Utilization of Scrubber Waste in Dry Cast Concrete Products

Presented by:

Tanya Turpin

Brad Cobbledick

Company:

Brampton Brick Limited

Presentation Outline

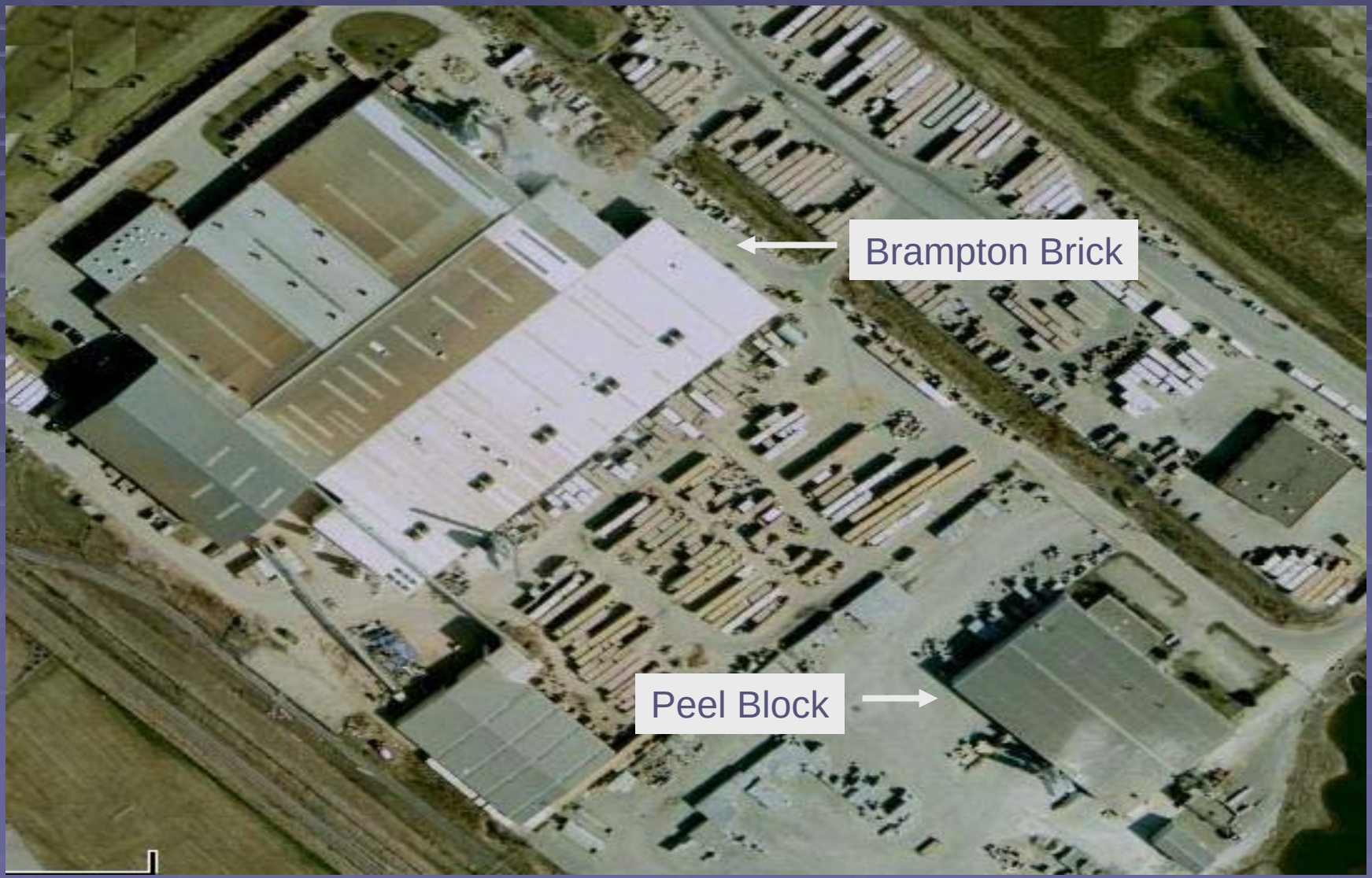
Background
Purpose
Batch Design

- Mix Design
- Materials
- Machinery

Physical Properties Measured

- Colorimeter
- Compression
- Absorptions

Plant Locations



Background

Brampton Brick Scrubber Limestone Waste

•100 Tons per Month

Peel Block Concrete Plant Raw Materials

•1280 Tons per Month

Substituting Raw Material

•7%-8%
•89.6 Tons- 102.4 Tons

Purpose

To manufacture a durable concrete product using limestone waste from a scrubber, as a substitute for a portion of the aggregates.

