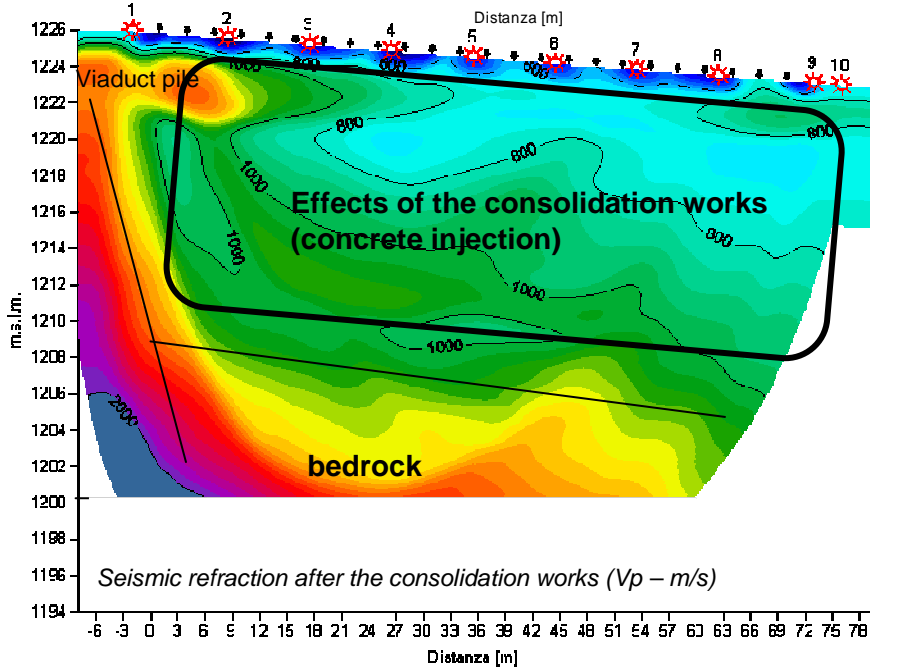
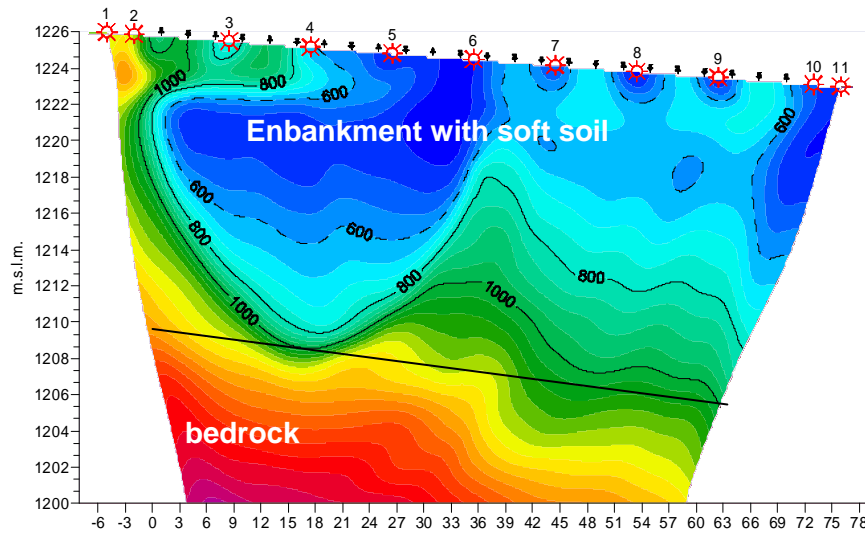


MONITORING OF THE EFFECTS OF CONSOLIDATION WORK ON ROAD EMBANKMENT HIGH RESOLUTIONS SEISMIC REFRACTION

Seismic refraction before the consolidation works ($V_p - m/s$)



Seismic refraction after the consolidation works ($V_p - m/s$)

The seismic refraction method can be used to evaluate the geotechnical characteristics of the subsoil; this because there is a close correlation between the velocity of propagation of compression waves and the parameters of deformability under dynamic conditions. In general, the speed of the compression waves V_p is influenced by two physical parameters of the subsurface: a) The density of the soil; b) The degree of saturation.

In general, it is noted that: 1) the presence of moisture determines generally a reduction of the values of V_p (the moist soil presents the values of speed lower, 300-400 m / s) ; 2) instead, the saturation of the soil determines an increase of the velocity the compression waves V_p : the anhydrous sand presents average values of V_p including between 450 and 900 m / s, while the saturated sand presents average values equal to 1500 m / s; c) The degree of densification affects the velocity of the waves V_p because it is function of the voids (and therefore of the presence of air, whose speed is equal to 330 m / s). The dry sand presents a range of values between 450 m / s and 900 m / s that depends on the weight of volume γ : at a low weight of volume (low degree of densification, high percentage of voids) corresponds the minimum value of velocity.

The correlation between the speed of the compression waves V_p and the density can be used for geotechnical purposes, both to evaluate the degree of densification of natural soils or embankments, and both to evaluate the effects of consolidation work. The example shown in the left side refers to a survey conducted the A32 motorway A32 (Bardonecchia, 2008), for a problem of settlement of the embankment (supported by reinforced earth). The consolidation work (concrete injection) has determined a clear and significant increase in the velocity of the p-waves

