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TOMONO, M., Technical Research Laboratory, Takenaka Komuten Co.,Ltd.,2-5-14 Minamisuna, Koto-ku, Tokyo 143
TOMOSUE, K., 2-18-9 Nakamagome, Ohta-ku, Tokyo 143
TONOMURA, A., Japan Engineering Consultants Co.,Ltd., Dai 3 Matsuda Bldg., 3-10 Nishi-Okubo, Shinjuku-ku, Tokyo 160
TONOUCHI, K., Urawa Research Institute, Oyo Corp., 2-2-19 Daitakubo, Urawa 336
TORII, O., Osaka Kojikyoku, Japan National Railways, Ofuka-cho, Kita-ku, Osaka 530
TORISU, R., c/o Dr. Hashiguchi, Faculty of Agriculture, Kyushu University, Hakozaki, Higashi-ku, Fukuoka 812
TORIYAMA, K., Faculty of Agriculture, Shimane University, 1060 Nishikawazu-cho, Matsue 690
TOYAMA, M., Yachiyo Engineering Co.,1-10-21 Nakameguro, Meguro-ku, Tokyo 153
TOYOSHIMA, M., 5-27-5 Nishigotanda, Shinagawa-ku, Tokyo 141
TSUBOI, H., Fudo Construction Co.,Ltd., 5-30 Hirano-cho, Higashi-ku, Osaka 541
TSUCHIDA, H., Port & Harbour Research Inst., Ministry of Transport, 3-1-1 Nagase, Yokosuka 239
TSUCHIDA, H., Nishimatsu Construction Co.,Ltd, 13 Sakuragawa-cho, Shiba-Nishikubo, Minato-ku, Tokyo 105
TSUCHIYA, H., Kisojiban Consultants Co.,Ltd., 2-14-1 Ishikawa-cho, Oota-ku, Tokyo 145
TSUGAWA, T., Muto Institute of Structural Mechanics, Mitsui Bldg., 2-1-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo 160
TSUJII, H., 1-37-12 Kitamachi, Nerima-ku, Tokyo 175
TSUMOTO, M., Niigata Prefectural Office, 602 1-bancho, Gakko-Dori, Niigata 951
TSURUTA, N., Shin Gijutsu Kaihatsu Co., Tanaka Bldg., 2-9 Yotsuya, Shinjuku-ku, Tokyo 160
TSUTSUI, H., Nishimatsu Construction Co.,Ltd., Ohgishima, Tsurumi-ku, Kawasaki 210
TSUTSUMI, S., Faculty of Agriculture, Tokyo University, 1-1-1 Yayoi, Bunkyo-ku Tokyo 113
TSUZUKI, M., Shiraishi Foundation Co.,Ltd., 1-14 Kanda-Iwamoto-cho, Chiyoda-ku, Tokyo 101
UCHIDA, I., Faculty of Engineering, Kyushu University, Hakozaki, Higashi-ku, Fukuoka 812
UCHIDA, K., 69 Shimoikeda-cho, Kitashirakawa, Sakyo-ku, Kyoto 606
UCHIDA, T., Fifth District Port Construction Bureau, Ministry of Transport, 2 Tsukiji-cho, Minato-ku, Nagoya 455
UCHIYAMA, K., Industrial Research Inst. of Kanagawa Prefecture, 3173 Showa-cho, Kanazawa-ku, Yokohama 236
UEDA, K., 1-27 Asahigaoka-cho, Ashiya 712
UEDA, K., Hazama-Gumi Ltd., 2-5-8 Kita-Aoyama, Minato-ku, Tokyo 107
UEDA, S., Fudo Construction Co.,Ltd., 1-2-1 Taito, Taito-ku, Tokyo 110
UEHAMA, T., Fourth District Port Construction Bureau, Ministry of Transport, 6-16 Amidaji-cho, Shimonoseki 750
UEHARA, H., 1-64 Sakiyama, Shuri, Naha 903
UEJIMA, K., Harima Construction Bureau, Hyogo Prefectural Government, 97-1 Tenzinki Zigemachi, Kakogawa-cho, Kakogawa 675
UEMAE, Y., Metropolitan Expressway Public Corp. 1-4-1 Kasumigaseki, Chiyoda-ku, Tokyo 100
UEMURA, K., Japan Tunneling Association Shinko Dai-ichi Bldg., 2-14-7 Shintomi Chuo-ku, Tokyo 104
UENO, C., Inst. of Construction Tech. Kajima Corp., 2-19-1 Tobitakyu, Chofu 182
UENO, S., Shimoōri-danchi 8-507, Shimoōri, Ōnojo, Fukuoka 816
UESHITA, K., Dept. of Civil Engineering Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464
UEZAWA, H., Oyo Corp., 3-2-1 Otsuka, Bunkyo-ku, Tokyo 112
UKAJI, F., Water Resources Development Public Corp., 5-3-6 Akasaka, Minato-ku, Tokyo 107
UKAJI, T., Technical Development & Engineering Dept., Tokyo Gas Co.,Ltd.,1-2-16 Yaesu, Chuo-ku, Tokyo 103
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UMEHARA, Y., Port & Harbour Research Inst., Ministry of Transport, 3-1-1 Nagase Yokosuka 239
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UTO, K., 1-22-27 Bunkyo, Sagamihara 228
WADA, A., Sakuraizumi Apt., 4-49 Kasugabaru-Kitamachi, Kasuga 816
WADA, K., 4-14-11 Minami-Ikebukuro, Toshima-ku, Tokyo 171
WAKAMATSU, S., Nippon Kokan Co.,Ltd., 1-1 Minami-Watarida-cho, Kawasaki-ku, Kawasaki 210
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WAKATABI, H.,Japan Eng.Consultants Co.,Ltd. 3-10 Nishi-Okubo,Shinjuku-ku,Tokyo 160
WATANABE, A., 1-8-3 Furuishiba, Koto-ku, Tokyo 135
WATANABE, H., Hanshin Consultants K.K. 2-7-3 Kawaguchi, Nishi-ku,Osaka 550
WATANABE, K., Nippn Koei Co.,Ltd., 1-6-7 Yushima, Bunkyo-ku, Tokyo 113
WATANABE, O., Tokyo Gas Co.,Ltd., 1-16-25 Shibaura, Minato-ku, Tokyo 105
WATANABE, S., Lab. of Soil Mechanics, Railway Technical Research Inst., J.N.R., 2-8-38 Hikari-cho, Kokubunji 185
WATANABE, T., Tokyo Institute of Technology 2-12-1 Ookayama, Meguro-ku,Tokyo 152
WATANABE, T., New-Line Construction Bureau, Teito Rapid Transit Authority, 3-19-6 Higashi-Ueno, Taito-ku, Tokyo 110
WATANABE, T.,Chiba Institute of Technology 2-17-1 Tsudanuma, Narashino 275

WATARI, M., Public Works Research Institute, Ministry of Construction, 5-41-7 Shimo, Kita-ku, Tokyo 115
YABE, M., Public Works Research Institute, Ministry of Construction, 4-12-52 Anagawa Chiba 280
YABUSHITA, H., Fudo Construction Co.,Ltd., 5-30 Hirano-cho, Higashi-ku,Osaka 541
YAGITA, I., Metropolitan Expressway Public Corp. 1-4-1 Kasumigaseki, Chiyoda-ku, Tokyo 100
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YAHATA, T., 4-5-3 Kami-Saginomiya,Nakano-ku, Tokyo 165
YAHIRO,T., Institute of Construction Tech., Kajima Corp., 2-19-1 Tobitakyu,Chofu 182
YAMADA, B., 288-1 Minemachi, Utsunomiya 320
YAMADA, K., Dept. of Civil Engineering Chubu Institute of Technology, 1200 Matsumoto-cho, Kasugai 487
YAMADA, K., 233-31 Miyanogi-cho, Chiba 281
YAMADA, K., Nippon Koei Co.,Ltd., 1-6-7 Yushima,Bunkyo-ku,Tokyo 113
YAMADA, M., Osaka City University, 459 Sugimoto-cho,Sumiyoshi-ku,Osaka 558
YAMADA, Y., Dept. of Civil Engineering, Tokyo University, 7-3-1 Hongo,Bunkyo-ku Tokyo 113
YAMADA, Y., Water Resources Development Public Corp., 5-3-6 Akasaka,Minato-ku, Tokyo 107
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YAMAGUCHI, H., 434 Kamisugeta,Hodogaya-ku, Yokohama 240
YAMAGUCHI,S., G.H. 12-501, 430 Mukogaoka, Takatsu-ku, Kawasaki 213
YAMAHARA, H., Shimizu Construction Co.,Ltd., 3-4-17 Etchujima, Koto-ku,Tokyo 135
YAMAMOTO, I., Midaira Mansion, 681 Noborito, Tama-ku,,Kawasaki 214
YAMAMOTO, M., Kanagawa University, 3-27 Rokkakubashi, Kanagawa-ku,Yokohama 221
YAMAMOTO, R., 130 Higashi-Kibogaoka, Asahi-ku Yokohama 241
YAMAMOTO, T., Watanabe Apt., 1-7-25 Mirokuji, Fujisawa 251
YAMAMOTO, T., Institute of Construction Tech. Kajima Corp. 2-19-1 Tobitakyu,Chofu 182
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YOSHINAKA, R., Saitama University, 255 Shimo-Okubo, Urawa 338
YOSHINARI, M., Tokai University, 2-28-4 Tomigaya, Shibuya-ku, Tokyo 151
YU, C-H., National Cheng-Kung University, No.50 Lane 15, Tong Ning Road, Tainan, Taiwan
YUASA, Y., Tokyo Metropolitan University, 2-1-1 Fukazawa, Setagaya-ku, Tokyo 158
ZAOYA, K., Chuo Kaihatsu Corp., 3-13-5 Nishiwaseda, Shinjuku-ku, Tokyo 160

Program

Programme

EXECUTIVE COMMITTEE

Friday 8th July

09:00-17:00 hours
1st meeting, "Sakura Room" of the Imperial Hotel

18:00-19:00 hours
Reception given by the Governor of Metropolitan Tokyo for members of the Executive Committee and their wives, in "Peacock Room South" of the Imperial Hotel

19:00-21:00 hours
Reception given by the President of the Japanese Society of Soil Mechanics and Foundation Engineering in "Sakura Room" of the Imperial Hotel

Saturday 9th July

09:00-19:20 hours
2nd meeting, "Sakura Room" of the Imperial Hotel

Sunday 10th July

09:00-15:00 hours
Excursion to Mt. Fuji by bus for members of the Executive Committee and their wives

MAIN AND SPECIALTY SESSIONS

Monday 11th July

10:30-13:00 hours

Opening Session, "Peacock Room"
Chairman: Mr. G. Togashi, Chairman of Organizing Committee

COMITE EXECUTIF

Vendredi 8 Juillet

09h00-17h00
Le 1er meeting, salle "Sakura" de l'hôtel Impérial

18h00-19h00
Réception donnée par le Gouverneur du Tokyo Métropolitain pour les membre de l'executif Comite et leure femmes à la salle "Peacock (sud) " de l'hôtel Impérial

19h00-21h00
Réception offerte par le Président de la Société japonaise de Mechanique des Sols et des Travaux de Fondations à la salle " Sakura " de l'hôtel Imperial

Samedi 9 Juillet

09h00-19h20
Le 2e meeting, salle " Sakura" de l'hôtel Impérial

Dimanche 10 Juillet

09h00-15h00
Excursion au Mt Fuji par l'autobus pour les membres de l'Executif Comité et femmes

SESSIONS PRINCIPALES ET SPECIALES

Lundi 11 Juillet

10h30-13h00

Séance d'ouverture, salle "Peacock ",
Président: Mr. G. Togashi, Président du Comité d'Organisation

15:00-17:30 hours

Specialty Session No.1
Tunnelling in Soft Ground,"Peacock Room West"
Chairman: Dr. S. Ibukiyama (Japan) (on behalf of Prof. H. Breth)

Specialty Session No.2
Soil Sampling, "Fuji Room"
Organizer: Prof. K. Hoshino (Japan)

Specialty Session No.3
Relationship between Design and Construction in Soil Engineering, "Peacock Room East"
Organizer: Dr. E.D'Appolonia (USA)

Tuesday 12th July

09:30-10:15 hours

Special Lecture
Geotechnical Aspects of Construction of the Shinkansen (New Railway Trunk Lines), "Peacock Room"
Dr. M. Fujii (Japan)

10:30-13:00 hours

Main Session No.1
Stress-Deformation and Strength Characteristics, "Peacock Room"
Chairman: Prof. M.V. Malyshev (USSR)
General Reporter : Prof. C.C.Ladd (USA)
Panelists: Dr. A.S. Balasubramaniam (Southeast Asia)
Mr. J.A. Jimenez Salas (Spain)
Prof. J.H.Schmertmann (USA)

15:00-17:30 hours

Specialty Session No.4
Ground Anchors, "Peacock Room West"
Organizer: Prof. P. Habib (France)

Specialty Session No.5
Determination of Soil Parameters from In Situ Tests, "Peacock Room East"
Organizer: Prof. J. Trofimenkov (USSR)

Specialty Session No.6
The Probabilistic Approach to Soil Mechanics Design, "Fuji Room"
Organizer: Prof. E. Schultze (FRG)

Wednesday 13th July

09:30-10:15 hours

Special Lecture
Slope Stability of Cuttings in Brown London Clay, "Peacock Room"
Prof. A.W. Skempton (UK)

15h00-17h30

Session spéciale N° 1
Tunnels dans les sols mous,salle"Peacock ouest"
Président: Dr.S. Ibukiyama (Japon) (au nom du Prof. H.Breth)

Session spéciale N° 2
Echantillonnage de sol, salle"Fuji"
Organisateur:Prof. K. Hoshino(Japon)

Session spéciale N° 3
Rélation entre l'etude et la construction dans les travaux de fondation, salle "Peacock,est"
Organisateur:Dr. E. D'Appolonia (EU)

Mardi 12 Juillet

09h30-10h15

Conférence spéciale
Aspects géotechniques de la construction du Shinkansen (Nouvelle voie ferrée interurbaine), salle "Peacock"
Dr. M. Fujii (Japon)

10h30-13h00

Session principale N° 1
Rélations entre contrainte-déformation et caractéristiques de la résistance, salle "Peacock"
Président: Prof. M.V.Malyshev (URSS)
Rapporteur général: Prof.C.C.Ladd (EU)
Discuteurs:Dr. A.S.Balasubramaniam (Asie du sud-est)
Mr. J.A. Jimenez Salas (Espagne)
Prof. J.H. Schmertmann (EU)

15h00-17h30

Session spéciale N°4
Ancrages dans le sol, salle "Peacock ouest"
Organisateur: Prof. P. Habib (France)

Session spéciale N°5
Détermination des paraméters du sol à partir d'essais en site,salle "Peacock est)
Organisateur: Prof.J. Trofimenkov (URSS)

Session spéciale N°6
L'approche probabiliste dans les études de mécanique du sol, salle"Fuji"
Organisateur: Prof. E. Schultze (RFA)

Mercredi 13 Juillet

09h30-10h15

Conférence spéciale
Stabilité des pentes de voies en tranchées au London clay, salle "Peacock"
Prof. A.W. Skempton (UK)

10:30-13:00 hours

Main Session No.2
Behavior of Foundations and Structures, "Peacock Room"
Chairman: Mr. B.A.Kantey (South Africa)
General Reporter: Dr. J.B.Burland (UK)
Panelists:Prof.G.A.Leonards (USA)
Prof.G.G.Meyerhof (Canada)
Prof.Yu G.Trofimenkov (USSR)
Prof.A.S.J. Vesic (USA)
Prof.H.Yamaguchi (Japan)

15:00-17:30 hours

Specialty Session No.7
Geotechnical Problems in Ocean Engineering "Peacock Room East"
Organizer: Mr. B. McClelland (USA)

Specialty Session No.8
Deformation of Earth/Rockfill Dams, "Peacock Room West"
Organizer: Prof.R.J.Marsal (Mexico)

Specialty Session No.9
Constitutive Equations of Soils, "Fuji Room"
Organizer: Prof.S.Murayama (Japan)

10h30-13h00

Session principale N° 2
Comportement des fondations et des structures,salle"Peacock"
Président:Mr.B.A.Kantey(Afrique du sud)
Rapporteur général:Dr.J.B.Burland (UK)
Discuteurs: Prof.G.A.Leonards (EU)
Prof.G.G.Meyerhof (Canada)
Prof.Yu G.Trofimenkov (URSS)
Prof.A.S.J.Vesic (EU)
Prof.H. Yamaguchi (Japon)

15h00-17h30

Session spéciale N°7
Problèmes géotechniques dans les travaux au large (off-shore),salle"Peacock est"
Organisateur:Mr.B. McClelland (EU)

Session spéciale N°8
Déformation des barrages en terre ou en enrochements, salle"Peacock ouest"
Organisateur: Prof.R.J.Marsal(Méxique)

Session spéciale N°9
Equations constitutives du sol, salle "Fuji"
Organisateur: Prof.S.Murayama (Japon)

Thursday 14th July

09:30-10:15 hours

Special Lecture
Development of the Mechanics of Granular Materials in Japan, "Peacock Room"
Prof. T. Mogami (Japan)

10:30-13:00 hours

Main Session No.3
Slopes and Excavations, "Peacock Room"
Chairman: Prof.A.Kézdi (Hungary)
General Reporter:Prof.N.Morgenstern (Canada)
Panelists: Prof.G.E.Blight (South Africa)
Mr.F.Blondeau (France)
Prof.P.Lumb (Southeast Asia)
Dr.P.R.Vaughan (UK)

15:00-17:30 hours

Specialty Session No.10
The Effects of Horizontal Loads on Piles, due to Surcharge or Seismic Effects, "Peacock Room East"
Organizer: Prof.E.de Beer (Belgium)

Specialty Session No.11
Geotechnical Engineering and Environmental Control,"Peacock Room West"
Organizer: Dr.Z-C Moh (Southeast Asia)

Specialty Session No.12
Computer Analysis in Soil Mechanics, Present and Future, "Fuji Room"
Organizer: Prof.R.L.Schiffman (USA)

Jeudi 14 Juillet

09h30-10h15

Conférence spéciale
Développement de la mécanique des matériaux granulaires en Japon, salle"Peacock"
Prof. T.Mogami (Japon)

10h30-13h00

Session principale N°3
Talus et fouilles, salle"Peacock"
Président:Prof.A.Kezdi (Hongrie)
Rapporteur général :Prof.N.Morgenstern (Canada)
Discuteuts: Prof.G.E.Blight (Afrique du sud)
Mr. F. Blondeau (France)
Prof. P.Lumb (Asie du sud-est)
Dr.P.R.Vaughan (UK)

15h00-17h30

Session spéciale N°10
Les effets sur les pieux des charges horizontales dûes aux surcharges ou aux actions sismiques,salle"Peacock est"
Organisateur: Prof.E.de Beer(Belgique)

Session spéciale N°11
La géotechnique et la maîtrise de l'environnement, salle"Peacock ouest"
Organisateur: Dr.Z-C Moh(Asie du sud-est)

Session spéciale N°12
Le calcul en ordinateur sur la mécanique du sol,présent et futur, salle"Fuji"
Organisateur:Prof.R.L.Schiffman (EU)

Friday 15th July

09:30-10:15 hours

Special Lecture
Vignettes of Four Presidents 1936-1969, "Peacock Room"
Dr. R.B. Peck (USA)

10:30-13:00 hours

Main Session No.4
Soil Dynamics and its Application to Foundation Engineering, "Peacock Room"
Chairman: Prof.H.B. Seed (USA)
General Reporter: Prof.Y.Yoshimi (Japan)
Panelists: Prof.S.Hansbo (Sweden)
Prof.M.Novak (Canada)
Prof.T.Shibata (Japan)
Prof.P.W.Taylor (New Zealand)

15:00-17:00 hours

Closing Session, "Peacock Room"
Chairman: Mr.G. Togashi, Chairman of Organizing Committee

Vendredi 15 Juillet

09h30-10h15

Conférence spéciale
Vignettes des quatre Présidents, 1936-1969 salle "Peacock"
Dr. R.B. Peck (E.U.)

10h30-13h00

Session principale N°4
Dynamique du sol et son application aux travaux de fondations, salle "Peacock"
Président: Prof.H.B.Seed (E.U.)
Rapporteur général: Prof.Y.Yoshimi (Japon)
Discuteurs: Prof.S.Hansbo (Sweden)
Prof.M.Novak (Canada)
Prof.T.Shibata (Japon)
Prof.P.W.Taylor (Nouvelle Zélande)

15h00-17h00

Séance de clôture, salle "Peacock"
Président: Mr.G.Togashi, Président du Comité d'Organisation

FILM SHOW

Monday 11th July

14:00-17:00 hours, "Kotobuki Room" of the Imperial Hotel

Tuesday 12th July

10:30-13:00 hours and 14:00-17:00 hours, "Kotobuki Room"

Wednesday 13th July

10:30-13:00 hours and 14:00-17:00 hours, "Kotobuki Room"

Thursday 14th July

10:30-13:00 hours and 14:00-17:00 hours, "Kotobuki Room"

Friday 15th July

10:30-12:45 hours and 14:00-15:00 hours, "Kotobuki Room"

PROGRAMME DES FILMS

Lundi 11 Juillet

14h00-17h00, salle "Kotobuki" de l'hôtel Impérial

Mardi 12 Juillet

10h30-13h00 et 14h00-17h00, salle "Kotobuki"

Mercredi 13 Juillet

10h30-13h00 et 14h00-17h00, salle "Kotobuki"

Jeudi 14 Juillet

10h30-13h00 et 14h00-17h00, salle "Kotobuki"

Vendredi 15 Juillet

10h30-12h45 et 14h00-15h00, salle "Kotobuki"

TECHNICAL EXHIBITS

Technical exhibits related to geotechnical engineering were set up in "Botan Room", "Kiku Room" and "Ran Room" of the Imperial Hotel during the Conference.

EXHIBITIONS TECHNIQUES

Exhibitions au géotechnique ont été ouvertes dans les salles "Botan", "Kiku" et "Ran" de l'hôtel Impérial pendant toute la durée du Congrés.

LADIES' PROGRAM

Monday 11th July

14:00-17:30 hours
Half-day sightseeing tour in Tokyo

Tuesday 12th July

09:30-13:00 hours
" Do it yourself" (Program I), "Fuji Room" of the Imperial Hotel

10:00-17:00 hours
Full-day sightseeing tour in Tokyo (Program II)

Wednesday 13th July

09:30-13:00 hours
" Do it yourself" (Program II), "Fuji Room" of the Imperial Hotel

10:00-17:00 hours
Full-day sightseeing tour in Tokyo (Program I)

Thursday 14th July

09:45-12:30 hours
Kimono show and Japanese dancing,"Fuji Room" of the Imperial Hotel

14:30-17:30 hours
Optional bus tour around Tokyo

Friday 15th July

09:30-13:00 hours
Optional bus tour around Tokyo

13:00-17:00 hours
Bus service for shopping

SOCIAL ACTIVITIES

Monday 11th July

19:30-21:30 hours
Reception for participants of the Conference and their accompanying persons, "Peacock Room" of the Imperial Hotel

21:00-22:30 hours

Stage show titled "Summer Festival in Japan" was presented in "Fuji Room" of the Imperial Hotel

Friday 15th July

19:30-21:30 hours
Banquet was held in "Rose Room" of the Tokyo Kaikan

PROGRAMME DES DAMES

Lundi 11 Juillet

14h00-17h30
Circuit touristique dans le Tokyo en demie-journée

Mardi 12 Juillet

09h30-13h00
" Fates vous-mêmes"(programme I), salle "Fuji" de l'hôtel Impérial

10h00-17h00
Circuit touristique dans le Tokyo toute la journée (programme II)

Mercredi 13 Juillet

09h30-13h00
" Fates vous-mêmes " (programme II),salle "Fuji" de l'hotel Impérial

10h00-17h00
Circuit touristique dans le Tokyo toute la journée (programme I)

Jeudi 14 Juillet

09h45-12h30
Présentation des Kimonos et danses japonaises, salle "Fuji" de l'hôtel Impérial

14h30-17h30
Facultatif tour en autobus dans le Tokyo

Vendredi 15 Juillet

09h30-13h00
Facultatif tour en autobus dans le Tokyo

13h00-17h00
Service de bus pour les achats

ACTIVITES SOCIALES

Lundi 11 Juillet

19h30-21h30
Réception pour les participants du Congrés et leurs accompagnatrices, salle "Peacock" de l'hôtel Impérial

21h00-22h30

Un spectacle nommé "Le fistival de l'été en Japon " a été présenté dans la salle "Fuji" de l'hôtel Impérial

Vendredi 15 Juillet

19h30-21h30
Le Banquet a été ouvert dans la salle "Rose" du Tokyo Kaikan

TECHNICAL VISITS VISITES TECHNIQUES

Visit Visite	Date Tue Mardi 12	 Wed Mercr 13	 Thurs Jeudi 14	Duration Durée	Transportation Moyen	Dept. Time Départ Heure	Time at the site Heure en site
Subway A Chemin de fer souterrain A	X	X	--	3 hrs	Bus	14:00	2 hrs
Subway B Chemin de fer souterrain B	--	X	X	3 hrs	Bus	14:00	2 hrs
Subway C Chemin de fer souterrain C	X	--	X	3 hrs	Bus	14:00	1.5 hrs
Bridge Piers Piles de pont	X	X	--	4 hrs	Bus	14:00	2 hrs
Port & Harbour Research Institute Laboratoire de géotechnique A	X	--	X	5.5 hrs	Bus & Train	13:30	1.5 hrs
Public Works Research Institute Laboratoire de géotechnique B	X	X	--	4.5 hrs	Bus	14:00	1.5 hrs
Building Research Institute Laboratoire de géotechnique C	--	X	X	3 hrs	Bus	14:00	1.5 hrs
Land Subsidence Affaissement de terrains	X	--	X	4 hrs	Bus	14:00	2 hrs
Steel Plant on Man-made Island Aciérie sur une île artificielle	X	X	X	4 hrs	Bus	14:00	1.5 hrs
Underground Substation Sous-station souterraine	--	X	X	3 hrs	Bus	14:00	1 hr
Tama New Town Scheme Projet de la ville nouvelle de Tama	X	--	X	4 hrs	Bus	14:00	2 hrs
Submerged Tunnel Tunnel immergé	--	X	X	4 hrs	Bus	14:00	2 hrs
Musashino Railway Yard Dépôt ferroviaire de Musashino	X	X	--	4 hrs	Train	14:00	1 hr

International Society for Soil Mechanics and Foundation Engineering

Minutes of the Executive Committee Meeting Held in Istanbul

3rd, 4th April 1975
09.30-12.00 and 13.00-17.00 each day

PRESENT

President	Prof. J. Kerisel	
Vice-Presidents	Dr. J.W. de Graft Johnson	*Africa*
	Prof. Z-C. Moh	*Asia*
	Prof. P.W. Taylor	*Australasia*
	Prof. A. Kézdi	*Europe*
	Prof. R.J. Marsal	*N.America*
	Prof. V.F.B. de Mello	*S.America*
Secretary General	Prof. J.K.T.L. Nash	

National Society	Voting Representative	Non-Voting Representative
Argentine	V-P	
Australia	V-P	
Austria	Dr. Manfred Fross	
Belgium	Prof. E.E. de Beer	
Brazil	Prof. Victor F.B. de Mello	
Bulgaria	Prof. G. Stefanoff	Dr. G. Dingosov
Canada	Prof. T.C. Kenney	
Chile	V-P	
China	-	
Colombia	V-P	
Czechoslovakia	Prof. A. Myslivec*	Dr. Z. Sobodka*
Denmark	Delegate of Sweden	
Ecuador	-	
Finland	Mr. Hans Rathmayer	
France	Mr. J. Legrand	Mr. G. Post
F.R.G.	Dr. H.W. Koenig	
G.D.R.	-	
Ghana	Dr. J.W.de Graft Johnson	
Greece	V-P	
Hungary	Prof. A. Kézdi	
India	-	
Iran	V-P	
Ireland	-	
Israel	Prof. J.G. Zeitlen	Prof. A. Komornik
Italy	Prof. C. Viggiani	
Japan	Prof. Masami Fukuoka	Prof. A. Nakase
Mexico	Prof. R.J. Marsal	
Morocco	-	
Netherlands	V-P	
New Zealand	Prof. P.W. Taylor	
Norway	Delegate of Sweden	
Pakistan	-	
Peru	-	
Poland	Dr. Wojciech Wolski	Dr. M. Werno
Portugal	-	
Rhodesia	Mr. D.H.L. Keeble	
Romania	Prof. Emil Botea	
S.Africa	Prof. J.E.B. Jennings	
S.E. Asia	Prof. Z-C Moh	
Spain	Prof. J.A. Jimenez Salas	
Sweden	Prof. Sven Hansbo	Mr. Nils Flodin
Switzerland	Prof. E. Recordon	

National Society	Voting Representative	Non-Voting Representative
Tunisia	-	
Turkey	Prof. E. Togrol	Prof. H. Peynircioglu
U.K.	Dr. W.M. Kirkpatrick	Dr. A.C. Meigh
U.S.A.	Prof. George F. Sowers	Dr. Delon Hampton
U.S.S.R.	Prof. N.A. Tsytovich	Dr. N.S. Chetyrkin
Venezuela	-	
Yugoslavia	Prof. Ivan Sovinc	

(represented by V-P on 4th)*

In addition the following were invited to attend all or part of the meeting and were present as observers:

Prof. R.L. Schiffman (Sub-Committee on Computer Programmes in Geotechnical Engineering)
Prof. de Beer (Secretary of the Co-ordinating Committee of ISSMFE, ISRM & IAEG).

