

GEOTECHNICAL INSTRUMENTATION FOR LANDSLIDE MONITORING



M. Melih Demirkan, Ph.D., P.E.

RITE
GEOSYSTEMS

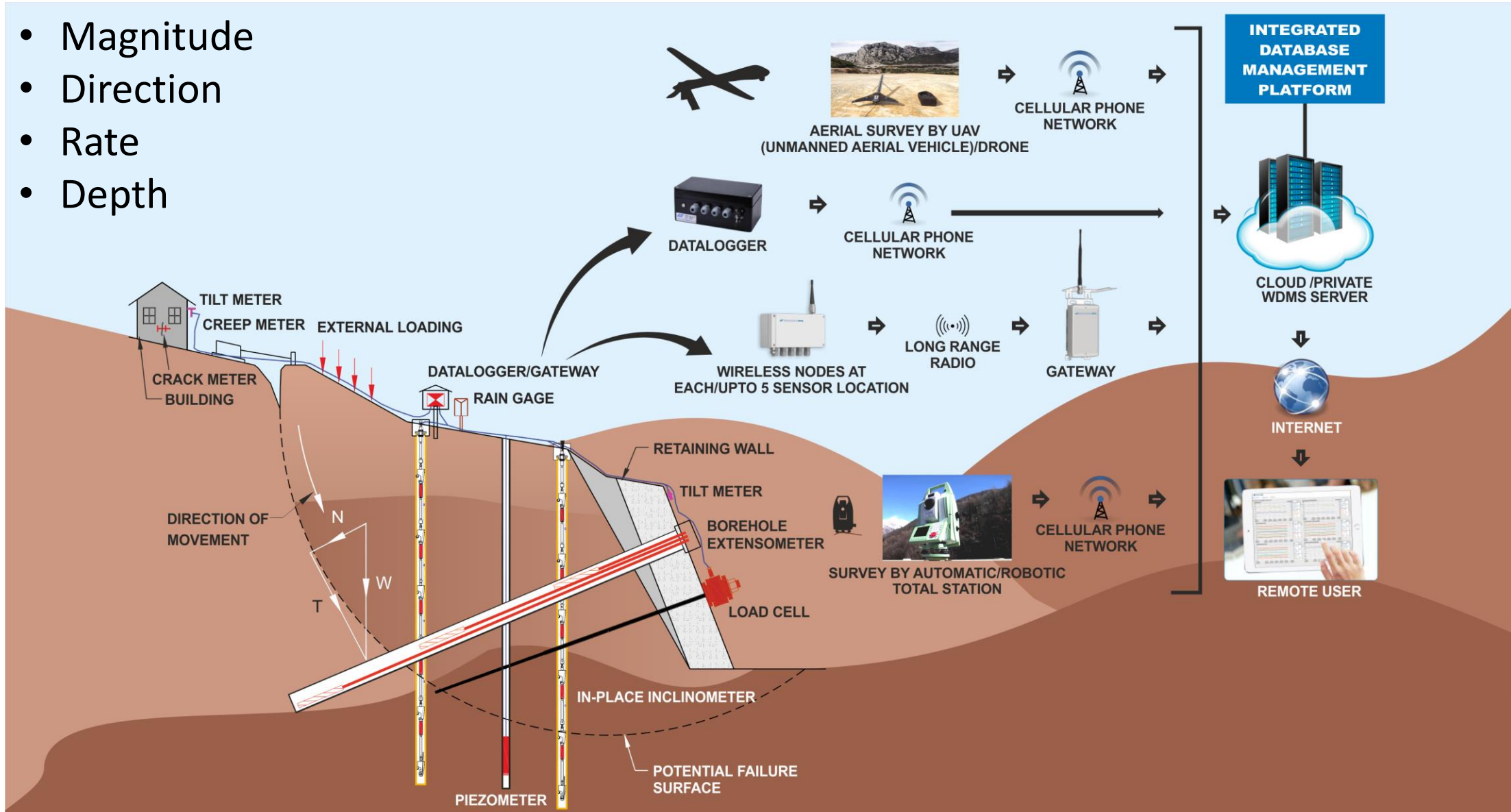
RELIABLE INSTRUMENTATION & DATA MONITORING SOLUTIONS
GEOTECHNICAL | GEODETIC | STRUCTURAL |
ENVIRONMENTAL

