



# *The Predictable Nature Of Materials Stabilized With Polymer Agents*

*Case Study:  
City of Scottsdale, AZ  
EarthCare Consultants  
Midwest Industrial Supply, Inc.*





# *Problem*

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- How Do You Know That a Polymer Stabilized Material Has Been Installed Properly and Will Perform As Expected?
  - Near & Long Term Strength
  - Structural Uniformity & Durability
  - How To Evaluate & What Is Expected?
    - Lab Tests Qualify The Material, Not The Installation
    - Conventional In-place Tests Interfere With & Delay Construction





# *Objective*

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- Install & Evaluate Polymer Stabilized Materials in Terms That Are Related to Performance.
  - Quantify Performance in Terms of Material Strength
  - Develop a Generic Construction Specification
  - Develop a Simple In-place QC Method That Is an Index of Strength





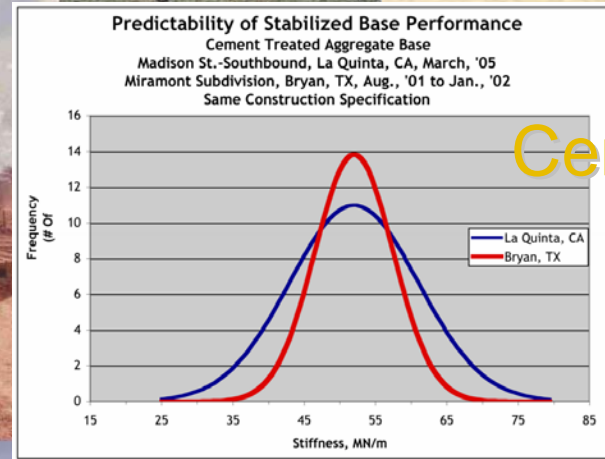
# *Approach*

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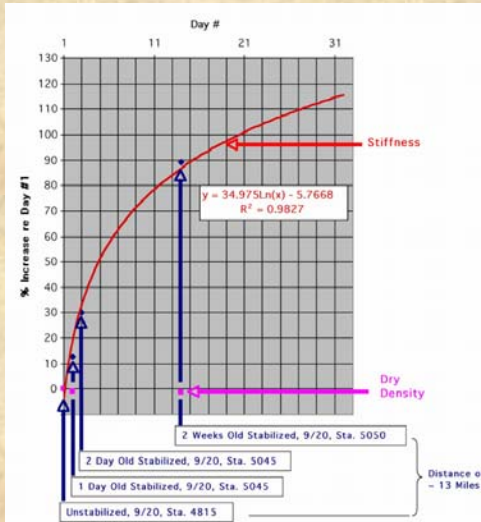
- Adaptation Of Lessons Learned With Cement, Lime, ...
  - Unpaved, Low Volume Roads Constructed Of Sandy Soil
  - Soil~Sement Stabilization
    - Blend Of Acrylic And Polyvinyl Acetate
    - Million Molecule Matrix of 100 nanometer molecules
    - Unique Adhesive Properties
  - In-place Stiffness Characterization Per ASTM D 6758
    - Several Sites of Various Ages
  - Trial or Supplemental Specification
  - Standardize Specification & QC Method
    - Refine With Use On All Major Soil Classes



# Basis

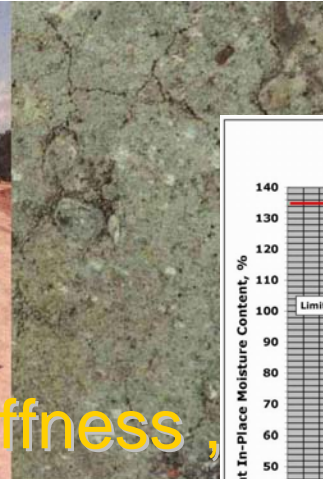


Cement

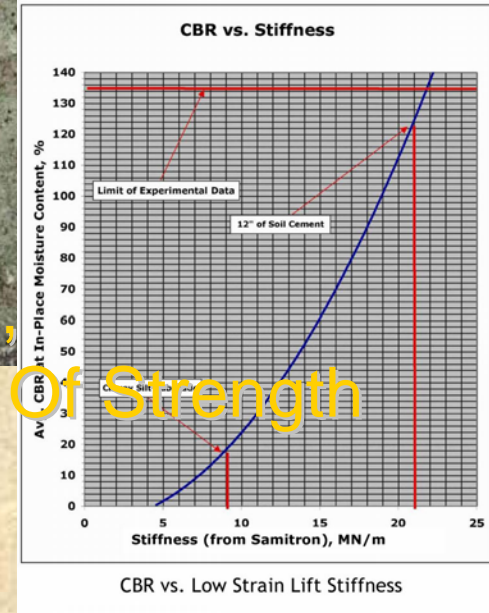


Lime

Koch Materials  
 Lime Stabilized A-2-4 Subgrade  
 Cure Rate Characterization  
 New Mexico Route 44,  
 July, 2000



