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## OPINIONS ON DMT BY USERS AND RESEARCHERS

"In my opinion this test represents the most important recent development in penetration testing... Everyone I know of, including myself, who has had significant experience with the test, has found it exceptionally useful."

*J.H. SCHMERTMANN, University of Florida, 1981*

"The use of the Marchetti Dilatometer Test is rapidly expanding worldwide such that the test is becoming one of the premier in situ tests available to the geotechnical profession. The rapid growth seems to reflect a need in the geotechnical profession for simple, rapid, and cost-effective tools to characterize sites for geotechnical projects. The DMT seems to possess most of the preferred qualities, i.e. it is simple to operate, rugged, non electronic, can be used with a variety of practical insertion equipment and appears to give very reproducible results."

*A.J. LUTENEGGER, Clarkson University, USA, 1988*

"Settlement of shallow foundations on granular soils ... at the present time the Marchetti dilatometer is the most generally applicable practical tool for sensing soil compressibility directly..."

*G.A. LEONARDS, Purdue University, 1988*

"Sixteen examples demonstrate how DMT provides soil compressibility data for the rapid calculation of foundation settlements with an average rate of predicted to actual settlements equal to 1.18. "

*J.H. SCHMERTMANN, University of Florida, 1986*

"We continue to have great success with our Dilatometer. The quality and accuracy of the results are quite amazing."

*J. HAYES, Site Investigation Services, Canada, 1985*

"The DMT, widely used in North America and Europe, has grown to one of more popular soundings same as cone penetration test (CPT). The popularity of DMT lies in the following reasons : (1) Simple operation (2) Reproducible results (3) Cost effectiveness (4) Wide variation of penetration equipment and rods"

*K. IWASAKI, Kiso-Jiban Consultants, Tokyo, 1991*

"...various applications of the Flat Dilatometer. It is my opinion that it has enormous potential in INDIA "

*KALPAKA ENGINEERS, Madras, 1987*

" We consider the DMT to be one of the most interesting products today"

*GEOTECH Geotechnical Equipment SA, Sweden , 1990*

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## MARCHETTI DILATOMETER USERS

Users of the DMT, currently in over 30 countries, include the likes of Norwegian Geotechnical Institute, U.S. Bureau of Reclamation, Delft Grondmechanica, Berkeley University, Fugro, Kiso-Jiban Consultants Tokyo, Stump Bohr-Zürich, Jacobsson & Widmark, Douglas & Partners-Sydney, Hong Kong University, Ontario Hydro, Law Engineering, GeorgiaTech, Cornell University, Pacific Gas & Electric, Viak AB, Bundesanstalt für Wasserbau, Swedish Geotechnical Institute, Ghent University, Warsaw University, Adelaide University, CSMRS New Delhi, Nanyang Technological Institute-Singapore, Gulf Inspection Kuwait, Hamza Associates-Cairo, Soil Centralab-Malaysia.

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## STANDARDS , RECOMMENDATIONS , MANUALS ON DMT

ASTM SUBCOMMITTEE 18.02 (1986), "Suggested Method for performing the Flat Dilatometer Test", Geotechnical Testing Jnl., Vol. 9, No. 2, June 1986, pp. 93-101.

SCHMERTMANN J.H. & CRAPPS D. (1988), "Guideline Summary for using the CPT and DMT for Geotechnical Design", Rep. No. FHWA-PA-87-014-84-24 to PennDOT, Office of Research and Special Studies, Harrisburg, PA, in 4 Volumes .