PITT | IRISE

CENTER FOR IMPACTFUL RESILIENT
INFRASTRUCTURE SCIENCE & ENGINEERING

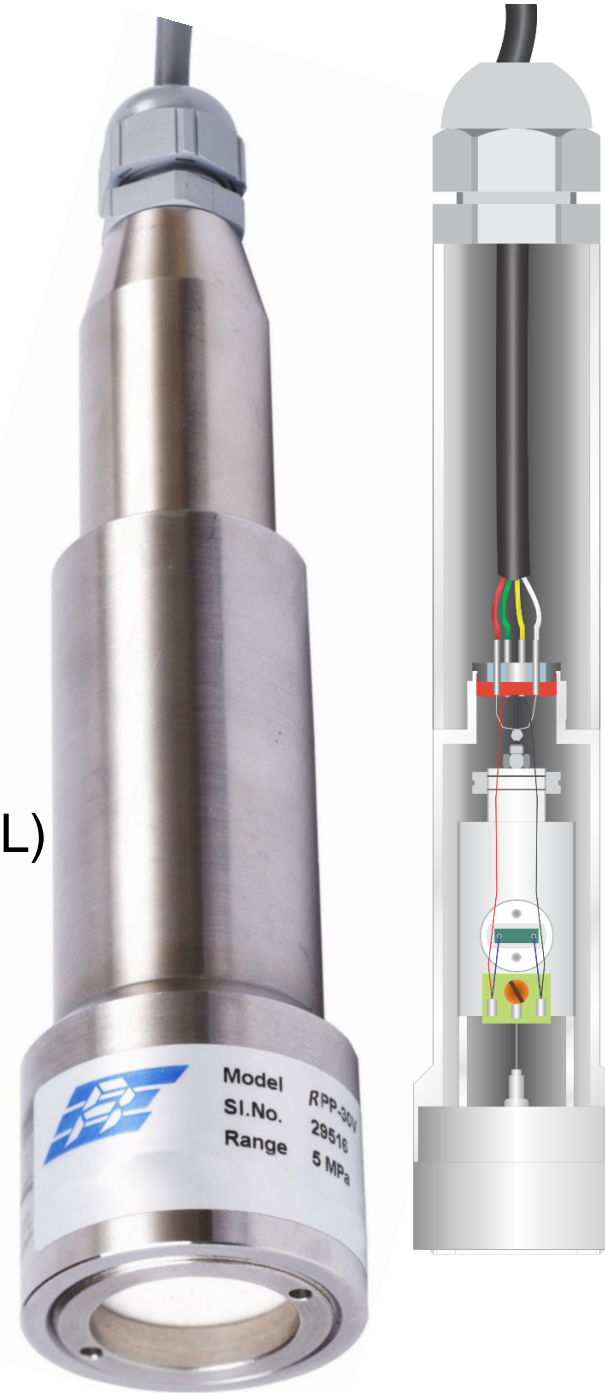
TYPICAL INSTRUMENTATION SCHEME – LANDSLIDE

- Magnitude
- Direction
- Rate
- Depth



WHY?

- WHY MONITORING?
 - OBSERVE ANY CHANGE
 - KNOW THE STATE OF THE SYSTEM
 - SAFETY AND PERFORMANCE
- WHY VIBRATING WIRE?
 - DURABLE (MATERIAL, ASSEMBLY, CABLE, SEAL)
 - LONG TERM STABILITY –NO DRIFT
 - FREQUENCY OUTPUT
 - TRANSMIT OVER LONG DISTANCE
 - REAL TIME MONITORING



GROUNDWATER LEVELS



VW piezometer model EPP-30V (top left), EPP-40V (right)



