

# Soil Cement Roads

## Richland County MT

2017 Rapid City  
Roads Conference



### Presenter:

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LLC, Missoula MT

### Key Personnel:

Adam Smith, Richland Co Public  
Works Director, Sidney MT

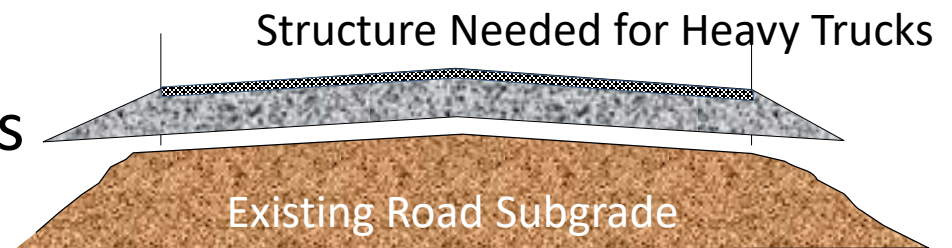
Josh Johnson, Interstate  
Engineering, Sidney MT

William Vischer, Pavements  
Engineer, Carter MT

Google “soil  
cement montana”

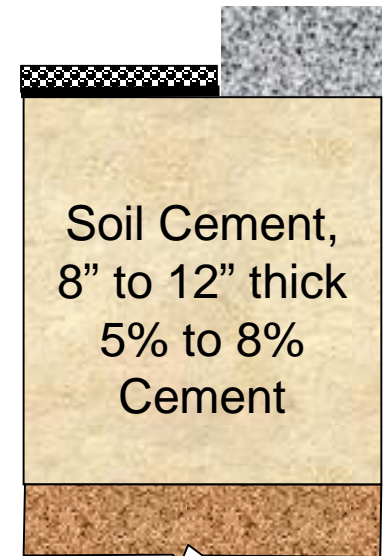
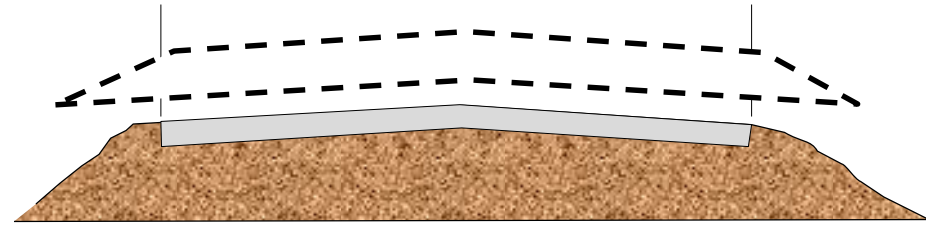
# Richland Co Rural Road Problems-2010

- Road Damage → Heavy Oil Field Trucks
- Clay subgrade soils, soft spots
- Limited Resources
  - Costly Gravel
  - 10 M\$ road budget, 100M\$ problem
- Hot Mix Paving Issues
  - Not enough road width for thick gravel base layer
  - Too costly per mile
  - Construction process too slow



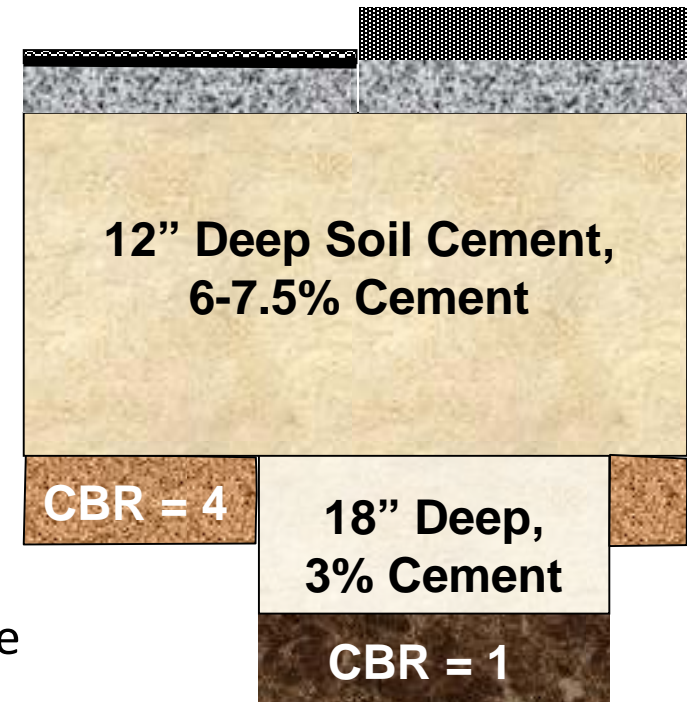
# Answer → Subgrade Soil Stabilization

- No subgrade widening, lower cost, ½ mile/day
- Lab mix designs with subgrade soils
  - Lime, Fly Ash, Portland Cement
- 2010 Test Sections
  - 4 miles with Portland Cement – 8, 10 & 12 inch thickness
  - Wearing Surface
    - Double Chip with & without geotextile
    - Otta Seal with High Float Emulsion
    - 4" layer of gravel treated with Calcium Chloride and Bentonite Clay



