

### MEDIEVAL FORTIFICATIONS IN THE CITY OF RHODES.

#### Engineering geological conditions and problem:

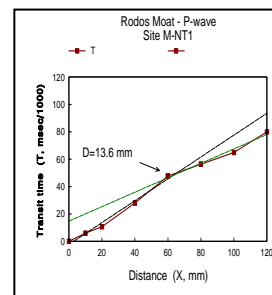
- The monumental group composed by the fortification of Rhodes covers an area of 350000m<sup>2</sup> around the town of the Knights.
- The sections open to visitors are to be found on different levels along the medieval moat and the peripheral park where the old fortified slope or “glacis” was situated, outside the fortification in the direction of the new town.
- The medieval fortifications in the city of Rhodes need big scale interventions as well as required restoration of departments that has collapsed, because of the action and the circulation of water and the action of plant’s roots in a particularly porosity material of construction (sandstone - limestone).



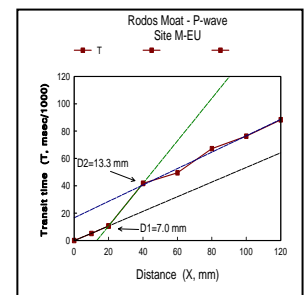
#### Protection measures already have been taken or have to be taken:

- Examination of the engineering geological conditions at the foundation area.
- Seismic hazard analysis
- Protection of the fortification constructions (masonry and limestone foundations) from earth pressure phenomena.
- Act as an additional supporting structure at specific points and strengthen the foundations.
- Non-destructive evaluation and consolidation of building stones and mortars.

Estimation of the consolidation depth of building stones, using indirect ultrasonic techniques



Non-treated block



Consolidated block

#### References on studies already performed:

- CHRISTARAS, B. (2000). Effectiveness of in situ P-wave measurements in monuments. *Journal of Nepal Geological Society*, Vol. 22, pp.45-48.
- MOROPOULOU, A., TSIOURVA TH., THEOULAKIS, P., CHRISTARAS, B. & KOUI, M (1998). Non-destructive evaluation of pilot scale treatments for porous stone consolidation in the Medieval City of Rhode. *PACT 56 (Revue du Conseil de l' Europe)*, pp. 259-278).
- PITILAKIS, K. (1998). Medieval city of Rhodes: Geotechnical soil conditions seismic hazard analysis & seismic design loads. 4th Course of EU-DGXII on “The fortification in the Mediterranean Basin”, pp. 250-264.
- LEKKAS, E., SAKELLARIOU, D. & LOSIOS, S. (1997). Observations on the action of geologically induced hazards in the ancient city of Rhodes (Greece), Proc. 4th Int. Symp. Cons. Mon. Med., Rhodes, pp. 239-246.