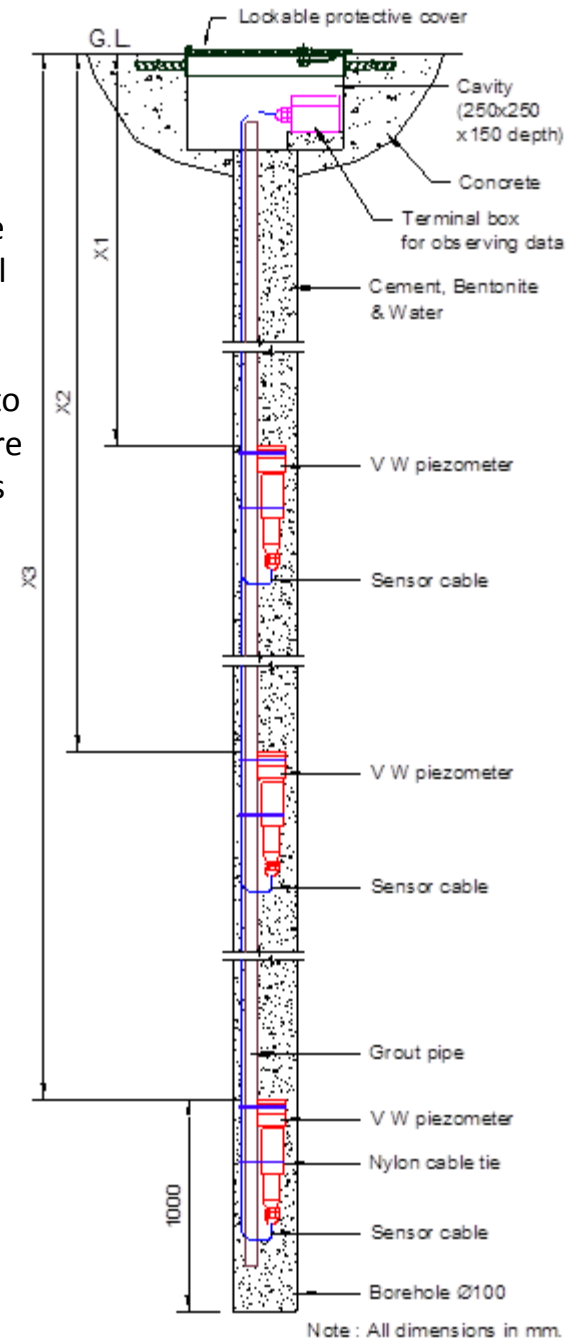
< Readout unit model EDI-51V



Vibrating wire piezometers, standpipe piezometers and automatic water level monitoring systems were installed around deep excavations-stations and shafts, adjacent to TBM bored tunnels to monitor change in groundwater pressure and level due to construction activities

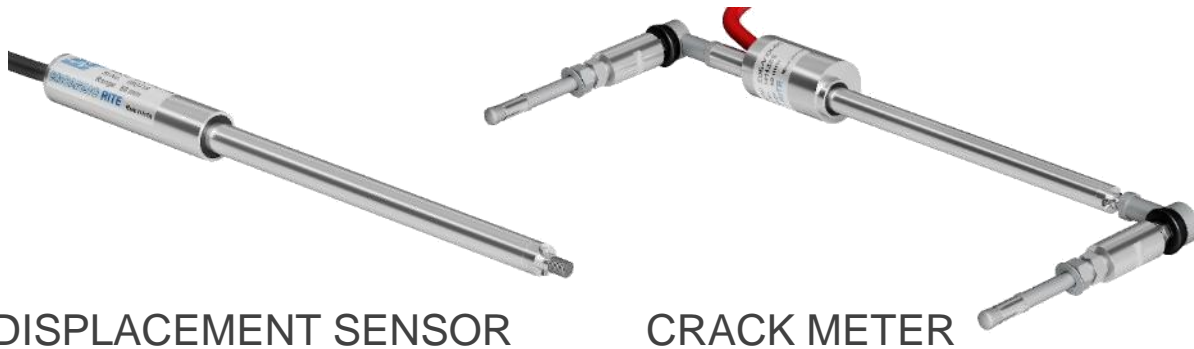


< Automatic Water Level Monitoring System



DISPLACEMENT, DEFORMATION

- VIBRATING WIRE DISPLACEMENT TRANSDUCERS
- LINEAR CRACK & JOINT METERS- ELECTRONIC & MECHANICAL
- 3D CRACK METERS - ELECTRONIC & MECHANICAL

