

Aggregate: Sand & Gravel

Martín Serrano
Ricky Jimenez
Building Technology
Aimee Buccellato
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Aggregate

- A combination of coarse particulate materials gathered into a mass
- Materials that do not react to cement and water
- Coarse aggregate: aggregate particles retained on a 4.75 mm sieve
- Fine aggregate: Particles that pass through a 4.75 mm sieve.
- Ex: gravel, crushed gravel, granite, pebbles, ceramic, sand, limestone, gypsum.



Photo by: Encyclopedia Britannica

Ancient History

- Assyrians and Babylonians used clay as the paste to connect and keep things together
- Egyptians used a paste mixing limestone and gypsum
- Romans developed the first type of cement
 - Consisted of various aggregates and hydraulic mortar



Photo by: Richard Armstrong

Modern History

- James Parker -1796
 - Discovered how to make hydraulic cement by calcining the aggregates of Roman concrete.
- James Frost
 - 1811- Patented a hydraulic cement made by calcining limestone chalk and clay in a wet mill.
 - 1822 – Elevated the temperature to eliminate CO2
- Joseph Aspidin
 - Portland Cement: Which combines concrete, mortar, and stucco at extremely high temperatures to form a clinker (nodules 3-25mm in D)



Photo by: Martin Serrano

Uses

- Mortar
 - To stick construction blocks together and fill spaces between them.
- Concrete
 - Achieved by combining aggregates and cement, which fills the gaps between the aggregate particles.
 - Ex: wall foundations, pavements, CMU.
- Add stability
 - By friction between the aggregate particles and the clay filling the spaces between them.
- Provide a draining layer
- Protect from frost damage



Photo by: Cement.org

Origins and Manufacturing

- Natural Sources
 - Gravel pits
 - River run deposits
 - Rock quarries
 - Pumice, scoria, volcanic cinders
- Manufactured aggregates
 - slag waste from iron and steel
 - Styrofoam beads



Photo by: Helderan Cement Group

Production Process

- 1ST locate a natural source of these materials.
- 2nd Chemical composition is tested to ensure that it is stable for construction
- 3rd Extract as large quantities
- 4th mixed as desired with cement.



Photo by: CDE Global Inc.

Source for Notre Dame

- Aggregate is extracted in river and rock bed around Indiana
- Kuert Concrete Inc.
 - 3113 Lincoln Way West, South Bend, In 46628
- Delivered to Notre Dame

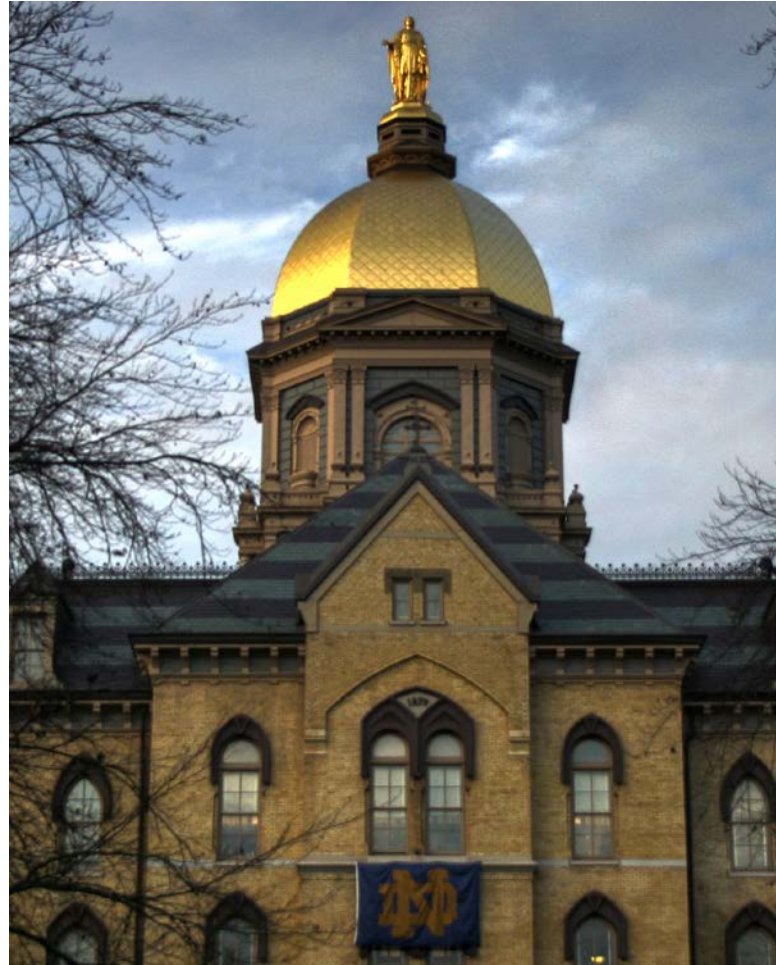


Photo by: Notre Dame University

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