1. Dr. Wolters (Secretary General, IAEG) apologised for his absence and sent us greetings from his Society.

2. A roll was taken of the various countries represented which at the start of the meeting amounted to 35 and it was established that there were sufficient for a quorum for general business to be conducted (one-third necessary).

3. The President explained that on account of the expense involved he had authorised Dr. Togrol to dispense with simultaneous French translation for the meeting. The French speaking delegates kindly acquiesed.

4. The Secretary General pointed out that the Minutes of the Moscow Executive Committee had been written in English and subsequently translated into French. For some of the Minutes (eg No.16) the translation consists of a summary, rather than a literal translation and the President remarked that in accordance with the Constitution Paragraph 4 the English version would clearly be the preferred one.

5. Further to Minute 9 of the Moscow Executive Committee, the Secretary General reported that Romania had been admitted into membership and they were welcomed by the Committee.

6. The Secretary General said that enquiries about membership had been received from engineers in Nigeria. He had visited Nigeria in December 1974 and had met a number who were interested. So far no formal application has been received.

   The current membership is 10,832 members in 49 National Societies - see Appendix 1.

7. The audited accounts for the two years ended 28th February, 1975 which are attached to the Minutes as Appendix 2 were presented by the Secretary General and on the proposal of Prof. Jennings, seconded by Prof. de Mello these were accepted unanimously.

8. A formal proposal was made that Barclays Bank Ltd. should continue to act as bankers to the Society (Appendix 3): that Deloitte Plender Griffiths & Co. should be appointed auditors to the Society for the next two years: and that Clifford Turner & Co. be appointed legal advisors to the Society. These were proposed by Prof. Jennings and seconded by Prof.de Beer and were accepted unanimously.

1. Le Dr Wolters (Secrétaire Général AIGE) s'excuse de son absence et envoie ses salutations au nom de sa Société.

2. On procéde à l'inventaire des pays représentés. Au début de la réunion, on en dénombre 35; le quorum nécessaire pour permettre l'exécution des affaires courantes (un tiers) est donc réuni.

3. Le Président indique que, compte-tenu du coût, il avait donné son autorisation au Dr. Togrol pour supprimer la traduction simultanée (en français) prévue pour la réunion. Les délégués francophones veulent bien accepter cette décision.

4. Le Secrétaire Général précise que le compte-rendu de la Réunion du Comité Exécutif de Moscou fut rédigé en Anglais et traduit en Français par la suite. Pour certaines parties, (par ex. le n° 16) la traduction correspond à un résumé plutôt qu'à une traduction complète; le Président précise que, conformément au paragraphe 4 des Statuts, le texte Anglais serait évidemment préféré.

5. Suite au compte-rendu n°9 de la Réunion exécutive de Moscou, le Secrétaire Général précise que la Roumanie est admise comme membre. Le Comité souhaite la bienvenue à ce nouveau membre.

6. Le Secrétaire Général indique que des demandes de renseignements concernant l'affiliation à la Société ont été reçues de certains ingénieurs nigériens. Le Secrétaire Général a rencontré, lors de sa visite au Nigéria en décembre 1974, un certain nombre de personnes intéressées. On n'a reçu, jusqu'ici, aucune candidature officielle. L'effectif actuel est de 10832 membres regroupés dans 49 Sociétés Nationales (voir annexe 1).

7. Sur une proposition du Pr.Jennings, appuyée par le Pr.de Mello, les comptes vérifiés des deux années se terminant au 25 février 1975, (annexe I), présentés par le Secrétaire Général, sont acceptés à l'unanimité (voir Annexe 2).

8. Trois motions proposées par le Pr.Jennings et appuyées par le Pr.de Beer:
   - que la Société BARCLAYS BANK Lt. continue d'agir en tant que Banque de la Société (Annexe 3)
   - que DELOITTE PLENDER GRIFFITHS & C° soit nommée Commissaires aux comptes de la Société pour les deux années à venir
   - que CLIFFORD TURNER & C° soit nommée Conseil Juridique de la Société

   sont acceptées à l'unanimité.

9. The report of the Budget and Finance Sub-Committee which had been submitted by the Chairman, Dr. D'Appolonia, and circulated with the Agenda was briefly introduced by Dr. Koenig and Dr. Meigh who explained that the report had not been discussed by the members of the Committee, although a draft had been circulated to them with comments invited.

It was appreciated that the Sub-Committee were endeavouring to keep to a minimum the dues of members by proposing alternative methods of raising funds, but there was general criticism of the additional load which the report suggested should be imposed on those (and especially the small countries) prepared to carry the already considerable burden of running an International or a Regional Conference.

Various recommendations in the report were considered separately.

First, with regard to Regional Conferences it was confirmed that in accordance with By-Law 21 it was most desirable that the Regional Vice-President should be present at the Regional Conference with which he is concerned and it was recommended that his travel and living expenses to do this should be met by the Organising Committee. If he is prevented from being present then his place should be taken by one of the other Officers of the International Society chosen by the Organising Committee and his expenses similarly met.

For an International Conference it was similarly agreed that the travel and living expenses of the President and the Secretary General in attending the Conference should be met by the Organising Committee.

Professor Taylor moved a motion that *"a country as part of its commitment in hosting a Regional Conference shall place a surcharge on the sale of the Proceedings amounting to 10% of the published price of all proceedings sold, including those to participants. The proceeds of the surcharge shall be made payable to the ISSMFE. Surcharges obtained from this source should be paid at the same time as the annual dues."*

The motion was seconded by Prof. Jennings and on a vote being taken was rejected by 20 to 10.

The proposal that the method of assessing dues be related to the geotechnical activity in a country (eg by means of the construction turnover) was presented by Dr. Meigh.

Dr. Chetyrkin considered that a more equitable system would be to have a flat rate per member plus a variable sum for each National Society using a sliding scale as had been done in Moscow.

Prof. de Mello suggested that about 30% of the annual budget should be raised by a fixed fee per member, the remaining 70% being raised by a variable sum per National Society depending upon the ability of the country to pay. This was seconded by Prof. Zeitlen and Dr. Meigh was asked to bring in proposals at a later stage of the meeting.

10. Prof. de Mello proposed and Prof. Za-Chieh Moh seconded that By-Law 19 should be amended as follows:-

9. Le Dr.Koenig et le Dr.Meigh présentent le rapport de la Commission du budget et des finances (soumis par son Président, le Dr.d'Appolonia, et diffusé avec l'ordre du jour); ils précisent que ce rapport n'a pas fait l'objet d'une discussion par les membres de la Commission, bien qu'une minute eût été diffusée avec demande de commentaires.

Bien que consciente des efforts de la Commission visant à réduire au maximum le montant des cotisations en proposant d'autres méthodes de financement, la Réunion dans son ensemble désapprouve la charge supplémentaire qui, selon le rapport, serait imposée à ceux (notamment, les petites nations) qui acceptent d'assumer la charge, déjà considérable, de l'organisation d'une Conférence Internationale ou Régionale.

On examine séparément différentes recommandations du rapport.

Premièrement, au sujet des Conférences Régionales, on confirme, en accord avec l'article 21 des Statuts, qu'il serait très souhaitable que le Vice-Président Régionale assiste à la Conférence Régionale correspondante.
On recommande que ses frais de voyage et de séjour soient pris en charge par le Comité oranisateur. Dans le cas de l'impossibilité de la présence du Vice-Président, il serait remplacé par un des responsables de la Société Internationale, choisi par le Comité organisateur, qui en assumerait également les frais.

Pour une Conférence Internationale, on préconise également que les frais de voyage et de séjour du Président et du Secrétaire Général pour assister à la Conférence soient pris en charge par le Comité organisateur.

Le Pr.Taylor soumet la motion suivante: "Un pays qui accueille une Conférence Régionale doit appliquer, au prix de vente du compte-rendu de la Conférence, un supplément de 10% du prix affiché payable par tout acheteur, y compris les participants. La somme qui résulte de ce supplément sera versée à la SIMSF en même temps que les cotisations annuelles".

Appuyée par le Pr.Jennings, cette motion est rejetée lors du scrutin par 20 voix contre 10.

Le Dr.Meigh propose que le calcul du montant des cotisations tienne compte de l'ensemble des activités géotechniques de chaque pays (par exemple, en se basant sur le chiffre d'affaires de l'industrie de la construction).

Le Dr.Chetyrkin estime plus équitable un tarif fixe pour chaque membre complété par une somme variable pour chaque Société Nationale estimée suivant un tarif dégressif (comme celà a été fait à Moscou).
Le Pr.de Mello propose que 30% environ du budget annuel provienne du tarif unique pour chaque membre, le solde correspondant à la somme variable pour chaque Société Nationale, cette somme étant déterminée selon les ressources de chaque pays. Cette proposition est appuyée par le Pr.Zeitlen. On demande au Dr.Meigh de présenter des propositions chiffrées plus tard au cours de la Réunion.

10. La modification suivante, à apporter à l'article 19 des statuts est proposée par le Pr.de Mello et appuyée par le Pr.Za-Chieh Moh: -

Each National Society shall pay to the order of the Society its subscription annually in advance on 1st January each year. From 1st January 1974 the amount was fixed by the Executive Committee (meeting in Moscow in 1973) at $100.00 (US) per National Society, plus an amount between $1.00 and $2.05 (US) per individual member as shown in Appendix 4. At any time the basis of subscriptions shall be that agreed by the most recent meeting of the Executive Committee, the number of members in the National Society being that at the time the payment is due. The Executive Committee shall have a financial report at each meeting and shall regularly review the amount of the subscription.

This was in accordance with the principles adopted at the Moscow Executive Committee, the wording had been circulated in advance with the Agenda and the proposal was unanimously adopted.

11. The President proposed that By-Law 15 should be amended by the addition of the words:

An invitation for the next-but-one International Conference may also be considered and accepted at this meeting.

The revised wording had been circulated with the Agenda and was accepted by 25 votes to 1.

12. The New Zealand delegate (Prof. Taylor) drew attention to the dangers of outside bodies implying that they had the sponsorship of ISSMFE for a conference where in fact this support had not been given.

The Secretary General asked any member who had doubts on this score to write to him about it. If our Society's name has been misused the Secretariat would then make an appropriate protest.

13. A request was received from the Italian National Society that the Executive Committee should discuss the basis of allocation of pages for each National Society in the Proceedings of an International Conference.

The President explained that this matter was under active discussion by the Tokyo Conference Advisory Committee and that he would be making proposals as to how this should be done for consideration by the Tokyo Executive Committee. It was agreed the President should decide the allocation for the Tokyo Proceedings. The President agreed to do this, reluctantly, after a unanimous vote. Prof. Viggiani explained that Italy was also concerned about the allocation for Regional Conferences.

Prof. de Mello said that for the forthcoming Pan-American Conference, in the South American area up to 30% of the pages is being considered for papers coming from without the specific area allocations, including even from without the Region, as it was believed that this was to the advantage of the Region. The remainder was allocated in accordance with the membership in the various National Societies.

Prof. Kézdi said that the allocation of pages should not depend on the number of members in a National Society but should be related to the quality of the papers submitted. It was thought

"Chaque société nationale devra verser sa cotisation annuelle le ler janvier de chaque année pour l'année en cours. La somme fixée par la Réunion exécutive à Moscou (1973), applicable à partir du ler janvier 1974, est de 100$US, pour chaque société nationale, majorée d'une somme variant entre 1,00$ et 2,05$ pour chaque membre (voir Annexe 4). A tout moment, la base de cotisation sera celle agréée par la dernière réunion en date du Comité exécutif, le nombre de membres de chaque société nationale étant celui au moment du versement. Un rapport financier sera soumis à chaque réunion exécutive qui devra régulièrement réexaminer le montant de la cotisation."

Cette proposition est en accord avec les principes adoptés à la réunion de Moscou; la rédaction déjà diffusée avec l'ordre du jour, est acceptée à l'unanimité.

11. Le Président propose la modification de l'article 15 des Statuts par l'adjonction de la phrase suivante:
"Une invitation à la conférence internationale qui suivra la prochaine conférence internationale pourra également être examinée et acceptée au cours de cette réunion."
Le rédaction révisée, diffusée avec l'ordre du jour, est adoptée par 25 voix contre 1.

12. Le délégué de la Nouvelle Zélande (Pr.Taylor) attire l'attention sur les dangers provenant du fait des tiers qui laissent entendre que leur conférence est parrainée par la SIMSF, là où cela n'est pas le cas.

Le Secrétaire Général demande à ceux qui auraient des doutes à ce sujet, de l'en informer par lettre. Le Secrétariat élèverait alors les protestations appropriées si le nom de la société avait été utilisé à des fins non-approuvées.

13. La réunion est saisie d'une demande émanant de la Société Nationale Italienne, à savoir que le Comité Exécutif examine les règles de détermination du nombre de pages des comptes-rendus des conférences internationales attribuées à chaque Société Nationale.
Le Président rappelle que cette question est actuellement examinée activement par le Comité Consultatif de la Conférence de Tokyo; il soumettra, au Comité Exécutif de Tokyo, un certain nombre de propositions sur les moyens à adopter.
Il est entendu que le Président devra décider du nombre de pages allouées pour les comptes-rendus de Tokyo. Après un scrutin à l'unanimité, le Président accepte cette tâche, avec peu d'enthousiasme. Le Pr.Viggiani précise que l'Italie est également préoccupée par cette attribution en ce qui concerne les conférences régionales.
Le Pr.de Mello informe la réunion que, pour la prochaine Conférence Pan-Américaine dans la Région de l'Amérique du Sud, on étudie la possibilité de réserver jusqu'à 30% des pages aux communications émanant de zones extérieures à celles pour lesquelles une attribution est faite et même extérieures à la Région considérée; on pense que cette formule sera bénéfique pour la Région. Les autres pages seront attribuées selon l'effectif des membres de chaque Société Nationale.
Le Pr.Kézdi estime que l'attribution des pages ne devrait pas dépendre de l'effectif; elle devrait tenir compte de la qualité des communications

by others that this would be impossible to apply.

The Vice-Presidents were asked to bring in recommendations about Regional Conferences to the Tokyo Executive Committee for discussion at that time.

14. The Secretary General reported that in accordance with the report of the Conference Advisory Committee set up at the Mexico Executive Committee an Advisory Committee was established in 1973 to recommend the procedure to be followed in connection with the Tokyo Conference. This Committee had met briefly in Moscow and again in June, 1974 at Stockholm and then again at Istanbul on April 2nd, 1975.

He outlined the schedule of events to be followed leading up to the Conference which is to be held from 11th-15th July 1977 and the general arrangements which are being proposed. These were approved in outline.

Prof. Nakase then introduced the draft of Bulletin No.1 and pointed out certain small amendments proposed to the text which had been circulated with the Agenda.

After some discussion the draft was provisionally approved pending further discussion over Paragraph I, which implied that members from all National Societies would be admitted. It now appears probable however, that there may be restrictions on the admission of South Africans and Rhodesians to Japan, the effect of which might require the approval referred to above to be withdrawn. This point was next discussed in detail.

15. The Secretary General outlined the events which led up to the exclusion of South Africans and Rhodesians from the Moscow Conference. This had been referred to in Minute No.40 of the Moscow Executive Committee and the Committee at that time was determined to try to avoid such a happening in the future.

When the place of the next conference was being considered in Moscow Prof. Fukuoka for Japan (as Dr. Koenig for the F.R.G. and Professor Prakash for India) gave an assurance that if the conference were to be held in their country all our members from any National Society would be welcome to attend, as reported in Minute 31 of the Moscow Executive Committee.

Since then, however, the Japanese Government had ruled that no Rhodesians would be admitted to Japan and South Africans could enter only for tourism or business activities. No permission to enter was at present given to those who wish to come in for purposes of sport, culture or academic activities. It should also be noted that India had recently ruled that Israelis could not enter India (and this clearly has implications for the holding of the 5th Asian Regional Conference in Bangalore in December) and Ghana had already informed members of the Ghanaian National Society that they would not be permitted to enter South Africa for the African Regional Conference in Durban in September.

The Committee was greatly exercised by this matter. Such actions by governments would do

présentées. Certains participants pensent qu'une telle règle serait d'une application difficile. On demande aux Vice-Présidents de proposer des recommandations relatives aux Conférences Régionales devant le Comité exécutif de Tokyo qui en discutera.

14. Le Secrétaire Général déclare que, conformément au rapport du Comité Consultatif, constitué lors de la Réunion Exécutive de Mexico, on procèda en 1973, à la mise en place d'un Comité Consultatif chargé de préconiser la marche à suivre pour la Conférence de Tokyo. Ce Comité tint une courte réunion à Moscou, puis en juin 1974 à Stockholm et le 2 avril 1975 à Istanbul.

Le Secrétaire Général décrit brièvement les étapes menant jusqu'à la Conférence (qui aura lieu du 11 au 15 juillet 1977) ainsi que les dispositions générales proposées. La Réunion donne son accord de principe.

Le Pr.Nakase, présentant la minute du Bulletin n°1, précise certaines modifications mineures qu'il propose d'introduire dans le texte diffusé avec l'Ordre du Jour.

Après une discussion assez étendue, la minute est provisoirement approuvée, sous réserve d'une nouvelle discussion du § 1, qui laisse entendre que les membres dépendants de toutes les Sociétés Nationales seront admis. Cependant, il semble maintenant probable que l'entrée au Japon des Rhodésiens et des Sud-Africains sera soumise à des restrictions; dans ce cas, il faudrait annuler cette approbation. Ce problème est ensuite discuté en détail.

15. Le Secrétaire Général rappelle brièvement les événements aboutissant à l'exclusion des Sud-Africains et des Rhodésiens de la Conférence de Moscou. Le compte-rendu n°40 de la Réunion Exécutive de Moscou fait allusion à ce problème et ce Comité prit la résolution de ne pas permettre un tel incident à l'avenir.

Lors de l'étude à Moscou, du choix du site de la prochaine Conférence, une garantie fut donnée par le Pr.Fukuoka, au nom du Japon (ainsi que par le Dr Koenig - pour l'Allemagne Fédérale et le Pr.Prakash pour l'Inde) que, si la Conférence devait avoir lieu dans son pays, tous les membres de n'importe quelle Société Nationale seraient les bienvenus; le compte rendu n°31 de la Réunion Exécutive de Moscou fait état de ces déclarations. Cependant, depuis cette date, le Gouvernement Japonais a décidé qu'aucun Rhodésien ne serait admis au Japon et que les Sud-Africains ne seraient admis pour des activités de tourisme ou d'affaires. Actuellement, on refuse l'entrée à ceux désirant venir pour des raisons sportives, culturelles ou académiques. Il faut noter également que l'Inde a décidé récemment d'exclure les visiteurs Israéliens (il est évident que cette décision aura des répercussions sur la 5e Conférence Régionale Asiatique à Bangalore en décembre) et que le Ghana a déjà informé les membres de la Société Nationale du Ghana qu'il leur sera interdit d'entrer en Afrique du Sud pour assister, en septembre, à la Conférence Régionale Africaine. Cette question posa de très grands problèmes au Comité. De telles actions gouvernementales portent

immense damage to our Society. The choices, as starkly stated by Professor Sowers were to:

(i) cancel the conference
(ii) change the place
(iii) allow it to proceed with reduced representation

and many delegates felt that the last of these choices, was unacceptable.

Professor Jennings spoke of his deep concern over this matter. The Russian ban, imposed at the eleventh hour, had caused distress, inconvenience and expense to a great many people and he felt we could not ignore the Japanese restrictions for which we had been given two years warning. He referred to the United Nations resolutions which had been given as the reason for Japanese government action which he had quoted in full in a recent letter to the President (Appendix 5). The South African National Society which contained coloured members could not be said to be racist in any way.

Professor Zeitlen said that the Israeli National Society considered that the Moscow Conference should have been cancelled when the Russian Government imposed its restrictions and he felt that we should now seek a change of place for the IXth Conference.

Dr. de Graft Johnson counselled moderation: it would be difficult for any National Society to obtain a meaningful undertaking from its Government to guarantee to admit years in advance the nationals of another state.

The Secretary General warned that if the conference were to be arbitrarily cancelled at short notice it might be excessively difficult to obtain invitations for a future one, and it might indeed be the end of the Society.

The meeting adjourned at this point at the end of the first day.

4th April 1975

16. The Secretary General presented a revised wording for the Statutes of the Co-ordinating Secretariat of ISSMFE, ISRM and IAEG. These have the same meaning as the version approved in Moscow (Moscow Minute No.21) but are in better English and the revised version was approved. (Appendix 6).

17. Prof. de Beer, Secretary of the above Co-ordinating Committee described the work of the Committee which had met in Brussels in December 1973 and in June 1974. Problems of mutual interest were under regular review. The minutes of the meetings were sent to the three Secretaries General and also to the three Presidents.

18. Prof.de Beer spoke of the desire of the Co-ordinating Committee to see if a common literature classification system in the fields of soil mechanics, rock mechanics and engineering geology could be made. Mr. Flodin expanded on this theme and it was agreed that it would be appropriate to have a committee consisting of three members from each of the Societies. The three from ISSMFE would be chosen from the

de très grands préjudices à notre Société. Le Pr.Sowers pose les choix brutalement:

- annuler la Conférence
- choisir un autre site
- maintenir le Conférence, la représentation étant réduite.

Un grand nombre des délégués trouve le dernier coix inacceptable.

Le Pr.Jennings fait part de sa grande préoccupation quant à ce problème. L'interdit russe, appliqué au dernier moment, fut une peine, un embarras et une perte financière pour un grand nombre de personnes on ne peut oublier les restrictions japonaises, connues deux ans à l avance. Il parle des résolutions adoptées par les Nations Unies et citées par le Gouvernement Japonais pour justifier son action; il a lui-même cité in-extenso, ces résolutions dans une lettre addressée au Président (Annexe 5). On ne peut considérer comme raciste la Société Nationale Sud-Africaine qui comporte des membres africains.

Le Pr.Zeitlen explique que, selon l'avis de la Société Nationale Israélienne, on aurait dû annuler la Conférence de Moscou lors de l'annonce des restrictions; il estime nécessaire de chercher un autre site pour la 9e Conférence.

Le Dr.de Graft Johnson préconise la modération. Il serait difficile pour n'importe quelle Société Nationale d'obtenir de son Gouvernement la promesse valable de permettre l'entrée d'étrangers plusieurs années à l'avance.

Le Secrétaire Général souligne que l'annulation arbitraire de la Conférence peu de temps avant la date prévue risquerait de créer des difficultés lorsqu'il sera question d'obtenir des invitations pour une Conférence future; ceci pourrait signifier la fin de la Société.

La réunion est levée à la fin du premier jour des débats.

Le 4 Avril 1975

16. Le Secrétaire Général présente une nouvelle rédaction des Statuts du Secrétariat de Coordination de la SIMSF, SIMR et AIGE: Le contenu est le même que celui adopté à Moscou (compterendu N°21) mais l'anglais est amélioré; le texte est approuvé (Annexe 6).

17. Le Prof.de Beer, Secrétaire de ce Comité de coordination, décrit le travail du Comité qui organisa des réunions à Bruxelles en décembre 1973 et en juin 1974. On étudie régulièrement les problèmes intéressant tous les partis. Les comptes rendus sont envoyés aux 3 secrétaires Généraux et aux 3 Présidents.

18. Le Prof.de Beer indique le souci du Comité de voir si l'on ne peut pas établir un dispositif commun de classification des documents dans les domaines de la mécanique des sols, de la mécanique des roches et de la géologie de l'ingénieur. M.Flodin développe cette idée et on décide qu'il serait opportun d'établir un comité composé de neuf membres (3 de chaque Société). Les délégués de la SIMSF seront choisis parmi les membres de la Commission consultative pour les informations,

Information Advisory Sub-Committee by its Chairman (who was asked to include one of the German members and Mr. Flodin).

The membership of the Information Advisory Committee was expanded by adding the following names:

Mr. F. Jørstad	(Norway)
Prof. Z-C Moh	(S.E.Asia)
Dr. A. Silveira	(Brazil)

The ISSMFE members were asked to remember the importance of the framework of the classification system already agreed by our Society at immense labour, on which the present Geotechnical Abstracts (and other systems) depend.

Prof. de Beer agreed to act as co-ordinator between the three groups.

19. Further to Minute 9, Dr. Meigh brought in detailed proposals based on a uniform subscription per member plus a variable sum per country.

The arrangement agreed at Moscow brought in the following income:

$ 4900 (22%) @ $100	from 49 countries
17202 (78%)	from indiv.members
$22102	

His revised proposals would bring in

$13350 (55%)	from the 49 countries
10832 (45%) @ $1.00	from indiv.members
$24182	

The rate for any National Society was obtained by multiplying the group number of the country (ranging from 1 to 8) by $75.00 but the mechanism could clearly be varied, eg by using a multiplier of $100.00 or by varying the per capita charge.

The amounts for each National Society were indicated by Dr. Meigh.

The adoption of the scheme outlined by Dr.Meigh using $75 x the group number and a per capita rate of $1.00 to take effect from 1st January 1976 was proposed by Prof. de Mello and seconded by Prof. Z-C Moh. (Appendix 7)

The voting was as follows:

in favour	19
against	14
abstentions	4

The motion was adopted and Dr. Meigh was warmly thanked for his work. Dr. Wolski asked that the Budget and Finance Sub-committee should consider the difficulties of some of the smaller countries and report to our next meeting. This was agreed.

20. It was agreed that a country in bad standing (i.e. who had not paid their subscription for 1974) would not be entitled to vote and accordingly the Vice-President for Asia was not permitted to record a vote for Iran.

21. A motion that the Tokyo Conference should be cancelled was made by Prof. Komornik who made an offer, signed on behalf of the Israel Society, to host the IXth Conference in Jerusalem from 11th-15th July 1977 using essentially the same

par le Président de cette Commission (on lui demande de nommer notamment un membre allemand et M.Flodin).