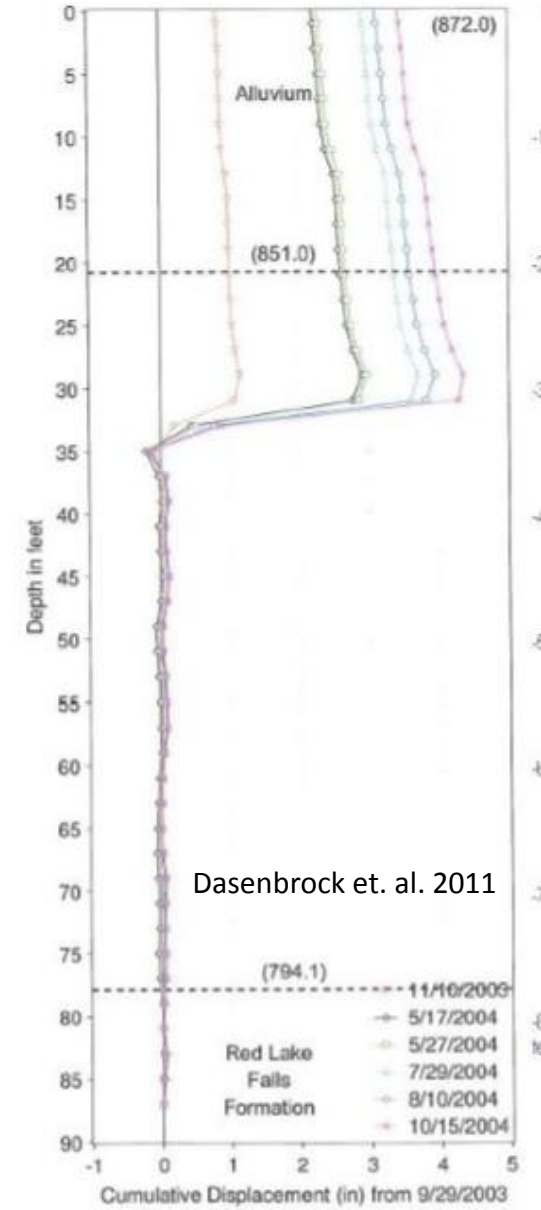
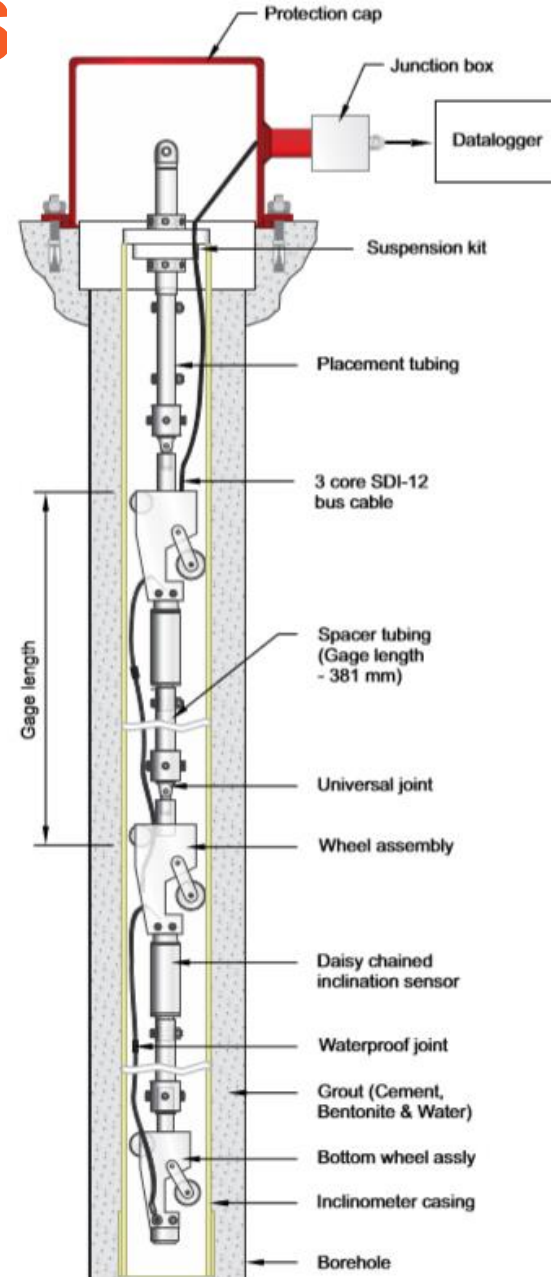