Stiffness,  
 An Index Of Strength



# City of Scottsdale, AZ

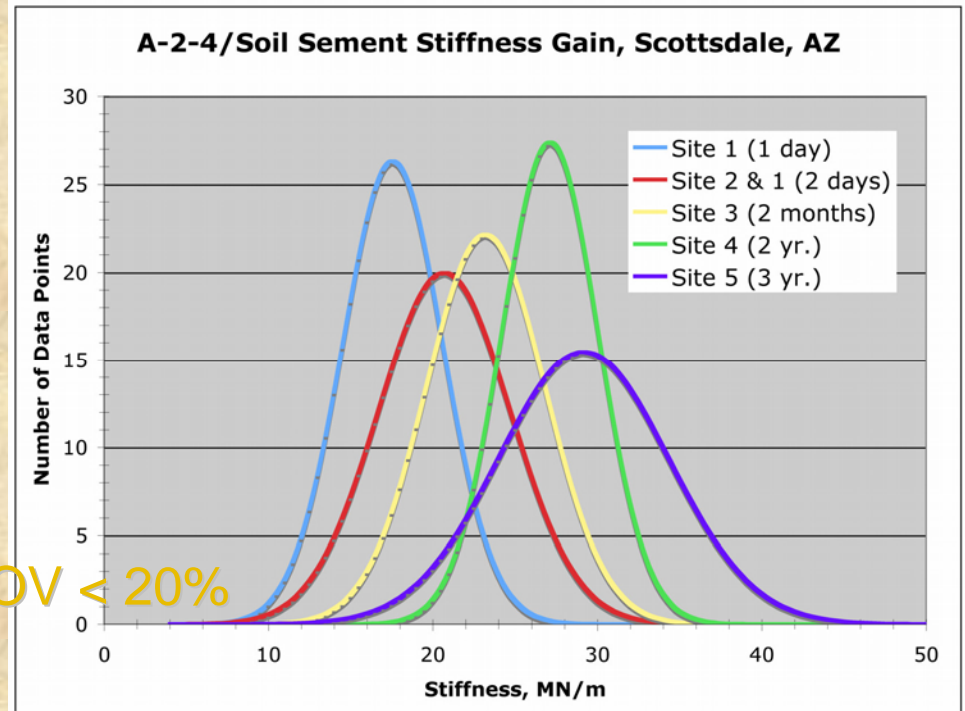
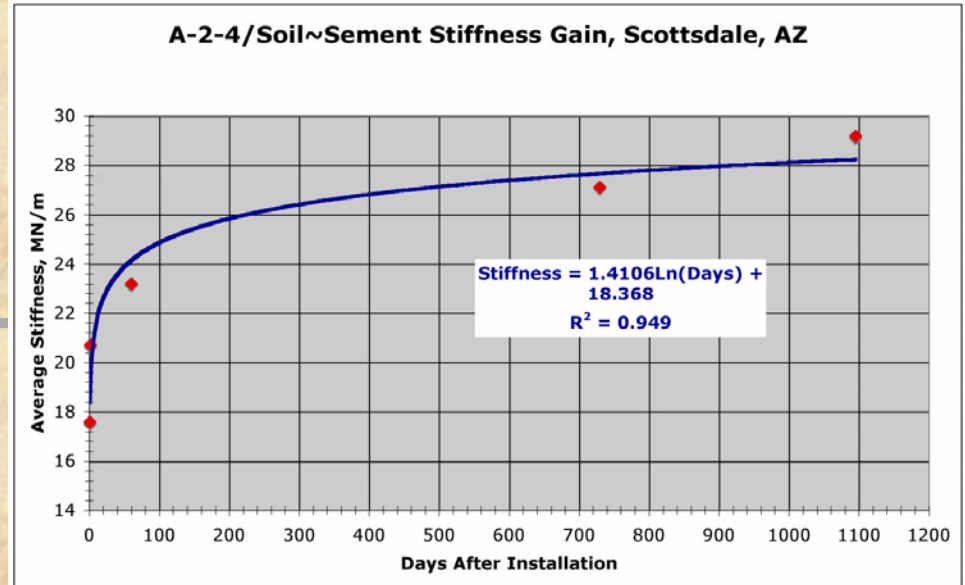


