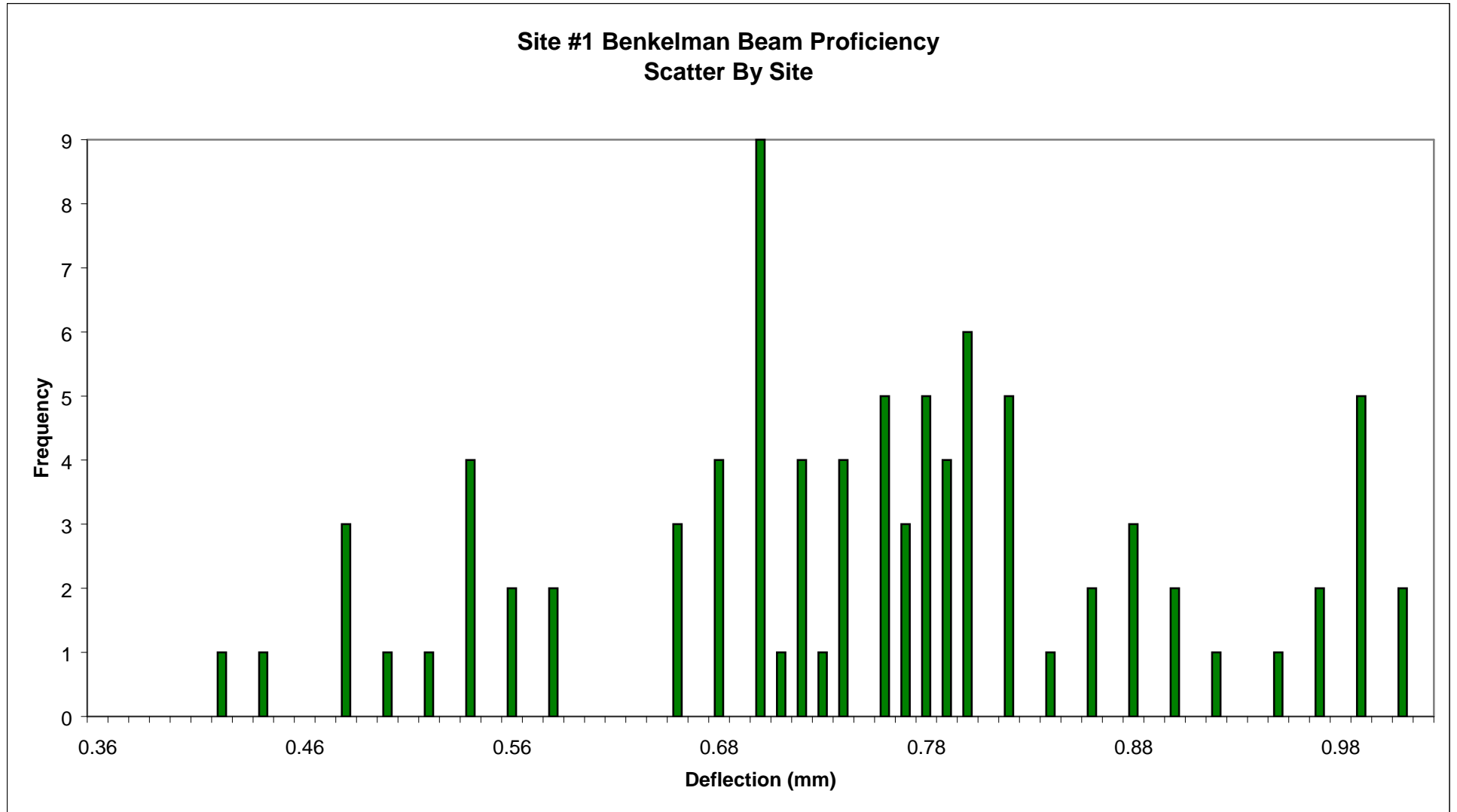
Thank you for taking part in this proficiency round, I trust you have found this to be an interesting and valuable experience, and if you have any queries please contact the undersigned.

