

Technical Talk on “General Background to Explosive Compaction” (7th December 2009)

Delivered by: Dr. Blair Gohl (President, Explosive Compaction, Inc., Canada)

by Mr. Chow Chee Meng, MIEM



The technical talk given by Dr. Gohl from Canada highlighted some general background on explosive compaction (EC) used in ground improvement works.

Explosive compaction is generally used for the following purposes:

- Reduction in static or seismic liquefaction potential
- Reduction of soil displacement potential following earthquake shaking
- Improvement of static bearing capacity and reduce static settlements (dynamic preloading)
- Reduction of tailings pond volume (increase storage capacity)
- Collapse underground voids in old mine workings or karst topography

The blast densification mechanism is illustrated in Figure 1.

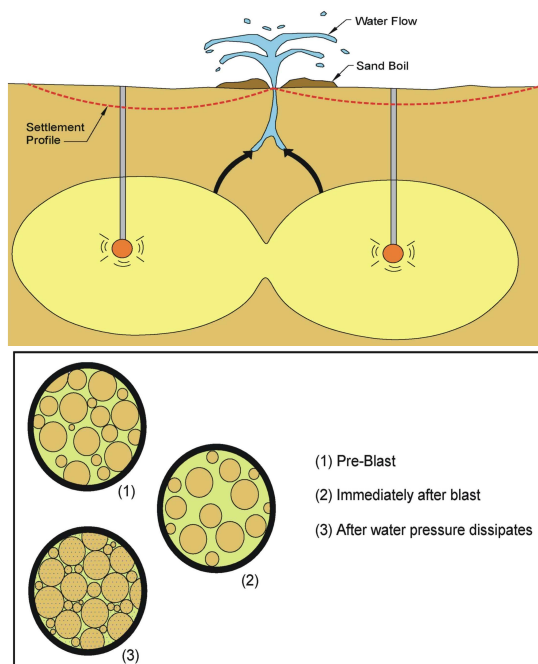


Figure 1: Blast densification mechanism

In explosive compaction works, Dr. Gohl highlighted some “perceived” disadvantages such as vibration control which can actually be designed around (e.g. sequential detonation using precision timing to minimise offsite peak particle velocity, PPV and reduce charge weight where necessary).

Dr. Gohl further illustrated some successful application of explosive compaction from case histories such as foundation densification for seismic liquefaction control in an urban environment with special emphasis on limiting offsite PPV. The project is challenging as blasting is typically carried out within 50m of structures and as close as 15m. Other case histories presented include foundation densification for Seymour Falls Dam, Quebec Hydro SM-3 Dam and Molikpaq II. Some typical results showing improved ground conditions from Quebec SM-3 Dam are shown in Figures 2.

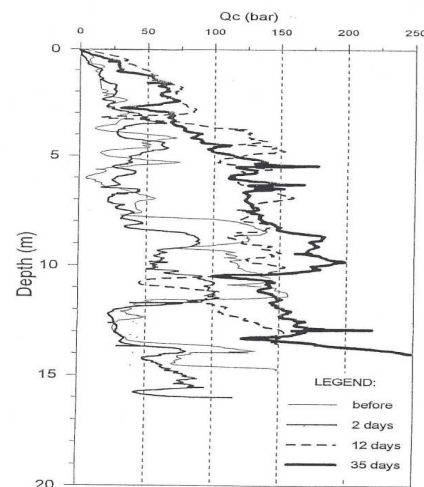


Figure 2: Time-dependent post-EC cone penetration resistance in clean river sand (Quebec SM-3 Dam)

Dr. Gohl concluded his talk by presenting an innovative use of EC as in-situ liquefaction testing which enables on-site liquefaction assessment to be carried out.