- May, 2007
- A-2-4 Silty Sand
- 5 Miles Of "Asphalt Like" Roadway
  - Ride Quality & Durability
  - Minimum Dust
- Amended With Soil~Sement<sup>®</sup>
  - Blend Of Acrylic And Polyvinyl Acetate
  - 4" Depth
  - Typical Dilution Rate Of 1:8
  - Top Sealed Post Compaction
  - 0.36 gal/yd<sup>2</sup> At Depth
- Stiffness Characterized As A Function Of Age



# Results

- Data Highly Correlated
- Strength Gain Consistent With Time
- Performance Appears Predictable
- Performance Is Uniform
- Pavement Like Performance
  - Structural Uniformity (Wear)
  - Maintenance (Yearly Soil~Sement<sup>®</sup> Topical Application)
  - Dust (Virtually None)

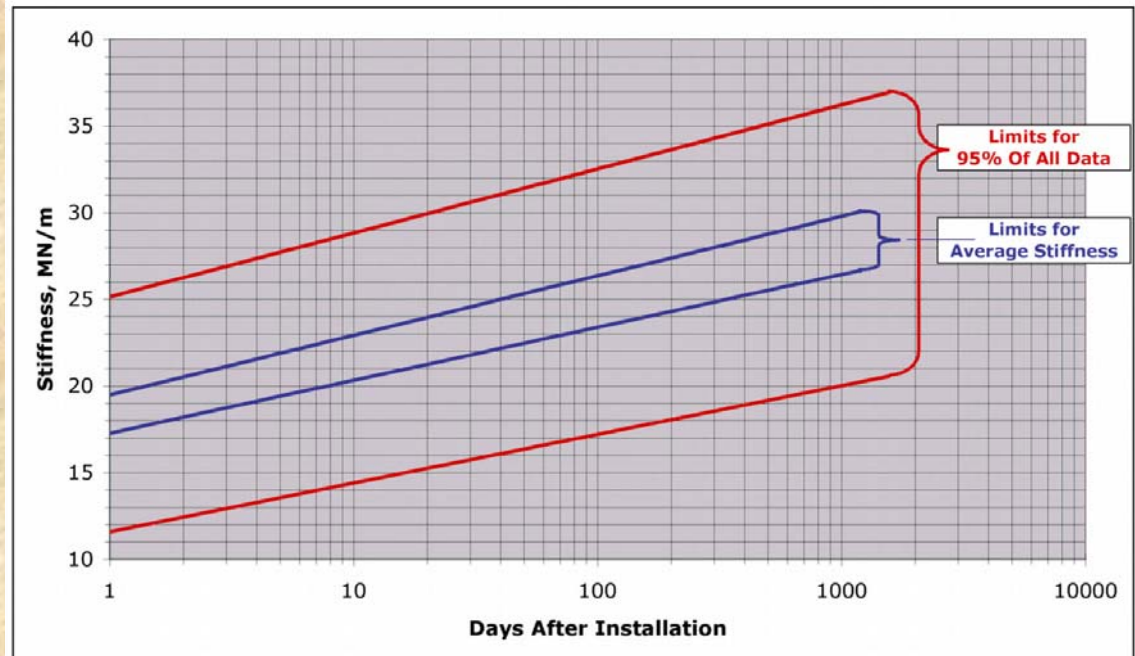


# Trial Specification

- Conventional Moisture & Density at Compaction
- 16 Stiffness Measurements per 1000' Using ASTM D6758 on Day 1 & 3
- Average Stiffness & Individual Measurements Within Specified Limits
- Valid for the Same Mix and Construction Methods As Those Used in Scottsdale, AZ



Acceptable Stiffness Limits  
Soil-Sement Amended ASSHTO A-2 Silty Sand







# *Conclusions & Recommendations*

## **Stiffness Controlled Stabilization Appears to Be Simple & Predictable**

- Stiffness Measurements Readily Quantify Strength Gain for Soil~Sement<sup>®</sup> Amended Silty Sand
- Performance Is Predictable Enough to Be Specified
- Characterize Additional Sites to Refine Specification
  - Mojave County, AZ
  - USMC Base, 29 Palms, CA
- Use Stiffness As an In-Place Index of CBR Measurements, Employed to Customize Mixes & Determine Expected Strength Gain