Yours faithfully,

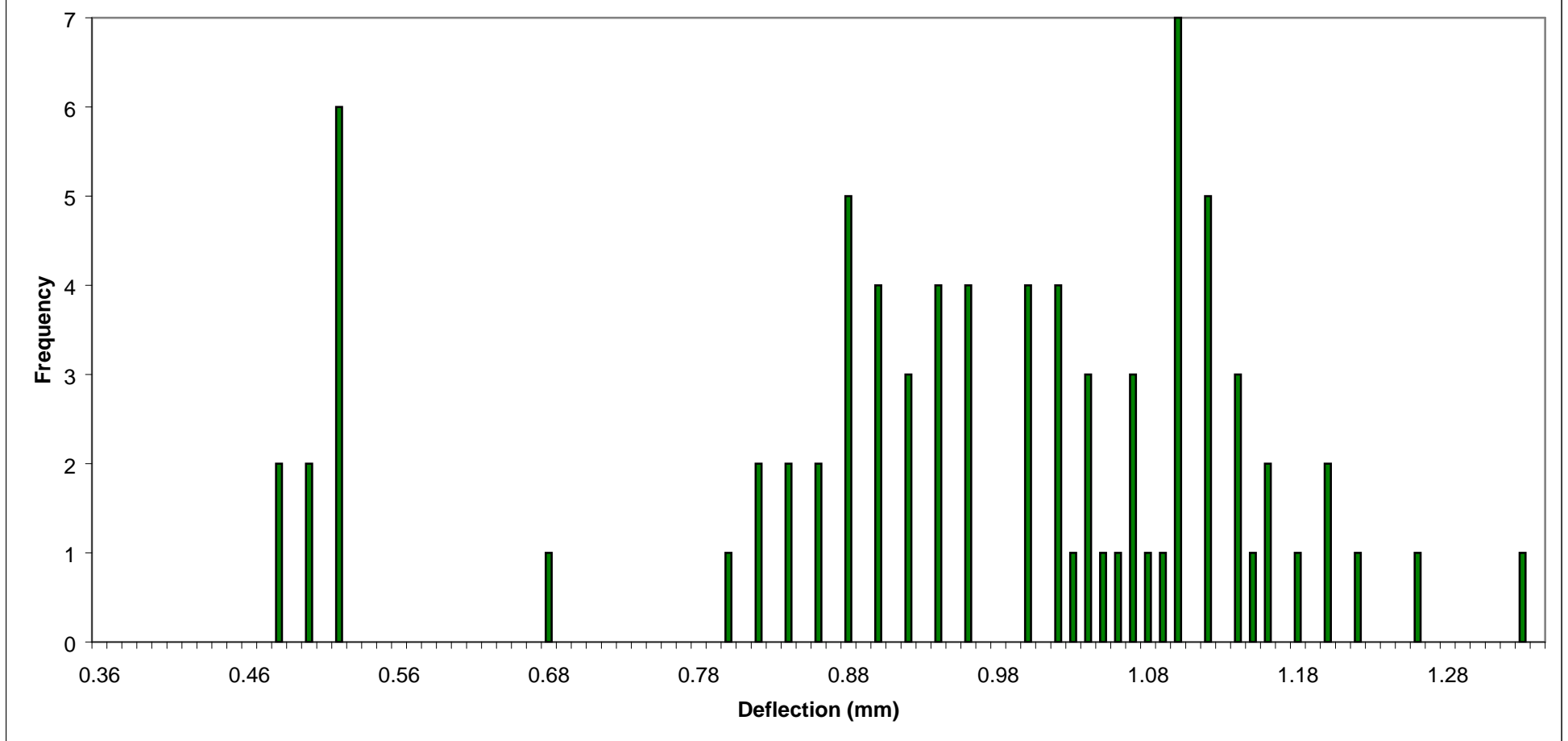
Jayden Ellis  
**Proficiency Round Analyser**  
**CETANZ Technical Group Leader**

## PROFICIENCY DATA

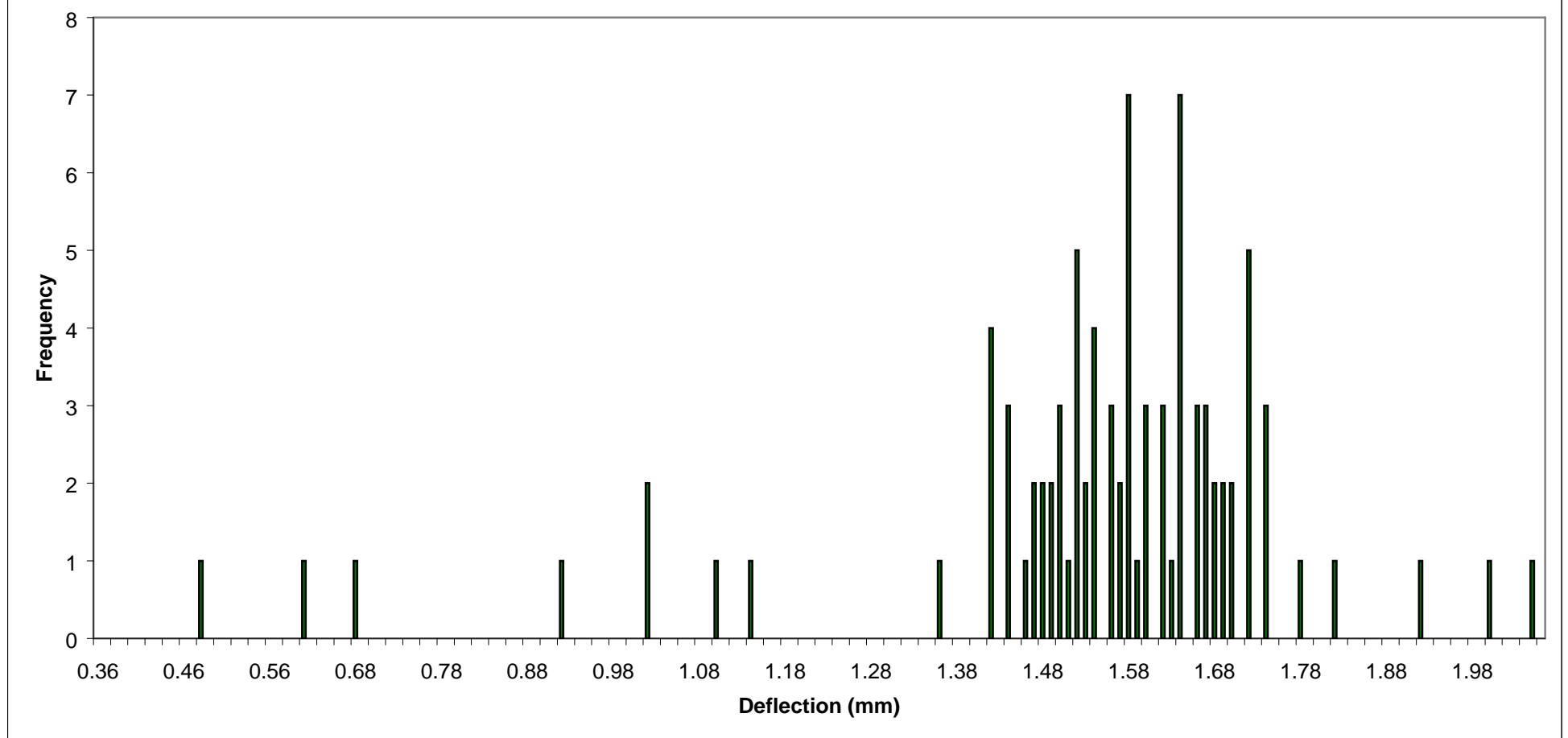
| Laboratory      | 1      | 2        | 3      | 4      | 5      | 6        | 7        | 8      | 9        |     |      |
|-----------------|--------|----------|--------|--------|--------|----------|----------|--------|----------|-----|------|
| Date            | 18-Jun | 9-Jun    | 13-Jun | 18-Jun | 13-Jun | 20-Jun   | 13-Jun   | 18-Jun | 13-Jun   |     |      |
| Temperature     | 10     | 14       | 16     | N/A    | 15     | 21.0     | 15       | N/A    | 17       |     |      |
| Conditions      | Fine   | Overcast | Fine   | Fine   | Fine   | F/Ovcast | Overcast | N/A    | Overcast |     |      |
| Surface         | Dry    | Dry      | Dry    | Dry    | Dry    | Dry      | Dry      | Dry    | Dry      |     |      |
| Axle Load       | 8.12   | 8.2      | 8.2    | 8.35   | 8.2    | 8.3      | 8.2      | 8.35   | 8.25     |     |      |