DISPLACEMENT SENSOR

CRACK METER

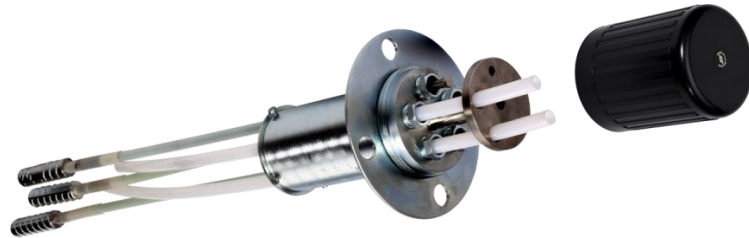


IN-PLACE INCLINOMETERS

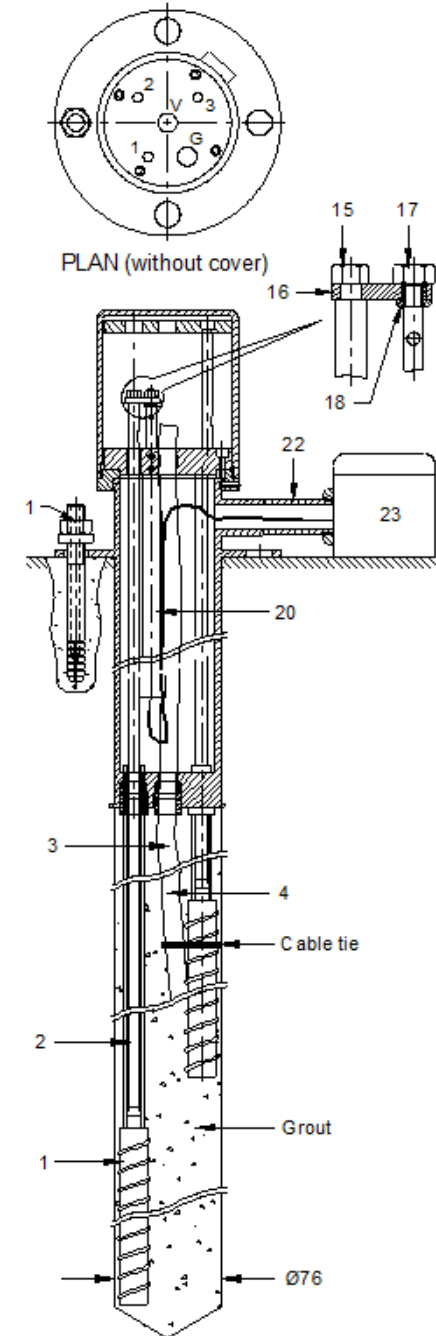


MPBX EXTENSOMETER

Multi (three) Point Borehole extensometers were installed above bored tunnel alignments to monitor subsurface ground settlement at anchor depths using digital depth micro meter. Reference plate at the head of the MPBX were also surveyed using precise levelling methods



MPBX model EDS-63-U/D and Digital Depth Micro meter



DIGITAL INCLINOMETER

THE IN-HOUSE DEVELOPED SOFTWARE THRU MOBILE PHONE



DATALOGGER

COMPACT SDI-INTERFACE

DATALOGGER WITH INTEGRAL

GSM/GPRS MODEM



AUTOMATED MONITORING SYSTEM

- AUTOMATED ROBOTIC TOTAL STATIONS USING TERRAMOVE SOFTWARE, TERRAMOVE CONTROL BOX.
- HIGH MEASUREMENTS DENSITY, SIMULTANEOUS WIRELESS TRANSMISSION
- CONTROLLED REMOTELY FROM ANYWHERE.



