

Pervious Concrete Mixtures and Production

Chapter 2



Basic Ingredients

- Cement
- Coarse Aggregate
- Water
- Little or No Sand
- Admixtures



Portland Cement

- Hydraulic Cement (reacts chemically with water)
- Primarily made from limestone
- Small amounts of clay and iron
- Heated in kiln to 2600 to 3000 degrees
- Changes chemically into clinker
- Ground into powder with small amount of gypsum
- ASTM C 150, Type I or II are typical
- ASTM 595 and ASTM C 1157 can be used
- Producer establishes cement content

Supplementary Cementitious Materials

- Fly Ash (up to 25%)
- Slag (up to 50%)
- Will increase set time
- Increase curing time



Admixtures

- Set Controlling
 - Retarders
 - Hydration Stabilizers
- Air Entraining
- Viscosity Modifying Admixtures (VMA)
- Integral Color
- Dry shake color not recommended



Aggregate

- Texture and Porosity Affected by
 - Aggregate Size
 - Aggregate Grading
 - Aggregate Angularity
 - Paving Equipment
- Volume of aggregate per cubic yard of concrete is about 27 cubic feet



3/8" Rock Surface Texture



1" Rock Surface Texture



Surface Texture Comparison

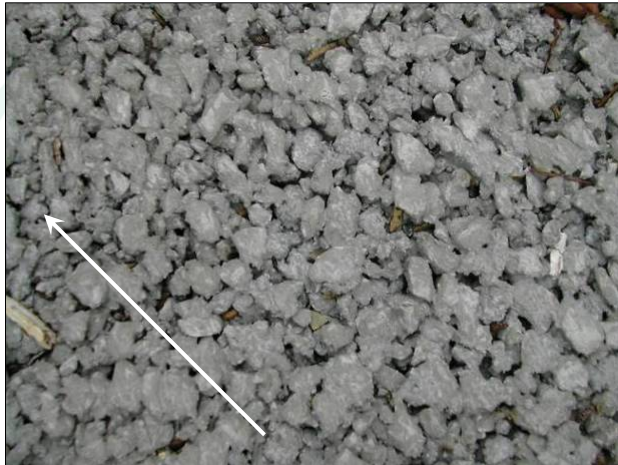


3/8" rock or gravel is most common size due to smoothness and appearance

Aggregate Angularity



Roller Screenshot



Spreader Box



Uniformity: Water to Cement Ratio

Lb. Water

Lb. Cement = W/C Ratio

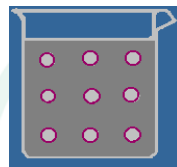
5# Water

10# Cement = 0.50 W/C Ratio

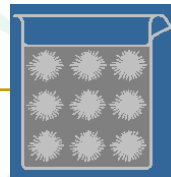
3# Water

10# Cement = 0.30 W/C Ratio

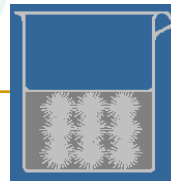
Water/Cement Ratios



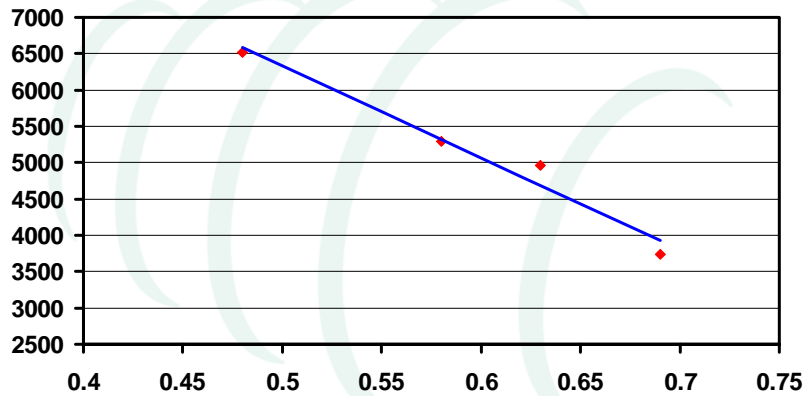
High W/C
Ratio, High
Water
Content, Low
Strength



Low W/C
Ratio, Low
Water
Content, High
Strength



Water Cement Ratio Curve



w/c of Pervious Concrete

Lb. Water

Lb. Cement = W/C Ratio

208# Water (No Fines) = 0.37 W/C Ratio

564# Cement

283# Water (Normal) = 0.50 W/C Ratio

564# Cement

Water Content

- Contractor Controls Water Content to Match:
 - Equipment
 - Weather
- Water may be added at the jobsite

What if w/c is Low?



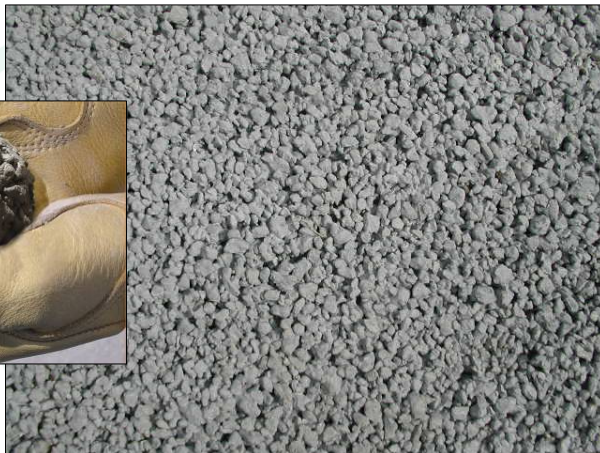
Pavement Ravels

What if w/c is High?



Pavement Seals

w/c is Just Right



Quality Control

- Strength testing is not appropriate
 - Slump is not appropriate for acceptance
 - Unit Weight is the only test for acceptance
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- Water content of concrete must match contractor's equipment
 - Don't be afraid to add water to get the right consistency
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Unit Weight – At the Plant

- The unit weight is simply the weight of one cubic foot
- Critical in quality control
- Unit Weight should be +/- 5 pcf of design
- Should be performed at the plant



ASTM C 138

Pulling Cores

- Larger projects might require cores
- Measure thickness
- Dry Density



ASTM C 42

Truck Mixed

- Truck Mixed
- Mix 70-100 revolutions



Central Mixed

- Central Mixed
- Delivered in ready-mix or dump truck
- For larger projects
- Used with Pavement Spreaders



Delivery Schedule

- Takes more time to discharge
- Stiffer in warm weather
- 8 cubic yards per truck
- Smaller loads may be necessary
- 40 min. between trucks
- Place in 60 min.