| Tyre Pressures  |        |          |        |        |        |          |          |        |          |     |      |
| LH Inner        | 80     | 120      | 100    | 80     | 122    | 90       | 122      | 80     | 110      |     |      |
| LH Outer        | 80     | 118      | 120    | 88     | 122    | 107      | 122      | 88     | 110      |     |      |
| Average LH      | 80     | 119      | 110    | 84     | 122    | 99       | 122      | 84     | 110      |     |      |
| RH Inner        | 80     | 119      | 100    | 80     | 122    | 90       | 122      | 80     | 110      |     |      |
| RH Outer        | 80     | 117      | 115    | 80     | 122    | 92       | 122      | 80     | 110      |     |      |
| Average RH      | 80     | 118      | 108    | 80     | 122    | 91       | 122      | 80     | 110      |     |      |
| Dual Wheel Dist | 310    | 350      | 340    | 320    | 330    | 340      | 330      | 320    | 320      |     |      |
| Tyre Width      | 260    | 250      | 275    | 190    | 250    | 222      | 250      | 190    | 215      |     |      |
| Axle Dist       | 3.60   | 3.55     | 4.58   | 4.25   | 4.70   | 4.20     | 4.70     | 4.25   | 5.00     |     |      |
| Time Start      | 9:45   | 14:05    | 9:45   | 10:30  | 10:30  | 9:30     | 10:30    | 10:30  | 13:00    |     |      |
| Time End        | 11:00  | 15:15    | 11:45  | 12:30  | 12:00  | 14:30    | 12:20    | 13:00  | 15:00    |     |      |
| Pavement Temp   | 9      | 16       | 23     | 22     | 17     | 15.3     | 17       | 22     | 22       |     |      |
| Site # 1        | 0.48   | 0.80     | 0.99   | 0.79   | 0.72   | 0.32     | 0.70     | 0.78   | 0.76     |     |      |
|                 | 0.48   | 0.70     | 0.99   | 0.79   | 0.70   | 0.74     | 0.78     | 0.56   | 0.80     |     |      |
|                 | 0.42   | 0.82     | 0.99   | 0.73   | 0.70   | 0.66     | 0.70     | 0.66   | 0.84     |     |      |
|                 | 0.44   | 0.82     | 1.01   | 0.82   | 0.68   | 0.66     | 0.68     | 0.64   | 0.86     |     |      |
|                 | 0.58   | 0.82     | 0.99   | 0.71   | 0.68   | 0.80     | 0.74     | 0.70   | 0.92     |     |      |