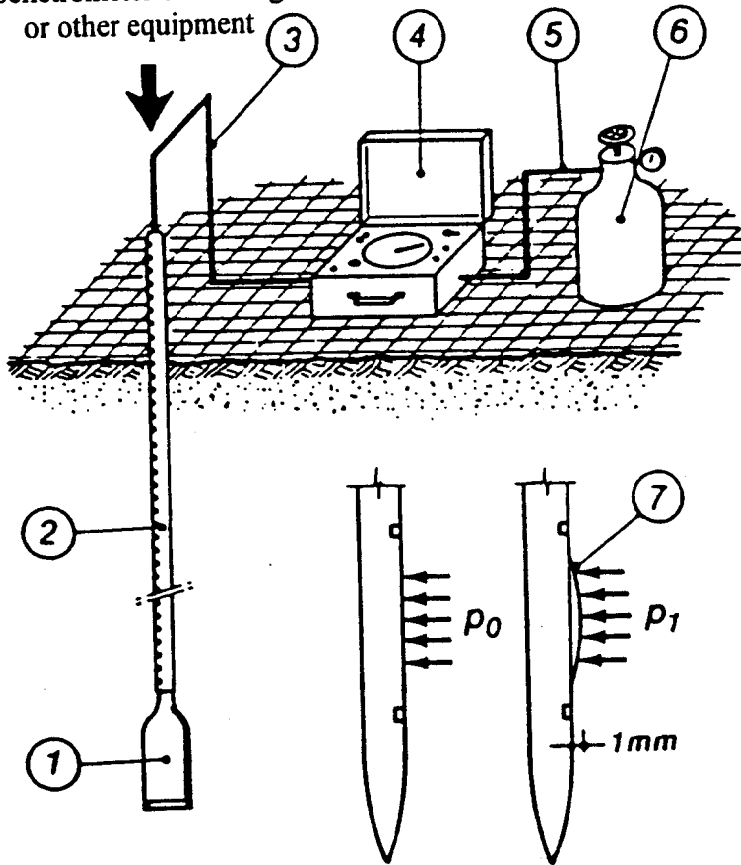
U.S. DEPARTMENT OF TRANSPORTATION (1992), "The Flat Dilatometer Test", Civ. Eng. Dept. Texas A & M University for the Fed. Highway Administration Washington D.C., Publ. FHWA-SA-91-044, by Briaud J.L. & Miran J., 102 pp.

STATENS GEOTEKNISKA INSTITUT (1989), "Dilatometerforsok - En In-Situ Metod for Bestamning av Lagerfoljd och Egenskaper i Jord" by R. Larsson (in Swedish), 58 pp.

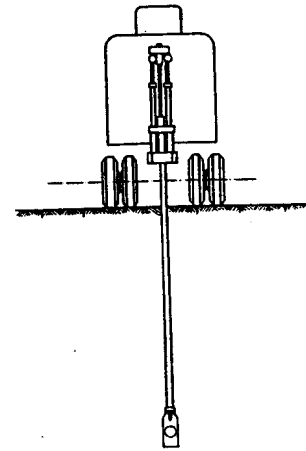
CORNELL UNIVERSITY Ithaca, N.Y. (1990), "Manual on Estimating Soil Properties for Foundation Design" Report No. EL-6800 Electric Power Research Institute, by Kulhawy F. & Mayne P., 250 pp.

# GENERAL LAYOUT OF THE DILATOMETER TEST (DMT)

Push force provided by  
penetrometer or drill rig  
or other equipment

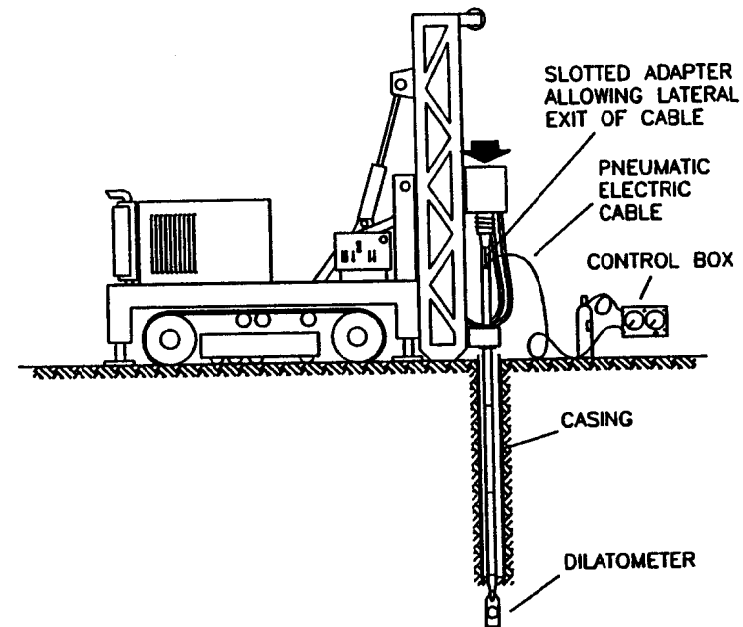


- |                              |                    |
|------------------------------|--------------------|
| 1. Dilatometer blade         | 4. Control box     |
| 2. Pushing rods (eg.: CPT)   | 5. Pneumatic cable |
| 3. Electric-pneumatic cable  | 6. Gas tank        |
| 7. Expansion of the membrane |                    |



