Block I Aggregate Properties

Reading material: Hot Mix Asphalt (Textbook): Chapter 1; Superpave handbook SP-1 (reference book)

Major Topics in this Block:

Part I Aggregate Production
Part II Physical Properties
Part III Aggregate Gradations

Part I Aggregate Production

Production (self-reading text book page 123-135):

Quarry Operations:

a) Remove the overburden material to expose the rock
b) Blasting: remove sound rock,
c) Hauling: using trucks,
d) Get the rocks to the aggregate feeder,
e) Screening (grizzley): remove small pieces, which are the result of weathered rock,
f) Crushing: produces stock piles of different sizes of aggregates.

Crushing:

- Affects the particle shape properties and gradation
- There are 4 types of crushing (mechanical reduction):

a) Impact: sharp impingement of one object against another.
b) Attrition: reduction of materials by a rubbing action
c) Shear crushing: trimming or cleaving action
d) Compression: compressive forces between two surfaces

- It is essential that the properties of the final product be consistent. This requires that the parent rock being fed into the crusher has consistent physical properties (such as specific gravity and absorption) ➔ Quality control ensures that the varia bility within physical properties is within an acceptable range.

Aggregate Sampling (ASTM D75)

- Very important for all test results depend on it
- Randomly selected for quality control
- Representative (average) for mix design
- Materials segregate in stock files and trucks
- The best sampling is to take different samples and combine them to get a represe ntative sample.
- In the laboratory, divide the field sample into smaller test samples by a sample s plitter or by quartering (ASTM C702)

Mineralogy:

- It provides information on some physical and chemical properties
- It affects the mechanical strength, chemical durability, skid resistance, and moistur e damage.
- Mineralogy is measured by petrographic examination using microscopes and X-ray scanning.

Chemical Composition:

- Chemical properties have little influence on performance (vs. physical properties)
- Mainly affects adhesion of asphalt binder to aggregates and compatibility with ant istripping additives
- Stripping: poor adhesion of aggregates to asphalt in the presence of water
- Aggregates that have affinity to water are called hydrophilic (water-loving).
- Aggregates that have affinity to asphalt are called hydrophobic (water-hating).