

Long Term Measurement Approaches for Foundation Settling and Positional Change



By: STEVEN PERRY
BENGAL RESOURCES & ASSOC., INC

1. Introduction to Problem of Foundation Settling/Symptoms

Unexplainable changes in alignment readings over time. Potential questions are:

a. Have there been seismic events? Cracks could mean nothing/curing.

Example: A utility reported a 90 thou change in vertical offset at their "A" coupling. Adjustment was made. A long term plan for monitoring concrete pylons was introduced based on previous projects in Europe and the US. This event never repeated or trended again. Poor performance has continued intermittently. A recorded seismic event precipitated the test. No data has confirmed foundation settling. A large one time alignment shift would be characteristic of a seismic event.



b. Are unexplainable alignment changes due to expansion or contraction of concrete? If so, this is not foundation settling.

- Concrete expands and contracts with a similar coefficient of expansion to mild steel.
- Outdoor units experience large changes in ambient conditions.
- Pylons for both indoor and outdoor units are subject to temperature fluctuations depending on whether the unit is energized or cold.
- Piping and condenser location can effect concrete pylon temperature.
- Inner pylons are frequently warmer than front standard and generator pylon supports.
- Considering a 50 to 60 foot column height, one can have an appreciation as to the effect on alignment for machinery mounted on the turbine deck.