DATABASE MANAGEMENT SYSTEMS

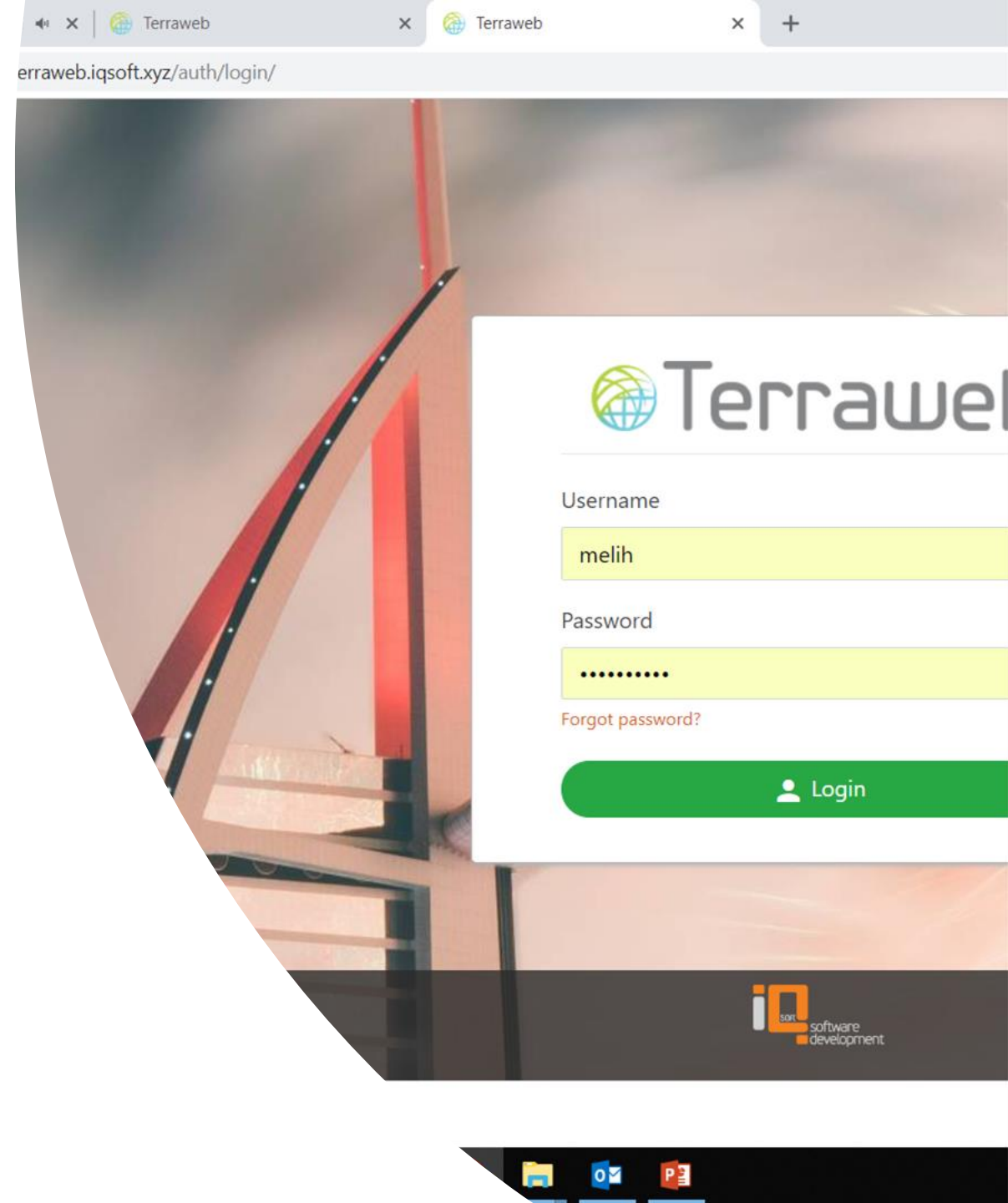
- ✓ **Easy access** to meaningful instrumentation data
- ✓ **Enhanced** graphical and numerical presentation
- ✓ **Instant alerts** via SMS or email to authorized personnel
- ✓ **Fast access** to different sensor data on one screen
- ✓ **Create** diagrams from any combination of parameters
- ✓ **Multiple** authorized users at different locations
- ✓ **Simultaneous** interactions of users
- ✓ **Low** operational cost
- ✓ **User friendly** on tablets and smartphones