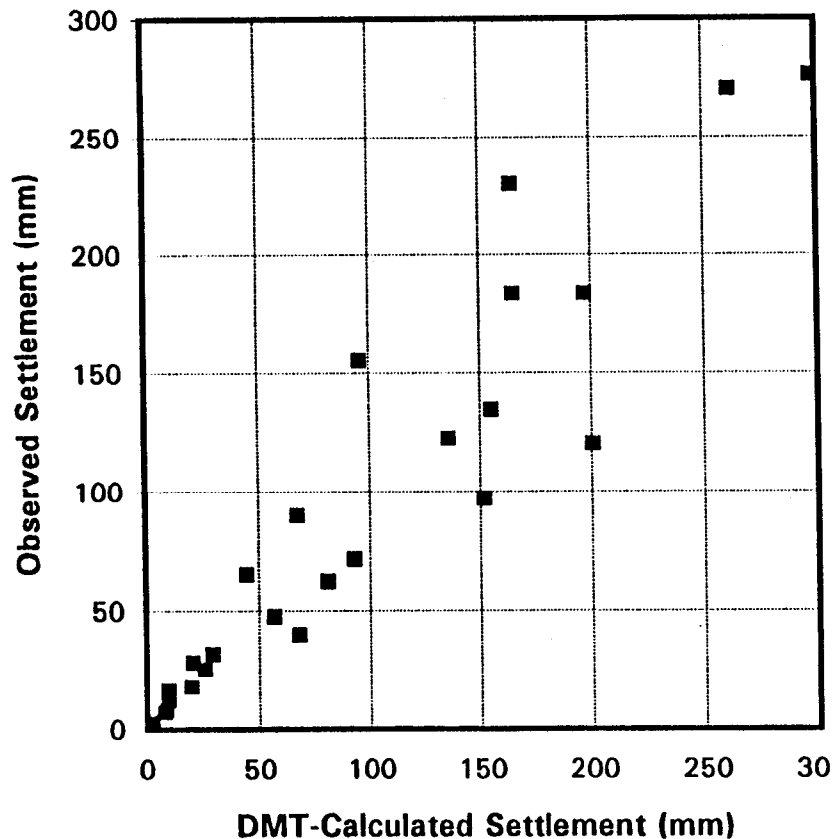
**DMT PERFORMED  
USING A  
PENETROMETER**

**DMT PERFORMED USING A DRILL RIG**



**COMPARISON of DMT-CALCULATED  
and OBSERVED SETTLEMENTS**  
HAYES J.A., 1990.

"The Marchetti Dilatometer and Compressibility"  
Paper to Southern Ontario Section of Canad. Geot. Soc.  
Seminar on "In Situ Testing and Monitoring". Sept.



**COMPARISON of DMT-CALCULATED  
and OBSERVED SETTLEMENTS**  
SCHMERTMANN, 1986

"Dilatometer to compute Foundation Settlement"  
Proc. In Situ '86 ASCE Spec. Conf. Virginia  
Tech, Blacksburg. ↓

No. 5.2.	Location	Structure	Compress. soil	Settlement (mm)			ratio DMT Meas.
				DMT	**	Meas.	
1	Tampa	bridge pier	HOC Clay	* 25	b,d	15	1.67
2	Jacksonvll.	Power Plant	compacted sand	* 15	b,o	14	1.07 (ave. 3)
3	Lynn Haven	factory	peaty sd.	188	a	185	1.02
4	British Columbia	test embankment	peat org. sd.	2030	a	2850	0.71
5a	Fredricton	surcharge 3' plate building	sand	* 11	a	15	0.73
b			sand	* 22	a	28	0.79
c			quick cl. silt	* 78	a	35	2.23
6a	Ontario	road embankment	peat	*300	a,o	275	1.09
b	"	building	peat	*262	a,o	270	0.97
7	Miami	4' plate	peat	93	b	71	1.31
8a	Peterborough	Apt. bldg	sd. & si.	* 58	a,o	48	1.21
b	"	Factory	"	* 20	a,o	17	1.18
9	"	water tank	si. clay	* 30	b,o	31	0.97
10a	Linkoping	2x3 m plate	si. sand	* 9	a,o	6.7	1.34
b	"	1.1x1.3m plate	si. sand	* 4	a,o	3	1.33
11	Sunne	house	silt & sand	* 10	b,o	8	1.25