Instruments utilized



Figure 2; IR Thermometer



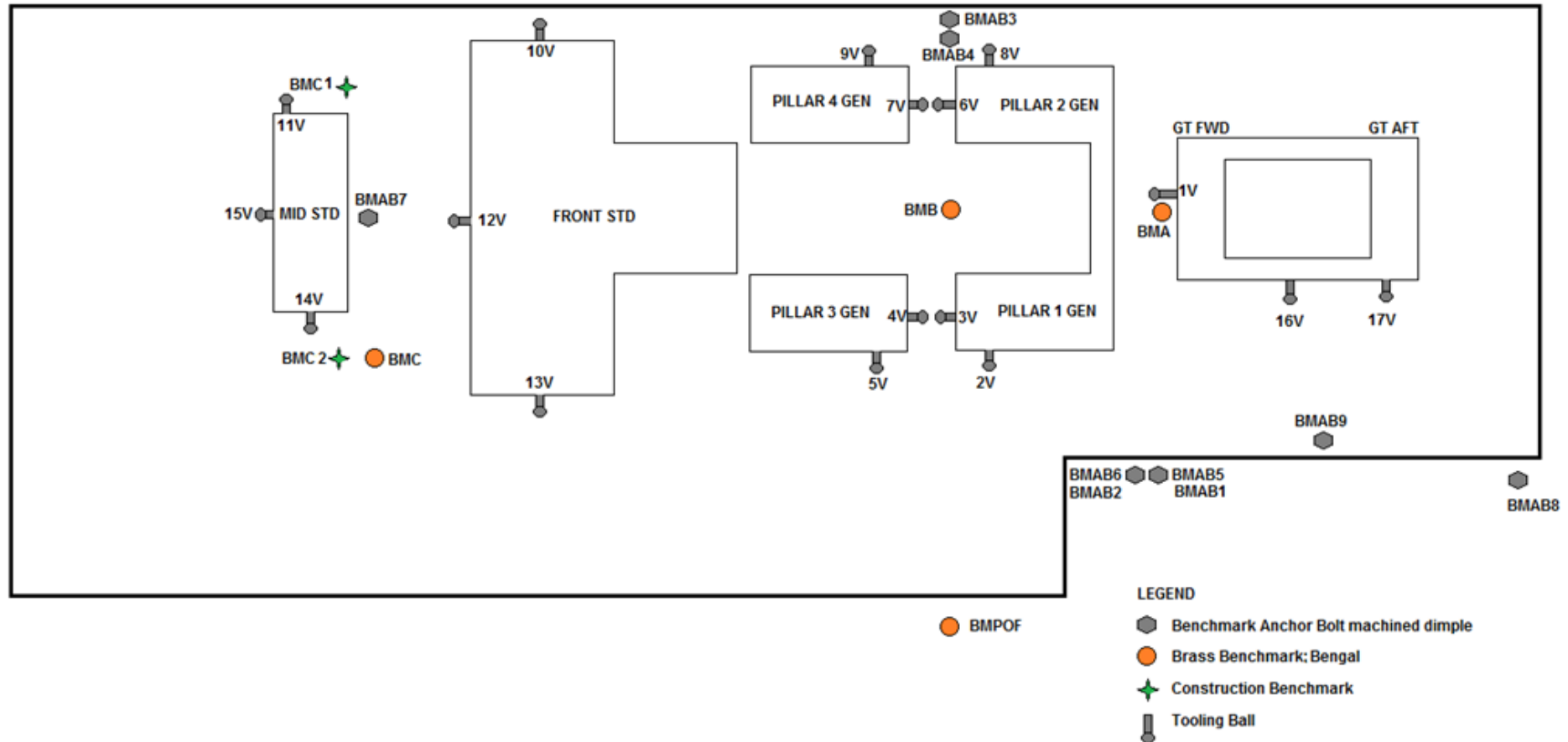
Figure 3: Optical Jig Transit

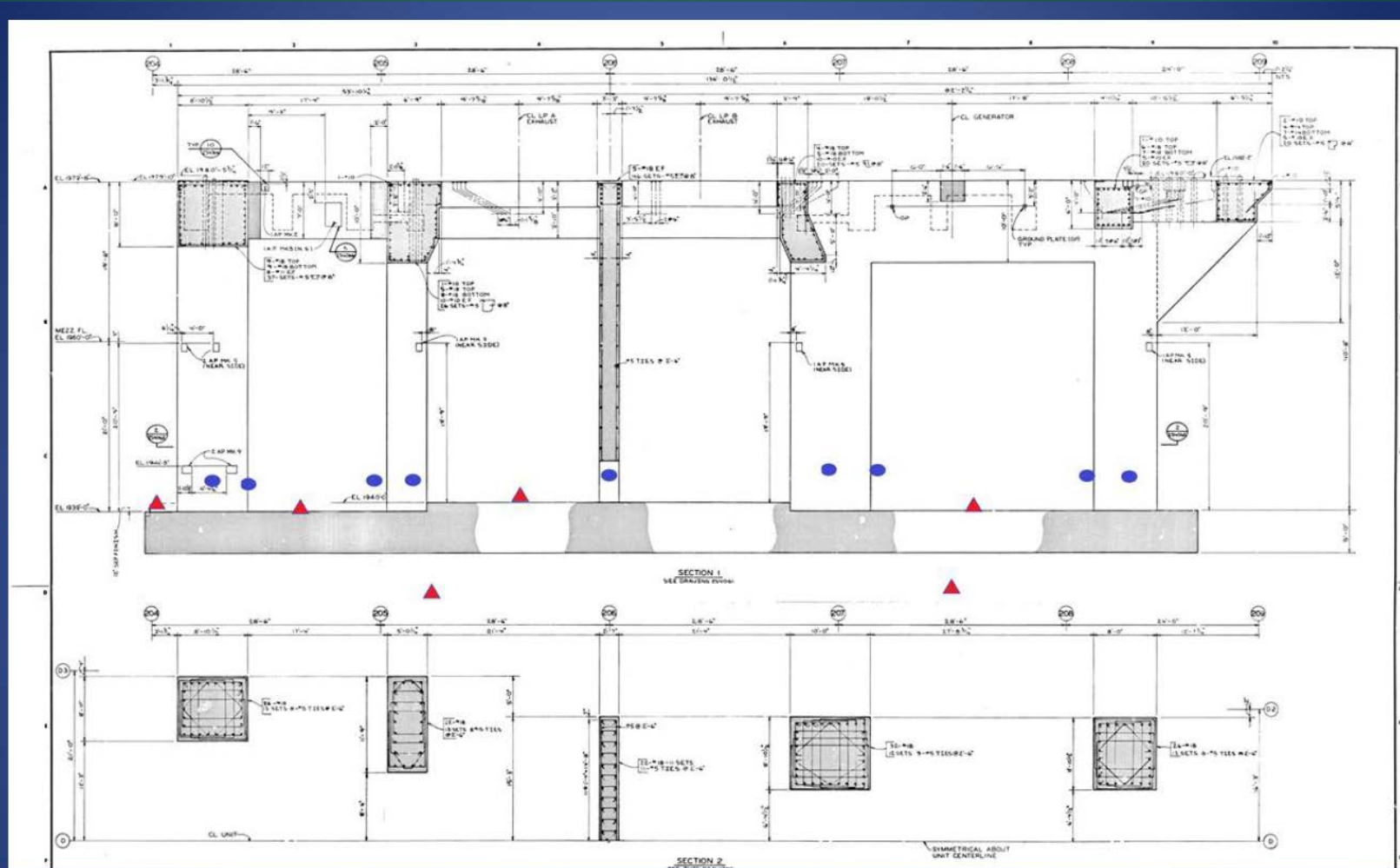


Figure 4: Optical tilting level

Global layout for vertical trending

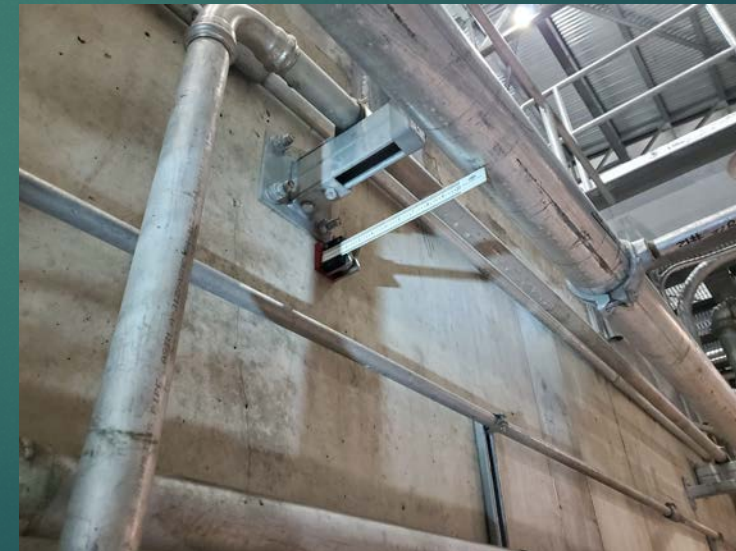