La composition de cette Commission consultative est agrandie en ajoutant les personnes suivantes:

M. F. Jørstad	(Norvège)
Pr.Z-C. Moh	(Sud-Est Asiatique)
Dr. A. Silveira	(Brésil)

Les délégués membres de la SIMSF sont priés de garder à l'esprit l'importance du principe du système de classification déjà adopté, après de très grands travaux, par notre Société; les Geotechnical Abstracts (parmi d'autres) sont intimement liés à ce système.
Le Pr.de Beer accepte le rôle de coordinateur des 3 groupes.

19. Suite au § 9 ci-dessus, le Dr.Meigh soumet des propositions détaillées basées sur le principe d'une cotisation fixe pour chaque membre majorée d'une somme variant d'un pays à l'autre.

Les dispositions adoptées à Moscou produiraient:

$ 4900 (22%)	à raison de 100$ pour les 49 pays
$17202 (78%)	provenant des cotisations individuelles
$22102	des membres

Les propositions présentées produiraient

$13350 (55%)	provenant des 49 pays
$10832 (45%)	à raison de 1,00$de cotisation par
$24182	membre

Le tarif d'une Société Nationale donnée est obtenu à partir de l'indice de groupe du pays (classé de 1 à 8) multiplié par 75,00$, mais on peut évidemment modifier cette répartition, par exemple en multipliant par 100,00$ ou en faisant varier la cotisation par membre.

Le Dr Meigh cite les montants pour chaque pays.

Le Pr.de Mello, appuyé par le Pr Z-C Moh propose l'adoption de ces dispositions (75$ x l'indice du groupe et tarif de 1,00$ par membre) à partir du 1er janvier 1976.
(Annexe 7)

Le scrutin donne:

Pour	19
Contre	14
Abstention	4

La motion est adoptée; le Dr Meigh est chaleureusement félicité de son travail. Le Dr Wolski demande que la Commission sur le budget et les finances examinent les difficultés des plus petits pays afin d'en rendre compte à notre prochaine réunion. Cette motion est adoptée.

20. On décide qu'un pays débiteur (n'ayant pas versé ses cotisations pour l'année 1974) n'aura pas le droit au vote; ainsi, le Vice-Président, Asie, ne peut voter au nom de l'Iran.

21. Le Pr.Komornik propose que la conférence de Tokyo soit annulée; il présente une invitation, signée au nom de la Société Israélienne, pour recevoir la 9ème Conférence à Jérusalem du 11 au 25 juillet 1977, avec plus ou moins le même programme que

programme as had already been suggested for Tokyo.

Prof. de Beer proposed a motion thanking the Japanese National Society for their efforts to date in planning the IXth Conference and for notifying the Society so clearly about the difficulties they were now encountering over the guaranteed admissions of South Africans and Rhodesians to the Conference. He asked that if the matter could not be solved within three months to avoid this discrimination then the President, and the Secretary General, should be authorised to cancel the conference and to seek an alternative acceptable meeting place.

Similar motions were proposed by Dr. Koenig, Prof. Sowers and Prof. Jennings.

Prof. Sowers then presented the following joint motion which was seconded by Prof. Jennings:

1. *The Executive Committee notes with regret and deep concern that the Japanese Government has indicated that it will not permit the attendance of members of certain national societies at the 9th International Conference. The Executive Committee believes that action of this sort will destroy the objectives and mechanisms of the ISSMFE. Furthermore such actions cannot be accepted by similar organisations which have as their objectives free interchange of scientific and technical information.*

2. *The Executive Committee expresses its deep appreciation of the Japanese National Society for its frank and timely notice of this problem. Further the Executive Committee thanks them for their steady effort to resolve the issue.*

3. *The Executive Committee requests the Japanese National Society to approach their Government at the highest level to obtain their assurance that By-law 15 should be applied at the Tokyo Conference.*

4. *At the same time the President, Secretary General and Vice-President from Asia will make similar efforts at the highest possible diplomatic levels, and National Societies are invited to take similar steps through their official channels.*

5. *If in 3 months, the officers of the International Society have not obtained the necessary assurances, the President is requested to cancel the Tokyo Conference.*

6. *In this case, the President and Secretary General (after consulting all Vice-Presidents) shall seek an alternate site and date considering first the proposal of the F.R.of Germany made in due form at Moscow and also the current proposal from Israel.*

7. *In the event the Tokyo meeting must be cancelled the Secretary General will inform appropriate related Societies of the decision and the reasons for it.*

Professor Fukuoka explained his sympathy for the South African National Society who had made such

celui proposé pour Tokyo.

Le Pr. de Beer propose de remercier la Société Japonaise pour leurs travaux d'organisation de la 9ème Conférence et pour avoir informé la Société si clairement des difficultés qu'il rencontre actuellement en rapport avec l'admission garantie des Sud Africains et des Rhodésiens à la Conférence. Il demande que le Président ainsi que le Secrétaire Général soient habilités à annuler la Conférence et à chercher un autre site acceptable si cette question ne pouvait être résolue dans les trois mois d'une façon qui évite une telle discrimination.

Des motions analogues sont proposées par le Dr. Koenig, le Pr. Sowers et le Pr. Jennings.

Ensuite, le Pr. Sowers propose la résolution commune ci-dessous appuyée par le Pr. Jennings:

1. Le Comité exécutif prend acte, avec regret, et une profonde inquiétude de la décision du Gouvernement Japonais d'interdire la visite des membres de certaines sociétés nationales à la 9ème Conférence internationale. Le Comité exécutif estime que de telles actions détruiraient les objectifs et les moyens de la SIMSF. En outre, de telles actions ne peuvent être acceptées par toute organisation analogue ayant pour objectif le libre échange d'informations scientifiques et techniques.

2. Le Comité exécutif remercie sincèrement la Société Japonaise de l'avoir informé à temps et franchement de ce problème. En outre, le Comité exécutif la remercie des efforts déployés pour résoudre cette question.

3. Le Comité exécutif demande à la Société Japonaise de prendre contact avec son Gouvernement, au plus haut niveau, afin d'obtenir une garantie que l'article 15 des statuts sera appliqué à la Conférence de Tokyo.

4. Parallèlement, le Président, le Secrétaire Général et le Vice-Président pour L'Asie, mèneront une action analogue, au plus haut niveau diplomatique; les Sociétés nationales sont invitées à faire des démarches analogues par leurs voies officielles.

5. Si, au bout de 3 mois, les responsables de la Société Internationale n'avaient pas reçu les garanties nécessaires il est demandé au Président d'annuler la Conférence de Tokyo.

6. Dans ce cas, le Président et le Secrétaire Général (après consultation avec tous les Vice-Présidents) chercheront un autre site pour une autre date, compte tenu premièrement de la proposition de l'Allemagne Fédérale (faite en bonne et due forme à Moscou) et aussi de l'invitation récente d'Israël.
7. Si la Conférence de Tokyo devait être annulée, le Secrétaire Général devra informer de cette décision et des raisons qui y ont conduit, les Sociétés qui peuvent être apparentées à la nôtre.

Le Prof. Fukuoka présente sa sympathie à la Société Sud-Africaine qui a toujours, et qui continue à

a great contribution to soil mechanics and were continuing to do so. It appeared, from what Prof. Jennings had told the Committee, that the U.N.Resolutions were not relevant to this situation. He would be glad to report in full the feelings of the Executive Committee on his return to Japan and would endeavour, if the Executive Committee agreed, to take the strongest action with their Government about it. But he feared that they might be unable to affect a change.

He pointed out that cancellation at a late stage would be a most serious matter for the host country: he himself had spent nearly three years working on the plans for the conference and many other engineers had been involved to a lesser degree. His aim, however, was the well-being of the International Society for which he and the Japanese had the greatest regard.

Prof. Za-Chieh Moh said that in his view, it would be almost impossible for a National Society to guarantee what would be the attitude of their government about visas a number of years hence. He believed that attending a conference was generally classified as "tourism" so what was being asked of the South Africans might not, in fact, be too unreasonable. Furthermore, if the motion were accepted, the International Society would be in duty bound to ask the assurance of the Organising Committees of all the Conferences which we were sponsoring (i.e. our own Regional Conferences, the Conference on Induced Seismicity in Banff, the First Baltic Conference, etc) that all the members of our Society would be permitted to attend them.

Dr. Chetyrkin expressed his agreement with Dr. Moh's views.

Items 1, 2, 3 and 4 of the motion were agreed unanimously by show of hands.

On a secret ballot being taken for items 5 and 6 the voting was as follows

5.	In favour	22
	Against	15
6.	In favour	28
	Against	9

The motions were therefore adopted and item 7 was agreed *nem con.*

The Vice-Presidents were requested to write to the organisers of their Regional Conferences stating that if the spirit of By-Law 15 is not observed at their forthcoming conference then the conference cannot be termed a Regional Conference of the ISSMFE. The organising committees of any other conferences being sponsored by the ISSMFE should be similarly informed by the Secretary General. This was agreed with one dissentient.

22. On behalf of the Chairman of the Sub-Committee on Symbols, Units, Definitions and Standards, M. Post reported that the work of the Committee was proceeding well and a full report would be made to the next Executive Committee. The Lexicon would be ready for printing by September 1975 but the money to print this is not available.

apporter une si grande contribution à la mécanique des sols. D'après les déclarations du Pr Jennings, les résolutions des Nations Unies ne s'appliquent pas à la présente situation. A son retour au Japon, il transmettra in extenso le sentiment du Comité exécutif; si le Comité Exécutif le veut, il s'efforcera de protester énergiquement auprès du Gouvernement Japonais. Il craint cependant qu'il ne soit pas possible d'obtenir un revirement.

Il précise qu'une annulation de dernière heure serait très sérieuse pour le pays hôte. Lui même a consacré près de 3 ans à l'organisation de la Conférence et bien d'autres y ont travaillé dans une moindre mesure. Néanmoins, son but est le succès de la Société Internationale que lui-même, ainsi que la Société Japonaise, tiennent dans la plus grande estime.

L'avis du Pr. Za-Chieh Moh est qu'il serait quasiment impossible pour une Société Nationale de garantir l'attitude de son gouvernement envers les visas dans quelques années. Il pense qu'assister à une conférence est généralement classé comme activité de "tourisme"; ainsi, ce que l'on demande aux Sud-Africains n'est peut être pas en fait trop déraisonnable. En outre, si cette résolution est adoptée, la Société sera moralement obligée d'exiger des garanties de tous les comités d'organisation de toutes les conférences parrainées par notre Société (nos propres conférences régionales, la conférence sur la séismicité induite, à Banff, la première conférence baltique, ...) que l'ensemble des membres de notre Société pourra y assister.

Le Dr. Chetyrkin se dit d'accord avec l'avis du Dr. Moh.

Les paragraphes 1, 2, 3, 4 de la motion sont acceptés à l'unanimité à main levée.

Après un scrutin secret sur les paragraphes 5 et 6, le résultat est:

§ 5	pour	22
	contre	15
§ 6	pour	28
	contre	9

Les motions sont adoptées, personne n'opposant le paragraphe 7.

On demande aux Vice-Présidents d'écrire aux organisateurs de leurs Conférences régionales pour les informer que dans le cas où l'esprit de l'article 15 des statuts ne serait pas respecté lors de leurs conférences futures, la conférence ne pourra être qualifiée de "conférence SIMSF". Le Secrétaire Général devra également informer les organisateurs des autres Conférences parrainées par la SIMSF de cette décision. Cette proposition est adoptée, une seule voix étant contre.

22. Au nom de la Commission sur les symboles, unités, définitions et normes, M. Post informe la réunion que le travail de cette Commission progresse de façon satisfaisante; un rapport complet sera soumis à la prochaine Réunion exécutive. Le Lexicon sera prêt pour l'imprimeur en septembre 1975 mais les fonds nécessaires à l'impression manquent.

The Secretary General reported that a Greek/ English version of the Lexicon has been prepared by the Greek National Society and M. Baguelin's Committee was asked to consider the incorporation of this into the new version.

The membership of the sub-committee is as given in Appendix 8.

Prof. de Beer asked if a co-ordinating committee on Symbols, Units and Definitions between the ISSMFE, ISRM and IAEG could be set up and it was agreed that M. Baguelin should be asked to appoint three members from his sub-committee to do this.

Prof. Taylor asked if the sub-committee would give early attention to the question of preferred sample diameters and he was asked to write about this matter to the Chairman.

23. The Secretary read a summary of a report of the Chairman of the Sub-Committee on Soil Sampling which had not been active since the Moscow meeting and which had then hoped to complete its work in 1975. The Chairman now asked for a renewed mandate for the committee but in view of the general uncertainty about it, it was agreed that the committee should now be discharged.

24. The Secretary General stated that he had received a lengthy report from Dr. Aitchison on the work of the Sub-Committee on the Exchange of Computer Programmes in Geotechnical Engineering. The four members of the Sub-Committee present considered that it was premature to present agreed recommendations to the Executive Committee and it was hoped that the Sub-Committee would be able to do this by the time of the next Conference.

25. It was agreed that the topic of Standardization should be removed from the work of M.Baguelin's Committee and that when problems of standardization arise ad-hoc Sub-Committees should be established to deal with each one, and in due course their agreed recommendations should be fed (if appropriate) through the Committee on Symbols, units and definitions.

26. The Sub-Committee on Standardization of Penetration Testing in Europe set up in 1965 was enlarged to have the membership given in Appendix 8:

Zweck	FRG (Chairman)
Broms	Sweden
von Moos	Switzerland
Schultze	FRG
van der Veen	Netherlands
de Beer	Belgium
Trofimenkov	USSR
Rodin	UK
Stefanoff	Bulgaria

27. The Secretary General spoke about the correspondence he had had with Prof. Leonards (USA) about the possibility of setting up a working group on Effective Stress in Partially Saturated Soils. No action was recommended at this stage. Prof. Jennings reported that a conference on the problems of partially saturated soils was to be held in South Africa, probably in 1978.

Le Secrétaire Général déclare qu'une version Grec/Anglais du Lexicon est établie par la Société grecque: le comité de M. Baugelin est prié d'étudier son incorporation dans la nouvelle édition.

La composition de cette Commission est donnée dans l'annexe 8.

Le Pr. de Beer demande s'il serait possible de créer un Comité de coordination sur les symboles, unités et définitions regroupant SIMSF, SIMR et AIGE. On demande donc à M. Baguelin de nommer 3 membres de sa Commission à cette fin.

Le Pr. Taylor demande si la Commission pourra traiter d'urgence du problème des diamètres préférés pour les échantillons. On lui demande d'écrire au Président Baguelin à ce sujet.

23. Le Secrétaire Général donne lecture d'un résumé d'un rapport du Président de la Commission sur le prélèvement des échantillons de sols; cette Commission espérait, à Moscou, achever son travail dans le courant de l'année 1975, mais n'a pas progressé depuis. Son Président demande le renouvellement du mandat de la Commission mais, compte tenu de l'atmosphère d'incertitude qui entoure cette Commission, on décide sa dissolution.

24. Le Secrétaire Général déclare qu'il a reçu un long rapport du Dr.Aitchison sur le travail de la Commission sur l'échange des programmes pour ordinateurs dans le domaine géotechnique. Les 4 membres de la Commission, présents, estiment qu'il est trop tôt pour soumettre au Comité exécutif, des recommandations approuvées par tous; ils espèrent que cela sera possible au moment de la prochaine Conférence.

25. On décide que "la normalisation" soit supprimée du programme du Comité de M. Baguelin; lorsque les problèmes de normalisation se poseront, des commissions ad-hoc seront créées pour chaque cas; ensuite, les recommandations qui en résulteront seront transmises (si jugées adéquates) par l'intermédiaire du Comité sur les symboles, unités et définitions.

26. La composition de la Commission sur la normalisation des essais de pénétration en Europe, créée en 1965, est agrandie, (la composition complète est donnée dans l'annexe 8:

Zweck	Allemagne Fédérale (Président)
Broms	Suède
von Moos	Suisse
Schultze	Allemagne Fédérale
van der Veen	Pays-Bas
de Beer	Belgique
Trofminkov	U.R.S.S.
Rodin	Grande Bretagne
Stefanoff	Bulgarie

27. Le Secrétaire Général rappelle son échange de correspondance avec le Pr. Leonards (U.S.A.) relative à la possiblité de créer un groupe de travail sur "les contraintes effectives dans les sols partiellement saturés". On ne prévoit pas de suite pour le moment. Le Pr.Jennings précise qu'une Conférence sur les problèmes des sols partiellement saturés sera organisée en Afrique du Sud, probablement en 1978.

28. A request received from the U.S.Committee that a Sub-Committee should be set up on Geotechnical Ocean Engineering was considered. Dr.Meigh asked about its terms of reference and it was agreed not to proceed with this until after the Specialty Session on this subject at the next Conference.

29. The Vice-President for Europe (Prof. Kézdi) reported on the activities which had taken place within the Region since the Moscow Conference.

30. Prof. Marsal, Vice-President for North America reported on the activities in his region and he also mentioned the geotechnical happenings in South America as Prof. de Mello had left the meeting.

31. Dr. de Graft Johnson (Vice-President for Africa) reported on the various SMFE activities within the African Region and he spoke of some of the difficulties of communication there.

32. Prof. Taylor (Vice-President for Australasia) spoke about the various activities in New Zealand and Australia since 1973.

33. Prof. Za-Chieh Moh unfortunately had to leave the meeting shortly before his verbal report was due. From his private discussions with individuals before the meeting it is evident that there is much activity in the Region.

34. The Secretary General stated that during the next 18 months arrangements would have to be made for the production of the next List of Members. Secretaries of National Societies were invited to send him the names of a printer who might be interested to quote for printing the list, which should be issued early in 1977. The possibility of offset litho was accepted and also a reduced size.

    It was agreed that sufficient copies of the list should be printed for each member to have a copy should this be required, but only the numbers requested by National Society secretaries should be dispatched in the first instance. It was hoped that every National Society would co-operate to secure as many advertisements as possible.

35. The Secretary General reported that as well as co-operation with ISRM and IAEG, there were regular consultations with ICOLD who had recently asked if we would be willing to produce State-of-the-Art papers on subjects of mutual interest at some time in the future. It was agreed that this might be done provided no expense was involved. One of our members, Mr.A.I. Johnson, is convenor of an International Conference on Land Subsidence due to take place in California in December, 1976, which we have agreed to co-sponsor. Unfortunately no financial assistance can be offered to them. Dr. MacDonald and Prof. Morgenstern continue to represent us on two committees organised by UNESCO.

36. The Secretary General reported that University Microfilms Ltd. had offered to reproduce Xerox

28. On étudie la demande, faite par le Comité des Etats-Unis, qu'une Commission soit créée au sujet de "L'Ingénierie géotechnique des Océans". Le Dr. Meigh demande ses termes de référence. On décide de ne pas donner suite avant la session spéciale sur cette question prévue pour la prochaine Conférence.

29. Le Vice-Président Europe (Pr.Kézdi) décrit les activités de la région depuis la Conférence de Moscou.

30. Le Pr. Marsal, Vice-Président, Amérique du Nord, décrit les activités de sa région; il évoque également les évènements géotechniques de l'Amérique du Sud, le Pr. de Mello étant parti.

31. Le Dr. de Graft Johnson (Vice-Président, Afrique) décrit les activités de la SIMSF dans la région africaine; il mentionne les difficultés de communication dans cette région.

32. Le Pr. Taylor (Vice-Président, Australasie) décrit les activités de la Nouvelle-Zélande et de l'Australie depuis 1973.

33. Le Pr. Za-Chieh Moh doit malheureusement quitter la salle juste avant son tour. D'après ses conversations avant la réunion, l'activité de la région est évidemment grande.

34. Le Secrétaire Général déclare que, pendant les 18 mois à venir, il faudrait prendre des dispositions pour la publication de la prochaine liste des membres. Il demande aux Secrétaires des Sociétés Nationales de lui communiquer les noms des imprimeurs susceptibles de vouloir soumissionner; la liste devant paraitre au début 1977. On accepte la possiblité d'une impression Offset et un format réduit.

    On décide que le nombre imprimé doit être suffisant pour permettre à chaque membre d'en avoir un exemplaire si nécessaire; cependant, au début, on n'enverra que le nombre demandé par chaque Société Nationale. On espère que chaque Société Nationale s'efforcera d'obtenir le plus grand nombre de commandes publicitaires.

35. Le Secrétaire Général déclare, qu'outre la coopération avec SIMR et AIGE, la Société est en contact régulier avec CIGB qui a demandé récemment si la Société voudrait bien envisager d'éditer à l'avenir un certain nombre de documents de synthèse "Etat des connaissances" concernant des domaines intéressant les deux Sociétés. On accepte cette possibilité, sous réserve que le coût soit nul. Un de nos membres (M. A.I. Johnson) est un des organisateurs d'une Conférence Internationale sur l'affaissement des terrains qui aura lieu en Californie en décembre 1976, et que notre Société a accepté de co-parrainer. On ne peut malheureusement proposer aucune aide financière. Le Dr.MacDonald et le Pr.Morgenstern représentent toujours notre Société auprès de deux Comités créés par l'UNESCO.

copies of Proceedings of past International and Regional Conferences. The 2nd Rotterdam Conference had already been copied by this firm and National Societies were authorised to have their out-of-print proceedings reproduced in this way if they wish to do so.

37. Professor Kenney reported that there was some concern within the Canadian National Society regarding the average standard of papers published in the Proceedings of recent international conferences of the ISSMFE. It was suggested that, in his future report to the Executive Committee on the subject of allocation of papers amongst member national societies, the President of the ISSMFE acknowledge Canada's concern.

38. Dr. Werno told of the plans which have been made for the 1st Baltic Conference on Soil Mechanics and Foundation Engineering to be held in Gdansk 22-25 September, 1975. All members were invited warmly to attend. It was believed that the spirit of By-Law 15 could be honoured.

39. Prof. Viggiani announced that the Italian Geotechnical Association was planning to hold a Conference on the Geotechnics of Structurally Complex Formations to be held in Italy, probably near Rome, in September 1976. The sponsorship of the ISSMFE was agreed, subject to the spirit of By-Law 15 being accepted.

40. Prof. Nakase asked if the Japanese Organising Committee was to proceed with the printing and dispatch of Bulletin No.1 on 15th May. Clearly a considerable expense for the Organising Committee was implied, roughly $5000. It was agreed that they should be requested to do this but that should the Conference have to be cancelled then the cost of this would be borne by the International Society.

41. A vote of thanks to the Chairman and Secretary General, to our Turkish host and to the secretariat was proposed by Prof. Komornik and this was carried unanimously by acclamation.

The meeting closed at 17.35.

Signed in and on behalf of the Executive Committee.

J. Kerisel

President
4th of April 1975

36. Le Secrétaire Général déclare que University Microfilms Ltd a proposé de photocopier les comptes rendus des anciennes Conférences Internationales et Régionales. Cette entreprise a déjà reproduit ceux de la 2e Conférence de Rotterdam; les Sociétés Nationales sont autorisées à faire reproduire de cette façon leurs comptes rendus épuisés si elles le désirent.

37. Le Pr. Kenney fait état de la préoccupation de la Société Nationale Canadienne sur la qualité générale des communications publiées dans les compte-rendus des récentes Conférences SIMSF. On suggère que le Président de la SIMSF, dans son futur rapport au Comité exécutif relatif au nombre d'articles alloué à chaque pays membre, fasse état de cette préoccupation canadienne.

38. Le Dr. Werno parle des dispositions prises pour la première Conférence Baltique sur la mécanique des sols et les fondations qui aura lieu à Gdansk du 22 au 25 setpembre 1975. Tous les membres sont cordialement invités. On pense que l'esprit de l'article 15 des Statuts pourra être respecté.

39. Le Pr. Viggiani annonce que l'Association géotechnique italienne propose une Conférence sur la Géotechnique des formations à structure complexe qui aura lieu, en Italie, probablement près de Rome en september 1976. La SIMSF accepte de parrainer cette Conférence, sous réserve du respect de l'article 15.

40. Le Pr. Nakase demande si le Comité d'organisation japonais devra continuer l'édition et l'envoi du Bulletin N°1 pour le 15 mai.
Cette tâche correspond à des frais considérables à la charge de ce Comité (5 000$ environ). On décide de demander au Comité d'organisation de poursuivre cette tâche, les frais étant remboursés par la Société Internationale si la Conférence était annulée.

41. Le Pr. Komornik propose de remercier le Président et le Secrétaire Général, ainsi que les hôtes turcs et le Secrétariat. Cette motion est adoptée à l'unanimité par acclamation.

La réunion est levée à 17 h 35.

Signé au nom du Comité Exécutif

Le Président
4 Avril 1975

APPENDIX 1

ISSMFE MEMBERSHIP ACCORDING TO INFORMATION GIVEN TO SECRETARIAT AT 15 MARCH 1975

Country	Europe	Asia	Africa	N.America	S.America	Australasia	Total
Argentina	-	-	-	-	96	-	96
Australia	-	-	-	-	-	426	426
Austria	55	-	-	-	-	-	55
Belgium	100	-	-	-	-	-	100
Brazil	-	-	-	-	132	-	132
Bulgaria	92	-	-	-	-	-	92
Canada	-	-	-	583	-	-	583
Chile	-	-	-	-	23	-	23
China	-	100	-	-	-	-	100
Colombia	-	-	-	-	19	-	19
Czechoslovakia	35	-	-	-	-	-	35
Denmark	110	-	-	-	-	-	110
Ecuador	-	-	-	-	39	-	39
Finland	114	-	-	-	-	-	114
France	698	-	-	-	-	-	698
FRG	900	-	-	-	-	-	900
GDR	23	-	-	-	-	-	23
Ghana	-	-	25	-	-	-	25
Greece	50	-	-	-	-	-	50
Hungary	25	-	-	-	-	-	25
India	-	227	-	-	-	-	227
Iran	-	25	-	-	-	-	25
Ireland	6	-	-	-	-	-	6
Israel	-	114	-	-	-	-	114
Italy	580	-	-	-	-	-	580
Japan	-	366	-	-	-	-	366
Mexico	-	-	-	315	-	-	315
Morocco	-	-	140	-	-	-	140
Netherlands	93	-	-	-	-	-	93
New Zealand	-	-	-	-	-	218	218
Norway	202	-	-	-	-	-	202
Pakistan	-	27	-	-	-	-	27
Peru	-	-	-	-	38	-	38
Poland	51	-	-	-	-	-	51
Portugal	167	-	-	-	-	-	167
Rhodesia	-	-	263	-	-	-	263
Romania	27	-	-	-	-	-	27
South Africa	-	-	461	-	-	-	461
S.E.Asia	-	184	-	-	-	-	184
Spain	300	-	-	-	-	-	300
Sweden	304	-	-	-	-	-	304
Switzerland	673	-	-	-	-	-	673
Tunisia	-	-	15	-	-	-	15
Turkey	42	-	-	-	-	-	42
United Kingdom	814	-	-	-	-	-	814
USA	-	-	-	1025	-	-	1025
USSR	255	-	-	-	-	-	255
Venezuela	-	-	-	-	177	-	177
Yugoslavia	78	-	-	-	-	-	78
Countries	*25*	*7*	*5*	*3*	*7*	*2*	*49*
Membership	*5794*	*1043*	*904*	*1923*	*524*	*644*	*10832*

APPENDIX 2

INTERNATIONAL SOCIETY FOR SOIL MECHANICS AND FOUNDATION ENGINEERING

AUDITED ACCOUNTS FOR THE TWO YEARS 1 March 1973 - 28th February 1975

Examined by Deloitte, Plender, Griffiths & Co. and signed 13 March 1975, London

RECEIPTS AND PAYMENTS

	Sterling £	Dollars US$
RECEIPTS		
Balance in Bank 1 March 1973	2,962.97	7,111.12
Subscriptions (including arrears)	15,462.35	37,109.64
Advertisements in Lists of Members	1,185.15	2,844.36
Sundry receipts	15.05	36.12
	£19,625.52	$47,101.24
EXPENDITURE		
List of Members	1,382.86	3,318.86
Travelling expenses	2,173.69	5,216.85
Printing, postage & sundries	667.27	1,601.45
Personnel Fees	5,240.48	12,577.15
Service Charge by ICE Mar.71-Sept.74 including Audit fee for 72 and 73 of £75	920.22	2,208.53
	£10,384.52	$24,922.84
Balance in Bank at 28 February 1973	£9,241.00	$22,178.40

APPENDIX 3

APPOINTMENT OF BANKERS

At a Meeting of the Executive Committee of the International Society for Soil Mechanics and Foundation Engineering (hereinafter called "the customer") held the 3rd,4th day of April 1975 IT WAS RESOLVED:- That BARCLAYS BANK LIMITED continue to be appointed the Bankers of the customer. That the said Bank be and they are hereby authorised -

1. To honour and comply with all cheques drafts bills promissory notes acceptances negotiable instruments and orders expressed to be drawn accepted made or given on behalf of the customer at any time or times
2. To honour and comply with all instructions to deliver and dispose of any securities or documents or property held by the Bank on behalf of the customer

   Provided any such cheques drafts bills promissory notes acceptances negotiable instruments orders and instructions are signed by the persons holding the undermentioned Offices for the time being Secretary General
3. To treat all cheques drafts bills promissory notes acceptances negotiable instruments and orders as being endorsed on behalf of the customer provided such endorsements purport to be signed by Secretary General

We hereby certify the above to be a true copy from the Minutes

(sgd) *J. Kerisel* CHAIRMAN
(sgd) *Kevin Nash* SECRETARY

Date 3rd April 1975

APPENDIX 4

LIST OF NATIONAL SOCIETIES WITHIN THE VARIOUS GEOGRAPHICAL ZONES. The sum in brackets indicates the individual membership fee in $(US) (See By-Law 19).