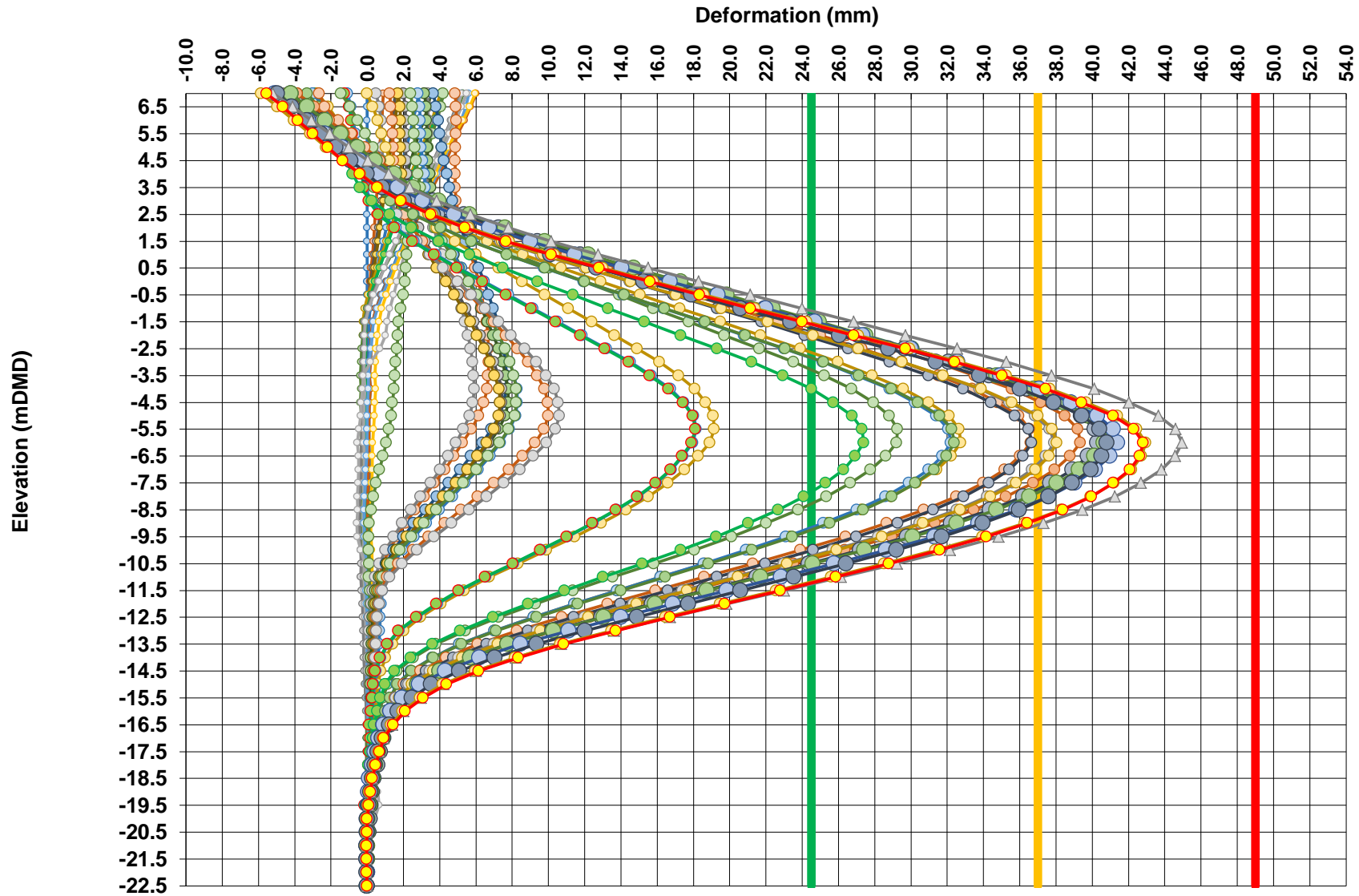
WEB BASED DATA MANAGEMENT

[HTTP://122.15.209.75:50015/DEMOWDMS/WEBDATALOGIN](http://122.15.209.75:50015/DEMOWDMS/WEBDATALOGIN)

[HTTPS://TERRAWEB.IQSOFT.XYZ/](https://terraweb.iqsoft.xyz/)