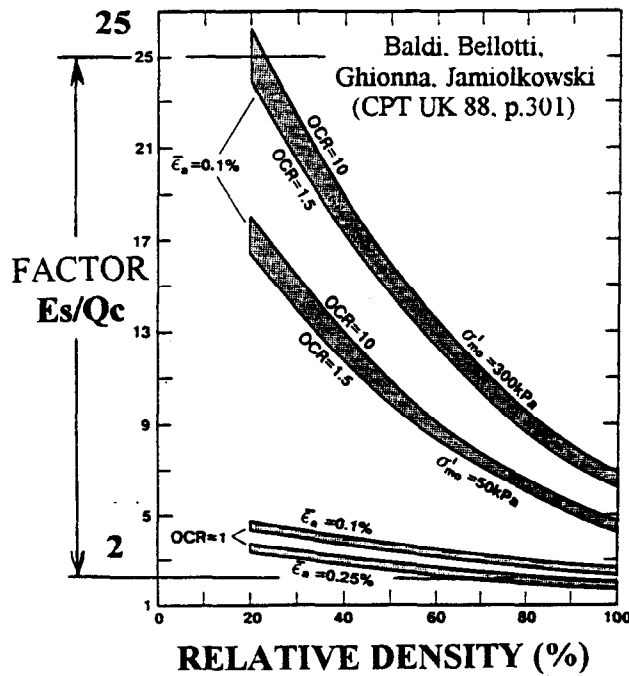
16 CASES HISTORY. AVERAGE  
CALCULATED/OBSERVED = 1.18

Similar agreement by others, e.g.:

Lacasse, S. & Lunne, T. 1986. Dilatometer Tests in Sand. Proc. In Situ '86 ASCE Spec. Conf. Virginia Tech, Blacksburg.

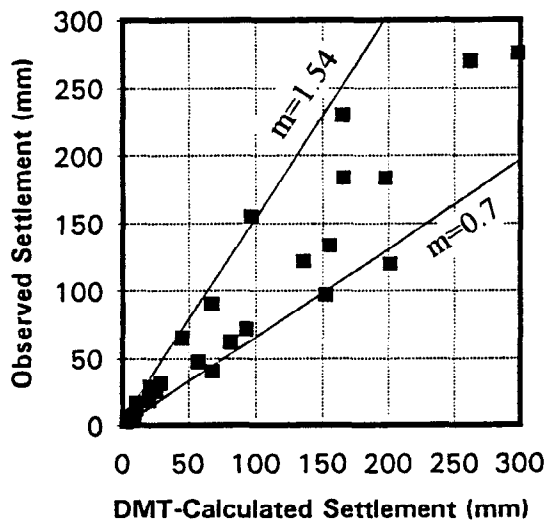
Sallfors G. (1988) "Validity of compression modulus determined by dilatometer tests", Proc. of two-day seminar at NGI on calibration of in situ tests.

# ACCURACY OF SETTLEMENT PREDICTIONS BY CPT AND DMT



In order to estimate the modulus  $E_s$  from the tip resistance  $Q_c$  of CPT,  $Q_c$  has to be factorized by the factor  $E_s/Q_c$ . Such factor, as shown by the figure, varies widely. In absence of information on OCR / lateral stress,  $E_s/Q_c$  varies between 2 and 25, with a ratio maximum to minimum 12.5.

## COMPARISON of OBSERVED and CALCULATED SETTLEMENT (Hayes, 1990)



The ratio between:  
a) Settlements predicted by DMT  
b) Observed settlements  
varies between 0.7 and 1.54  
(average 1.04) with a ratio  $\approx 2$   
between maximum and  
minimum(\*)

(\*) Schmertmann 1986, Lacasse 1986,  
Sallfors 1988, Hayes 1990

The above data suggest that the settlements predicted by DMT are several times more accurate.