Europe				*Asia*		*Africa*		*Australasia*	
Austria	(1.30)	Netherlands	(1.45)	China	(1.75)	Ghana	(1.00)	Australia	(1.60)
Belgium	(1.45)	Norway	(1.30)	India	(1.60)	Morocco	(1.00)	New Zealand	(1.30)
Bulgaria	(1.15)	Poland	(1.60)	Iran	(1.15)	Rhodesia	(1.15)		
Czechoslovakia	(1.45)	Portugal	(1.15)	Israel	(1.15)	S.Africa	(1.30)		
Denmark	(1.30)	Romania	(1.30)	Japan	(1.75)	Tunisia	(1.00)	*South America*	
Finland	(1.30)	Spain	(1.45)	Pakistan	(1.30)				
France	(1.75)	Sweden	(1.45)	S.E.Asia	(1.30)			Argentina	(1.45)
F.R.G.	(1.75)	Switzerland	(1.45)					Brazil	(1.45)
G.D.R.	(1.60)	Turkey	(1.30)			*North America*		Chile	(1.15)
Greece	(1.30)	United Kingdom	(1.75)					Colombia	(1.15)
Hungary	(1.30)	U.S.S.R.	(2.05)			Canada	(1.75)	Ecuador	(1.00)
Ireland	(1.15)	Yugoslavia	(1.30)			Mexico	(1.45)	Peru	(1.00)
Italy	(1.75)					U.S.A.	(2.05)	Venezuela	(1.30)

APPENDIX 5

University of the Witwatersrand, Johannesburg *Department of Civil Engineering*
1 Jan Smuts Avenue, Johannesburg 2001, South Africa

Professor Jean Kerisel, Semicsol Etudes
115 rue Saint-Dominique, PARIS 7, France

JEJ/apn
27th March 1975

Dear Professor Kerisel,

Executive Committee Meeting of the International Society for Soil Mechanics and Foundation Engineering : Istanbul 1975

Further to my letter of 7th March, 1975, I have been thinking deeply about the situation which might arise if the Japanese delegation reports their Government's refusal of visas to delegates from certain member countries of our Society for the purpose of attending the International Conference in Tokyo in 1977. I have discussed the matter at length with the local Japanese Consul General and also with senior officers of our Foreign Affairs Department. It appears that very important points of principle are at stake and that in arguing our own particular case we will be touching on a matter which goes very much wider than our own particular Society. The same things are happening in the fields of Science and Medicine and many important organizations, for example, the International Council of Scientific Unions, have also come under the same axe. For these reasons, our researches have been rather deeper. The following points are made:

1. Our International Society By-law 15 requires the host country to agree in advance to participation by all member nations. This undertaking was given by Japan in Moscow in 1973 and is recorded in item 31 on page 11 of the minutes of that executive committee meeting.

2. It should be appreciated that the International Conference to be held in Tokyo is not a Japanese event. It is solely the affair of our International Society and neither the United Nations nor the Japanese Government can compel the International Society to take action which is contrary to its own Statutes. It would be a different thing if the conference were being organized by a local Japanese group and if they had given it international status by inviting external organizations to attend and participate. Therefore, put in a very blunt way, Japan has no standing in such a decision; it is a matter for the ISSMFE only.

3. In Professor Fukuoka's letter to Professor Nash, dated 4th December 1974, he says that the Japanese Foreign Office is following a resolution of the United Nations General Assembly. Further on in the letter, he talks about the 'resolution approved by the Security Council of the United Nations' and this refers specifically to Rhodesia. The second statement may be correct but the first one is certainly not and I have taken the trouble to secure the necessary Resolutions of the United Nations taken both in 1973 and 1974. They read as follows:

   a) General Assembly Resolution No.3151 (XXVIII) Part G, December 1973, Item 10(d):
   "Calls upon all Governments which have not yet done so: .... To end all cultural, educational and civic contracts and exchanges with racist institutions in South Africa; ...."

b) General Assembly Resolution No.3324 (XXIX) Part E, December 1974, Item 8:
"Recommends that the South African regime should be totally excluded from participation in all international organizations and conferences under the auspices of the United Nations so long as it continues to practise apartheid and fails to abide by United Nations resolutions concerning Namibia and Southern Rhodesia;"

c) General Assembly Resolution No.3324 (XXIX) Part E, December 1974, Item 9 (c):
"Requests all Governments: ... To prohibit all cultural, educational, scientific, sporting and other contacts with the racist regime and with organizations or institutions in South Africa which practise apartheid; ..."

4. If one reads the three extracts of the United Nations Resolutions given above it is clear that none of them can apply to our particular case. The first is a 'request' (it calls upon), the second 'recommends' international organizations which operate under the auspices of the United Nations and the third refers to institutions in South Africa which practice apartheid (exclusion on the basis of colour alone), which is certainly not the practice of our National Group. It is very evident that none of these can possibly apply to our Society or the South African national group. There is therefore no case whatsoever for the Japanese Government to say what organizations of the ISSMFE may or may not attend our 1977 conference. If we accept the situation we are yielding to a principle which is very important and close to the hearts of all engineering and scientific organizations throughout the world.

I have made these points to our Japanese Consul General and he has transmitted our views to Tokyo. Let us hope that, when we meet in Istanbul, Professor Fukuoka will come armed with a reversal of his Government's opinion. In this way an awkward and embarrassing situation could be avoided.

I should like to reiterate what I have already said in my previous letters and also in the letter to Professor Fukuoka in this regard. I will not be ungentlemanly or aggressive or anti-Japanese in anything I may say at Istanbul but I do feel that our International Society faces a crisis which must be resolved. I suggest that you look at the recent similar events in Nigeria for the International Press Union. Nigeria eventually capitulated and allowed South African delegates to attend the forthcoming conference in that country.

Yours sincerely,

(Sgd) J.E. Jennings

J.E. Jennings
Professor of Civil Engineering

APPENDIX 6

STATUTES

OF THE INTERNATIONAL GEOTECHNICAL SOCIETIES' CO-ORDINATING SECRETARIAT

MEMBERSHIP

1. These Statutes record the creation of a permanent co-ordinating Secretariat for: the International Society for Soil Mechanics and Foundation Engineering; the International Society for Rock Mechanics; and the International Association of Engineering Geology.

CONTROL

2. The Secretariat is governed by a Committee made up of the Secretaries General of the three Societies.

SECRETARY

3. The day-to-day servicing of the Committee is carried out by a Secretary, appointed by the Committee. He is expected to be present in an advisory capacity when the Committee meets, but has no voting powers. He is also to be invited as an advisor to the Executive Committee meetings of the three Societies.

AIMS AND OBJECTS

4. The aims and objects of the joint Secretariat are to promote co-ordination between the Societies and to protect their mutual interests. The Committee shall specify in detail how this is to be accomplished. Any expansion of the aims shall require the unanimous agreement of the Committee.

LANGUAGES

5. The official languages of the Secretariat are those of the member Societies.

LOCATION

6. The Secretariat has its centre in Brussels but it may be transferred elsewhere by unanimous decision of the Committee.

FINANCE

7. The Secretariat shall be run so that the expenses are covered by grants and subsidies from Governments or from National or International bodies.

The way in which the funds, put at the disposal of the Secretariat, are used, shall be the responsibility solely of the Secretariat.

MEETINGS

8. The Committee shall meet at the Secretariat centre at least once a year, and additionally at the request of two members of the Committee.

First approved by the ISSMFE Executive Committee, Moscow, 2/3 August, 1973
ISRM Katowice, October, 1973
IAEG Hanover, September, 1973

Revision approved by ISSMFE, Istanbul 3/4 April 1975
ISRM
IAEG

APPENDIX 7

PROPOSAL FOR A UNIFORM SUBSCRIPTION PER MEMBER PLUS A VARIABLE SUM PER COUNTRY AS OUTLINED IN MINUTE 19 TO TAKE EFFECT FROM 1st JANUARY 1976

The rate for any National Society was obtained by multiplying the group number of the country by $75.00, and a per capita rate of $1.00

Group No.	Country	Present Subscription $	Revised Subscription $	Membership
4	Argentina	239	396	96
5	Australia	782	801	426
3	Austria	171	280	55
4	Belgium	245	400	100
4	Brazil	291	432	132
2	Bulgaria	206	242	92
6	Canada	1120	1033	583
2	Chile	126	173	23
6	China	275	550	100
2	Colombia	122	169	19
4	Czechoslovakia	151	335	35
3	Denmark	243	335	110
1	Ecuador	139	114	39
3	Finland	248	339	114
6	France	1322	1148	698
6	FRG	1675	1350	900
5	GDR	137	398	23
1	Ghana	125	100	25
3	Greece	165	275	50
3	Hungary	132	250	25
5	India	463	602	227
2	Iran	129	175	25
2	Ireland	107	156	6
2	Israel	231	264	114
6	Italy	1115	1030	580
6	Japan	741	816	366
4	Mexico	557	615	315
1	Morocco	240	215	140
4	Netherlands	235	393	93
3	New Zealand	383	443	218
3	Norway	363	427	202
3	Pakistan	135	252	27
1	Peru	138	113	38
5	Poland	182	426	51
2	Portugal	292	317	167
2	Rhodesia	402	413	263

Group No.	Country	Present Subscription $	Revised Subscription $	Membership
3	Romania	135	252	27
3	South Africa	699	686	461
3	S.E. Asia	339	409	184
4	Spain	535	600	300
4	Sweden	541	604	304
4	Switzerland	1076	973	673
1	Tunisia	115	90	15
3	Turkey	155	267	42
6	United Kingdom	1525	1264	814
8	U.S.A.	2201	1625	1025
8	U.S.S.R.	623	855	255
3	Venezuela	330	402	177
3	Yugoslavia	201	303	78

APPENDIX 8

MEMBERSHIP OF ISSMFE SUB-COMMITTEES 1973-1977

Budget and Finance

Dr.E.D'Appolonia	(Chairman)	USA
Prof. Chin Fung Kee		Malaysia
Dr. J.W.S.de Graft Johnson		Ghana
Dr. H.W. Koenig		FRG
Mr. A.C. Meigh		U.K.
Mr. M.J. Pender		New Zealand
Prof. S. Prakash		India

Conference Advisory Committee (IXth)

President, Prof. Kerisel (Chairman)	France
V-P Asia, Prof.Z-C Moh	Thailand
Secretary of VIIIth Conf, Mr.Chetyrkin	USSR
Prof. Masami Fukuoka	Japan
Prof. A. Nakase	Japan
Secretary General, Prof.Nash	U.K.

Soil Sampling *(Discharged by Istanbul Executive Committee 4 April 1975)*

Dr. G.D. Aitchison	(Chairman)	Australia
Prof. B. Broms		Sweden
Mr. H. Mori		Japan
Prof. J.O. Osterberg		USA
Dr. M.J. Hvorslev		USA
Mr. M. Wood	(Secretary)	Australia

Standardization of Penetration Testing in Europe

Dr. H. Zweck	(Chairman)	FRG
Dr. B. Broms		Sweden
Prof. E. de Beer		Belgium
Mr. S. Rodin		UK
Prof. E. Schultze		FRG
Prof. G. Stefanoff		Bulgaria
Frof. Yu G Trofimenkov		USSR
Dr. A. von Moos		Switzerland
Ir. G. van der Veen		Netherlands

Computer Programmes

Dr. G.D. Aitchison	(Chairman)	Australia
Monsieur J.P, Giroud		France
Prof. C. Viggiani		Italy
Prof. Z-C Moh		Thailand
Dr. E. Togrol		Turkey
Mr. A.E. Furley		U.K.
Dr. H. Meissner		F.R.G.
Prof. R.L. Schiffman		U.S.A.
Prof. B. Ladanyi		Canada
Dr. C.M. Gerrard	(Secretary)	Australia

Information Advisory

Mr. J. DeSalvo	(Chairman)	USA
Monsieur F. Schlosser		France
Mr.N. Flodin		Sweden
Prof. I. Sovinc		Yugoslavia
Mr. H. Kuehn		FRG
Prof. H. Petermann		FRG
Mr. W. Norup		USA
Mr. F. Jørstad		Norway
Prof. Z-C Moh		S.E. Asia
Dr. A. Silveira		Brazil

Symbols, Units, and Definitions

Mr. F. Baguelin	(Chairman)	France
Dr. L. Jurgenson		USSR
Dr. J.N. Hutchinson		UK
Mr. A.I. Johnson		USA
Mr. E. Sandegren		Sweden
Prof. E. Schultze		FRG
Dr. G. Ter-Stepanian		USSR
Prof. J.L. Justo		Spain
Prof. Colombo		Italy
Mr. J. Morton		Canada
Prof. Borges		Portugal
Prof. P. Habib		France

International Society for Soil Mechanics and Foundation Engineering

Minutes of the Executive Committee Meeting Held in Tokyo

8th and 9th July 1977
09.00-12.30 and 13.30-17.00 each day

PRESENT	President	Prof. J. Kerisel	
	Vice-Presidents	-	*Africa*
		Prof. Z-C Moh	*Asia*
		Prof. P.W. Taylor	*Australasia*
		Prof. A. Kézdi	*Europe*
		Prof. R.J. Marsal	*N.America*
		Prof. V.F.B. de Mello	*S.America*
	Secretary General	Prof. J.K.T.L. Nash	

NATIONAL SOCIETY	*VOTING REPRESENTATIVE*	*NON-VOTING REPRESENTATIVE*
Argentina	-	-
Australia	Mr. A.D. Hosking	Prof. I.B. Donald
Austria	Dr. M. Fross	-
Belgium	Prof.E. de Beer	Prof. M. Lousberg
Brazil	Prof. D. de A. Velloso	Eng. A.D.F. Napoles-Neto
Bulgaria	Prof. G. Stefanoff	Prof. G. Dingosov
Canada	Dr. D.H. Shields	Dr. J.I. Clarke
Chile	Prof. F. Martinez	-
China	-	-
Colombia	-	-
Czechoslovakia	Dr. Ing B. Kamenov	-
Denmark	Prof. N.K. Ovesen	Helle Strømann
Ecuador	Ing. Luis Marin Nieto	-
Finland	Dr. J. Hartikainen	-
France	Prof. P. Habib	Mr. Pierre Florentin
F.R.G.	Dr-Ing E.H. Koenig	Dr-Ing K.H. Idel
G.D.R.	Dr. Klaus Welzien	-
Ghana	-	-
Greece	V-P, Europe	-
Hungary	V-P, Europe	Prof. G. Petrasovits
India	Prof. S. Prakash	Dr. R.K. Bhandari
Indonesia	Ir.A. Aziz Jayaputra	Mr. Erik Lemmens
Iran	V-P, Asia	-
Ireland	Del. U.K.	-
Israel	Prof. J.G. Zeitlen	-
Italy	Prof. A. Croce	Prof. C. Viggiani
Japan	Prof. M. Fukuoka	Prof. A. Nakase
Mexico	Ing.G. Springall-Caram	Ing. E. Moreno Gomez
Morocco	Mr. A. Chaoui	-
Netherlands	Prof. A.F. van Weele	-
New Zealand	Mr. G.L. Evans	-
Nigeria	Mr. M.O. Adesunloye	Mr. E.O.O. Fasehun
Norway	Prof. N. Janbu	-
Pakistan	-	-
Peru	Prof. A. Carrillo	-
Poland	Prof. Z. Grabowski	Prof. W. Wolski
Portugal	-	-
Rhodesia	Prof. W.R. Mackechnie	-
Romania	Prof. Emil Botea	-
South Africa	Mr. G.W. Donaldson	Prof. G.E. Blight
S.E. Asia	Prof. Peter Lumb	Dr. A.S. Balasubramaniam
Spain	Prof. J.A.J. Salas	-
Sweden	Prof. Sven Hansbo	Mr. N. Flodin
Switzerland	Prof. Ed. Recordon	-
Syria	Mr. F.S. Mawlawi	Dr. K. Kayyal
Turkey	Prof. E. Togrol	-
United Kingdom	Prof. N.E. Simons	Dr. Alan C. Meigh
USA	Prof. D. Hampton	Prof. H.B. Seed
USSR	Prof. Yu.G. Trofimenkov	Dr. B.S. Fedorov
Venezuela	Dr. H. Perez-la Salvia	-
Yugoslavia	Prof. I. Sovinc	-

1. In opening the meeting the President welcomed the delegates from many countries: it was a particular pleasure to have with us a lady representative (Miss H. Strømann from Denmark). We had invited the Presidents or Secretaries General of the ISRM and the IAEG to be represented and were very happy that Prof.Habib, President of ISRM was here. The IAEG had apologised for their absence and sent their good wishes. The Vice-Presidents elect had been invited and the following were present:

Prof.W.R.Mackechnie	*Africa*
	Asia (Prof.D.Mohan)
MrA.A.D.Hosking	*Australasia*
Prof.B.Broms	*Europe*
Prof.G.F.Sowers	*N.America*
Prof.F.Martinez	*S.America*

In addition, the Chairmen of the Sub-Committees had all been invited and the following were present:

Dr.E.D'Appolonia	*Budget and Finance*
M. F.Baguelin	*Symbols, Units & Definitions*

Certain other persons had been invited to attend part of the meeting in order to assist in the discussion: Mr.Willy Norup, Mr.H.Kuhn, Prof.E.W.Brand and Dr.R.P.Brenner.

The Past Presidents had also been invited and Professors Peck and Skempton were present during the second day. The Secretary of the ISSMFE/ISRM/IAEG Co-ordinating Committee, Prof. de Beer, was also present.

Membership

2. The Secretary General reported that further to Minute 6 of the Istanbul meeting he had formally admitted Nigeria into membership in 1975 and the presence of the delegate from Nigeria was warmly acknowledged.

3. The Secretary General reported that further to Minute 5 of the Moscow meeting he had sought and been granted an extension of permission to admit new National Societies into membership up to this Tokyo meeting. An application had been received and accepted from Syria in 1975 and the delegate from Syria was warmly welcomed at the meeting.

4. The Secretary General reported that an application had been received from Indonesia and he now recommended its acceptance. This information was warmly received by the Executive Committee and Indonesia was welcomed into membership forthwith.

1. A l'ouverture de la réunion, le Président souhaite la bienvenue aux délégues des nombreaux pays représentés, et particulierement à la représentante du Danemark (Mlle H.Strømann). Les Présidents ou Secrétaires Généraux de l'ISRM et de l'IAEG ont été invités à se faire representer, et le Président se déclare très heureux de la présence du Professeur Habib, Président du l'ISRM. L'IAEG a demandé qu'on excuse son absence, et a envoyé ses salutations. Les Vice-Présidents élus ont été invités. Sonts présents:

Prof.W.R.Mackechnie	*Afrique*
	Asie (Prof.D.Mohan)
Mr.A.D.Hosking	*Australasie*
Prof.B.Broms	*Europe*
Prof.G.F.Sowers	*Amerique du Nord*
Prof.F.Martinez	*Amerique du Sud*

De plus, les Présidents des Sous-Comités ont tous été invités - Sont présents:

Dr.E.D'Appolonia	*Budget et Finances*
M. F.Baguelin	*Symbols, Unités et Définitions*

D'autres personnes ont été invitées à la réunion pour participer à la discussion: M. Willy Norup, Dr.H.Kuhn, Prof.E.W.Brand et Dr. R.P.Brenner.

Les anciens Présidents ont également été invités, et le Professeur Peck et le Professeur Skempton sont présents à la deuxieme journée de la réunion. Est également présent le Dr. de Beer, secrétaire du Comité de Coordination de l'ISSMFE, de l'ISRM et de l'IAEG.

Participation

2. Le Secrétaire Général déclare que, conformement à l'article 6 du procès-verbal de la réunion d'Istanbul, il a officiellement admis le Nigeria comme membre en 1975, et la présence du délégué du Nigeria est chaleureusement saluée.

3. Le Secrétaire Général déclare que, conformement à l'article 5 du procès-verbal de la réunion de Moscou, il a demandé et obtenu que l'on étende jusqu' à cette réunion de Tokyo son droit d'admettre comme membres de la Société Internationale de nouvelles Sociétés Nationales. Une demande de la Syrie à été reçue et acceptée en 1975, et le délégué de Syrie est chaleureusement acceuilli à la réunion.

4. Le Secrétaire Général déclare qu'une demande a été reçue de l'Indonesie et recommande son acceptation. Cette information est chaleureusement reçue par le Comite Exécutif et l'Indonesie est acceuillie comme membre.

5. The Secretary General reported that he had had continuing discussions with individual engineers from Iraq about the possibility of forming a Society and that the V-P N.America had had discussions with a Dominican group, but these had not as yet been finalised.

6. The Secretary General was authorised to admit new members on behalf of the ISSMFE for a further 2 years.

7. The Secretary General reported that Pakistan had had difficulties in paying their dues but that the fee for 1977 had been received. It was agreed that the earlier years in arrears should be overlooked.

8. The Secretary General reported that he had written to Tunisia many times following their admission at the Moscow Executive Committee but that no reply whatsoever had been received. Nor had any dues been paid. Finally, he wrote in October 1976 that unless a reply was received by the end of the year it would be assumed that Tunisia was not a member of our Society and this action was approved. The Tunisian membership was therefore annulled.

9. The Secretary General reported that the only country remaining in bad-standing was Colombia and it was agreed that no vote could be recorded for them.

10. The Secretary General reported that no members of the Chinese National Society would be attending this meeting but that he had had several discussions with officials from the Chinese Embassy in London about the problems relating to membership. He had now been invited to visit Peking and hoped to do so during the coming year.

11. The membership at July 1977 is shown in Appendix 1.

Attendance at International Conferences

12. Further to Minute 21 of the Istanbul meeting, the President summarised the actions taken by himself and the Secretary General to carry out the wishes of the Executive Committee and told how further advice had been sought from each National Society as to how to proceed when it was found that the F.R.G. could not act as host. A large majority of countries were in favour of continuing with the Tokyo Conference if South Africans and Rhodesians could be admitted, or of leaving it to the President in consultation with the Officers to make the best arrangements he could. The Secretary General had had discussions with Japanese Government representatives on this subject and a means of providing entry for South Africans appeared possible

5. Le Secrétaire Général déclare qu'il a eu des discussions suivies avec des ingenieurs Iraquiens sur la possibilité de former une Societé, et que le V-P d'Amerique du Nord a eu des discussions avec un groupe Dominicain, mais que celles-ci n'ont pas encore abouti.

6. Le Secrétaire Général est autorisé, pour les deux années à venir a admettre de nouveaux membres au nom de l'ISSMFE.

7. Le Secrétaire Général déclare que le Pakistan a eu des difficultés à effectuer ses paiements, mais que les cotisation de 1977 a été reçue. Il est accepté que les arriérés des années précédentes ne soient pas réclamés.

8. Le Secrétaire Général déclare qu'il a écrit à la Tunisie à de nombreures reprises depuis son admission par le Comité Exécutif de Moscou, mais qu' aucune réponse n'a jamais été reçue. ainsi qu'aucune cotisation. Finalement, il a écrit on Octobre 1976 que, à défault d'une réponse reçue avont la fin de l'année, il serait admis que la Tunisie ne serait pas membre de notre Société. Cette acte a été approuvé et la participation de la Tunisie a par consequent été annulée.

9. Le Secrétaire Général déclare que le seul pays restant débiteur est la Colombie et son droit de vote lui est supprimé.

10. Le Secrétaire Général déclare qu'aucun membre de la Société Nationale Chinoise n'assistera à cette réunion, mais qu'il a eu plusieurs discussions avec des représentants officiels de l'ambassade de Chine à Londres sur les problemes relatifs à la participation. Il a depuis été invité à Pékin, et espère pouvoir répondre à cette invitation l'an prochain.

11. La liste des membres de la Société Internationale, en juillet 1977, est indiquée à l'Annexe 1.

Participation aux Congrès Internationeux

12. Suite à l'article 21 du procès-verbal de la réunion d'Istanbul, le Président résume les actions entreprises par lui-même et le Secrétaire Général pour satisfaire les demandes du Comité Exécutif. Il indique comment chaque Société Nationale a été invitée à donner son avis sur la conduite à suivre quand il est apparu que la R.F.A. ne pouvait pas organiser le Congrès. Une large majorité de pays s'est degagée pour poursuivre la préparation du Congrès de Tokyo, à condition que les Sud-Africains et les Rhodésiens puissent être admis, ou pour s'en remettre au Président qui, après consultation du Bureau, prendrait les décisions qui s'imposent. Le Secrétaire Général a eu des discussions avec des

and Rhodesian representation was also assured. Under these circumstances, although it was recognised that the arrangements were not perfect, the President decided that the Conference should go ahead and National Societies were notified to this effect. He now reported that subsequently a completely satisfactory agreement for South Africans had been achieved and we must now look to an alteration in the By-Laws to try to ensure that the Executive Committee can act more freely should such an occasion arise in the future.

13. The South African delegate described the great pleasure of the members in his Country when permission to attend the Conference had been received but the South African National Society considered that in not carrying out the mandate of the Executive Committee the President and Secretary General had acted contrary to the By-Laws and he proposed that the disappointment of the South Africans in this respect should be recorded.

Amendment to the Statutes

14. A proposal by the President that By-Law 12(ii) should be amended to read as follows:
"Voting shall in general be by a show of hands. However, for the election of the President, for the selection of the place of an International Conference .....etc"
was unanimously accepted.

15. A proposal by the President that By-Law 12(v) should be modified was accepted with minor modification. Professor de Beer proposed an amendment which was seconded by Professor Stefanoff and this was adopted by a large majority. The revised By-Law now reads as follows:
"A National Society which is unable to send a representative may delegate its voting rights either to its own Vice-President or to the delegate of another National Society, having notified this to the Secretary General."