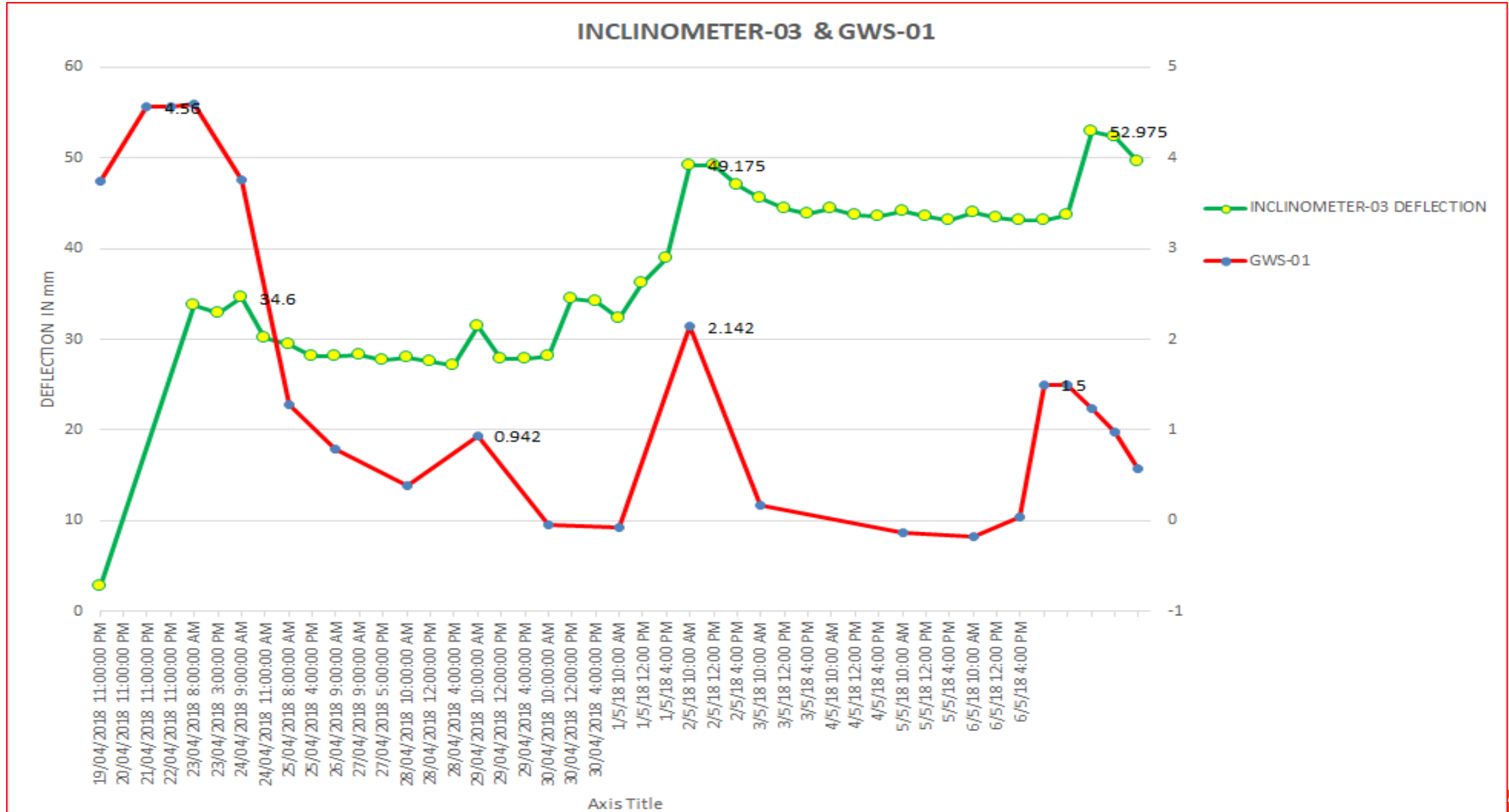


MOVEMENT FROM INCLINOMETER DATA



VERTICAL INCLINOMETER-02

COMBINED GRAPH-INCLINOMETER & PIEZOMETER



thank you



melih@ritegeosystems.com

RITE GEOSYSTEMS INC.
1653 McFarland Rd., Pittsburgh PA 15216
+1 (412) 745 8300
www.ritegeosystems.com