|                 | 0.56   | 0.82     | 0.95   | 0.79   | 0.76   | 0.76     | 0.78     | 0.50   | 0.88     |     |      |
|                 | 0.54   | 0.78     | 0.97   | 0.77   | 0.70   | 0.70     | 0.78     | 0.68   | 0.90     |     |      |
|                 | 0.52   | 0.88     | 0.99   | 0.79   | 0.80   | 0.70     | 0.74     | 0.72   | 0.86     |     |      |
|                 | 0.58   | 0.80     | 0.97   | 0.77   | 0.72   | 0.54     | 0.76     | 0.48   | 0.90     |     |      |
|                 | 0.54   | 0.80     | 1.01   | 0.77   | 0.72   | 0.74     | 0.76     | 0.54   | 0.88     |     |      |
| Average         | 0.51   | 0.80     | 0.99   | 0.77   | 0.72   | 0.66     | 0.74     | 0.63   | 0.86     | Ave | 0.74 |
| sd              | 0.06   | 0.05     | 0.02   | 0.03   | 0.04   | 0.14     | 0.04     | 0.10   | 0.05     | sd  | 0.14 |
| Site # 2        | 0.52   | 0.88     | 1.10   | 1.00   | 0.90   | 1.02     | 0.84     | 1.18   | 1.20     |     |      |
|                 | 0.52   | 1.10     | 1.10   | 1.07   | 0.88   | 0.86     | 0.80     | 1.10   | 1.04     |     |      |