16. A proposal from the President that By-Laws 15, 16 and 17 should be altered received long and careful discussion and Mr. Donaldson on behalf of the South African Society introduced an amendment to what had been proposed. There was no seconder to this, however.

17. Three amendments to the proposals by the President were made and accepted and the revised version of the By-Laws which were adopted by the Society now read as follows:

représentants du gouvernement Japonais à ce sujet: il apparait possible de trouver un moyen de permettre l'entrée des Sud-Africains, et il fut assuré que la Rhodesie pourrait être représentée. Dans ces conditions, et bien que l'accord ne fut pas parfait, le Président décida que le Congrès de Tokyo aurait lieu, et en prévint les Sociétés Nationales. Il déclare que, depuis, un accord tout à fait satisfaisant pour les Sud-Africains a été obtenu, et qu'il faut maintenant envisager une modification du Règlement Intérieur pour permettre au Comité Exécutif d'agir plus librement si de telles circonstances se reproduisent.

13. Le délégué Sud-Africain a décrit le grand plaisir qu'ont eu les membres de son pays de recevoir l'autorisation de participer au Congrès, mais la Société Nationale d'Afrique du Sud considère qu'en n'appliquant pas intégralement le mandat du Comité Exécutif, le Président et le Secrétaire Général ont agi en opposition avec le Règlement Intérieur. Il demande que la déception des Sud-Africains sur ce point soit inscrite au procès-verbal.

Amendement aux Statuts

14. Le Proposition du Président de modifier l'article 12(ii) du Règlement Intérieur de la façon suivante:
"Le vote aura lieu en général à main levée. Cependant, pour l'élection du Président, pour le choix du lieu d'un Congrès International..... etc"

est acceptée à l'unanimité.

15. Le Proposition du Président de modifier l'article 12(v) du Règlement Intérieur est acceptée après une légère modification. Le Professeur de Beer propose un amendement, soutenu par le Professeur Stefanoff, qui est adopté avec une large majorité. L'article révisé est le suivant:
" Une Société Nationale qui ne peut pas envoyer un représentant peut déléguer ses droits de vote soit à son Vice-Pr sident, soit au délégué d'une autre Société Nationale, après en avoir informé le Secrétaire Général".

16. Le Proposition du Président de modifier les articles 15, 16 et 17 du Règlement Intérieur fait l'objet d'une discussion longue et attentive et M. Donaldson, au nom de la Société d'Afrique du Sud, dépose un amendement à la motion proposée. Personne ne soutient cet amendement.

17. Trois amendements à la motion du Président ont été déposés et acceptés, et la version finale des articles du Règlement Intérieur acceptée par la Société est la suivante:

"Place
15A An invitation from a National Society to act as host for an International Conference and the accompanying Executive Committee meeting should be received sufficiently long in advance so that it can be placed on the Agenda of the Executive Committee meeting at the time of the previous conference. An invitation for the next-but-one International Conference may also be considered and accepted at this meeting. If two or more invitations are received the choice shall be determined by secret ballot. If four years before a Conference is due to take place no invitation has been received, the Officers are authorised to make appropriate arrangements for one to be held.

"Facilities
Before accepting an invitation the Executive Committee shall be satisfied that the host country has
(i) a meeting place with appropriate facilities
(ii) suitable hotel accomodation
(iii) sufficient of interest for technical and other visits.

"Attendance
15B All members of the International Society are entitled to attend these International Conferences and a National Society offering to act as host must state clearly at the time the invitation is discussed what restrictions (if any) are imposed against the entry of foreign nationals by the Government of the country in which the conference is to be held, whether or not these are related to recommendations of the United Nations. If, after an invitation has been accepted, the said Government increases its restrictions, the President shall seek the opinion of the various National Societies as to whether or not the Conference should be held at another location with another host country, or whether the ISSMFE status of the Conference should be withdrawn and, after consultation with the other Officers, shall act in the best interests of the Society.

"Programme
15C The general programme to be followed at an International Conference shall be decided by the Conference Procedure Committee appointed for this purpose at the Executive Committee Meeting held at the time of the previous Conference. The detailed arrangements shall be the responsibility of the Organising Committee of the host country, in consultation with the President and the Secretary General.

"Registration
15D These Conferences are intended for members of the International Society and

"Lieu
15A Tout proposition d'une Société Nationale d'organiser un Congrès International et la réunion correspondante du Comité Exécutif devrait être reçue suffisamment en avance pour qu'elle puisse être portée à l'ordre du jour de la réunion du Comité Exécutif tenue lors du Congrès précédent. Une invitation pour le Congrès International suivant le prochain Congrès International pouvra également être examinée et acceptée au cours de cette réunion. Si deux invitations, ou plus, sont reçues, le choix sera fait au scrutin secret. Si quatre ans avant la date prévue pour un Congrès, aucune invitation n'a été reçue, le Bureau est autorisé à faire les démarches appropriées pour que le Congrès puisse avoir lieu.

"Facilités
Avant d'accepter une invitation, le Comité Exécutif devra s'assurer que le pays invitant a
(i) un lieu de réunion avec les facilités appropriées
(ii) des installations hotelières convenables
(iii) une possibilité suffisante de visites techniques et autres présentant un intérêt.

"Participation
15B Tous les membres de la Société Internationale ont le droit d'assister aux Congrès Internationaux et une Société Nationale qui propose d'organiser un Congrès doit clairement définir, quand son invitation vient en discussion, quelles sont les restrictions éventuelles mises par le Gouvernement du pays organisateur à l'entrée de ressortissants étrangers, que ces restrictions soient liées ou non à des recommendations des Nations Unies. Si, après l'acceptation d'une invitation, le dit Gouvernement élargit ses restrictions, le Président consultera les différentes Sociétés Nationales pour savoir si le Congrès devrait ou non se tenir en un autre lieu, avec un autre pays organisateur, ou si la Société Internationale doit retirer son parrainage a ce Congrès. Après consultation du Bureau, le Président agira dans le meilleur interêt de la Société.

"Programme
15C Le programme général d'un Congrès International sera décidé par le Comité special établi dans ce but à la réunion du Comité Exécutif tenue lors du Congrès précedent. La responsabilité des dispositions de détails appartiendra au Comité d'Organisation du pays invitant, en accord avec le Président et le Secrétaire Général.

"Insciption
15D Ces Congrès sout destinés uniquement aux membres de la Societé Internationale

their accompanying persons only. Others wishing to register must obtain the permission of the National Society in their country of residence or of the Secretary General."

List of Members

18. The Secretary General reported that quotations for printing the List of Members had been received from a number of countries but the most favourable had again been from Hong Kong and a contract with Libra Press had been accepted. The cost for printing had amounted to approximately US$10000 and for distribution to US$4000 making a total of US$14000. The new List contains 28 advertisements including one in colour and this will bring back to the Society about US$7500 making the total out of pocket expense US$6500. Although National Societies had been asked to provide their lists in a standard form in order to make off-set litho production possible, the saving from this would have been only marginal since the amount of reduction possible would not have been so great and a heavier paper would have had to have been used. The list was therefore produced in letter-press but the overall size is one half that of the 1972 List and the weight is also about halved.

19. The new List was generally admired and Professor Lumb was thanked for his assistance in steering it through the Printers.

20. It was recongised that had the number of advertisements been doubled the List would have paid for itself, but the Secretary General told of the great efforts made in his office to obtain more and he concluded that it was not an easy task. It was suggested by Dr. D'Appolonia that an agency should be employed to obtain advertisements in future if the List were to be continued. It was evident from the discussions that the List is much more valuable to some countries than to others and it was agreed by 20 votes to 2 that we should continue with it. It was further agreed that a Sub-Committee should be appointed to bring in proposals to the next Executive Committee Meeting as to how the List should be produced and how it should be financed. It was pointed out that if we co-operate with ISRM and IAEG to produce a joint List then the cost to each would be enormously reduced since there is a considerable overlap in membership.

Copyright of past International Conference Proceedings

21. The Secretary General reported that he receives regular enquiries from authors wishing to republish parts of papers

et aux personnes les accompagnant. Les autres personnes souhaitant s'inscrire devront obtenir l'autorisation de la Société Nationale de leur pays de résidence, ou du Secrétaire Général".

Liste des membres

18. Le Secrétaire Général déclare que des offres pour l'impression de la liste des membres ont été reçues de nombreux pays, mais que l'offre la plus favorable provient à nouveau de Hong-Kong et qu'il a accepté un contrat avec Libra Press. Le cout de l'impression s'est elevé à environ 10000 dollars US et celui de la distribution à 4000 dollars US, soit un total de 14000 dollars US. Le nouvelle liste comporte 28 annonces publicitaires, dont une en couleur, ce qui rapporté à la Société environ 7500 dollars US, la part restant à la charge de la Société étant de 65000 dollars US. Bien qu'on ait demandé aux Sociétés Nationales de fournir leur liste dans un format standard, pour rendre possible une reproduction par offset, l'économie qui en aurait résulté n'aurait été que marginale, car on n'aurait pas pu réduire autant le format et on aurait dû utilser un papier plus épais. Le liste a donc été imprimée en composition, mais la taille et également le poids sont réduits de motié par rapport à la liste de 1972.

19. La nouvelle liste fait l'objet de l'admiration générale et le Professeur Lumb est remercié de son aide dans les relations avec l'imprimeur.

20. Il est clair que si le nombre des annonces publicitaires avait été deux fois plus élevé, la liste aurait été autofinancée, mais le Secrétaire Général fait part des efforts importants faits par ses services pour en obtenir d'avantage, et conclut que ce n'est pas chose facile. Le Dr. D'Appolonia suggère de faire appel à une agence pour obtenir des annonces publicitaires, dans le cas où la liste serait maintenue. Il ressort des discussions que la liste est plus utile dans certains pays que dans d'autres, mais il est décidé de la maintenir, par un vote de 20 voix contre 2. Il est décidé ensuite de désigner un Sous-Comité qui fera à la prochaine réunion du Comité Exécutif des propositions sur la manière de mettre en oeuvre et de financer la liste. Il est rappelé qu'une co-operation avec l'ISRM et l'IAEG pour produire une liste commune réduirait énormement le coût pour chaque société, du fait du grand nombre d'inscriptions multiples.

Copyright des Comptes-Rendus des Congrès Internationaux précédents

21. Le Secrétaire Général déclare qu'il recoit regulièrement des demandes d'auteurs désireux de reproduire des

which have appeared in our past Conference roceedings and that although it is always our policy to agree, in fact the copyright is not in general with the ISSMFE as may be seen from inside the front cover of these Proceedings. Many of these are now out of print and University Microfilms are producing Xerox copies and paying royalties to the various host National Societies. This includes the Moscow Proceedings and the payment of royalties is currently under discussion with University Microfilms and with VAAP and with ISSMFE. The Russians considered that they were entitled to receive royalties only on those papers which had originated in the USSR nor did they feel able to give permission for non-Russian papers to be republished. The Secretary General had therefore suggested to them and to University Microfilms that the ISSMFE should be considered as the holder of the copyright for the non-Russian papers and should receive the royalties accordingly. It was therefore planned that the total royalties should be paid by University Microfilms to the ISSMFE and that we should pass on to VAAP an appropriate proportion for the Russian papers. This suggestion was approved. The current availability of previous International and Regional Conference Proceedings is shown in Appendix 2.

Allocation of pages in Conference Proceedings

22. Further to Minute 13 of the Istanbul Meeting the President introduced a report recommending how pages should be allocated in Volumes I and II of the Conference Proceedings in future. This is produced as Appendix 3. Professor Togrol and Dr. Meigh reminded members that these rational proposals were a tremendous advance on our previous practice but some members considered that minor amendments would improve them further. The following changes were agreed to the recommendations proposed by the President.

(i) no change
(ii) that the President may allocate O.1N at his own discretion but having consulted with the Vice-Presidents about it.
(iii) a change from anticipated revenue to revenue actually received in the previous 4 years
(iv) line 2, before "number of pages" insert "relative" in order to allow for possible changes in the total number of pages available from one conference to another.

extraits d'articles parus dans les Comptes-Rendus de nos Congrès précédents et que, bien que notre règle soit toujours d'accepter, le copyright n'appartient pas en fait à la Société Internationale, comme l'indique l'interieur de la Couverture des Comptes-Rendus. De nombreux comptes-rendus sont maintenant épuisés et University Microfilms en fait des photocopies et paye des droits d'auteur aux différentes Sociétés Nationales organisatrices. Ceci inclut les Comptes Rendus de Moscou, et le paiement des droits d'auteur est actuellement en discussion entre University Microfilms, VAAP, et la Société Internationale. Les Russes considèrent qu'ils n'ont droit aux droits d'auteur que pour les articles émanant de l'URSS, et ne se sentent pas capables d'autoriser la reproduction des articles n'émanant pas de l'URSS. Le Secrétaire Général leur a alors suggieré, ainsi qu'à University Microfilms, que la Société Internationale soit considérée comme détentrice du copyright pour les articles n'émanant pas de l'URSS, et recoive les droits d'auteur en conséquence. Il a été alors décidé que l'ensemble des droits d'auteur serait payé par University Microfilms à la Société Internationale et que celle-ci transfererait à VAAP la part correspondant aux articles russes. Cette suggestion est approuvée. La disponibilité actuelle des Comptes-Rendus des Congrès Internationaux et Régionaux précédents est indiguer à l'annexe 2.

Répartition des pages pour les Comptes Rendus des Congrès

22. Suite à l'article 13 du procés verbal de la réunion d'Istanbul, le Président présente un rapport (annexe 3) recommandant pour l'avenir la manière de repartir les pages pour les tomes 1 et 2 des Comptes Rendus des Congrès. Le Professeur Togrol et le Dr. Meigh rappellent que ces propositions rationnelles sont considerablement plus avancées que la pratique précédente, mais quelques membres considèrent qu'elles pourraient être améliorées par des amendements mineurs. Les changements suivants ont été décidés, par rapport aux recommandations proposées par le Président:

(i) pas de changement
(ii) le Président pourra distribuer O.1N pages à sa discrétion, mais après avoir consulté les Vice-Présidents
(iii) changer "anticipated revenues" en "revenues actually received in the previous 4 years"
(iv) ligne 2, avant "number of pages", ajouter "relative" pour permettre un changement éventuel du nombre total de pages d'un Congrès à l'autre.

23. It was agreed that it would be extremely difficult to produce corresponding uniform recommendations for the Proceedings of Regional Conferences but the new Vice-Presidents were asked to report on this matter to the next Executive Committee Meeting.

Report of the Information Advisory Committee

24. As indicated in Minute 1, the Committee was joined by Mr. Norup, Dr. Kuhn, Professor Brand and Dr. Brenner at this point in order to discuss the report of the Chairman of the IAC (Appendix 4) and this was introduced on behalf of its Chairman, Mr. J.M. DeSalvo, by Mr.Norup. Dr. Koenig reported that the FRG National Society realised the great concern of the Asian Geotechnical Engineering Centre (AGE) to produce Abstracts at a price which could be afforded by the developing countries of Asia but he pointed out that the German Geotechnical Abstracts, which are an official publication of the ISSMFE, had existed in a precarious financial state for some years after their inception. They had survived only due to the generosity of the Volkswagen Foundation. GA were prepared to make their abstracts available at a reduced price to individuals in Asia, for one year in the first instance, provided a Centre such as AIT would take over the distribution and collect the subscriptions. They were also prepared to supply GA direct to individuals at a reduced rate provided the firm for which the individual worked was additionally a regular subscriber.

25. Professor Brand reported that AGE felt that the report provided by the Chairman of IAC had been unreasonably biased against them and the Secretary General agreed that the Chairman's report with attachments should not be reproduced in full with the Minutes of this Meeting. On behalf of AGE, Professor Brand made a number of helpful suggestions as to how AGE should proceed in the future and he asked that the Current Awareness Service in particular should be given ISSMFE endorsement.

26. Mr. Flodin told of his concern that IAC and AGE should have had policy disagreements and he expressed his certainty that with the evident goodwill which exists on both sides that these should now be ironed out by both getting together for mutual discussion. This was gratefully accepted by all present and it was agreed that their suggestions should be transmitted to the President at an early date.

The Meeting adjourned at this point at the end of the first day.

23. Il est convenu qu'il serait très difficile de faire des recommandations semblables pour les Comptes-Rendus des Congrès Régionaux, mais les nouveaux Vice-Présidents sont priés de faire un rapport sur cette question à la prochaine réunion du Comité Exécutif.

Rapport du Comite Consultatif pour l'Information (IAC)

24. Comme indiqué à l'article 1, Mr. Norup, le Dr. Kuhn, Le Professeur Brand et le Dr. Brenner se sont joints au Comité pour discuter le rapport de Mr. J.M. DeSalvo, Président de l'IAC (Annexe 4) présenté par Mr. Norup. Le Dr.Koenig déclare que la Société Nationale de la RFA a compris le grand intérêt manifesté par l'Asian Geotechnical Engineering Centre (AGE) à produire des Résumés (Abstracts) à un prix admissible par les pays d'Asie en voie de développement, mais il rappelle que les Résumés Géotechniques (GA) allemands, qui sont une publication officielle de la Société Internationale, ont connu une situation financiere difficile dans leurs premieres années. Ils n'eut survecu que grâce à la générosité de la Fondation Volkswagen. GA est prêt à rendre ses résumés disponibles à prix réduit pour les souscripteurs individuels d'Asie, pour une periode d'essai d'un an, à condition qu'un centre comme l'AIT se charge de la distribution et des souscriptions. GA est également prêt à fournir directement à prix réduit les résumés à des souscripteurs individuels, à condition que leur entreprise prenne une souscription supplémentaire à tarif normal.

25. Le Professeur Brand déclare que l'AGE considère que le rapport présenté par le Président de IAC est déraisonablement hostile à leur égard, et le Secrétaire Général reconnait que le rapport du Président et les pièces annexées ne devraient pas être reproduits intégralement dans le procés-verbal de cette réunion. Au nom de l'AGE, le Professeur Brand fait nombre de suggestions utiles sur le développement futur de l'AGE et il demande en particulier le parrainage de la Société Internationale pour le Comprehensive Awareness Service.

26. Mr. Flodin dit qu'à son avis il est normal que l'IAC et l'AGE aient eu des divergences de politique et exprime sa certitude qu' elles seront maintenant surmontées par une réunion et des discussions. Ce point de vue est accepté par tous et il est décidé que leurs suggestions seront transmises ultérieurement au Président.

La réunion est ajournée à la fin du premier jour.

Place of 1981 Conference

27. On behalf of Australia Prof. Donald issued a warm invitation for the 1981 Conference to be held in Melbourne. The Australian Government at present restricts the entry of persons with Rhodesian and Taiwanese passports. An invitation from Sweden to hold the Conference in Stockholm was then introduced by Prof. Hansbo who stated that the only restrictions to entry at present in force applied to holders of Rhodesian passports. He indicated the type of organisation and programme which the Swedish National Society planned to adopt but stated that they would be prepared to follow the wishes of the Conference Advisory Committee. On taking a secret ballot the votes were as follows:

Australia	10
Sweden	32

Prof. Donald expressed the good wishes of the Australians to the Swedes but added the hopes that Australia would in due course be given the opportunity to act as hosts. The President, on behalf of the ISSMFE, thanked the Swedish National Society for kindly accepting this great burden and he offered them our best wishes.

Lieu du Congrès de 1981

27. Au nom de l'Australie, le Professeur Donald lance une invitation chaleureuse pour que le Congrès de 1981 se tienne à Melbourne. Le Gouvernement d'Australie impose actuellement des restrictions à l'entrée de personnes ayant un passeport de la Rhodésie ou de Taiwan. Une invitation de la Suède à tenir le Congrès à Stockholm est présentée par le Dr. Hansbo, qui affirme que les seules restrictions à l'entrée dans son pays actuellement en vigeur s'appliquent aux porteurs de passeports de la Rhodésie. Il énonce le type d'organisation et de programme que la Société Nationale de Suède compte adopter mais indique que ceux-ci seront préparés conformément aux voeux du Comité consultatif du Congrès. Le vote à bulletin secret donne le résultat suivant:

Australie	10
Suède	32

Le Professeur Donald adresse aux Suèdois les voeux des Australiens, mais ajoute qu'il a l'espoir que l'Australie pourra, le moment venu, avoir l'occassien d'organiser un Congrès. Le Président, au nom de la Société Internationale, remercie la Société Nationale de Suède de bien vouloir accepter cette lourde charge, et lui adresse tous ses voeux.

Place of 1985 Conference

28. On behalf of the USA National Society, Prof. Seed warmly invited the Society to hold the 1985 Conference in California, either in Los Angeles or more probably in San Francisco. There were at present no restrictions against entry in operation and the Organising Committee were happy to accept the new By-Laws on International Conferences.

The meeting welcomed the U.S. invitation, especially when associated with the 50 year anniversary and on taking a ballot there was unanimous acceptance. Prof. Seed was asked to pass on to the U.S. National Society the grateful thanks of the ISSMFE.

Lieu du Congrès de 1985

28. Au nom de la Société Nationale des Etats-Unis, le Professeur Seed invite chaleureusement la Société à tenir son Congrès de 1985 en Californie, soit à Los Angeles, soit, plus probablement, à San Francisco. Il n'y a actuellement aucune restriction en vigueur à l'entrée aux USA et le Comité Organisateur serait heureux d'accepter les nouveaux articles du Règlement Intérieur concernant les Congrès Internationaux. L'assemblée acceuille avec bienveiblance l'invitation des USA, tout spécialement à cause du lien avec son cinquantenaire, et le vote est favorable à l'unanimité. Le Professeur Seed est prié de transmettre à la Société Nationale des Etats-Unis les sincères remerciements de la Société Internationale.

Proposed European Standard on Penetration Testing

29. Prof. Broms outlined the history of the European Committee on Penetration Testing originally under the chairmanship of Dr. Zweck and presented their report (Appendix 5). They recommend:

(i) that the ISSMFE recommend the adoption of the standards for use in Europe

Proposition de Norme Européenne pour les Essais de Pénétration

29. Le Professeur Broms retrace l'historique du Comité Européen pour les Essais de Pénétration, présidé à l'origine par le Dr. Zweck, et présente son rapport (Annexe 5) qui recommande:

(i) que la Société Internationale recommande l'adoption des normes pour leur emploi en Europe.

(ii) that the proposed standards should be published in English and French as a separate publication
(iii) that where possible research papers to international journals should include results using at least one of the proposed standards
(iv) that a further meeting on penetration testing should be held in Europe in 1979 or 1980.

Prof. de Mello queried why this matter was being considered at an International Conference rather than at a European Conference and the President pointed out that it was important that use of the new standard should become widely known. It was agreed with one dissenting note that the above recommendations should be adopted.

Symbols, Units and Definitions

30. M.Baguelin, chairman of the Sub-Committee on Symbols, Units and Definitions introduced his committee's report and spoke first about the new edition of the Lexicon for which they also had overall charge. Unfortunately there had been considerable delay in printing the Lexicon but it was hoped that it would shortly be available. The Sub-Committee had circulated a recommended set of symbols, units and standards for general use in soil mechanics, including penetration testing and these were outlined by M. Baguelin. Various detailed suggestions were made in the meeting and the Sub-Committee was asked to take these into account before publication. As before the recommended symbols and units will be published in the Lexicon: they are also to be given in Appendix 6 to these Minutes.

31. The President drew attention to the proposal that the printing of the Lexicon which had been financed by a generous grant from the National Research Council of Canada should additionally be financed by a loan of $3000 from ISSMFE funds. It was hoped that the new Lexicon would be widely purchased and used and that this loan would be recovered from the sales. The Sub-Committee was warmly thanked for the considerable effort that had been put into this work and congratulated on their achievement.

Publicity and Exchange of Computer Programs

32. In the absence of Dr. Aitchison, the President first drew attention to a few points in the report of the Chairman of the Sub-Committee on Computer Programs

(ii) que les normes proposées soient publiées en Anglais et en Français, sous forme d'une publication séparée.
(iii) que, dans la mesure du possible, des articles de recherche dans des publications internationales incluent des résultats faisant appel à au moins une des normes proposées.
(iv) qu'une réunion ultérieure sur les essais de pénétration ait lieu en Europe en 1979 on en 1980.

Le Professeur de Mello demande pourquoi cette question a été soulevée lors d'un Congrès International plutôt que lors d'un Congrès Européen, et le Président fait ressortir qu'il est important que l'emploi des nouvelles normes soit largement connu. Ces recommendations sont adoptées à l'unanimité moins une voix.

Symboles, Unités et Définitions

30. M. Baguelin, Président du Sous-Comité des Symboles, Unités et Définitions, présente le rapport de son Comité, et parle d'abord de la nouvelle édition du Lexique dont il avait également la responsabilité. Il y a eu malheureusement un retard considérable dans l'impression du Lexique, mais on espère qu'il sera disponible sous peu. Le Sous-Comité a diffusé ce qu'il recommande comme liste de symboles, unités et normes d'usage général en mécanique des sols, y compris pour les essais de pénétration comme le souligne M.Baguelin. Plusieurs suggestions de détails sont faites par l'assemblée et on demande au Sous-Comité de les prendre en considération avant la publication. Comme auparavant, les symboles et unités recommandés seront publiés dans le Lexique. Ils figurent également à l'annexe 6 de ce procés-verbal.

31. Le President attire l'attention sur le fait que l'impression du Lexique, qui a été financée par une bourse généreusement accordée par le National Research Council du Canada, devrait en plus être financée par un prêt de 3000 dollars US de la Société Internationale. On a l'espoir que le nouveau Lexique sera largement acheté et employé et que ce prêt sera remboursé sur les ventes. Le Sous-Comité est chaleureusement remercié pour l'effort considérable qu'il a produit pour cette tache, et est félicité pour sa réalisation.

Publicité et Echange de Programmes d'ordinateur

32. En l'absence du Dr. Aitchison, le Président a tout d'abord attiré l'attention sur quelques points du rapport du Président du Sous-Comité pour les programmes

and the Annex to the report by Prof. Schiffman (Appendix 7). Prof. Donald introduced the report and explained that the Australian National Society believed that they had overall responsibility for the CSIRO operation, rather than the ISSMFE, and that since they had equal links with the ISRM and the IAEG they had invited the two bodies to sponsor the Institute also. Prof. Viggiani, Dr.Moh and Prof. Togrol, members of the Sub-Committee all stated that there had been a minimum of communication between the committee and its chairman and that the report was that of the latter only. Prof. Habib, on behalf of ISRM, pointed out that the decision made by the ISSMFE was of extreme importance to the other two International Societies and he hoped that we would make our position very clear. It was agreed without dissent that the present Sub-Committee should be laid down and that a new one should be set up under the chairmanship of someone who was neither Australian nor from the USA to report on the whole matter to the next meeting of the Executive Committee.

d'ordinateur, et l'annexe à ce rapport par le Professeur Schiffmann (Annexe 7) Le Professeur Donald a présenté le rapport et expliqué que la Société Nationale d'Australie croyait que c'était elle, et non la Société Internationale, qui avait l'entière responsabilité du CSIRO, et étant liée également à l'ISRM et à l'IAEG, elle avait invité ces deux organismes à parrainer également cet Institut. Le Professeur Viggiani, le Dr. Moh et le Professeur Togrol, membres du Sous-Comité ont tous déclarés que les échanges entre le Comité et son Président ont été réduits au minimum, et que le rapport n'émanait que Président. Le Professeur Habib, au nom de l'ISRM, rappelle que la décision prise par l'ISSMFE est d'une extrême importance pour les deux autres Sociétés Internationales et espère que notre position sera clairement établie. On convient, sans opposition, de dissoudre le Sous-Comité actuel et d'en créer un nouveau, dont le Président ne serait ni Australien, ni Américain, pour faire un rapport à la prochaine réunion du Comité Exécutif.