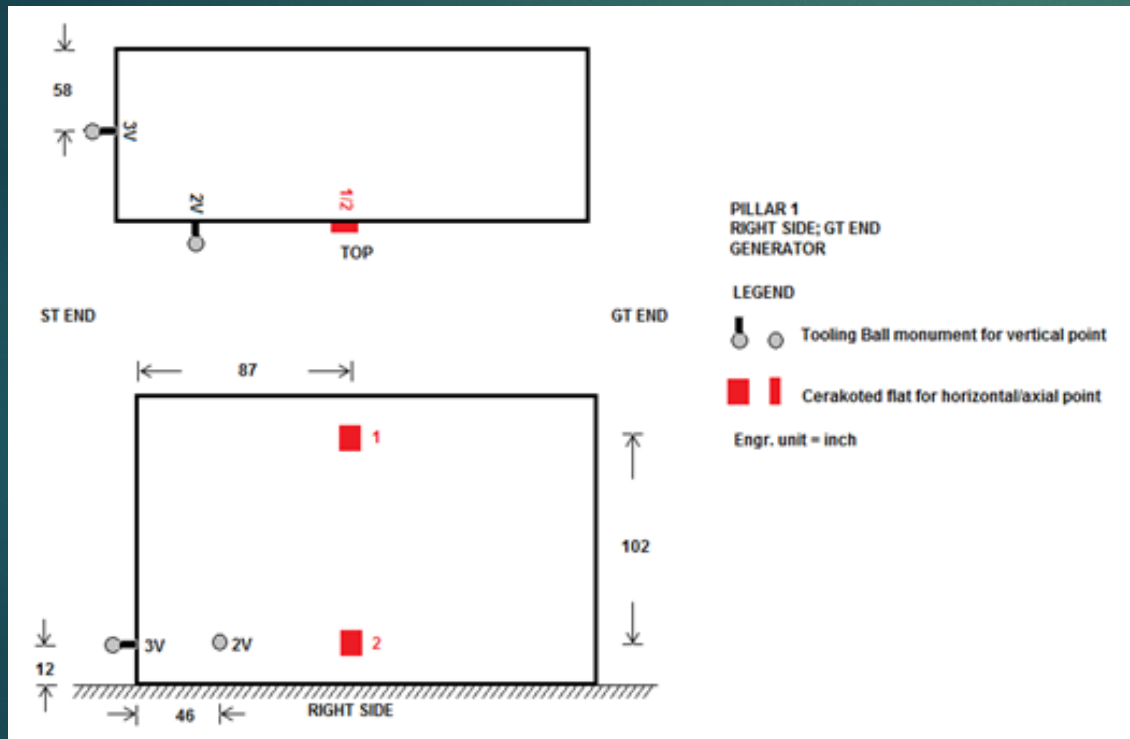
GLOBAL VERTICAL BENCHMARK LAYOUT; CMF 21





Example of global monument and benchmark layout at basement level. Elevation view.

Example of horizontal and axial setup of positional change



Trend Chart over time