|                 | 0.52   | 0.88     | 1.16   | 0.96   | 0.94   | 1.04     | 0.88     | 1.12   | 1.10     |     |      |
|                 | 0.50   | 0.90     | 1.14   | 1.07   | 0.94   | 0.92     | 0.86     | 1.08   | 0.96     |     |      |
|                 | 0.50   | 1.02     | 1.12   | 1.15   | 0.94   | 0.68     | 0.84     | 1.12   | 1.04     |     |      |
|                 | 0.52   | 1.00     | 1.14   | 1.09   | 0.92   | 1.14     | 0.90     | 1.06   | 1.20     |     |      |
|                 | 0.48   | 0.90     | 1.12   | 1.05   | 0.96   | 1.00     | 0.92     | 1.10   | 1.26     |     |      |
|                 | 0.52   | 1.02     | 1.10   | 1.07   | 0.96   | 0.52     | 0.82     | 1.02   | 1.22     |     |      |
|                 | 0.48   | 1.00     | 1.12   | 1.03   | 0.88   | 0.94     | 0.82     | 1.33   | 1.16     |     |      |
| Average         | 0.51   | 0.97     | 1.12   | 1.05   | 0.92   | 0.90     | 0.85     | 1.12   | 1.13     | Ave | 0.95 |
| sd              | 0.02   | 0.08     | 0.02   | 0.05   | 0.03   | 0.19     | 0.04     | 0.09   | 0.10     | sd  | 0.20 |
| Pavement Temp   | 10     | 17       | 22     | 11     | 19     | 15.9     | 19       | 22     | 20.6     |     |      |