Tokyo Conference Advisory Committee

33. The Secretary General introduced the report of the Tokyo Conference Advisory Committee (Appendix 8) and outlined the general relationship between the host Organizing Committee and the ISSMFE. The report was adopted.

Comité Consultatif du Congrès de Tokyo

33. Le Secrétaire Général présente la rapport du Comité Consultatif du Congrès de Tokyo (Annexe 8) et souligne le lien entre le Comité organisateur du pays invitant et la Société Internationale. Le rapport est adopté.

Professional Cards

34. Prof. de Mello stated that the Vice Presidents had been charged, by the President, with the task of advising as to whether or not Professional Cards should be allowed. They had had difficulty in obtaining information but it was recommended that such cards should not be used in any future List of Members and this was agreed.

Cartes professionnelles

34. Le Professeur de Mello déclare que les Vice-Présidents ont été chargés par le Président de donner leur avis sur l'éventualité d'une autorisation des Cartes Professionnelles. Ils ont eu du mal à obtenir des renseignements, mais ils recommandent de ne pas utiliser de telles cartes dans une future Liste des Membres, ce qui est accepté.

Committee on Sampling

35. The President reminded the meeting that the ISSMFE Sub-Committee on Sampling had been laid down at the Istanbul meeting and the Secretary General spoke about the relationship between the International Group on Soil Sampling (IGOSS) and the former Sub-Committee. He expressed the view that IGOSS had been responsible to the Sub-Committee and that since the one had been laid down then the other had ceased to have any responsibility to the ISSMFE. He hoped that if the next President decided to set up a new Sub-Committee on sampling that the IGOSS organisation would cease to operate since it would be undesirable to have two

Comité sur l'échantillonnage

35. Le Président rappelle à l'assemblée que le Sous-Comité de l'ISSMFE sur l'échantillonnage a été dissout à la réunion d'Istanbul, et le Secrétaire Général parle des liens entre le Groupe International sur l'échantillonnage(IGOSS) et ce sous-comité. Il est d'avis que l'IGOSS était responsable envers le sous-comité et que, celui-ci ayant été dissout, il n'a plus de responsabilité envers l'ISSMFE. Il espère que si le nouveau Président décide de créer un nouveau Sous-Comité sur l'échantillonnage, l'organisation de l'IGOSS cessera, car il serait indésirable d'avoir deux comités internationaux travaillant dans le même domaine. Le Professeur

international committees working in the same field. Professor Donald said that he had spoken to Dr. Aitchison, the Chairman of IGOSS about this point and he had expressed the view that the interests of IGOSS were somewhat wider than those of our Society.

Donald dit qu'il a évoqué la question avec le Dr. Aitchison, Président de l'IGOSS, et est d'avis que les intérêts de l'IGOSS sont en quelque sorte plus étendus que ceux de notre Société.

36. Professor Fukuoka pointed out that there was to be a Specialty Session on Soil Sampling and it was agreed that if those who took part in that session felt that a new Sub-Committee on Soil Sampling was desirable, the President should be encouraged to re-establish one.

36. Le Professeur Fukuoka rappelle qu'il doit y avoir une session speciale sur l'échantillonnage du sol, et on convient que si les participants à cette session estiment qu'un nouveau sous-comité sur l'échantillonnage du sol est souhaitable, le Président sera encouragé à le réconstituer.

Other Sub-Committees

37. It was agreed that the new President should be advised to set up the following Sub-Committees

(i) 1981 Conference Advisory Committee
(ii) Budget and Finance Committee
(iii) Committee on List of Members
(iv) Committee on Geomechanical Computer Programs
(v) Information Advisory Committee
(vi) Committee on Symbols and Units
(vii) Site Investigation Committee (possibly including problems associated with sampling)
(viii) European Committee on Penetration Testing

Autres Sous-Comités

37. On décide que le nouveau Président aura à nommer les Sous-Comités suivants:

(i) Comité Consultatif du Congès de 1981
(ii) Comité du Budget et des Finances
(iii) Comité de la Liste des Membres
(iv) Comité pour les programmes d'ordinateur en géomécanique
(v) Comité Consultatif pour l'Information
(vi) Comité des Symboles et Unités
(vii) Comité pour la Reconnaissance des Sites (comprenant éventuellement les problèmes liés à l'échantillannage)
(viii) Comité Européen pour les Essais de Pénétration.

Co-ordinating Committee of ISSMFE, ISRM and IAEG

38. Prof. de Beer reported on the work of the Co-ordinating Committee (Appendix 9) which had met in Brussels three times since the Istanbul meeting. He mentioned that the committee had been working on the subject of standard directives for the submission and publication of International Conference proceedings. It was agreed that these were desirable and that in future A-4 should be retained as a standard size. The Secretary General was asked to serve on the Co-ordinating sub-committee on Standard Proceedings.

Comité de Coordination de l'ISSMFE, l'ISRM et l'IAEG

38. Le Professeur de Beer fait le rapport du Comité de Coordination (Annexe 9) qui s'est réuni à Bruxelles à trois reprises depuis la réunion d'Istanbul. Il mentionne que le Comité a travaillé sur la normalisation des directives pour la soumission et la publication des Comptes-Rendus des Congrès Internationaux. Il est décidé que ces directives sont souhaitables et que le format A-4 devrait à l'avenir être reconnu comme taille normalisée. Il est demandé au Secrétaire Général de faire partie du Sous-Comité de Coordination pour la normalisation des Comptes-Rendus.

39. In addition there are now Co-ordinating Committees on which the ISSMFE membership is as shown:

(i) Literature Classification (Mr. Flodin, Mr. Kuhn, Mr. Jorstad)
(ii) Symbols, Units and Definitions (Not yet appointed)
(iii) Site Investigation and/or Sampling (Not yet appointed)

39. De plus, il existe maintenant des Comités de Coordination, auxquels la participation de l'ISSMFE est la suivante:

(i) Classification de la Littérature (M. Flodin, M.Kuh, M.Jorstad)
(ii) Symboles, Unités et Définitions (non encore désignés)
(iii) Reconnaissance des Sites et/ou Echantillonnage (Non encore désignés)

Professor de Beer was congratulated for the work which had been carried on by the Co-ordinating Committee and he was asked to pass on our thanks to the Belgian Government for the funds they have made available to defray the expenses of holding the meetings in Brussels.

Co-operation with other International Societies

40. The Secretary General reported that in addition to ISRM and IAEG there had been occasional correspondence and meetings between himself and the Secretaries General of various of the other International Societies. The UNESCO committees on

(i) Seismic phenomena association with large reservoirs, and
(ii) Strong earthquake motion

on which the ISSMFE had been represented by Dr. D. MacDonald and Professor N. Morgenstern respectively had finished their work and their reports in English and French were available from UNESCO. There had been some discussion with ICOLD about the production of a joint State-of-the-Art paper with ourselves on Earth and Rockfill dams. This work was being done by Prof. Marsal and S.Wilson and Prof. Marsal informed the meeting that it was hoped to have completed this work by the end of 1977. The ISSMFE had acted as a joint sponsor of 2nd Symposium on Land Subsidence which was organised by the International Association of Hydrological Sciences and took place at Anaheim, California in December 1976.

Activity in the various Regions 1973-77

41. The reports of the various Vice-Presidents are attached as follows:

Africa	(Appendix 10)
N.America	(Appendix 11)
S.America	(Appendix 12)
Asia	(Appendix 13)
Australasia	(Appendix 14)
Europe	(Appendix 15)

and these were spoken to by those Vice-Presidents who were present, Professor Marsal, Professor de Mello, Dr. Moh, Professor Taylor and Professor Kezdi. Professor Kezdi drew attention to the loss to international soil mechanics by the deaths in particular of Albert Caquot, Wilhelm Aichorn, Leonard Cooling, Prof. Krasmanovic, and Jacques Florentin, and the meeting stood for a minute in silence in their memory.

Le Professeur de Beer est félicité du travail qu'il a accompli au Comité du Coordination et il est chargé de transmettre nos remerciements au Gouvernement Belge pour les fonds qu'il a mis à disposition pour payer les dépenses relatives aux réunions tenues à Bruxelles.

Coopération avec d'autres Sociétés Internationales

40. Le Secrétaire Général déclare qu'en plus de l'ISRM et de l'IAEG, il y a eu à l'occassion des échanges de lettres et des réunions entre lui et les Secrétaires Généraux de diverses autres Sociétés Internationales. Les Comités de l'UNESCO sur

(i) les phénomènes sismiques associés aux grandes retenues, et
(ii) les tremblements de terre importants

auxquels la Société Internationale était représentée respectivement parle Dr. D. MacDonald et le Professeur N. Morgenstern, ont terminé leurs travaux. Leurs rapports en Anglais et en Français sont disponibles à l'UNESCO. Il y a eu des discussions avec l'ICOLD pour la réalisation en commun avec notre Société d'un état des Connaissances sur les barrages en terre et en enrochements. Ce travail a été accompli par le Professeur Marsal et S.Wilson, et le Professeur Marsal informe l'assemblée qu'il espère en avoir terminé pour la fin de l'année 1977. L'ISSMFE a accordé son parrainage au 2e symposium sur la Subsidance des Sols, organisé par l'Association Internationale des Sciences Hydrologiques(IAHS) et tenue à Anaheim, en Californie, en Décembre 1976.

Activités des différentes régions de 1973 à 1977

41. Les rapports des différents Vice-Présidents figurent en annexe:

Afrique	(Annexe 10)
Amérique du Nord	(Annexe 11)
Amérique du Sud	(Annexe 12)
Asie	(Annexe 13)
Australsie	(Annexe 14)
Europe	(Annexe 15)

et ont été présentés par ceux des Vice-Présidents qui assistent à la réunion, les Professeurs Marsal et de Mello, le Dr. Moh, les Professeurs Taylor et Kézdi. Le Professeur Kézdi attire l'attention sur la perte pour la Mécanique des Sols Internationale que représante particulièrement la mort d'Albert Caquot, du Wilhelm Aichorn, de Leonard Cooling, du Professeur Krasmanovic et de Jacques Florentin. L'assemblée se lève pour observer une minute de silence en leur

Meeting of 1979 Executive Committee

42. The Secretary General outlined the requirements for holding an Executive Committee of the Society and referred to Appendix 16. He pointed out that unless the meeting is held in April then the Executive Committee would not be able to approve Bulletin No.1 for the Stockholm Conference but this could, of course, be delegated to the Conference Advisory Committee. Professor Seed proposed that this delegation should be made and this was seconded by Dr. Shields, but on taking a vote it was decided not to do this by 21:15. Only two invitations were received for holding the meeting in April 1979 and of these the Mexican delegate pointed out that for South Africans, Rhodesians and Chileans special permission to attend would have to be obtained. The votes were as follows:

Mexico	20
South Africa	9

and the Mexican invitation was accepted with acclamation.

Vice-Presidents for the period 1977-81

43. The formal election of the Vice-Presidents for the period 1977-81 was noted with acclamation:

Africa	Prof. W.R.Mackechnie	*Rhodesia*
N.America	Prof.G.F. Sowers	*USA*
S.America	Prof.F.Martinez	*Chile*
Asia	Prof.D.Mohan	*India*
Australasia	Mr. A.D.Hosking	*Australia*
Europe	Prof.B.Broms	*Sweden*

Amendment to By-Law 6

44. Professor de Mello proposed that By-Law 6 should be amended to read as follows:

A candidate for the Presidency must previously have served the Society as a Vice-President or as Secretary General.

It was appreciated that it was desirable that a President should be well informed about the workings of the Society but it was generally thought that the proposal would be unnecessarily restrictive. On taking a vote the motion was lost *nem con.*

Election of President, 1977-81

45.

The following candidates were duly nominated for the post of President, ISSMFE, for the period 1977-81:

mémoire.

Réunion du Comité Exécutif de 1979

42. Le Secrétaire Général souligne la nécéssité de tenir un Comité Exécutif de la Société et se réferre à l'annexe 16. Il indique que, sauf si la réunion a lieu en Avril, le Comité Exécutif ne serait pas en mesure d'approuver le bulletin n.1 de la Conférence de Stockholm, rôle qui, bien sur, pourrait être délégué au Comité Consultatif du Congrès. Le Professeur Seed propose de faire cette délégation, et cette proposition est soutenue par le Dr. Shields, mais le vote est défavorable par 21 voix contre 15. Deux invitations seulement sont reçues pour tenir la réunion en Avril 1979, et le délégué du Mexique indique que les Sud-Africains, les Rhodésiens et les Chiliens devront obtenir une autorisation spéciale pour assister à la réunion dans son pays. Les résultats du vote sont les suivants:

Mexique	20
Afrique du Sud	9

et l'invitation du Mexique est acclamée.

Vice-Présidents pour la période 1977-1981

43. Les Vice-Présidents pour la période 1977-1981, élus précedemment, sont acclamés:

Afrique	Prof.W.R.Mackechnie	Rhodésie
Amérique du Nord	Prof.G.F. Sowers	Etats Unis d'A
Amérique du Sud	Prof.F.Martinez	Chili
Asie	Prof.D.Mohan	Inde
Australasie	Mr.A.D.Hosking	Australie
Europe	Prof.B.Broms	Suède

Amendement à l'article 6 du Règlement Intérieur

44. Le Professeur de Mello propose d'amender l'article 6 du Règlement Intérieur de la façon suivante:
Un candidat à la Présidence doit avoir préalablement servi la Société comme Vice-Président ou comme Secrétaire Général.

On convient qu'il est souhaitable qu'un Président soit bien informé du fonctionnement de la Société mais il est de l'avis général que la proposition est trop restrictive, ce qui n'est pas nécéssaire. La motion est repoussée par un vote *nem con.*

Election du Président pour 1977-1981

45.

Les canditats valablement désignés pour le poste de Président de l'ISSMFE pour la période de 1977-1981 sont les suivants:

		Vote No					
		1	2	3	4	5	6
Dr. G.D. Aitchison	*(Australia)*	2	1				
Prof. M. Fukuoka	*(Japan)*	11	11	11	14	13	23
Prof. A. Kezdi	*(Hungary)*	9	12	11	11	11	
Prof. G.A. Leonards	*(U.S.A.)*	0					
Prof. V.F.B. de Mello	*(Brazil)*	13	12	14	15	21	22
Prof. G.G. Meyerhof	*(Canada)*	4	3	3			
Dr. Z-C Moh	*(S.E. Asia)*						
Prof. J.K.T.L. Nash	*(U.K.)*	5	5	5	5		

Dr.Moh announced, however, that he wished to withdraw his candidature and the results of the successive votes are shown in the Table above.

Professor Fukuoka was therefore elected as President of the ISSMFE and the result, which was won by one vote, was greeted with applause.

Le Dr. Moh annonce cependant qu'il désire retirer sa candidature, et les résultats des différents tours de scrutin sont indiqués sur le tableau ci-dessus.

Le Professeur Fukuoka est donc élu Président de l'ISSMFE, et le résultat, obtenu à une voix près, est acceuilli par des applaudissements.

Budget and Finance

46. The Chairman of the Budget and Finance Sub-Committee, Dr. D'Appolonia presented the Committee's report which is shown as Appendix 17. Following the decision made yesterday that the expense of printing the List of Members should not be borne by the Host Country to the International Conference this recommendation (5(b)) was withdrawn from the report.

47. He drew attention to the proposal that the Group Numbers should be calculated on the basis of gross G.N.P. (Criterion A) modified by individual G.N.P. (Criterion B) for the country concerned and Prof. Prakash, on behalf of the Indian Geotechnical Society, suggested that Criterion B should be used, modified if necessary by Criterion A, as a preferable basis. Professor Kezdi considered that the average of the two criteria might be better and he also felt that the steps used to derive the final Group Number were not well positioned. However, on taking a vote the proposal to use Criteria A and B as originally suggested by the Committee was accepted. It was further agreed that bi-annual indexing should be adopted and that the Budget and Finance Committee should present a formula for doing this to the next Executive Committee Meeting.

48. Ing.Springall, on behalf of the Mexican National Society, proposed that

(1) 5% of the selling price of International and Regional Confer-

Budget et Finances

46. Le Président du Sous-Comité du Budget et des Finances, le Dr. d'Appolonia, présente la rapport du Comité (Annexe 17). A la suite de la décision de la veille de ne pas mettre à la charge du pays organisateur de Congrès International le coût de l'impression de la liste des membres, la recommandation (5(b)) a été retirée du rapport.

47. Il attire l'attention sur la proposition visant à ce que les numéros de groupe pour chaque pays soient calculés sur la base du PNB total (critère A) et modifiés éventuellement en fonction du PNB rapporté à la population (critère B). Le Professeur Prakash, au nom de la Société Géotechnique de l'Inde, suggère d'utiliser de préférence comme base le critère B, modifié si nécessaire par le critère A. Le Professeur Kézdi considère que la moyenne des deux critères pourrait être une meilleuse solution, et il estime également que les étapes du calcul utilisé pour obtenir le numéro de groupe final sont mal indiquées. La proposition d'utiliser les critères A et B, de la façcon suggérée initialement par le Comité, est acceptée par un vote. Il est également accepté d'adopter une indexation bi-annuelle et le Comité du Budget et des Finances est chargé de présenter une formule d'indexation à la prochaine réunion du Comité Exécutif.

48. L'Ing Springall, au nom de la Société Nationale du Mexique, propose que

(1) 5% du prix de vente des Comptes Rendus des Congrès Internationaux

ence Proceedings should be allocated by the host Organising Committee to the ISSMFE

(2) a surcharge of 10% of the fee paid by exhibitors at International and Regional Conferences should be paid by the host Organising Committee to the ISSMFE

but on taking a vote this section of the Budget and Finance Committee Report was rejected.

49. The other recommendation 5(a) of the Committee was accepted.

Co-ordination of Conference Dates

50. Professor Prakash suggested that the Secretary General should co-operate with the International Association of Earthquake Engineering to co-ordinate on the dates of the 1981 International Conferences of the two societies and the Secretary General agreed to do this.

Financial Statement 1975-77

51. The Secretary General presented the Accounts for the years 1975-77 (Appendix 18) which had been audited by Deloitte & Company and these were approved.

Votes of Thanks

52. Professor Togrol proposed a vote of thanks to our hosts, the Japanese for their most generous hospitality. The President also thanked the interpreters and both motions were greeted with applause.

Secretary General

53. The Secretary General agreed to remain in office until the next meeting of the Executive Committee in 1979.

The meeting ended at 19.20 hours

et Régionaux soient affectés à l' ISSMFE par le Comité Organisateur du pays invitant.

(2) une surtaxe de 10% des droits payés par les exposants aux Congrès Internationaux et Régionaux soit payée à l'ISSMFE par le Comité Organisateur du pays invitant.

mais cette partie du rapport du Comité due Budget et des Finances est repoussée par un vote.

49. L'autre recommandation (5(a)) du Comité est acceptée.

Coordination des dates des Congrès

50. Le Professeur Prakash suggère que le Secrétaire Général coopère avec l'Association Internationale d'Earthquake Engineering (IAEE) pour coordonner les dates des Congrès Internationaux de 1981 des deux Sociétés, et le Secrétaire Général accepte cette suggestion.

Rapport financier pour 1975-1977

51. Le Secrétaire Général présente les comptes pour la période 1975-1979 (annexe 18), qui ont été examinés et approuvés par Deloitte & Company.

Vote de remerciements

52. Le Professeur Togrol propose un vote de remerciements à nos hôtes japonais pour leur très généreuse hospitalité. Le Président remercie également les interprètes et les deux motions sont acceuillies par des applaudissements.

Secrétaire Général

53. Le Secrétaire Général accepte de poursuivre ses fonctions jusqu' à la prochaine réunion du Comité Exécutif en 1979.

Le séance est levée à 19h20.

Signed in and on behalf of the Executive Committee

J. KERISEL

J. Kerisel, President

The composition of the ISSMFE Sub-Committees for the period 1975-77 appears in Appendix 19.

APPENDIX 1

MEMBERSHIP AT JULY 1977

	Europe	Asia	Africa	N.America	S.America	Australasia	Total
Argentina					93		93
Australia						158	158
Austria	53						53
Belgium	99						99
Brazil					117		117
Bulgaria	92						92
Canada				737			737
Chile					23		23
China		100					100
Colombia					54		54
Czechoslovakia	35						35
Denmark	150						150
Ecuador					44		44
Finland	152						152
France	817						817
F.R.G.	634						634
G.D.R.	22						22
Ghana			29				29
Greece	85						85
Hungary	25						25
India		189					189
Indonesia		58					58
Iran		30					30
Ireland	2						2
Israel		119					119
Italy	736						736
Japan		368					368
Mexico				387			387
Morocco			109				109
Netherlands	94						94
New Zealand						232	232
Nigeria			26				26
Norway	238						238
Pakistan		16					16
Peru					59		59
Poland	110						110
Portugal	218						218
Rhodesia			249				249
Romania	27						27
S.Africa			485				485
S.E. Asia		220					220
Spain	346						346
Sweden	313						313
Switzerland	168						168
Syria		11					11
Turkey	47						47
U.K.	732						732
U.S.A.				900			900
U.S.S.R.	255						255
Venezuela					184		184
Yugoslavia	86						86
Countries	25	9	5	3	7	2	51
Members	5536	1111	898	2024	574	390	10533

APPENDIX 2

AVAILABILITY OF INTERNATIONAL AND REGIONAL CONFERENCE PROCEEDINGS OF THE ISSMFE

**By agreement with University Microfilms Ltd of St.John's Road, Tylers Green, High Wycombe, Bucks HP10 8HR, UK, several of the out-of-print proceedings are now available direct from them in either a xerographic or microfilm form. They have a minimum order of £8.50 and prices quoted do not include VAT or postage and packing. Orders for these particular volumes should be sent to Mr. A.F. Cole, and at least 8 weeks from receipt of your payment should be allowed before receipt of copy. Microfilm is approximately one-third of the price of Xerox.*

INTERNATIONAL CONFERENCES	*Publishers*	*Cost*
1st, Harvard 1936	Geotechnical Engineers Inc.934 Main St, Winchester, Mass 01890, USA	US$40.00 bound reprint
2nd, Rotterdam 1948	Xerographic copy* from University Microfilms (OP.66183) Vol.3-$37.20, 4-$38.10, 5-$39.00, 6-$38.50, 7-$21.70 and an Index	Vol.1$40.20 2-$38.10 - $10.00
3rd, Zurich 1953	Societe Suisse de Mecanique des Sols et des Travaux de Fondations, Case Postale 8022, Zurich, Switzerland	US$70.00
4th, London 1957	Xerographic copy* from University Microfilms (OP.60972)	1-$54.50 2-$54.40 3-$33.20
5th, Paris 1961	Xerographic copy* from University Microfilms (OP.52874)	1-$102.60, 2-$100.80 3-$47.70
6th Montreal 1965	University of Toronto Press, University of Toronto, Canada	Can$100.00
7th Mexico City 1969	Sociedad Mexicana de Mecanica de Suelos AC, Apartado Postal 8200 Mexico 1, DF, Mexico	US$70.00
8th Moscow 1973	OUT OF PRINT - Negotiations underway with University Microfilms	
9th Tokyo 1977	Japanese Society of SMFE, Toa Bekkan Bldg, 13-5 I-Chome, Nishi-Shinbashi, Minato-ku, Tokyo, Japan	50,000 Yen (Surface mail)

REGIONAL CONFERENCES		
EUROPEAN		
1st, Stockholm 1954	Swedish Geotechnical Society, c/o K.Tekniska Hogskolan, Institutionen for Jord-och Bergmekanik, Fack, 100;44 Stockholm 70 Sweden *(Reproduced in Geotechnique 1955, 5, 1-226)*	Vol.3 only S.Kr. 26.00
2nd, Brussels, 1958	Xerographic copy* from University Microfilms (OP.21446)	1-$18.50, 2-$19.90, 3-$32.20
3rd, Wiesbaden 1963	Xerographic copy* from University Microfilms (OP.21447)	1-$52.10, 2-$19.90
4th, Oslo 1967	Norwegian Geotechnical Inst. POB 40, Taasen N.Oslo 8, Norway	N.Kr. 210
5th, Madrid, 1972	Soc.Espanola de Mecanica del Suelo y Cimentaciones, Alfonso XII, Num.3, Madrid 7, Spain	2500 Pesetas
6th, Vienna 1976	Dr.Manfred Fross, Inst.f.Grundbau u. Bodenmechanik, Karlsplatz 13 1040 Wien, Austria	A.sh.600.00
AFRICAN		
1st, Pretoria 1955	Out of print *(Reproduced in Trans.S.A.Instn.Civ.Engrs, 1955, 5, 263-322, 406-478)*	
2nd, Lourenco Marques 1959	Out of Print	
3rd, Salisbury, 1963	Out of Print	
4th, Cape Town 1967	A.A.Balkema, 93 Keerom St, Cape Town, South Africa	SA R 20.00
5th, Luanda 1971	Laboratorio de Engenharia de Angola, Caixa Postal No.6500, Luanda, Angola	US$40.00
6th, Durban 1975	A.A.Balkema, 93 Keerom St, Cape Town, South Africa	SA R 30.00
ASIAN		
1st, New Delhi, 1960	Xerographic copy* from University Microfilms (OP.21455)	US$65.70
2nd, Tokyo 1963	Japanese Society of SMFE, Toa Bekkan Bldg, 13-5 I-chome, Nishi-Shinbashi, Minato-ku, Tokyo	US$20.00
3rd, Haifa, 1967	Xerographic copy* from University Microfilms (OP.21456)	1-$44.40, 2-$22.80
4th, Bangkok 1971	Asian Inst. of Technology POB 2754, Bangkok, Thailand	US$30.00
5th, Bangalore 1975	Secretary SARC, c/o Civil Engineering Dept, Indian Institute of Science, Bangalore, 560 012, India	US$50.00
AUSTRALIA - NEW ZEALAND		
1st, Melbourne 1952	Xerographic copy* from University Microfilms (OP.21460)	US$30.80
2nd, Christchurch 1956	Xerographic copy* from University Microfilms (OP.21461)	US$26.45
3rd, Sydney, 1960	Xerographic copy* from University Microfilms (OP.21462)	US$42.70
4th, Adelaide 1963	Xerographic copy* from University Microfilms (OP.21463)	US$42.00
5th, Auckland 1967 1st, Melbourne, 1971 (1st Geomechanics) 2nd, Brisbane, 1975	Instituion of Engineers Australia, 157 Gloucester St, Sydney NSW 2000, Australia	Aus$25.00 + p.p. Aus.$40.00
PAN AMERICAN		
1st, Mexico City 1960	Sociedad Mexicana de Mecanica del Suelos AC, Apartado Postal 8200 Mexico DF, Mexico	US$30.00
2nd, Sao Paulo, 1963	Associacao Brasileira de Mecanica dos Solos, Rua Joaquim Nabuco, 254-ap.201 Rio de Janeiro, Guanabara ZC-37, Brasil	US$30.00
3rd, Caracas 1967	Sociedad Venezolana de Mecanica del Suelo e Ingenieria de Fundaciones Ap.4074-Este, Caracas, Venezuela	US$30.00
4th, Puerto Rico 1971	American Soc of Civil Engrs, 347 E.47th St, New York, NY 10017, USA	US$20.00
5th, Buenos Aires 1975	Sociedad Argentina de Mecanica de Suelos, CC4064, Correo Central, Beunos Aires, Argentina	Approx.US$45.00

APPENDIX 3

REPORT TO THE EXECUTIVE COMMITTEE BY THE PRESIDENT : THE ALLOCATION OF PAGES IN THE INTERNATIONAL CONFERENCE PROCEEDINGS

INTRODUCTION

During the meetings held at Istanbul on 3rd and 4th April 1975, the Executive Committee of the International Society delegated to the President the task of fixing the number of pages to be allotted to each of the member societies in the Proceedings of the 9th International Conference. In addition to this, your President has willingly agreed to recommend to the Executive Committee criteria which could be adopted in future to make such a distribution.

