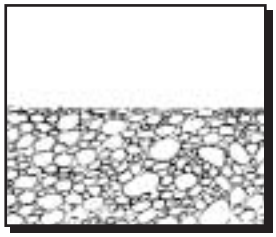
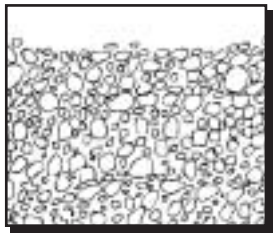
COMPACTION EXPLAINED

How to ensure your wall is compacted properly

Retaining wall specifications generally focus on features such as grid lengths, grid spacing, interblock shear strength, soil type, block to grid connection and other components that constitute a geogrid reinforced soil mass. Wall specifications also include compaction requirements (ie: 90% of Standard Proctor) but little else is mentioned on the importance of compaction. We will discuss what compaction is, how to measure it, how to achieve it, and why it is so important.

- Compaction is the process of rearranging soils to consolidate the space occupied by the soil particles while forcing out excess air and water. Compaction is accomplished by applying a force or vibration to the soil mass. The efficiency and success of any compaction effort will be dependent on the type of soil being worked, the moisture content present in the soil mass, and the technique used to compact the soil. In retaining wall design, cohesion is not considered when analyzing external and internal stability. Properly compacted soils help to strengthen the internal strength of the soil mass by aligning the soil particles together and increasing the coefficient of friction when a load is applied to the soil, and reducing undesirable settlement.





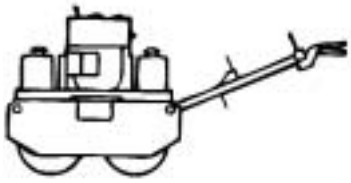
- Compaction is measured using an industry standard proctor test. The level of compaction in a soil mass is determined by comparing the density of the soil as measured at the site with the density of that soil type as defined in the Standard Proctor tests. For example, specifications often require compaction to be 90 percent of Standard Proctor. This means the on-site soil density must be equal to 90% of the maximum achievable compaction.

- Compaction is achieved by applying three basic types of force to the soil mass.

1. Vibration – Vibratory machines send waves of motion through the soil to reposition and consolidate the soil particles. Forces of this type do a good job of forcing out excess air within the uncompacted mass. Vibratory machines work well in noncohesive soils; soils comprised of at least 50 percent sand or gravel.

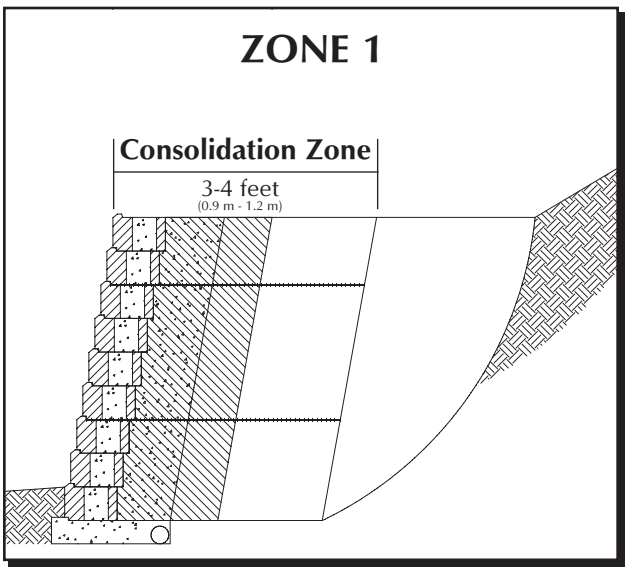
2. Ramming – Rammers simulate the action of someone striking the ground with a hammer. This type of force is a good choice with highly cohesive clay soils because it breaks down the soil masses and forces out excess moisture.

3. Static – By simply using the weight of the machine being passed over the desired area, compaction can occur. Generally this will only yield compaction of a thin top layer where the load is applied. A heavy, walk-behind roller can develop good results when used in 8 in. (20.3 cm) lifts. Don't count on obtaining proper compaction by driving your construction equipment back and forth over soil.



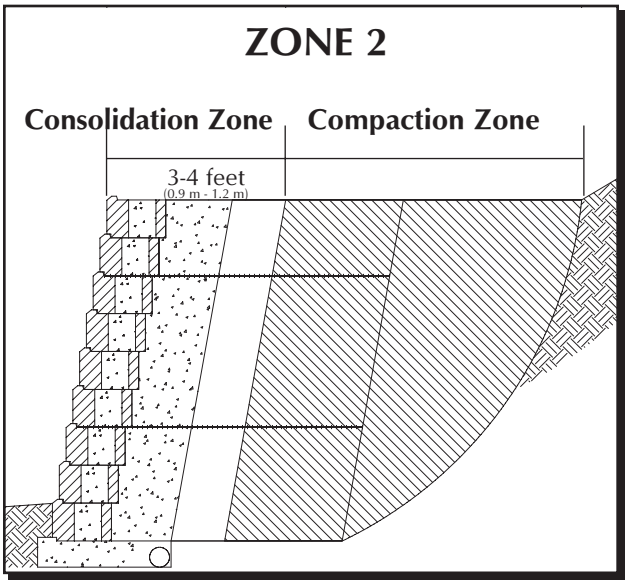
Compaction Explained - Con't.

The compaction process will be helped by controlling the amount of moisture in the soil. When the proper amount of water is present, it acts as a lubricant to help consolidate the soils as they are being compacted. If there is too much water in the soil, the water will take up space between the particles and prevent them from bonding together. If the soils are too dry, water will be required as each new lift of soil is placed to reduce the friction between the soil particles to obtain proper compaction.



When an Allan Block wall is constructed there are two distinct zones for compaction.

- **Zone One** is referred to as the consolidation zone. It's an area approximately 3 ft (0.9 m) wide behind your Allan Block wall. Compaction is required in 8 in. (20.3 cm) lifts utilizing a walk behind vibratory plate compactor. We have found that stackable block walls perform best when hand operated plate compactors are used to consolidate Zone One. Compacting the aggregate within the block cores locks the blocks together. Compacting the Zone One materials with the same plate compactor prevents overcompaction and unnecessary rotation of the wall face.
- **Zone Two** is often referred to as the backfill zone. It's the area that extends from the back of Zone One to the on-site slope or cut that you will fill to. Operating mechanized equipment in Zone Two is acceptable. Allan Block recommends that the soils in both zones be compacted in 8 in. (20.3 cm) lifts. The scope of the job and the type of soil will determine what type of compaction equipment should be used, and what degree of final compaction should be achieved.



Now let's move on to the bottom line. Properly built and properly compacted Allan Block wall structures will perform. Know the soils and their characteristics before you start your project. Stage the wall with the right type of equipment. Always build one row at a time, compacting in 8 in. (20.3 cm) lifts. Since the soils are part of the structure, they require and deserve a high quality installation. Don't build a mechanically stabilized earth structure without proper compaction. It's the best insurance you will ever buy, don't leave your job site without it.