| Site # 3        | 1.14   | 1.60     | 1.47   | 1.72   | 1.50   | 1.10     | 1.58     | 1.56   | 1.64     |     |      |
|                 | 1.52   | 1.44     | 1.57   | 1.69   | 1.64   | 1.52     | 1.62     | 1.50   | 1.58     |     |      |
|                 | 1.58   | 1.44     | 1.49   | 1.67   | 1.58   | 0.60     | 1.62     | 1.44   | 1.74     |     |      |
|                 | 1.64   | 1.52     | 1.47   | 1.63   | 1.68   | 1.58     | 1.60     | 1.56   | 1.64     |     |      |
|                 | 1.66   | 1.42     | 1.53   | 2.00   | 1.54   | 0.68     | 1.66     | 1.52   | 1.58     |     |      |
|                 | 1.72   | 1.48     | 1.57   | 1.67   | 1.56   | 1.02     | 1.72     | 1.52   | 1.72     |     |      |
|                 | 2.05   | 1.42     | 1.51   | 1.74   | 1.50   | 1.02     | 1.68     | 1.46   | 1.62     |     |      |
|                 | 1.74   | 1.42     | 1.53   | 1.78   | 1.58   | 0.48     | 1.70     | 1.36   | 1.70     |     |      |
|                 | 1.82   | 1.42     | 1.49   | 1.67   | 1.64   | 0.92     | 1.64     | 1.64   | 1.72     |     |      |
