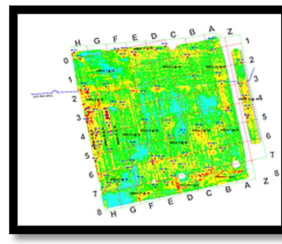
DEWATERING FLY ASH
with
LANDPAC High Energy Impact Compaction (HEIC)

Contents



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Why Dewater Fly Ash?

Fly Ash material has historically been stored in ponds and is well known for being unstable and sensitive to vibration when saturated.

Changing the water content in the material by a few percentage points has an effect on the behavior of the material. The reduction in water content increases the strength of the ash, changing the pore pressure to change from slightly positive to slightly negative, imparting cohesion and shear strength to the material.

Typical Dewatering System(s)

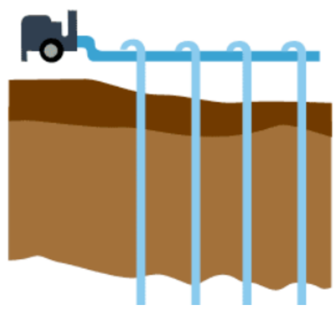
Many techniques have been applied but, in general, a combination of several may have to be used, depending on the material's characteristics, water content, and behavior during the dewatering process.

Typical Well Point System

A well documented process includes the use of a well point system. A well point system consists of a number of well points spaced around the site, all connected to a common header which is attached to one or more well point pumps. In a typical system, well points are spaced at intervals of from 1 to 3 meters. The depth to which a well point is sunk into the ground is largely determined by the nature of the subsurface soil.

Well point systems are frequently the logical and economic choice for dewatering sites where the required lowering of ground water level is on the order of 20 feet (6 meters) or less. Greater lifts are possible by lowering the water in two or more stages. The 20 feet (6 meters) lift restriction results from the fact that the water is lifted by difference between ambient air pressure and the lowered pressure created by the pump.

Well point systems are practical and effective under most soil and hydrologic conditions. Among the instances where other dewatering techniques are preferable are where water levels must be lowered greater distance than can be practically handled by the well point systems, where greater quantities of water must be moved than is practical with well points, or where the close spacing of well points and the existence of the above-ground header might physically interfere with construction operations.



Well Point Diagram

Eductors Well Systems

In a typical eductor well system a series of wells are installed with a spacing related to the soil condition. The wells are equipped with a feed pipe, a venturi ejector and a return pipe. At the head of the well, the feed pipe is connected to a high pressure feed line and the return pipe is connected to a low pressure evacuation line. The two lines are connected to a special pumping plant which supply the feed line with high pressure water and collect and evacuate the water from the evacuation line. The high pressure water going through the venturi will draw the ground water through the well screen and push it up to the surface through the return pipe. This system can lower the water table to approximately 100 feet (30 meters) in conditions where the permeability of soil is low.

Despite higher installation cost, wells are being used more and more because they often prove more economical to operate than well points. Wells can be installed at ground surface outside the construction area and will lower water in a single lift without staging. Units are generally spaced from 20 to 200 feet (6 to 60 meters) on centers. Each unit comprises a well, pump, and discharge piping. An ejector is installed at relatively close spacing similar to the array in well point systems, but requires only a single stage to effect draw down of up to 100 feet (30 meters). However, because the ejector system is very power inefficient, its use generally is limited to soil of low permeability.

LANDPAC High Energy Impact Compaction

Initial dewatering will have to be performed by typical methods, as described above. The dewatering of the ash will greatly improve its shear strength which will then allow for equipment to get onto the project area for possible excavation definite consolidation.

Further Dewatering

If a substantial amount of water is still left at depth, then a combination of vertical drains and high energy impact compaction can prove to be very useful. The higher energy created by the dynamic loading of an impact compactor will generate positive pore water pressure forcing the water to reach the surface through the drainage system. This water can then be allowed to flow away from the surface being treated. Typically, the vertical drains and compaction combination shortens the period for the dissipation of pore water pressure thus allowing for soil consolidation to take place more effectively and a lot faster.

Consolidation

If sufficient dewatering has taken place, the high energy of an impact compactor will greatly assist in an accelerated consolidation process, with an effective depth ranging between 5 and 8 feet (1.5 and 2.5 meters) at a minimum. This will uniformly increase the strength profile of the material treated with maximum induced settlement; Ash is traditionally fairly collapsible when dewatered.

If a correct and sufficient drainage system is installed/constructed, then the consolidation process is sufficiently improved, far beyond the time required to achieve the same results with a preload.

Photograph of a 3 sided 25kJ LANDPAC
High Energy Impact Compactor (HEIC)

Photograph of a 5 sided 22kJ LANDPAC
High Energy Impact Compactor (HEIC)

Keywords Associated with LANDPAC HEIC (High Energy Impact Compaction)

The following keywords are generally associated with the process of impact compaction:

- Impact loads on a continuous base.
- Increased energy and contact stresses.
- Increased maximum dry unit weight of compaction.
- Increased depth of influence.
- Thicker lift compaction.
- Increased load duration and therefore reduced shear stiffness response.
- Increased area of contact.
- Enhanced compressibility.
- 100% Coverage.
- Accelerated Consolidation.
- Continuous strength balanced profile.

- Higher operating speeds – increased productivity.
- 9,200-13,000 yd^3 (7,000-10,000m^3) per shift per machine.
- Many different applications.
- Continuous Impact Response (CIR) certification.