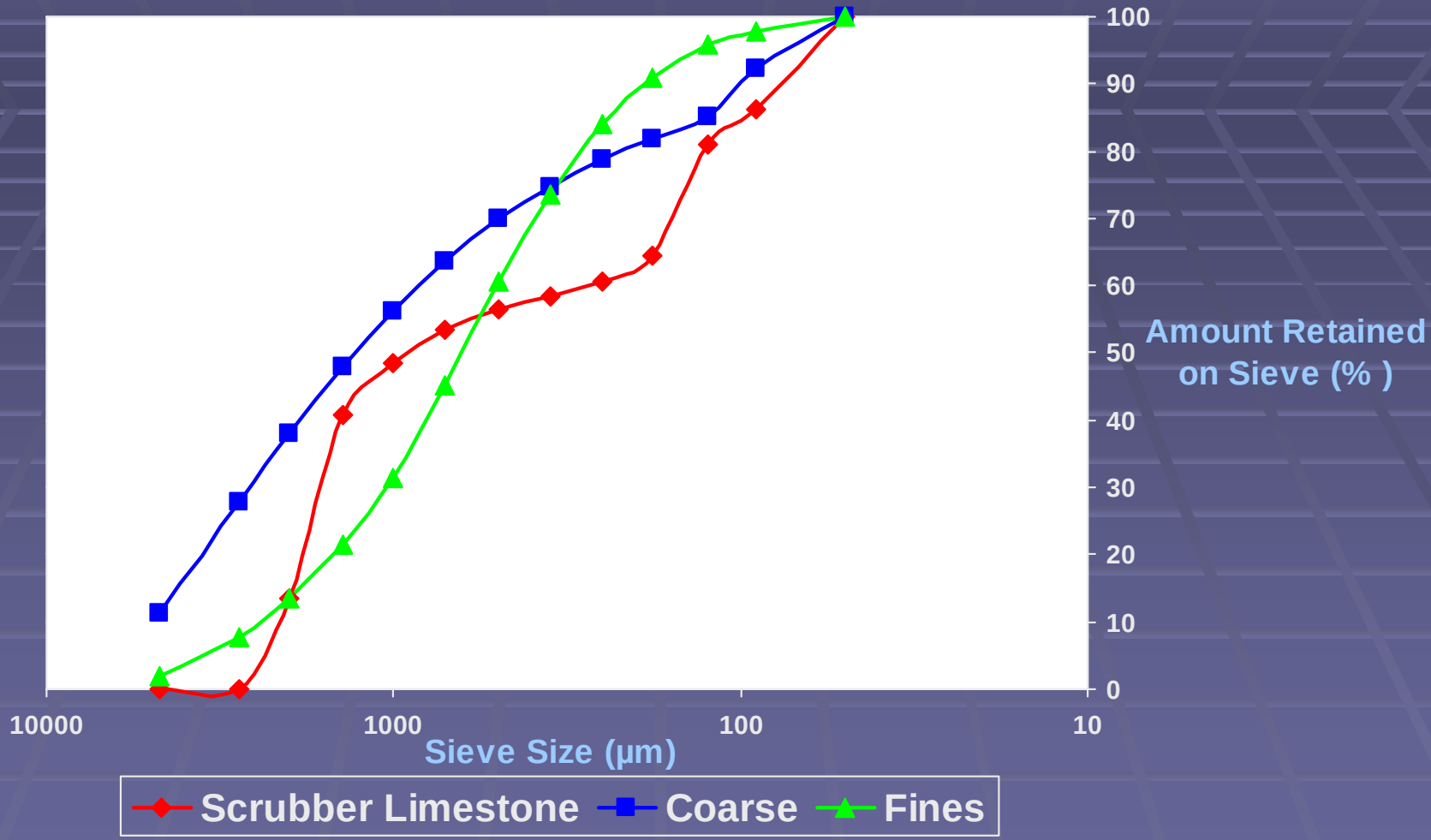
Raw Material

Fine Aggregate

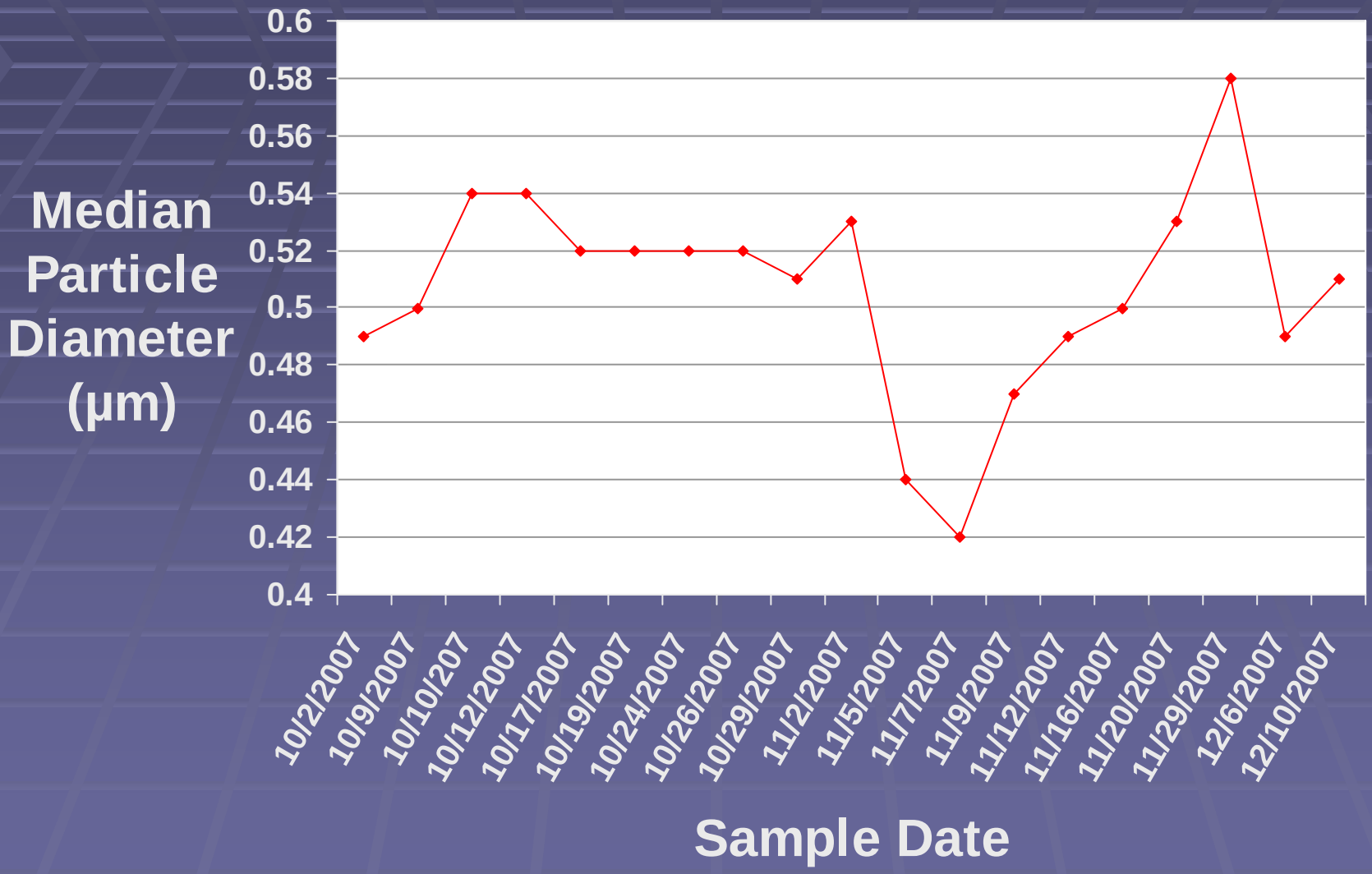
Coarse Aggregate

Scrubber Waste

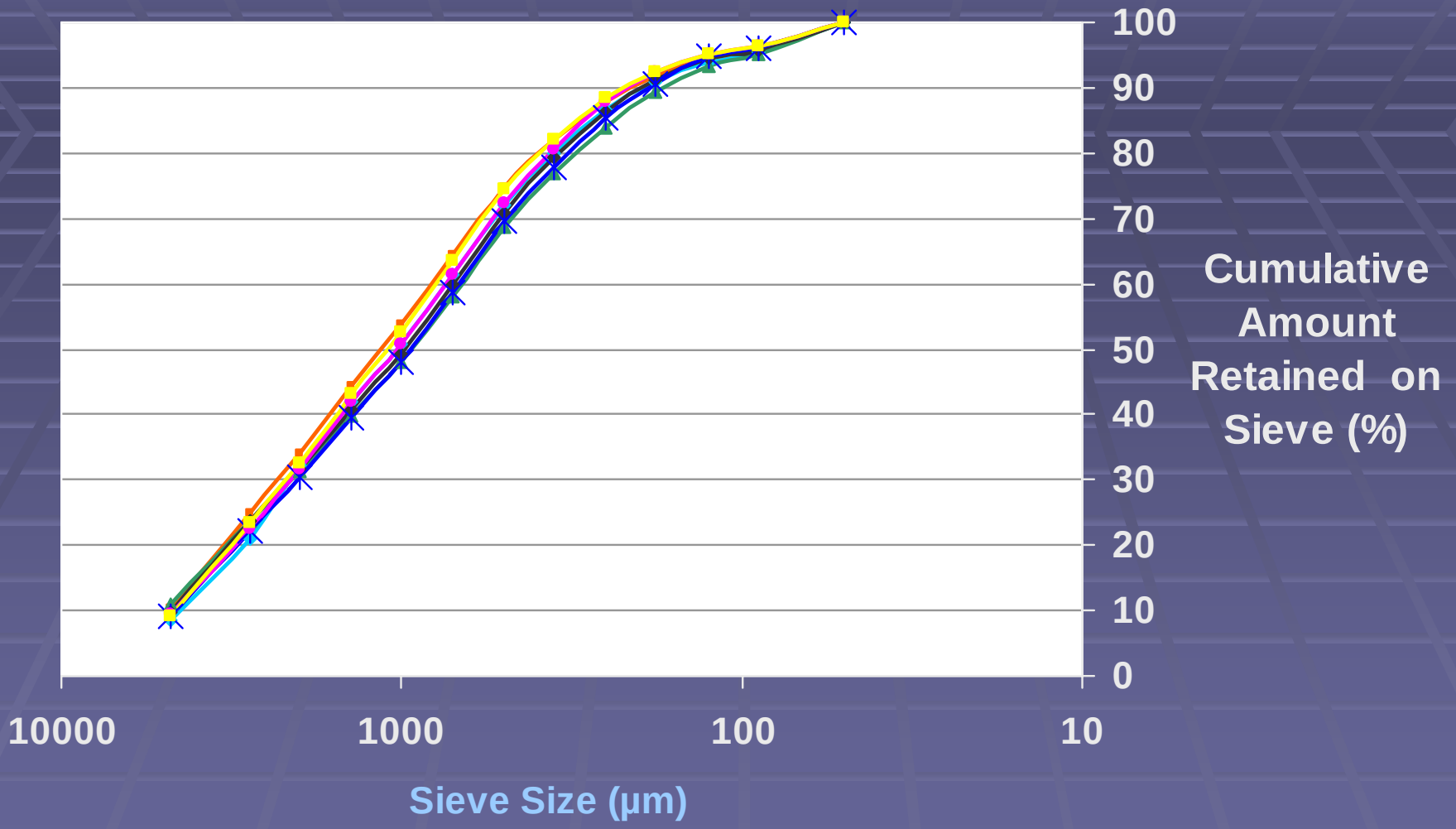
Sieve Analysis Raw Material



Median Particle Diameter



Experimental Results of Scrubber Limestone Addition Sieve Analysis



Laboratory Scale Batch Design

Table 2: Laboratory Batch Design

Product	Total Cementitious Material (g)	Total Fines (g)	Total Coarse (g)	Total Aggregates (g)	Batch Total (g)
Masonry	315	2100	2700	5000	5315