|                 | 1.92   | 1.54     | 1.59   | 1.69   | 1.54   | 1.48     | 1.66     | 1.54   | 1.60     |     |      |
| Average         | 1.68   | 1.47     | 1.52   | 1.73   | 1.58   | 1.04     | 1.65     | 1.51   | 1.65     | Ave | 1.54 |
| sd              | 0.25   | 0.06     | 0.04   | 0.11   | 0.06   | 0.39     | 0.04     | 0.08   | 0.06     | sd  | 0.25 |



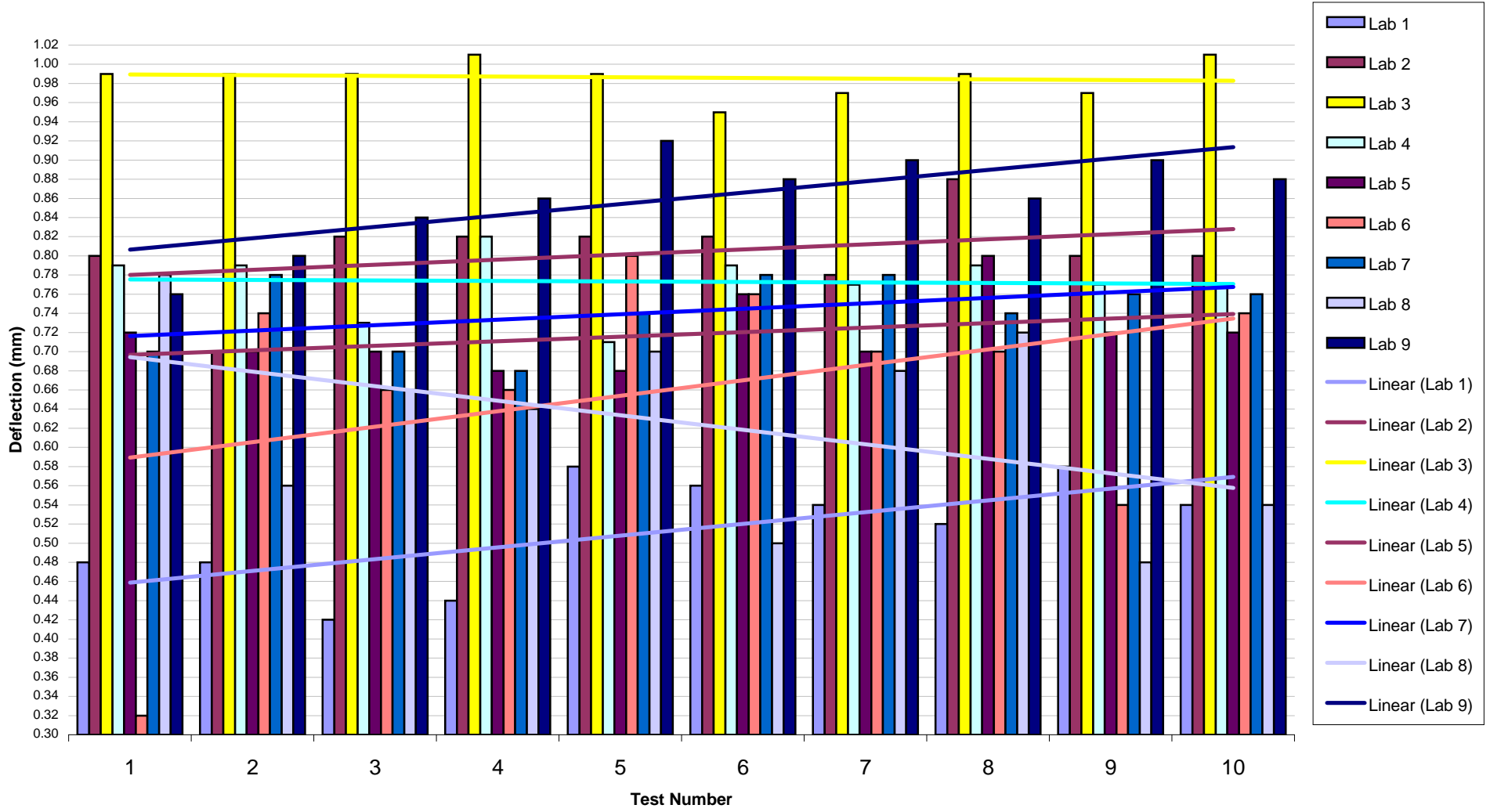
### Site #2 Benkelman Beam Proficiency Scatter By Site



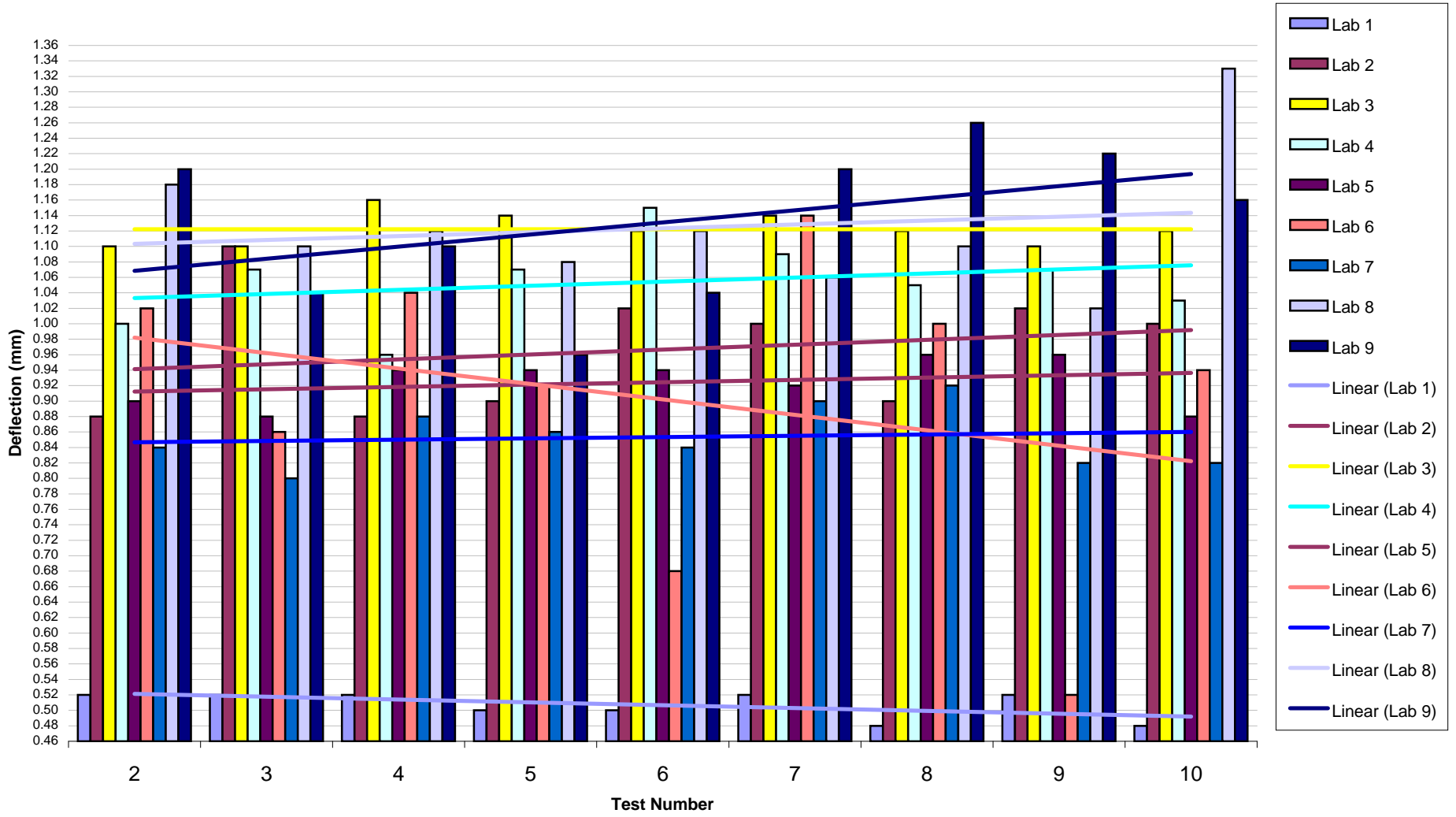
### Site #3 Benkelman Beam Proficiency Scatter By Site



### Site #1 Benkelman Beam Proficiency Scatter By Test Order

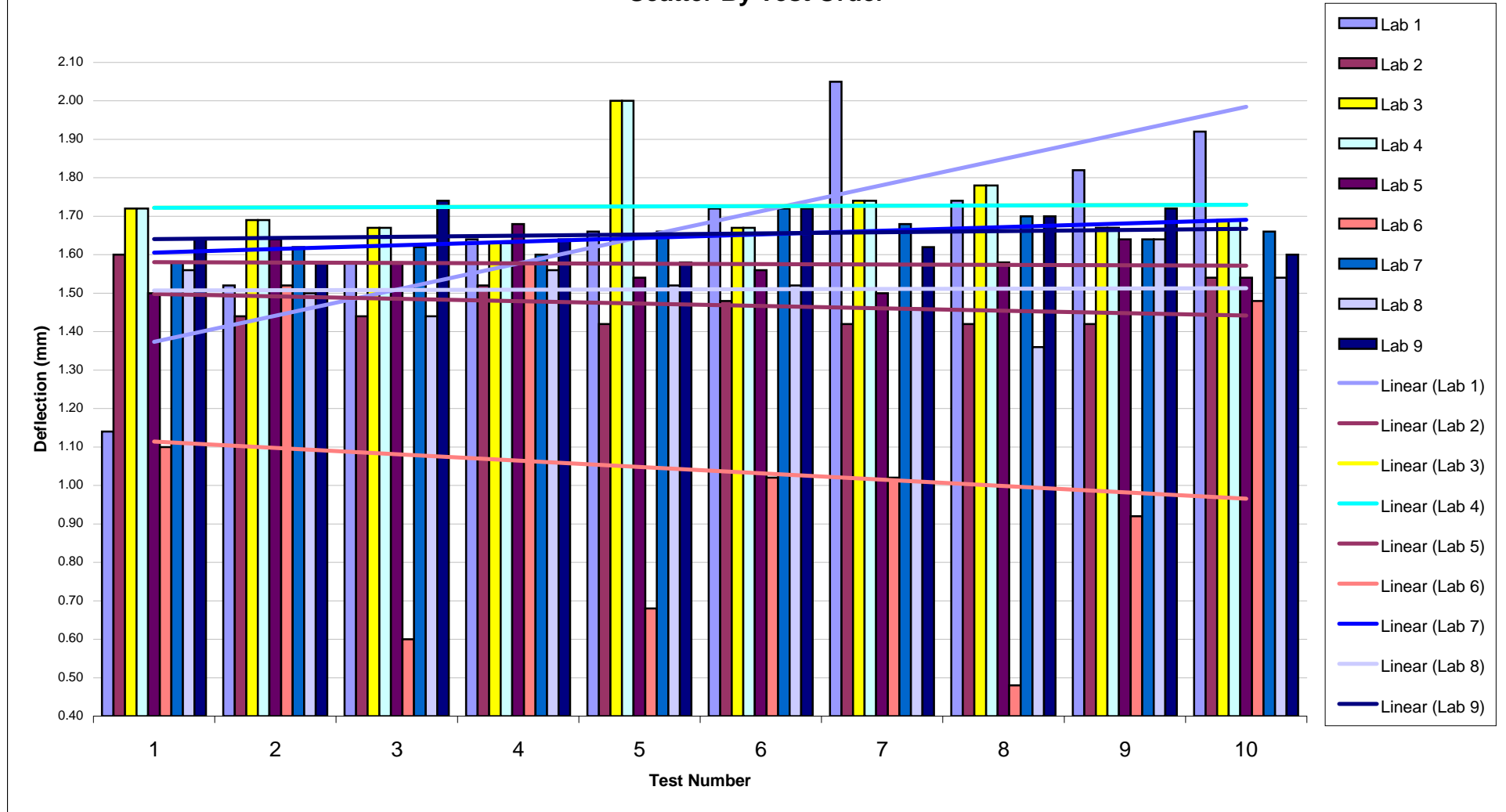


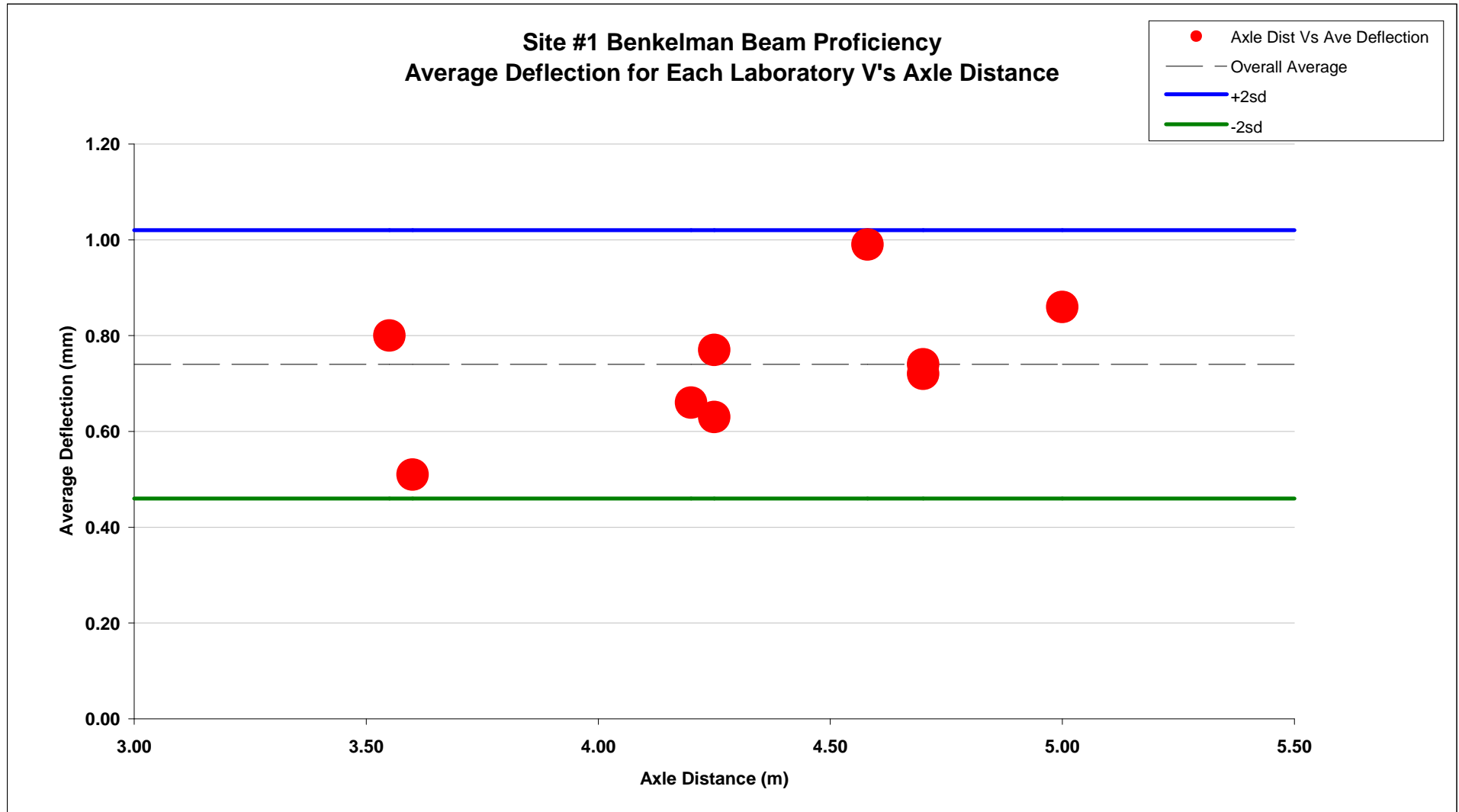
### Site #2 Benkelman Beam Proficiency Scatter By Test Order

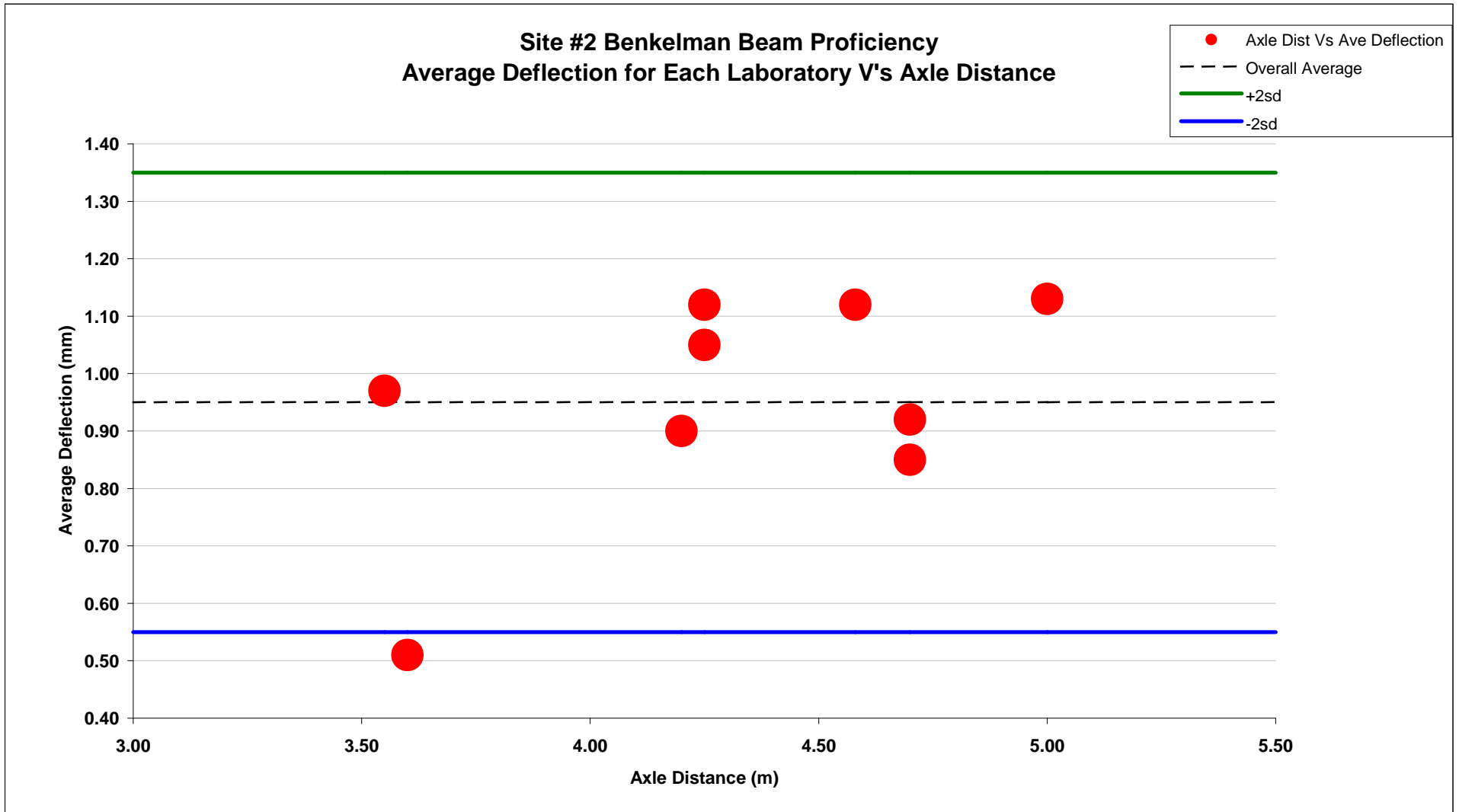




### Site #3 Benkelman Beam Proficiency Scatter By Test Order







### Site #3 Benkelman Beam Proficiency Average Deflection for Each Laboratory V's Axle Distance

- Axle Dist Vs Ave Deflection
- - - Overall Average
- +2sd
- -2sd