It seemed necessary to him that a decision of such an obvious importance should contain a minimum of arbitrariness.

HISTORY

The number of pages used by each National Society was originally a measure of the soil mechanics initiative within that Society and attempts to produce a fair distribution were subsequently left to the President himself. In fact what was actually printed did not always correspond to what had been recommended owing to a last minute re-distribution of the unused quota.

METHODS IN USE BY OTHER LEARNED SCIENTIFIC SOCIETIES

It is difficult to draw any useful lessons over this matter from other learned societies. For example, ICOLD takes as its main criteria the number and the importance of the dams which exist in each given country. IABSE (which is far from having the same international position that we do, and according to its regulations must have a President of Swiss Nationality), takes more into account the number of members from each country. The International Society for Rock Mechanics does not as yet have a fixed policy on this matter and seems to have opted for a distribution based on the number of previous papers of all kinds about rocks published by each country.

DISCUSSION AT ISTANBUL

Two slightly different suggestions were made at Istanbul. The first one favoured a distribution proportional to the amount of fees paid by the National Society. This upset the delegates from the developing countries, which is quite understandable. In these countries engineers are likely to do research which favours cheap and intelligent solutions, whereas in the developed countries engineers may live happily on a regular routine by using conventional techniques which require no further research. A second possibility was to divide the papers in proportion to the number of members. Some of our colleagues were against this on the grounds that the actual numbers of members listed as belonging to a National Society is not wholly meaningful, especially for the countries of Eastern Europe where membership is linked with foreign exchange. This must be accepted and that is why, at the suggestion of the Soviet delegate, it was agreed at Istanbul to alter the make-up of the annual dues, weighting more heavily the share attributable to the National Society and diminishing the share attributable to the number of individual members. Thus, at Moscow (1973) the dues had been fixed on the formula:

$100 + No.of members x Group Index.

The Group Index varied from $1.00 to $2.05 depending on the intrinsic wealth of the Country and this was altered at Istanbul (1975) to:

$1.00 per member + $75 x Group Number.

The Group Number of the country, which ranges from 1 to 8 derives from figures published by the U.N. and is related to the subscription payable to that body. It is a function of the Gross National Product of the member countries. The higher the national income, the higher the Group Number and somewhat more than half of our budget comes from this fixed sum.

GENERAL APPROACH

No system will ever be perfect. But as a start some rationalization, however imperfect, is surely preferable to an arbitrary distribution. In this matter it seemed to me that the subscriptions to the International Society formed the best basis for, although it is true that the poorest countries are likely to have a lot of very imaginative things to say, the more opportunities a country has to erect structures, factories, bridges, etc. the more experimental observations are available for it to mention and the more likely it is to back new theories. Of course it is possible that in some countries the Gross National Product derives more from an exchange of services and mineral extractions than from buildings, but this is likely to be exceptional and in my view it is likely to alter with time. In any case, only part of the make-up of the proposed paper allocation will be biassed towards the richer countries. We must remind ourselves of our past procedure in assessing how radical are the proposed changes.

RECOMMENDATIONS FOR THE FUTURE

Finally, my concrete suggestion is as follows:-

Supposing that the total number of pages to allot is N (in Tokyo it will be about 1300):-

(i) First I suggest that the organizing country be allowed an additional quota of 0.04N which it may retain for itself or give to others. It is normal that the organising country should have such a share in order to relate at length what they are doing, to reward them for their organising and for the financial risks which they have assumed.

(ii) Second, I suggest leaving to the discretion of the President 0.1N. He may allocate these pages, with or without consulting the Vice-Presidents, to the countries whose researches he thinks deserve more attention, or who have published the best papers at the previous conference, or in the period between the two conferences.

(iii) The rest of the pages, i.e. 0.86N shall be allotted in proportion to the total of the subscriptions paid by the National Society during the 4-year period Conference to Conference. This will be made up of two parts: the actual subscriptions paid during the first two years up to the time when the allocation is made, and the estimated subscriptions to be paid during the final two years. I deliberately use the word "actual" in order to penalize any country which is late in paying its subscription.

(iv) In order to ensure a certain continuity the following rule should be adopted: "No difference of more or less than 25% shall be made in the number of pages initially allotted to one country at two consecutive conferences", apart, of course, from changes due to non-payment of dues.

(v) Finally, if at the last minute, some National Societies have not used their full allocation of pages, the organising committee shall be responsible for allotting them to another National Society (other than that of the host country).

The proposed method was used for the Tokyo Conference and is illustrated in the attached Table. It will be seen that the Argentina quota (for example) came out at 17 pages but, on account of printing requirements and also their previous record this was rounded to an even 18. Then, in the end, they submitted no papers at all, so their whole allocation became available for re-distribution, thus making it possible for Belgium and Brazil (etc) to use more than they were originally allowed.

No allocation was made to persons or countries not in membership.

J. Kerisel
Paris, March, 1977.

(Please note Minutes 22 and 23 for agreed amendments to paragraphs (ii) (iii) and (iv) above)

TABLE I

DISTRIBUTION OF PAGES TO NATIONAL SOCIETIES IN PROCEEDINGS OF TOKYO CONFERENCE

(7) as initially allocated and (8) as finally agreed. * *Allowing for previous record*

Country	No.of Members as at 1.10.76 (1)	Subscriptions 1974-1975 $ (2)	(Estimated) Subscriptions 1976-1977 $ (3)	Estimated Mean Annual Sub. $ (4)	% of mean total budget (5)	Notional Allocation of pages (6)	President's Allocation * (7)	Actual pages used (8)
Argentina	93	482	790	318	1.40	17	18	
Australia	445	1672	1622	823	3.64	45	46	42
Austria	53	340	558	224	0.99	12	14	8
Belgium	99	487	797	321	1.42	18	20	24
Brazil	117	582	849	358	1.58	20	22	28
Bulgaria	92	412	484	224	0.99	12	14	14
Canada	667	2113	2234	1087	4.81	60	60	64
Chile	23	252	346	150	0.66	8	6	
China	100	550	1100	413	1.82	23	18	
Colombia	19	244	338	145	0.64	8	6	
Czechoslovakia	35	300	670	243	1.07	13	14	18
Denmark	139	486	718	301	1.33	16	14	16
Ecuador	36	275	222	124	0.54	7	6	
Finland	143	522	727	312	1.38	17	18	16
France	817	2040	2534	1143	5.05	63	68	72
F.R.G.	634	2909	2182	1273	5.63	70	72	80
G.D.R.	22	274	645	230	1.01	13	12	12
Ghana	29	250	204	114	0.50	6	8	
Greece	85	324	583	227	1.00	12	12	12
Hungary	25	266	500	191	0.84	10	10	4
India	189	925	978	476	2.10	26	28	36
Iran	5	212	310	130	0.57	7	8	
Ireland	5	214	311	131	0.57	7	6	6
Israel	119	462	533	249	1.10	14	16	14
Italy	736	2293	2372	1166	5.16	64	50	44
Japan	368	1482	1634	779	3.44	43	48	96
Mexico	387	1059	1302	590	2.61	32	28	32
Morocco	140	480	430	228	1.00	12	12	
Netherlands	94	470	789	315	1.39	17	16	24
New Zealand	232	748	910	415	1.83	23	24	16
Nigeria	26	-	152	101	0.44	5	6	
Norway	238	720	919	410	1.81	22	26	22
Pakistan	27	270	354	156	0.69	9	8	8
Peru	59	276	268	136	0.60	7	6	8
Poland	110	364	960	331	1.46	18	20	30
Portugal	218	584	685	317	1.40	17	18	18
Rhodesia	249	760	812	393	1.73	21	18	
Romania	27	203	504	177	0.78	10	10	12
S.Africa	516	742	1447	547	2.42	30	30	30
S.E. Asia	220	678	854	383	1.69	21	20	24
Spain	346	882	1246	532	2.35	29	28	34
Sweden	313	1033	1376	602	2.66	33	34	38
Switzerland	168	1293	898	548	2.42	30	24	8
Syria	11	54	170	90	0.39	5	6	
Tunisia	15	230	180	103	0.45	6	6	
Turkey	47	311	540	213	0.94	12	12	12
U.K.	732	3049	2352	1350	5.97	74	84	90
U.S.A.	1490	4402	4180	2146	9.49	118	108	116
U.S.S.R.	255	1246	1710	739	3.27	41	48	58
Venezuela	181	660	812	368	1.62	20	18	10
Yugoslavia	86	403	614	254	1.12	14	18	12

APPENDIX 4

REPORT OF INFORMATION ADVISORY COMMITTEE, ISSMFE

Joseph M. DeSalvo, Chairman February 25, 1977

SYNOPSIS

IAC has continued in its service to ISSMFE members by modification and improvement of IGC, cooperation with other international organizations, maintenance and improvement of GA/GRS and liaison with the Asian Institute of Technology. The new Coordinating Committee consisting of ISSMFE, ISRM, and IAEG is further modifying IGC, without changing its basic framework, for suitability to all three organizations. GA/GRS still maintains its position as the best information/retrieval system available to our profession. However, competition from AGE could have the effect of weakening GA/GRS and the effectiveness of ISSMFE to serve all members. Immediate steps should be taken to eliminate the competition and to devise constructive means of cooperation which will result in satisfaction to the goals of the Asian Nations and all nations within ISSMFE.

INTRODUCTION

The prime efforts and accomplishments of the Information Advisory Committee (IAC) have been:

1. Modification and improvement of the International Geotechnical Classification System (IGS) of the ISSMFE
2. Cooperation with the International Society for Rock Mechanics (ISRM) and International Association of Engineering Geologists (IAEG) to further develop a universal International Geotechnical Classification System
3. Maintenance and improvement of Geotechnical Abstracts and Geodex Retrieval System (GA/GRS), the official information system of ISSMFE
4. Liaison with the Asian Information Center for Geotechnical Engineering (AGE).

This committee consists of ten members as shown on the attachment. The four tasks listed above have been delegated to specific members of IAC, with general input requested from all members. The accomplishments of IAC have been significant and have served the general membership of ISSMFE well. The continuation of this work, supported by full cooperation of all National Societies, is essential if ISSMFE is to remain the information center, and the single technical representative, of the World's geotechnical engineers.

INTERNATIONAL GEOTECHNICAL CLASSIFICATION SYSTEM

The development of IGC is well known to the Executive Committee of ISSMFE. Its evolution over the past 24 years is summarized by Nils Flodin (2) in his address to AGE. This hierarchic classification system was finally accepted by the Executive Committee at the 1969 Mexico Conference, with slight amendments accepted at the 1973 Moscow Conference. The 1973 version (4) is currently in use. Mr. Flodin has been instrumental in the original development and amendments of the IGC. Additional modifications are anticipated in connection with future cooperation with ISRM and IAEG.

COORDINATING COMMITTEE ON LITERATURE CLASSIFICATION

At the Istanbul meeting in April 1975, the Executive Committee voted that a Coordinating Committee be established for literature classification. The Coordinating Committee shall consist of nine members, three each from the following organizations: ISSMFE, ISRM and IAEG. For convenience, the name of the Coordinating Committee has been abbreviated to SRG (Soils/Rock/Geology). Prof. de Beer is coordinating secretary of SRG.

The three representatives of ISSMFE have been selected from IAC based on their close knowledge and use of the International Geotechnical Classification System. Those representatives are Nils Flodin, Herbert Kuhn, and Finn Jørstad. Mr. Flodin is chairman and coordinator of the ISSMFE group.

From the latest correspondence available at the time of preparing this report, ISRM and IAEG have appointed only two representatives each, with a third yet to be chosen.

It is proposed that the existing IGC be amended to adopt the needs of ISRM and IAEG so that one universal classification system may serve the needs of all three groups. The IGC is a logical basis for development because of the more than 20 years of effort and periodic updating that has brought this classification system to its present level of usefulness. Over the past 6 years, thousands of papers have been classified and hundreds of thousands of cards have been prepared and disseminated throughout the world for information and retrieval by libraries, institutions, firms and individuals; and computers have been fed using the present IGC system. Thus, it would be catastrophic to change the system radically (5).

A meeting of the Coordinating Committee was scheduled for early December, 1976 in Cologne. However, it was not possible for members of ISRM and IAEG to attend. Nevertheless, Flodin, Kuhn and Jørstad did meet and made some improvements based on their experience over the past four years and some correspondence from ISRM. It is planned to summarize the amendments for distribution to and comments from ISRM and IAEG members. Additional progress should be made from the time of writing this report to the time of the Executive Committee meeting in Tokyo.

Our ISSMFE representatives to SRG are encouraged that there will be good cooperation and agreement among all three groups.

GEOTECHNICAL ABSTRACTS/GEODEX RETRIEVAL SYSTEM (GA/GRS)

GA/GRS was adopted by ISSMFE at the 1969 Mexico Conference as its official information system and since January 1970 has been issuing 144 abstracts monthly, in conjunction with retrieval cards, covering about 500 sources of worldwide publications. The development of GA by the German Society is summarized by Kuhn (3). Geodex International, Inc. of California had an established international geotechnical abstracting and retrieval service utilizing a series of punched key-word cards for retrieval of the abstracts (GRS).

In the late 1960's the Geotechnical Engineering Division (then called the Soil Mechanics and Foundations Division) of the American Society of Civil Engineers (ASCE) prepared and published a 1500 word Thesaurus of key words for indexing and retrieval of abstracts. It also, for a period of about two years, published in its Journal abstracts of worldwide publications provided by ISSMFE members, many of whom are presently on the IAC. The ASCE voluntarily relinquished its role of publishing abstracts in view of the intentions of ISSMFE to publish GA, which would serve the members better. In so doing, however, ASCE urged the merger of GA and GRS as complementary services because of the need to provide a method to conveniently retrieve the abstracts.

GA/GRS have been linked as the official abstract/retrieval system of ISSMFE since the first issue of GA in January 1970. The abstract cards contain both the IGC system and a set of descriptors taken from a list of 347 Geodex key words. The user may file and retrieve abstracts by either the GRS punched cards or the IGS system.

GA/GRS operates independently on a self supporting basis under the management of the German Society and Geodex International, Inc., respectively, but with the full endorsement and support of ISSMFE. Almost 1000 subscribers in some 65 countries use GA/GRS. The data of the more than 10,000 published abstracts of GA, and the Geodex descriptors, are being stored in a computer so as to offer other services to the members. During the past 7 years, the lists of descriptors and sources of articles have been revised to keep pace with the needs of the profession. Thus, GA/GRS is the best information service available to the Geotechnical Engineering profession in the world, and is constantly being monitored and updated to take advantage of new techniques and changing needs so as to serve the members better.

LIAISON WITH AGE

On April 5-9, 1976, the Asian Information Center for Geotechnical Engineering (AGE) of the Asian Institute of Technology conducted a Workshop on Geotechnical Information Systems in Bangkok. The objectives and recommendations coming from that meeting are presented in the Proceedings (1). IAC was invited to represen ISSMFE at the Workshop; at the request of this reporter, Flodin, Jørstad, Kuhn and Norup attended on behalf of ISSMFE. Their report (also supported by Mr. Floss) is appended.

Several discussions and conclusions coming from the Workshop give cause for concern for the ISSMFE representatives of the Workshop and the IAC chairman. In order to explain the concerns, a brief review is required.

In Moscow in 1973, AGE discussed its plans for publications and services. In relation to interaction with GA/GRS, it was noted that

1. AGE is restricted to Asia
2. AGE will publicize GA/GRS
3. AGE will abstract only papers published in Asia and unpublished reports relevant to Asia. ISSMFE President Peck suggested that "peculiar to Asia" be used instead of "relevant to Asia"
4. There will be only a 5% overlap in AGE abstracts and GA/GRS abstracts
5. ISSMFE gave AGE its blessing on the understanding that the two services would be mutually exclusive, and that AGE would not compete with GA/GRS.

Referring to the Workshop report by ISSMFE attendees, item (b), 50% of AGE abstracts duplicate GA abstracts. This is far above the 5% overlap agreed to. Item (d), referring to the Current Awareness Services, indicates direct competition with GA, and increased competition via AGE's plans to expand its service to a monthly publication and to sell it not only in Asia but also internationally. Item (f) of the report is also disturbing; a worldwide newsletter is a violation of the Moscow agreement, since its effect is likely to be to solicit subscriptions outside Asia.

Referring to Conclusions and Recommendations, p.17 of Workshop Proceedings (1), item 3 reads as follows: "AGE should continue to function .... by collecting (a) published geotechnical literature of relevance to Asia, and (b) unpublished documents which originate in Asia, ..." This is in direct opposition with the Moscow agreement wherein AGE will publish only papers published in Asia and unpublished reports peculiar to Asia. The concerns of the ISSMFE representatives of the Workshop and the IAC chairman have been impressed on the Secretary General, who expressed them in this letter to Professor Brand (AGE) dated 10th November 1976. A copy is attached.

It is this reporter's opinion that the efforts of AGE, if allowed to go unchecked, will result in the undermining of ISSMFE's international stature and authority to the detriment of all the world's members.

It is recommended that ISSMFE restrain AGE from proceeding with such plans and that a constructive scheme be devised to utilize AGE's funds for the purpose of supporting GA/GRS, and to provide GA/GRS at low cost to the developing nations of Asia. A better service to the Asians should result from such an effort, by combining resources of talent, time, and money; the alternative, a splintering away from the ISSMFE policies and procedures, could cause others to follow and the prestige and effectiveness of ISSMFE to falter. AGE must consider the effect of its efforts on all nations, as well as those of Asia.

In conclusion, it is recommended that ISSMFE restrain AGE from competing with GA/GRS and that earnest efforts be made to utilize AGE's funds to support ISSMFE while accomplishing its own goals for the Asian Nations.

J.M. DeSalvo

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2. Flodin, N.; Ibid, pp.65-68
3. Kuhn, H.; Ibid pp.61-63
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APPENDIX 5

REPORT OF THE SUBCOMMITTEE ON STANDARDIZATION OF PENETRATION TESTING IN EUROPE

RAPPORT DU SOUS-COMITÉ EUROPÉEN DE STANDARDISATION DES ESSAIS PAR PENETRATION

CONTENTS

1. ACTIVITIES OF THE SUBCOMMITTEE ON STANDARDIZATION OF PENETRATION TESTING IN EUROPE

At the Fourth International Conference on Soil Mechanics and Foundation Engineering in London, 1957, a Subcommittee on Static and Dynamic Penetration Testing Methods was appointed to study the methods of static and dynamic penetration tests with a view to their standardization.

The different methods were studied between 1957-1961 and comparisons were made between them. However, the Subcommittee could not make any recommendations to the Executive Committee at the Fifth International Conference in Paris, 1961. It was then decided that the work of the Subcommittee should be continued with the aim of standardizing a limited number of penetration testing methods, chosen among the most commonly used methods in Western Europe and America. At the following meeting it was decided to divide the activities into two parts: Dr H Zweck should coordinate the standardization of penetration testing methods in Europe, and Prof H Ireland would do the same for the Standard Penetration Test (SPT test).

The European group of the Subcommittee met in Wiesbaden in 1963 and discussed a draft for the standardization of the German dynamic sounding test, the Dutch static cone penetrometer test and the Swedish weight sounding test. These discussions resulted in a paper "Recommended methods for static and dynamic penetration tests (subsurface soundings)".

At the Sixth International Conference in Montreal, 1965, the secretary of the Subcommittee Prof M Vargas presented one report from the European group and one from the American group. Because of the wide divergence of opinions among the members of the Subcommittee it was recommended that the work should be compiled in separate reports and published in the proceedings of the A.S.C.E., Geotechnique or other appropriate journals. The following reports have been published:

Recommended method for static and dynamic penetration tests (subsurface soundings), 1965. Geotechnique Vol 18 (1968), No 1, p 98-101.

Ireland H.O., Moretto O. and Vargas M. (1970). The dynamic penetration test: A standard that is not standardized. Geotechnique Vol 20, No 2, p 185-192.

At the meeting in Montreal the Subcommittee was dissolved. However, the European national societies wanted to continue the work on a regional basis and therefore a European Subcommittee was established with Dr H Zweck as chairman. There were no reports of the activities of this committee at the inter-

national conferences held in Mexico City 1969 and Moscow 1973.

In 1974 the Swedish Geotechnical Society organised a European Symposium on Penetration Testing (ESOPT). At this symposium the topic "Standardization and future cooperation" was discussed. The results of these discussions were presented in the proceedings ESOPT, Vol 2:1, p 53-55. It was pointed out that the standardization of penetration equipment and of test procedures is not only desirable but also necessary and that only a small number of penetrometers should be standardized. The suggestion was made that all national geotechnical societies should be encouraged to set up national committees on penetration testing and appoint contact members with the European Subcommittee in order to enlarge the base for the work on standardization.

At the ISSMFE Executive Committee meeting in Istanbul in 1975 the Subcommittee was enlarged to nine members:

H Zweck	FRG (chairman)
B Broms	Sweden
A von Moos	Switzerland
E Schultze	FRG
C van der Veen	Netherlands
E de Beer	Belgium
Y Trofimenkov	USSR
S Rodin	UK
G Stefanoff	Bulgaria

The enlarged Subcommittee had its first meeting in Ghent, Belgium, in August 1975. Dr F Baguelin, France, was invited to this meeting as an additional member. U Bergdahl, Sweden, was appointed secretary of the Subcommittee.

At this meeting it was decided to develop proposals for the standardization of the following four tests:

Static sounding
Dynamic sounding
Standard Penetration Test
Weight sounding

Four working groups were appointed with the following persons as chairmen:

E de Beer	(Static sounding)
B Broms	(Dynamic sounding)
S Rodin	(Standard Penetration Test)
B Broms	(Weight sounding)

The second meeting of the enlarged European Subcommittee was held in The Hague, Holland, in June 1976. At this meeting about 40 delegates from 15 European countries discussed the proposals presented by the four working groups. Recommendations for the revision of the proposals were agreed, with the object of presenting them in a final report to the Executive Committee before the Ninth International Conference in Tokyo, 1977.

A third meeting of the Subcommittee was held in Stockholm, Sweden, in November 1976 for final discussions of the report and recommendations of the Subcommittee.

2. RECOMMENDATIONS OF THE SUBCOMMITTEE ON THE USE OF THE STANDARDIZED PENETRATION TESTING METHODS

Several attempts have been made during the years 1957-1976 to standardize different penetration testing methods. However, the proposals of the Subcommittee in 1968 have not found wide acceptance except in the countries where the proposed methods had previously been used. Numerous field and laboratory investigations have been performed in different countries during this period, as can be seen from the proceedings of the International Conferences on Soil Mechanics and Foundation Engineering. However, it is often not possible to compare the results from the different investigations due to differences in the penetration testing methods which have been used.

The Subcommittee on Standardization of Penetration Testing in Europe therefore recommends that papers to international conferences or journals presenting results from penetration tests should also include results from at least one of the recommended standard penetration testing methods, so that the test data can be compared directly to other tests of the same kind.

The Subcommittee also recommends that the proposed standards should be published both in English and French as a separate publication.

It is also suggested that the work of the Subcommittee should be continued and that a conference or a symposium on penetration testing should be arranged in 1979 or 1980 where experiences from the different European countries can be presented and desirable modifications of the recommeded standards can be discussed.

3. RECOMMENDED STANDARD PENETRATION TESTING METHODS

Many different penetrometers are used at present all over the world, viz:

Static sounding
Dynamic sounding
Standard Penetration Test (SPT)
Weight soundings

Four standard tests are proposed. These are based on existing test methods. The recommended standards specify not only the main dimensions of the different penetrometers and the test procedures but also details, such as the roughness of the cone, that can influence the test results. The recommended standard tests are:

Cone penetration test (CPT)

Dynamic probing test (DPA and DPB)
SPT test
Weight sounding test

The recommended standards are given in Appendix A-D. The proposals also include recommendations for presentation of the test results.

3.1 The particular penetrometer selected for the standard cone penetrometer (Appendix A) has been chosen essentially on the basis of its simple geometry. A continuous penetration testing procedure is also recommended.

As other cone penetrometers besides the standard cone penetrometer will continue to be used in the future, provision has been made for them in section 10 of the recommended standard (Appendix A).

3.2 Three different dynamic sounding methods were proposed by the Subcommittee at the Sixth International Conference of Soil Mechanics and Foundation Engineering in Montreal, 1965, (Geotechnique, Vol 18, No 1, March 1968). However, it has been found desirable to further limit the number of methods. Only one method with two variations has therefore been presented in the recommended standard (Appendix B). The so called light and heavy dynamic sounding methods are not included. As a further step towards standardization, some details of the recommended standard correspond with those in the SPT test.

Light dynamic penetrometers are extensively used in Central Europe. These have been standardized in West Germany (DIN 4094 sheet 1 and 2) and in Bulgaria (Bulgaria State Standard 8994-70). These light penetrometers are relatively sensitive and can detect smaller changes of the soil conditions than medium or heavy penetrometers. However, the Subcommittee are of the opinion that in most cases of soft soils the cone penetration test could be used instead of the light dynamic penetrometer to relate the soil conditions.

With heavy dynamic penetrometers it is generally not possible to detect small changes of the soil density, but these penetrometers can be used to investigate stiff and hard soils at great depths. Because of these advantages the Subcommittee has included some procedures outside the normal range of the standard dynamic probing equipment.

3.3 The Standard Penetration Test (SPT) is used extensively in North and South America. In Europe this method is commonly used in the UK and in the southern parts of Europe. A standard is therefore proposed for the SPT test (Appendix C). It is based on the existing ASTM Standard D 1586-67 (reapproved 1974), but is more detailed with respect to the equipment and the testing procedure.

It should also be noted that a hammer with a free fall (as recommended in the SPT test) will give more reproducible results but smaller N values than a hammer operated by a friction winch with manilla rope to lift and drop the hammer.

3.4 The weight sounding method is extensively used in Scandinavia and also in Japan. During the meeting in The Hague in June, 1976, consideration was given to whether the weight sounding method should be standardized. It was recommended that a standard should also be proposed for this method.

The recommended standard for the weight sounding test agrees closely with the existing Scandinvaian standard for this test (Appendix D).

4. RECOMMENDATIONS FOR FUTURE RESEARCH CONCERNING PENETRATION TESTING

At the Subcommittee meeting in Ghent, Belgium, a number of questions were raised about the details of the equipment and test procedures which can influence the test results. Also, the interpretation of the test results was discussed. It was decided that the four working groups should propose subjects for research with respect to the recommended standards. The Subcommittee hopes that the proposed subjects will initiate research on penetration testing in different countries.

The following subjects were proposed by the four working groups.

The recommended research should be performed on different soils with a range of densities and consistencies. Although the research can be performed in the field, some of the factors could be more easily investigated if the tests can be performed under controlled conditions in a calibration chamber.

4.1 Recommended subjects for research on the cone penetration test

(a) The standard penetrometer tip presents the simplest geometry. A systematic study of the influence of the geometry of the penetrometer tip on the penetration resistance is recommended.

(b) The influence of continuous or discontinuous testing on the test results, for a given geometry.

(c) In the recommended standard, the friction sleeve is located immediately above the cone, and therefore in the special stress field existing at the end of the string of push-rods. There should be a comparative study of the results obtained on

friction sleeves located at larger distances from the cone with those obtained with the recommended standard sleeve.

(d) The influence of the rate of penetration, possibly related to the measurement of pore water pressures, at several points in the 'end' stress field.

(e) Study, by means of inclinometers, of the shape taken by string of push-rods.

