Track Crossing Testing using a Light Weight Deflectometer

What is a Light Weight Deflectometer (LWD)

- It is a portable device that measures the onsite dynamic or resilient modulus (Evd) of subgrade soils and pavements. In other words, it indicates the material's stiffness.
- It is suitable for cohesionless, cohesive, and mixed types of soils with a maximum grain size of 63mm.
- The LWD test method has been in use in European countries and the USA for over 30 years.
- It has a 10kg falling weight that drops onto a 300mm diameter metal plate which is a similar concept to the Clegg hammer only far more appropriate to a full-depth profile.
- The tested profile volume by the LWD is 300mm in diameter and 600mm in depth.

What does Stiffness mean and How is it different from Strength

- stiffness and strength are closely related as such, they are easily confusing terms when it comes to engineering
- Stiffness of material is the measure of a material's ability to return to its original form after being acted on by an external force.
- Strength is a measure of the amount of stress a material can withstand without breaking. This is the ability of the material to support maximum load before it breaks or is permanently deformed.

How have we used this device to test racecourse track crossings

- We are using to provide empirical data to evaluate the variation in concussive forces a horse experiences while traveling across the crossings.
- The device allows us to assess the stiffness of the crossing profile and compare it to the approaching track surface whether it is a turf or synthetic track surface.
- It provides the capability to assess the fully constructed profile down to the subgrade soils and beyond.
- Whilst at this stage of the research, we are not chasing a specific stiffness modulus, we are looking at the differences or similarities to the other track surfaces.
- The test requires a few drops of the slide weight to embed the plate and then three drops are recorded in quick succession. The test is complete in approximately 1 min
- The device prints out a readout of the result which can also be stored or downloaded to a computer

Summary

- What we are looking to demonstrate in the test results, is that the track crossing before being reconstructed with the Rebound Safety Matt (RSM), is extremely stiff and potentially dangerous to horse and rider.
- Post installation using RSM, the stiffness of the track surface is comparable to the stiffness of the track crossing and a horse and rider can safely traverse barely noticing the difference in feel.