CIVL 3137
Homework 2

1. An aggregate sample has an oven-dry mass of 3225 g, an SSD mass of 3264 g, and a <u>bulk</u> volume of 1243 cm³. Calculate the volume of the absorbed water and the <u>net</u> volume of the aggregate. You can assume the mass density of water is 0.9975 g/cm³ (at 23°C).

2. Calculate the apparent, bulk (OD), and SSD relative densities and the absorption of the aggregate in the previous problem.

3. A coarse aggregate sample has an SSD mass of 3002 g, a dry mass of 2952 g and an apparent mass suspended in water of 1854 g. Calculate the apparent, bulk (OD), and SSD relative densities.

4. When the aggregate in the previous problem was submerged in water, what <u>net</u> volume of water was displaced by the aggregate particles?

5. If the aggregate in the previous problem was submerged in a vat of ethanol instead of water, what would be its apparent submerged mass? Assume the mass density of ethanol is 0.7893 g/cm³ (at 23°C).

6. An SSD sample of sand has a mass of 507.2 g. A pycnometer has a mass of 662.3 g when filled with 500 ml of clean water. Ajfter adding the sand and refilling it to the 500-ml mark, the pycnometer has a mass of 978.3 g. After drying in an oven overnight, the sand has a mass of 493.9 g. Calculate the apparent, bulk (OD), and SSD relative densities per ASTM C-128.

7. An LA Abrasion test is performed on a crushed limestone being considered for use in a concrete mix. The initial mass retained on a No. 12 sieve was 5008 g. After 1000 revolutions in the abrasion device, the mass retained on the No. 12 sieve was 2759 g. Calculate the abrasion loss and state whether or not this aggregate would meet the TDOT specifications for coarse aggregate.

8. A sodium soundness test is performed on the crushed limestone from the previous problem. The initial mass retained on a 5/8" sieve was 1012 g. After 5 cycles of soaking and drying, the mass retained on the 5/8" sieve was 956 g. Calculate the soundness loss and state whether or not this aggregate would meet the TDOT specifications for coarse aggregate:

9. Below are the gradations of two gravels proposed for use in making portland cement concrete:

Sieve Opening	Percent Passing A	Percent Passing B
25.0 mm (1")	–	100
19.0 mm (3/4")	–	96.4
12.5 mm (1/2")	100	48.5
9.50 mm (3/8")	91.7	12.7
4.75 mm (No. 4)	13.0	2.9
2.36 mm (No. 8)	4.2	–
1.18 mm (No. 16)	2.0	–

What are the standard size numbers of these two aggregates per ASTM D448?