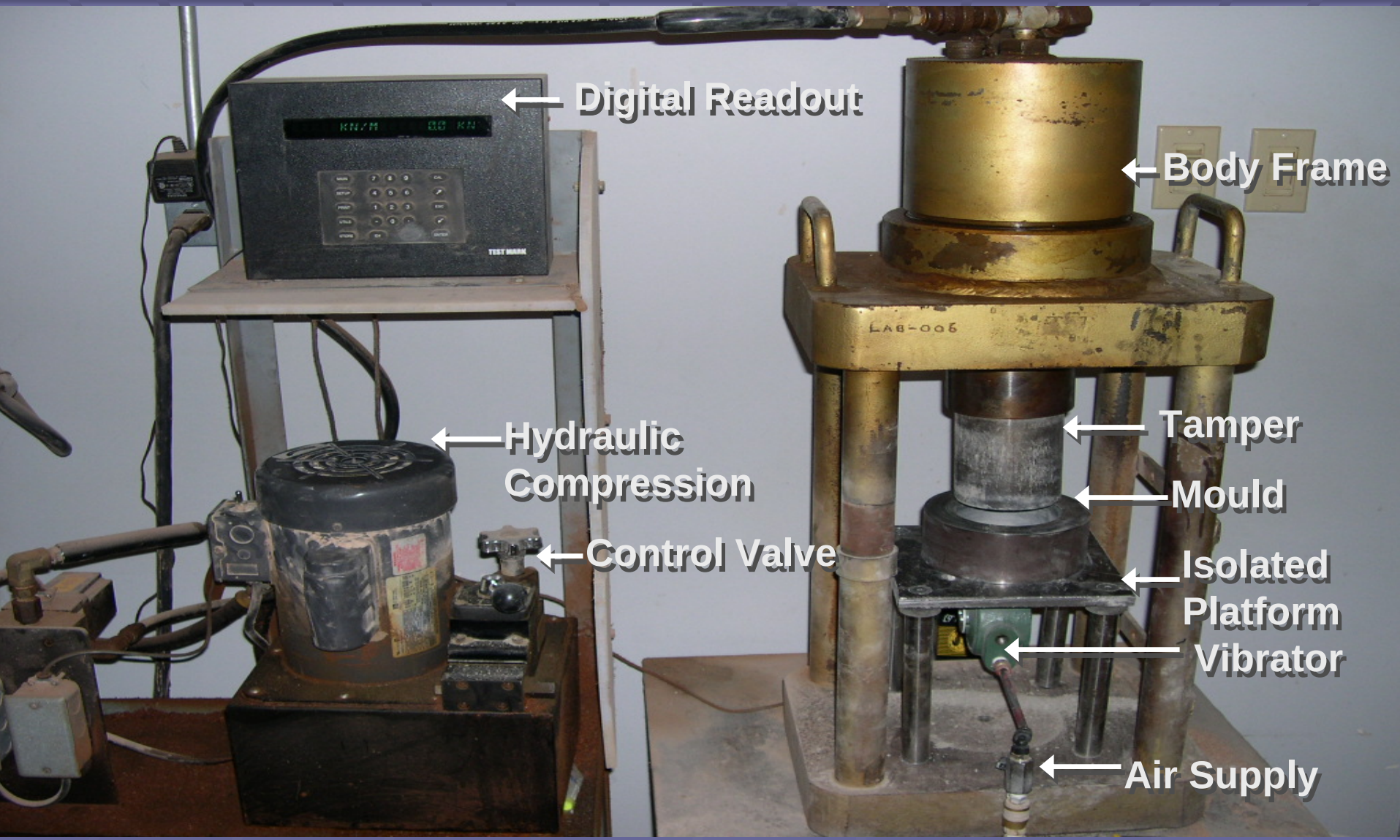
Batch Design

Table 1: Peel Block Aggregate Percentages

Product	Fines in Batch (%)	Coarse in Batch (%)	Cementations Material in Batch (%)
Masonry	54.6	39.1	6.3

