**Sieve Analysis Activity Handout** **Name_____ per_____**

**GROUP #: _____**

How does math get used in road construction? Consider the roads we all use. What is involved in building a road? A road can't be built on just the "regular" untouched ground for many reasons but primarily because the natural ground does not have the right mixture of sand & gravel and is most likely too soft and won't support the traffic over time. Eventually, the road could fail causing a dangerous situation. Thus, contractors will use different types of materials to construct the road for optimum performance.

Dilemma: How do you make sure the material you are using is correct?

This activity will replicate on a small scale what road contractors deal with on a large scale with every project. It is crucial to determine the type of material you are working with and if that material is correct for the application. Soils engineers determine the best materials for the type of road being built and give the contractors a sieve (gradation requirement) for the materials to be used. This application is used based on the type of traffic required, from small roads in remote areas of Alaska to large airports that must be able to support large jet airplanes.

For this activity there will be 4 groups with specific job functions per person. The goal of this exercise is to separate the particle sizes of sand & gravel to get weight measurements of each size. This will help determine if the material is of the correct mixture required by the project sieve.

**Step 1:** Choose a jar of material and get an accurate weight. **(HINT – there are 16 ounces per pound)**

1. Total Weight of Jar (completely full as given): _____ ounces

**Step 2:** Pour the material into the given copper screens (make sure to put on lid).

**Step 3:** Shake the material side to side, up and down, side to side for 6 minutes. Take turns within the team as this can be strenuous.

**Step 4:** Remove the 3/8" screen and pour material into one of the empty measuring pour cups. Label this material **"A".**

**Step 5:** Put lid on top of the No. 4 screen and shake the material for 2 minutes.

**Step 6:** Remove the No. 4 screen and pour material into one of the empty measuring pour cups. Label this material **"B".**

**Step 7:** Put lid on top of the No. 8 screen and shake the material for 2 minutes.

**Step 8:** Remove the No. 8 screen and pour material into one of the empty measuring pour cups. Label this material **"C".**

**Step 9:** Pour the remaining material left in the catch pan into one of the measuring pour cups. Label this material **"D".**

**Step 10:** Take the empty jar and get an accurate weight.

1. Total Weight of Jar (empty w/lid on): _____ ounces
2. Total Weight of Jar (completely full) subtract weight of empty jar to get the Total Weight of all the materials: _____ ounces

**Step 11:** Pour material **"A"** into the jar and get an accurate weight.

1. Total weight of material "A" w/jar: _____ ounces
2. Weight of empty jar w/lid: _____ ounces
3. Subtract to get Total weight of material **"A":** _____ ounces
4. Divide the weight of material "A" by the weight all materials and multiply by 100 to get the percentage of material retained on the 3/8" screen: _____ % (carry out to the hundredths place)
5. Challenge! How much material passed through the 3/8" screen: _____ %

**Step 12:** Pour material **"B"** into the jar and get an accurate weight.

1. Total weight of material "B" w/jar: _____ ounces
2. Weight of empty jar w/lid: _____ ounces
3. Subtract to get Total weight of material **"B":** _____ ounces
4. Divide the weight of material "B" by the weight all materials and multiply by 100 to get the percentage of material retained on the No. 4 screen: _____ % (carry out to the hundredths place)
5. Challenge! How much material passed through the No. 4 screen: _____ %

**Step 13:** Pour material **"C"** into the jar and get an accurate weight.

1. Total weight of material "C" w/jar: _____ ounces
2. Weight of empty jar w/lid: _____ ounces
3. Subtract to get Total weight of material **"C":** _____ ounces
4. Divide the weight of material "C" by the weight all materials and multiply by 100 to get the percentage of material retained on the No. 8 screen: _____ % (carry out to the hundredths place)
5. Challenge! How much material passed through the No. 8 screen: _____ %

**Step 14:** Pour material **"D"** into the jar and get an accurate weight.

1. Total weight of material "D" w/jar: _____ ounces
2. Weight of empty jar w/lid: _____ ounces
3. Subtract to get Total weight of material **"D":** _____ ounces
4. Divide the weight of material "D" by the weight all materials and multiply by 100 to get the percentage of material retained in the catch pan: _____ % (carry out to the hundredths place)

**Step 15:** Determine if your material would be acceptable to use on the project if it had to meet the below sieve analysis? YES NO (circle one)

**Sieve Analysis:**

1. % of material passing the 3/8" screen = 55 – 70 %
2. % of material passing the No. 4 screen = 40 – 54 %
3. % of material passing the No. 8 screen = 25 – 39 %

Group activity discussion about outcomes and key points from the exercise to relate to how contractors must use information like this to do estimates, procure materials, allocate resources, and schedule projects.