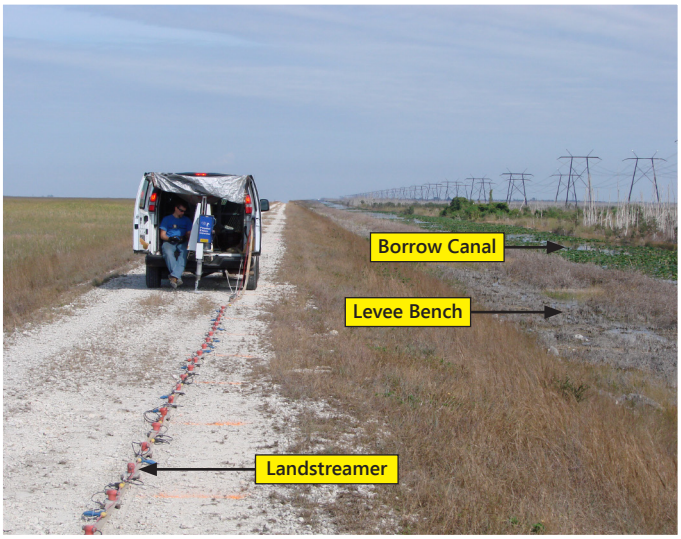
Gannett Fleming
Quantum Geophysics

Excellence Delivered ***As Promised***

Rapid/Effective Means of Evaluating Levees

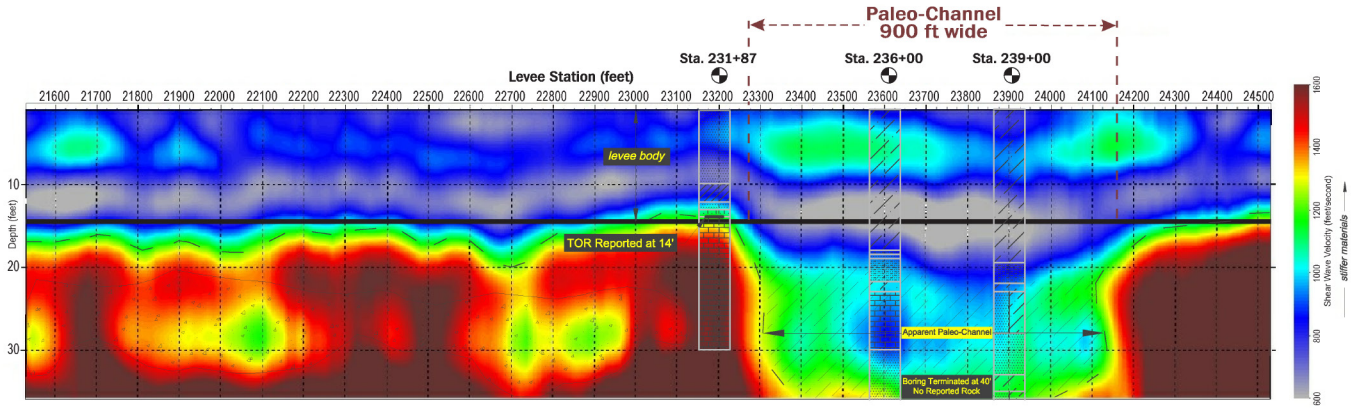
Large levee systems can be more effectively evaluated using geophysics than traditional exploratory drilling alone. This is because geophysical methods provide a continuous profile of the subsurface making it easier to detect relatively small, unpredictable features that might otherwise be straddled by borings. Small, unpredictable features that can influence the integrity and stability of levees include areas of less stiff materials in the levee body and in the foundation materials.

The multi-channel analysis of surface waves (MASW) is a geophysical method that is well suited for evaluating levees because it determines the vertical distribution of shear wave velocities (V_s). V_s is a measure of material stiffness much like N-values from standard penetration test (SPT) borings.



MASW survey on a levee

Gannett Fleming has evaluated 70 miles of levees with MASW (coupled with confirmation drilling) and this approach has proven very effective. **MASW is "rapid" – approximately 3,000 +/- feet of levee can be surveyed per day.** The V_s profile shown below was acquired in one day. Warmer colors indicate higher V_s (stiffer materials), cooler colors indicate lower V_s (less stiff materials). A bold black line represents the approximate original ground surface. Borings show that the levee is a one-layer structure based upon texture – it is mainly constructed of sand. The levee is a two-layer V_s structure - a high V_s layer overlies a lower V_s layer. This stratification in stiffness is also observed in N-values reported in borings. A paleo-channel underlies part of the levee. It is characterized by low V_s to depths greater than 30 feet below levee crest and comprised mainly of sand with low N-values. This section of the levee has a history of settlement – the levee body directly over the paleo-channel is characterized by higher V_s which is fill brought in periodically to maintain crest height.



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