Machinery

Diagram 1: Laboratory Compression and Vibration Machine



Final Product

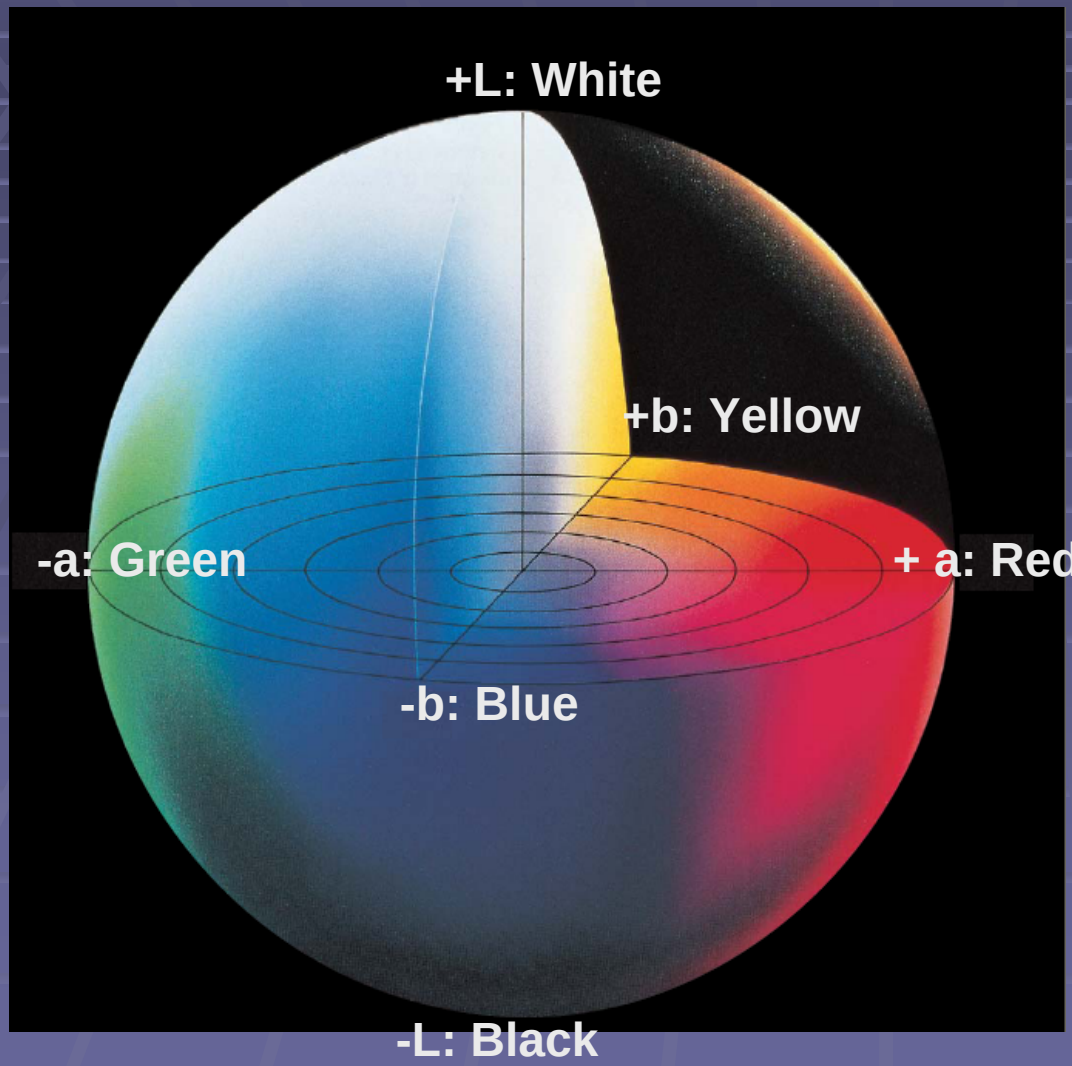
Concrete Puck

Physical Properties of the Final Product

- *Colorimeter Data*
- *Compressive Strengths*
- *Water Absorptions*

Colorimeter Data

Diagram 1: 3-D Colorimeter Wheel



Lightness

- Measure of brightness.
- Represented as “L”.

Hue

- Measure of colour.
- Represented as “a”.

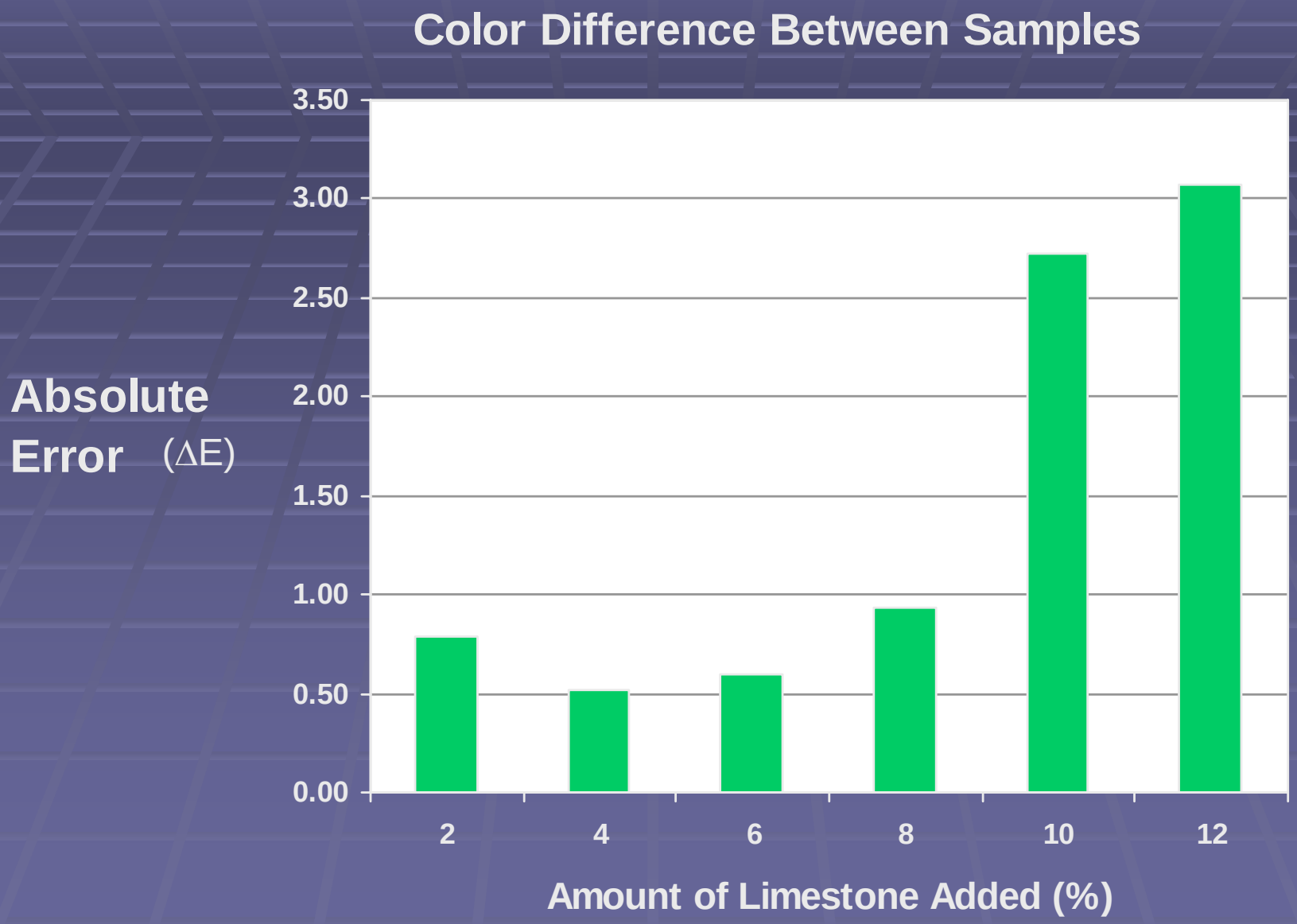
Chroma

- Measure of intensity or charity.
- Represented as “b”.