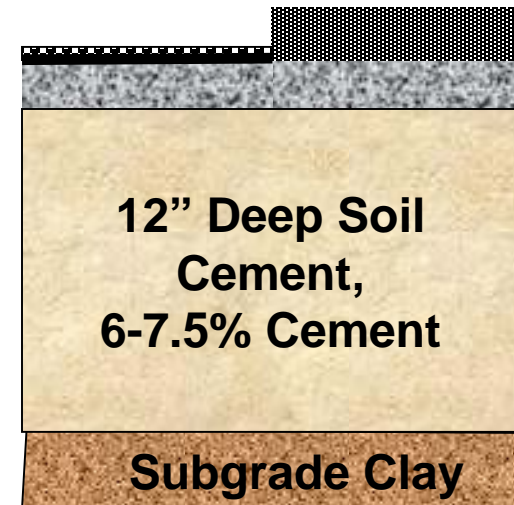
# 2011-2013 Soil Cement Construction

- 55 Miles Built – less than ½ cost of hot mix paving
- 2011 – 10” Soil Cement 2012 & 13 – 12” Soil Cement
- Worst Designs – Double Chip on Soil Cement – no gravel base
- Best Designs
  - Subgrade Soft Spot Treatment – 18” depth with 3% Cement
  - Structural Layer – 12” depth with 6% to 7.5% (depending on clay soil)
  - Wearing Surface
    - Double Chip with 3 inches gravel base
    - 3 inches hot mix with 3 inches gravel base



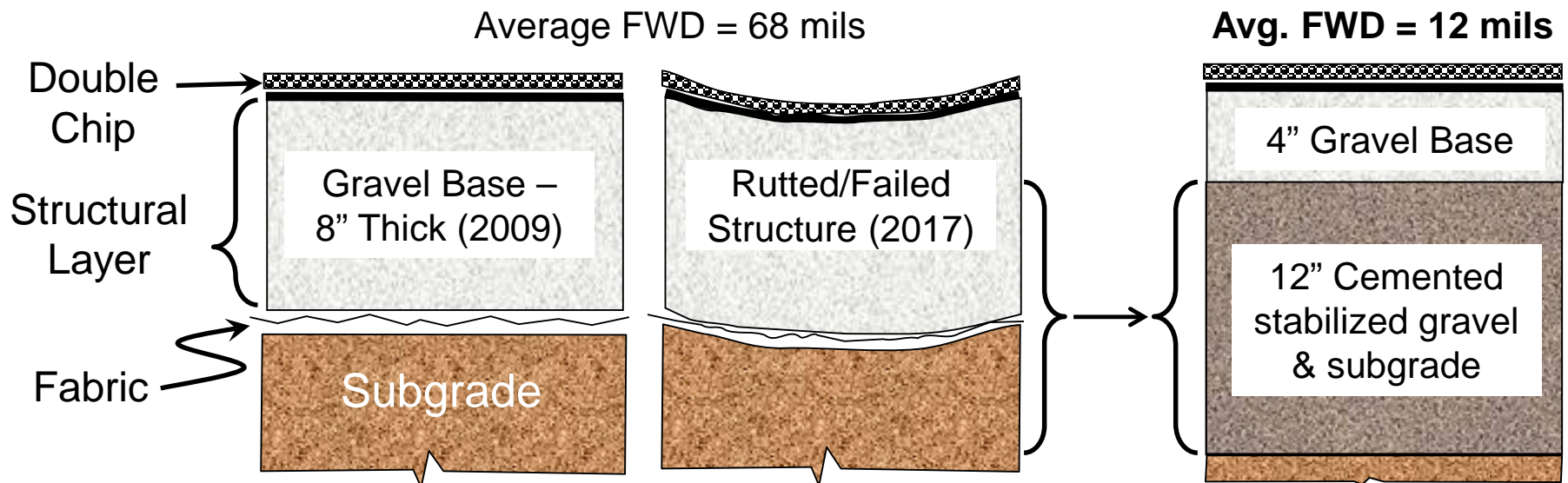
# Strength Testing of Soil Cement

- Falling Weight Deflectometer on 39 miles
  - Spring & Fall for 8 years (2010-2017)
- Long Term Results after 8 years
  - Typical: 3 to 5 times as strong as gravel base
  - Worst Case: 2 times as strong as gravel base
  - Long Term Costs: much less than  $\frac{1}{2}$  cost of hot mix option
- Best Designs
  - Clay Soil Stabilization:
  - Wearing Surface for Heavy Truck Traffic
    - Double chip on 3 inches gravel base
    - 3 inches hot mix on 3 inches gravel base



# County Road Crew Use of Portland Cement, 2015-2017

- 2015 - Permanent stabilization of gravel road soft spots with 3% cement (CBR 1 → 12)
- 2016 - Rebuilt 2011 soil cement problem areas – one mile in 39 miles
- 2017 - Stabilized 1 mi. of failed BST road



# Recommendations

- Consider cost savings with soil cement for upgrading high traffic routes
- Select the right stabilizer for you soils
- Consider Portland cement for permanent repair of subgrade soft spots