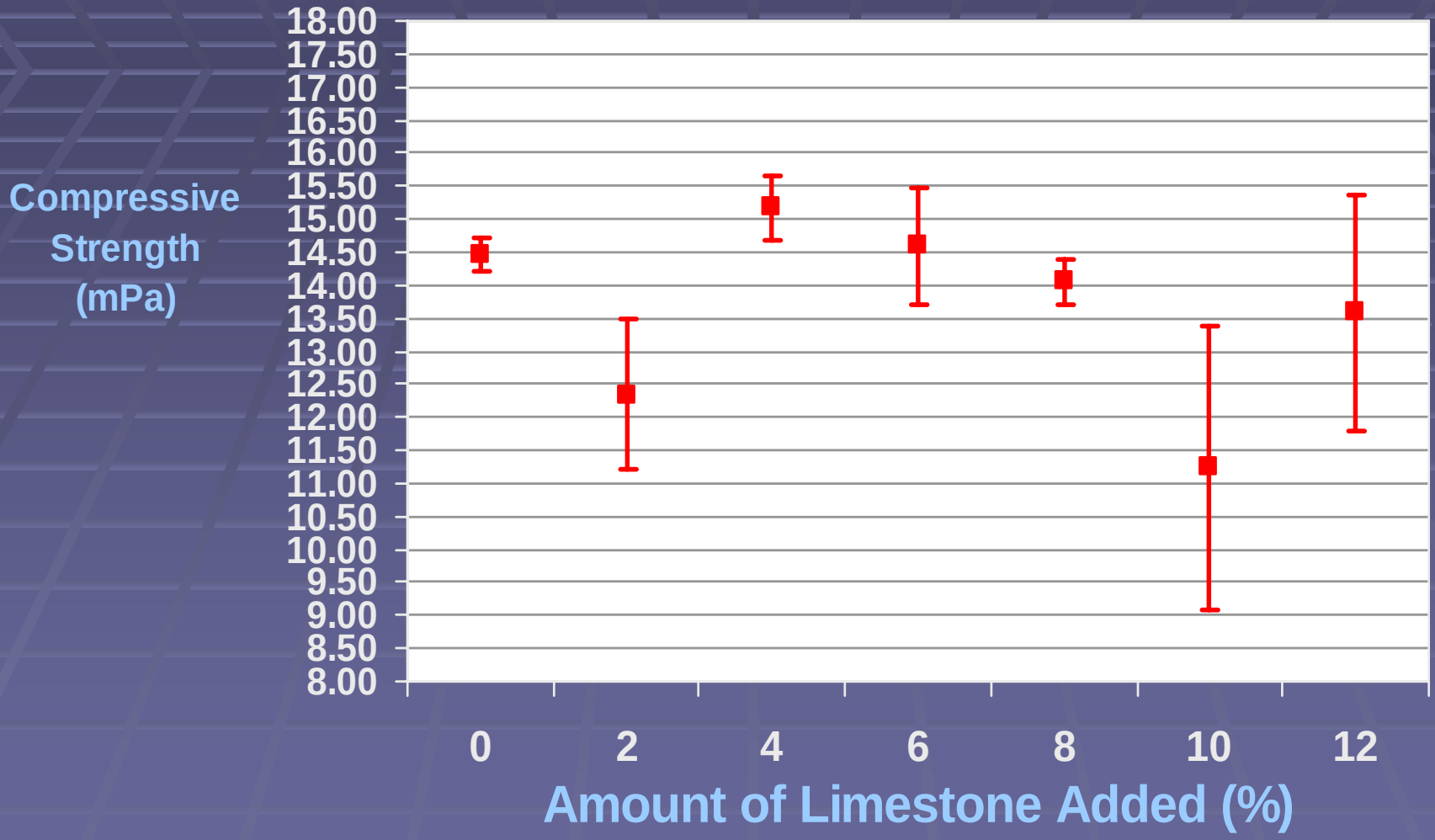
Color Difference

Absolute Error = ΔE

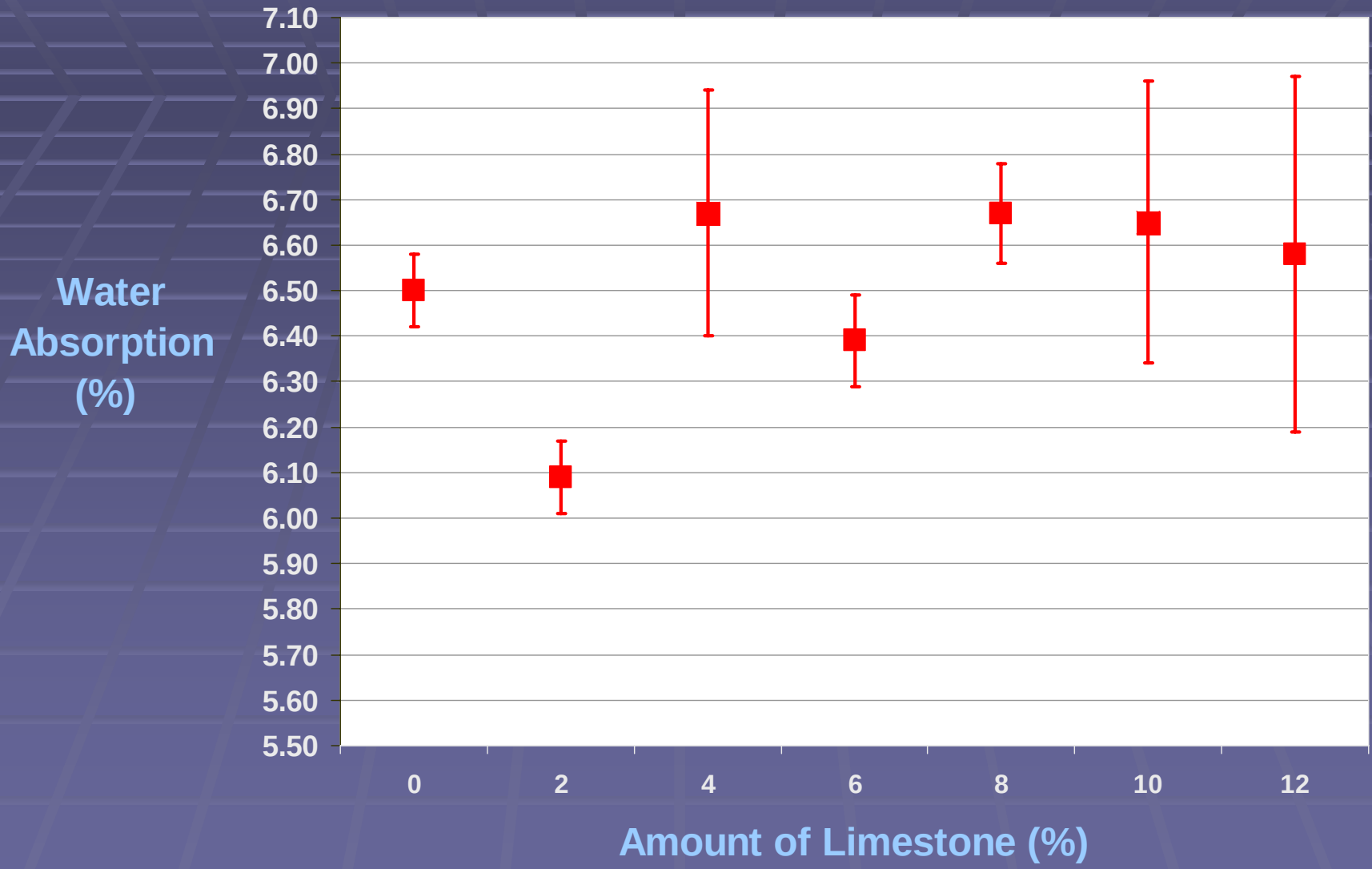
$$\Delta E = \sqrt{(\Delta L)^2 + (\Delta a)^2 + (\Delta b)^2}$$

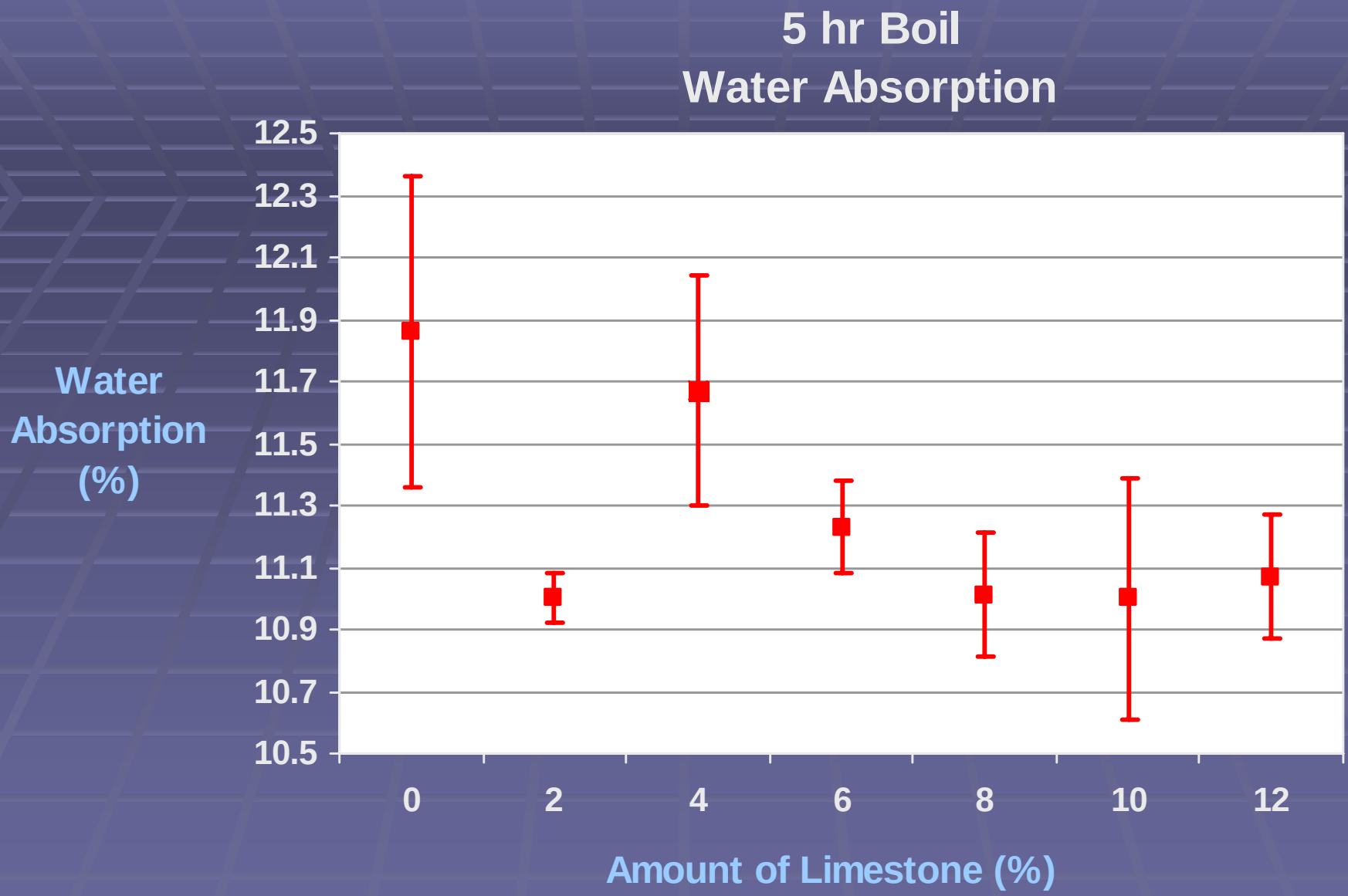

Color Difference Between Samples
Absolute Error (ΔE)
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2
4
6
8
10
12
Amount of Limestone Added (%)

Compressive Strength vs Limestone Addition

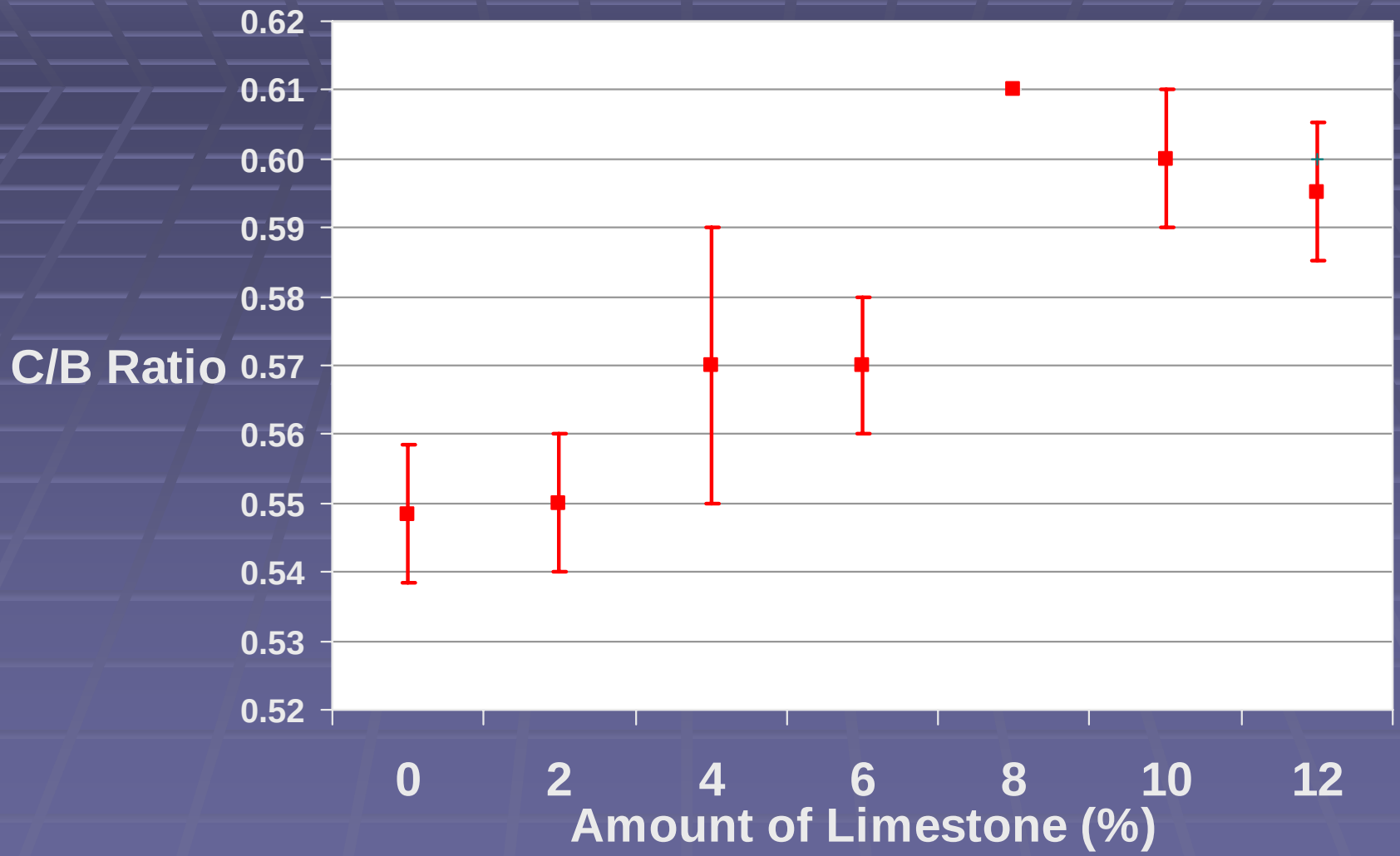


24 hr Cold Water Absorption




5 hr Boil
Water Absorption
Water Absorption (%)
12.5
12.3
12.1
11.9
11.7
11.5
11.3
11.1
10.9
10.7
10.5
0
2
4
6
8
10
12
Amount of Limestone (%)

Saturation Coefficient



Future Trials

- Replace Screening with the Sand
- Freeze -Thaw
- Plant Trial

Acknowledgements

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Questions

Comments