(f) The influence of the dimensions of the base on the cone resistance (for the same geometry of the penetrometer tip).

(g) The influence of the roughness of the cone and the friction sleeve. The influence of covering half of the total sleeve area with special grooves about 1 mm deep and 1 mm wide (as suggested by the Swedish Committee) should be examined.

4.2 Recommended subjects for research on the dynamic probing test

(a) The effeciency of the blow can probably be increased considerably if an appropriate anvil cushion is used. This could decrease the scatter of the results and improve the interpretation of the results. Suitable cushions should be tested out in different soil types.

(b) In the DPB test, friction along the rods can be reduced by using casing, drilling mud, compressed air, rotation of the rods or by using couplings of a slightly larger diameter than that of the rods. Such techniques may facilitate the DPB test and improve the test results. A study should be made of the skin friction resistance by measuring the torque when the rods are rotated. Comparisons should be made between DPA and DPB tests under the same conditions.

(c) Development of methods to measure in situ the point resistance in the DPB test. This can be done directly at the point or indirectly by studying at the surface the reflected stress wave.

(d) The relationship between the dynamic point resistance, the static point resistance and the bearing capacity of piles.

(e) The relationship between dynamic point resistance, SPT and plate bearing capacity. The influence of the ground water table should be examined.

(f) The limitations of different dynamic tests.

(g) Different light and heavy dynamic penetration tests should be compared and evaluated under identical conditions before standardization of these methods.

4.3 Recommended subjects for research on the SPT test

(a) A comparative study of the N values obtained with a self-tripping mechanism and friction winches.

(b) A comparative study of the N values obtained with a self-tripping mechanism operating at the top of the borehole and down-the-hole drive weight assembly.

(c) For the interpretation of the SPT test, various authors have published correction factors to be applied to the design recommendations published by K Terzaghi and R B Peck, 'Soil Mechanics in Engineering Practice' 1948. Are these correction factors based on data obtained from a self-tripping mechanism or friction winch?

(d) A Comparative study of the N values obtained with the recommended standard SPT and the SPT (cone) apparatus.

(e) A comparative study of different 'standard' rods at different depths to assess the effect of rod stiffness on the N value.

(f) The effect on the N value of the diameter of the borehole.

(g) The effect on the N value of the state of stress at the test location.

4.4 Recommended subjects for research on the weight sounding test

(a) A comparative study of the weight sounding test and other penetration tests in order to get correlations for different soils.

(b) The relationship between the penetration resistance and the bearing capacity and the settlements of spread footings and piles.

(c) The allowable limit of wear on the lower pyramidal part of the point.

Respectfully submitted:

H Zweck	FRG (chairman)
F Baguelin	France
E de Beer	Belgium
B Broms	Sweden
W Heijnen	Netherlands
S Rodin	UK
E Schultze	FRG
G Stefanoff	Bulgaria
Y Trofimenkov	USSR
U Bergdahl	Sweden (secretary)

APPENDIX A

RECOMMENDED STANDARD FOR THE CONE PENETRATION TEST (CPT)

CONTENTS

1. SCOPE

The cone penetration test consists in pushing into the soil, at a sufficiently slow rate, a series of cylindrical rods with a cone at the base, and measuring continuously or at selected depth intervals the penetration resistance of the cone, and if required the total penetration resistance and/or the friction resistance on a friction sleeve.

Cone penetration tests are performed in order to obtain data on one or more of the following subjects:

1) the stratigraphy of the layers, and their homogeneity over the site
2) the depth to firm layers; the location of cavities, voids and other discontinuities
3) soil identification
4) mechanical soil characteristics
5) bearing capacity of piles

2. DEFINITIONS

2.1 CPT stands for Cone Penetration Test and includes what has been variously called Static Penetration Test, Quasi Static Penetration Test and Dutch Sounding Test.

2.2 Penetrometer (apparatus): an apparatus consisting of a series of cylindrical rods with a terminal body, called the penetrometer tip and the measuring devices for the determination of the cone resistance, the local side friction and/or the total resistance.

2.3 Penetrometer tip.

2.3.1 Penetrometer tip proper: the terminal body at the end of the series of push rods, which comprises the active elements that sense the cone resistance, and the local side friction resistance.

2.3.2 Conventional penetrometer tip: by convention, if the length of the part of the penetrometer tip proper located above the cone is smaller than 1000 mm, the push rod length to be added to the length of the penetrometer tip in order to obtain a length of 1000 mm.

2.4 Cone: the part of the penetrometer on which the end bearing is developed.

According to the design of the apparatus the following are distinguished:

2.4.1 Fixed cone penetrometer tip: the cone can only be subjected to micro relative dis-

placements with respect to the other elements of the tip.

According to the shape of the cone the following are distinguished:

2.4.3 Simple cone in which the cylindrical prolongation above the conical part is generally equal to the diameter of the cone base.

2.4.4 Mantle cone: a cone which is prolonged with a more or less cylindrical sleeve, whose length is larger than the diameter of the base of the cone: this sleeve is called the mantle.

2.5 Friction sleeve: The section of the penetrometer tip upon which the local side friction to be measured is developed.

2.6 System of measurement.

The system includes the measuring devices themselves and the means of transmitting information from the tip to where it can be seen or recorded. For example the following can be distinguished:

2.6.1 Electric penetrometer: which uses electrical devices such as strain gauges, vibrating wires, etc..., built into the tip.

2.6.2 Mechanical penetrometer: which uses a set of inner rods to operate the penetrometer tip.

2.6.3 Hydraulic and pneumatic penetrometer: which uses hydraulic or pneumatic devices built into the tip.

2.7 Push rods: the thick walled tubes or rods used for advancing the penetrometer tip and, in addition, to guide and shield the measuring system.

2.8 Inner rods: solid rods which slide inside the push rods to extend the tip of a mechanical penetrometer.

2.9 Thrust machine: the equipment that pushes the penetrometer into the soil. The necessary reaction for this machine is obtained by dead weight or/and anchors.

2.10 Friction reducer: narrow local protuberance outside the push-rod surface, placed at a certain distance above the penetrometer tip, and provided to reduce the total friction on the push-rods.

2.11 Continuous and discontinuous penetration testing (see note 1 - para.11).

2.11.1 Continuous penetration testing: a penetration test in which the cone resistance is measured, while all elements of the penetrometer have about the same rate of penetration.

2.11.2 Discontinuous penetration testing: a penetration test in which the cone resistance is measured, while the other elements of the penetrometer tip remain stationary. When a friction sleeve is also included the sum of the cone resistance and resistance on the sleeve is measured when both cone and friction sleeve are pushed down, while the other elements of the penetrometer tip remain stationary.

2.12 The cone resistance q_c.

The cone resistance is obtained by dividing the total force acting on the cone Q_c, by the area of the base of the cone A_c

$$q_c = Q_c : A_c$$

This resistance is expressed in Pa, kPa or MPa x).

2.13 The local side friction f_s: the local unit side friction is obtained by dividing the force Q_s, needed to push down the friction sleeve, by its surface area A_s

$$f_s = Q_s : A_s$$

The local resistance f_s is expressed in Pa, kPa or MPa x).

2.14 Total force Q_t: the force needed to push cone and push-rods together into the soil. Q_t is expressed in kN.

2.15 Total side friction Q_{st}: this is generally obtained by subtracting the total force on the cone Q_c, from the total force Q_t

$$Q_{st} = Q_t - Q_c$$

Q_{st} is expressed in kN, as are Q_t and Q_c. Certain penetrometers allow Q_{st} to be measured directly.

2.16 Friction Ratio R_f and Friction Index I_f (see note 2 - para. 11).

2.16.1 Friction Ratio R_f: the ratio of the local side friction f_s to the cone resistance q_c, measured at the same depth, expressed as a percentage.

2.16.2 Friction index I_f: the ratio of the cone resistance q_c to the local side friction f_s, measured at the same depth.

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x) 1 Pa (Pascal) = 1 N/m^2

3. RECOMMENDED STANDARD PENETROMETER

3.1 General geometry of the penetrometer tip.

In the recommended standard penetrometer testing, penetrometer tips with or without a friction sleeve can be used (Fig. 1a and Fig. 1b).

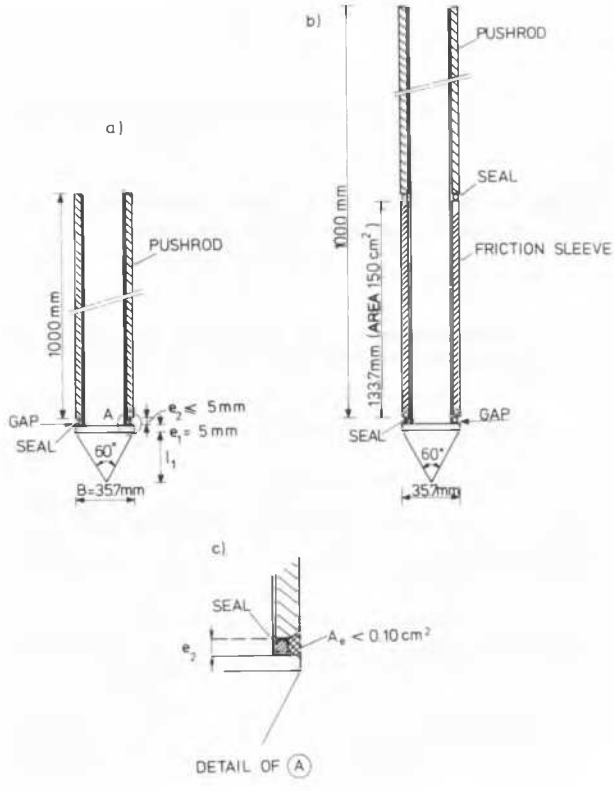


Fig 1. Recommended standard penetrometer with a fixed cone and without (a) or with (b) a friction sleeve.

The penetrometer tip must have the same diameter as the cone over a length of 1000 mm above the cone base. The gap between the cone and the other elements of the penetrometer tip should be kept to the minimum necessary for the operation of the sensing devices, and designed and constructed in such a way as to prevent the entry of particles. This is also to apply to the gaps at either end of the friction sleeve, if one is included, and the other elements of the penetrometer tip. The axes of the cone, the friction sleeve if included and the body of the penetrometer tip, must be coincident.

In the case of a penetrometer tip without a sleeve, its diameter shall be the same as that of the base of the cone with a tolerance of -0.3 mm and +1 mm, over a length of 1000 mm (≃ 30 times the diameter of the base).

In the case of a penetrometer tip with a friction sleeve, the part of the penetrometer tip located above the friction sleeve shall have the same diameter as the friction sleeve over a length of 450 mm (≃ 12 times the diameter of the base) with a tolerance of -0.3 mm. The other parts of the penetrometer tip must also correspond with the above conditions for a penetrometer tip without a sleeve.

3.2 The cone.

The diameter of the base of the cone is 35.7 mm. The apex angle of the cone is 60°.

The cone is to be continued by a cylindrical extension (Fig. 2); the height e_1 of this extension is 5 mm.

Manufacturing tolerances

on the diameter of the base of the cone +0.3 mm

$35.7 \text{ mm} \leq B \leq 36.0 \text{ mm}$

on the height of the cone +0.3 mm

$31.0 \text{ mm} \leq l_1 \leq 31.3 \text{ mm}$

roughness of the cone < 5 μm.

Operating tolerances

wear on the diameter of the base of the cone -1 mm

$34.7 \text{ mm} \leq B \leq 36.0 \text{ mm}$

wear on the height of the cone -7 mm

$24.0 \text{ mm} \leq l_1 \leq 31.3 \text{ mm}$

wear on the length of the cylindrical extension -2 mm

cones with a visible asymmetrical wear are to be rejected.

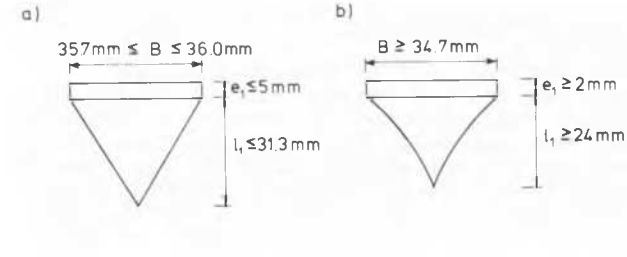


Fig 2. Manufacturing (a) and operating (b) tolerances of the recommended standard cone.

3.3 Gap and seal above the cone (Fig. 1).

The gap between the cone and the other elements of the penetrometer must not be larger than 5 mm.

The seal placed in the gap should be properly designed and manufactured in order to prevent the entry of soil particles into the penetrometer tip. It must have a deforma-

bility many times larger than that of the sensing devices. The crosssectional area A_e of the gap, remaining after deduction of the area occupied by the seal must be smaller than 0.10 cm² (see cross-hatched area in Fig. 1c). The outer limits of the gap are to be shaped in such a way that the measurements are not affected by the possible entry of soil particles.

3.4 Sensing devices.

The sensing device should be designed to measure the cone resistance without being influenced by a possible eccentricity of that resistance.

3.5 Friction sleeve (Fig. 1b).

The diameter of the friction sleeve is to be manufactured and the sleeve retained in operation, only so long as it is at least the same value as the base of the cone, with a tolerance of +0.35 mm.

The surface area of the friction sleeve shall be 150 cm² with a tolerance of ±2%. The surface of the friction sleeve shall have a manufactured surface roughness of 0.5 µm (see note 3 para. 11) with a tolerance of ±50% in the direction of its longitudinal axis. In operation this roughness shall not become smaller than 0.25 µm. The projection above and below the friction sleeve shall correspond with the other parts of the penetrometer tip.

The friction sleeve is to be located immediately above the cone (Fig. 1b). The annular spaces between the friction sleeve and the other part of the penetrometer tip and their seals must conform to the same specifications as described under 3.3.

3.6 Push rods.

The push rods are screwed or attached together to bear against each other and to form a rigid-jointed series with a continuous straight axis. The deviation from the axis should not exceed 4‰ x) for the five lower push rods of the series and 8‰ x) for the remainder. The manner in which the "deviation" is determined is shown in Fig. 3.

When measuring the total friction with push-rods their diameter over the total length shall be 36 mm with a tolerance of ±1 mm.

x) These deviations corresponds in case of an even curvature to a deflexion of 1-2 mm in length.

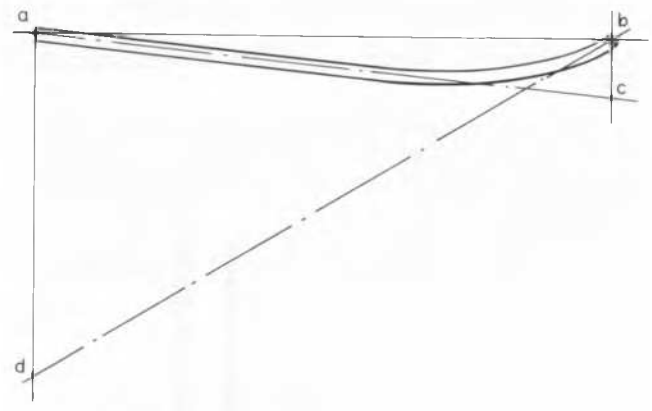


Fig 3. Determination of the deviation from the straight axis for push-rods.

3.7 Measuring equipment.

The resistances are to be measured by devices attached to the cone and the friction sleeve if included, and the signals are to be transmitted by a suitable method to a data recording system.

Exclusive recording of test results on a tape, which does not permit direct accessibility to the data, is not recommended.

3.8 Thrust machine.

The machine shall be able to provide a stroke preferably of one meter, and shall push the rods into the soil at a constant rate of penetration. The thrust machine shall be anchored and/or ballasted such that it does not move relative to the soil surface during the pushing action.

3.9 Friction reducer.

If a friction reducer is included, it should be located at least 1000 mm above the base of the cone.

4. STANDARD TESTING PROCEDURE

4.1 Continuous testing.

The standard testing procedure is that of continuous penetration testing, in which the measurements are made while all elements of the penetrometer have the same rate of penetration.

4.2 Verticality.

The thrust machine is to be erected to obtain a thrust direction as near vertical as practicable. The maximum acceptable deviation of the thrust direction from the vertical is 2%. The axis of the push-rods must coincide with the thrust direction.

4.3 Rate of penetration.

The rate of penetration is the rate of the downward movement of the element of the penetrometer under consideration at the time the force on that element is measured.

The rate of penetration is 2 cm/sec with a tolerance of $\pm$ 0.5 cm/sec. This rate must be maintained during the entire stroke, even if readings are only taken at intervals.

4.4 Interval of readings.

A continuous reading is recommended. In no case shall the interval between the readings be more than 20 cm.

4.5 Measurement of the depth.

The depths are to be measured with an accuracy of at least 10 cm.

5. PRECISION OF THE MEASUREMENTS

Taking into account all possible sources of error (parasitical frictions, errors of the recording devices, eccentricity of the load on the cone resp. the sleeve, temperature differences, etc...) the precision to be obtained should not be worse, than the larger of the following values:

5% of the measured value
1% of the maximum value of the range.

The precision must be verified in the laboratory or in the field taking into account all possible disturbing influences.

6. PRECAUTIONS, CHECKS AND VERIFICATIONS

6.1 Before the CPT is made, the straightness of the push-rods, particularly of the lower five rods of the series, has to be checked. A method of checking the straightness consists in standing the push-rod vertically, spinning it, and observing whether it wobbles while it is rotating. If the wobble is noticeable, the push-rod should be discarded.

6.2 Regular inspections are to be made for wear (of the cone and friction sleeve).

6.3 It is also necessary to check that the CPT test is not performed too close to existing boreholes or other penetrometer tests. For CPT tests with extended penetration it is recommended not to go closer than 25 boring diameters from uncased and unfilled boreholes, or at least 1 m from previously performed CPT tests.

6.4 The seals between the different elements of a penetrometer tip are to be regularly inspected to determine their quality. Prior to use the seals are to be checked to determine if soil particles are present.

6.5 Where the signals of the measuring devices built into the penetrometer tip are transmitted to the surface by an electric cable, it should be continuous, and consequently prethreaded through the push-rods.

6.6 Electric penetrometer tips should be temperature compensated. If the shift observed after extracting the tip is so large that the conditions of accuracy as defined under para. 5 are no longer met, the test should be discarded.

6.7 The friction sleeve transducer must operate in such a way that only shear stresses, and not normal stresses, are recorded.

7. CALIBRATION

7.1 When manometers are being used, they are to be recalibrated at least every 6 months.

For each type of manometer there must be two identical units, each with its own calibration, available with the machine. At regular intervals the manometer used in the tests shall be checked against the reserve manometer.

7.2 The calibration of load cells or proving rings should be verified at least every 3 months.

Regular checks on the site with an appropriate field control unit are recommended.

8. SPECIAL FEATURES

8.1 Push-rod guides.

Guides should be provided for the part of the push-rods protruding above the soil and for the push-rod length in water in order to prevent buckling.

8.2 Inclinometers.

In order to obtain more precise information

on the drift of the push-rods into the soil, inclinometers may be built into the penetrometer tip.

The need of such information depends on the soil conditions and increases with increasing depth of the test.

8.3 Push rods with smaller diameters.

In order to decrease the skin friction on the rods, use can be made of push-rods with a smaller diameter than that of the penetrometer tip. The distance between the smaller diameter push-rods and the cone base should be at least 1000 mm.

9. REPORTING OF RESULTS

9.1 The following information shall be reported on the graphs of the measurements:

1. In order to state that the penetrometer and the test procedure are completely in agreement with the recommended Standard, each graph shall be marked with the letter S.
   After this letter will be added one of the following letters indicating the system of measurement:
   M = mechanical
   E = electric
   H = hydraulic
2. The date of the test and the name of the firm.
3. The identification number of the CPT test and the location of the site.
4. The depth from which a friction reducer, or push-rods with a reduced diameter, have been used. The depth at which the push-rods have been extracted over a limited height in order to break the lateral resistance, after which the push-rods have again been pushed into the soil.
5. Any abnormal interruption from the normal procedure of the CPT test.
6. Observations made by the operator such as soil type, sounds from the extension rods, indications of stones, disturbances, etc.
7. Data concerning the existence and thickness of fill, or existence and depth of an excavation, and level of the CPT test with respect to the original or artificial soil surface.

9.2 Besides the information indicated in para. 9.1, the internal files should also mention:

1. The identification number of the penetrometer tip used.
2. The name of the operator in charge of the crew which performed the test.
3. The dates and reference numbers of the calibration certificates for the measureing devices.

9.3 The following scales are recommended for the presentation of the graphs:

Depth scale: 1 unit length (arbitrary) for 1 m
Cone resistance q_c: the same unit length for 2 MPa
Local side friction f_s: the same unit length for 0.5 MPa
Total penetration force Q_t: the same unit length for 5 kN
Total friction Q_{st}: ditto

So long as the above mentioned relationships between the scales along the vertical and horizontal axis are respected, the scales can be chosen arbitrarily in such a way that standard sized sheets can be used.

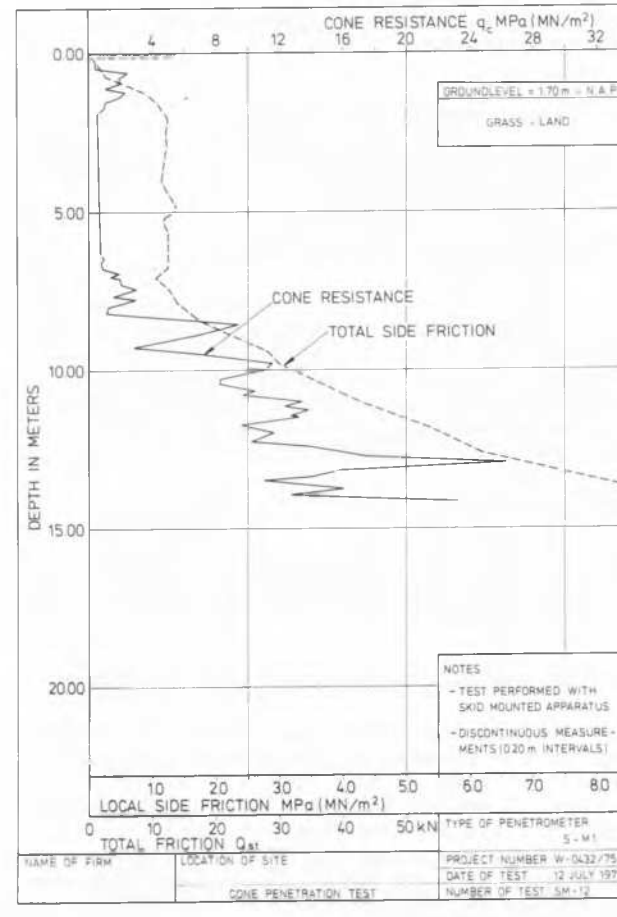


Fig. 4 An example of the presentation of test results from a CPT test.

9.4 Site plan.

For every investigation which is carried out, a clear site plan shall be drawn, with clear reference points in order that the locations of the penetrometer tests are accurately plotted.

Also when made in conjunction with borings the time sequences are to be indicated of the performance of the borings and CPT tests.

9.5 Besides the information mentioned under para. 9.1, it is recommended that the elevation of the soil-surface at the location of the test is given. In addition, where appropriate the following information should be given:

(a) The readings of the inclinometer, if taken.

(b) All checks made after extracting the push-rods, the conditions of the push-rods and the penetrometer tips.

(c) The depth of the water in the hole remaining after withdrawal of the penetrometer, or the depth at which the hole collapsed.

(d) Whether or not the testhole has been backfilled, and if so by which method.

10. DIVERGENCES FROM THE STANDARD RECOMMENDED

10.1 General.

A general and very important specification is, that all divergences from the Recommended Standard are to be described explicitly and completely on the test graphs. In order to simplify these remarks the names or symbols defined in para. 10.5 can be used.

10.2 Divergences only related to the dimensions and the shape of the cone.

10.2.1 Diameter of the base of the cone.

In order to be able to penetrate deeper in certain cases a cone with a smaller base can be used. In order to be able to include the measuring device, or to be able to drive the penetrometer tip through hard layers with less danger of damage occurring to the tip, cones with larger diameters are used.

10.2.2 Apex angle of the cone.

To decrease the possibility of damage, an apex angle of 90^0 can be used.

10.2.3 Tolerances.

All tolerances specified for the Recommended Standard, are to be adapted in direct proportion to the diameter.

10.2.4 Symbols.

Tests performed with a diverging cone cannot be represented by the letter S, as they differ from the Standard. If all other elements are identical as in the Standard, they can be indicated by the letters M, E, H, but followed by the indication B = and α = giving the values of the diverging characteristics of the cone.

10.3 Divergences only related to the location or dimensions of the friction sleeve.

10.3.1 If the friction sleeve, contrarily to the Recommended Standard, is not placed immediately above the base of the cone, the minimum distance (h) between that base, and the lower end of the friction sleeve should be three times the diameter of the base.

10.3.2 Surface of the sleeve.

When using a cone having a base diameter of 35.7 mm, but with a friction sleeve of a length other than the Recommended Standard, then the surface area of the sleeve should not be larger than 350 cm^2, and not smaller than 100 cm^2.

When using a cone with a base diameter different from the Recommended Standard, the surface area of the sleeve should be adjusted proportionally to the surface area of the base of the cone.

10.3.3 Symbols.

Tests performed with a diverging friction sleeve cannot be represented by the letter S, as they differ from the Recommended Standard. If all other elements are identical as in the Recommended Standard, they can be indicated by the letters M, E, H, but followed by the indication:

height of lower end of sleeve h =
surface area of the sleeve A_S =

10.4 Discontinuous testing with freee cone penetrometer tips.

10.4.1 With a free cone penetrometer tip, either continuous or discontinuous testing is possible. The manner in which the test is performed should be described in the report and on the test graphs.

10.4.2 Discontinuous testing.

In the case of discontinuous testing, although the rate of downward movement due to the thrust machine is known, the rate of penetration of the free cone at the point of rupture of the soil can be different to that of the movement due to the thrust machine. They only correspond when there is continuous downward movement of the push-rods.

When testing discontinuously the minimum

movement to be imposed on the cone or on the friction sleeve is 0.5 times the diameter of the cone (see note 4 para. 11).

10.5 Table of traditional penetrometer tips diverging from the Recommended Standard.

The penetrometer tips actually in use in several countries, and diverging from the Recommended Standard, are given below. They are indicated by a name, and a symbol which has been added to permit abbrevations when referring to them on the test graphs.

10.5.1 Mechanical penetrometer tip - note 5 para. 11.

M1 The Dutch mantle cone penetrometer tip (Fig. 5)
M2 The Dutch friction sleeve penetrometer tip (Fig. 6)
M3 The U.S.S.R. mantle cone penetrometer tip (Fig. 7)
M4 The simple cone penetrometer tip (Fig. 8)
M5.1 The Andina cone penetrometer tip (Fig. 9a)
M5.2 The Andina friction sleeve cone penetrometer tip (Fig. 9b)

10.5.2 Electric cone penetrometer tip.

E1.1 The Delft electric penetrometer tip (Fig. 10a)
E1.2 The Delft friction sleeve electric penetrometer tip (Fig. 10b)
E2 The Degebo friction sleeve electric penetrometer tip (Fig. 11)

10.5.3 Hydraulic penetrometer tip.

H1.1 The Parez hydraulic penetrometer tip (Fig. 12a)
H1.2 The Parez friction sleeve hydraulic penetrometer tip (Fig. 12b)

10.6 Precision of the measurements.

When testing diverges from the Recommended Standard two classes of precision are defined:

the normal precision class: see section 5
the lower precision class: the precison obtained should not be worse than the larger of the following values:
10% of the measured value
2% of the maximum value of the range

In all such cases the class of precision of the tests shall be indicated in the report and on the test graphs.

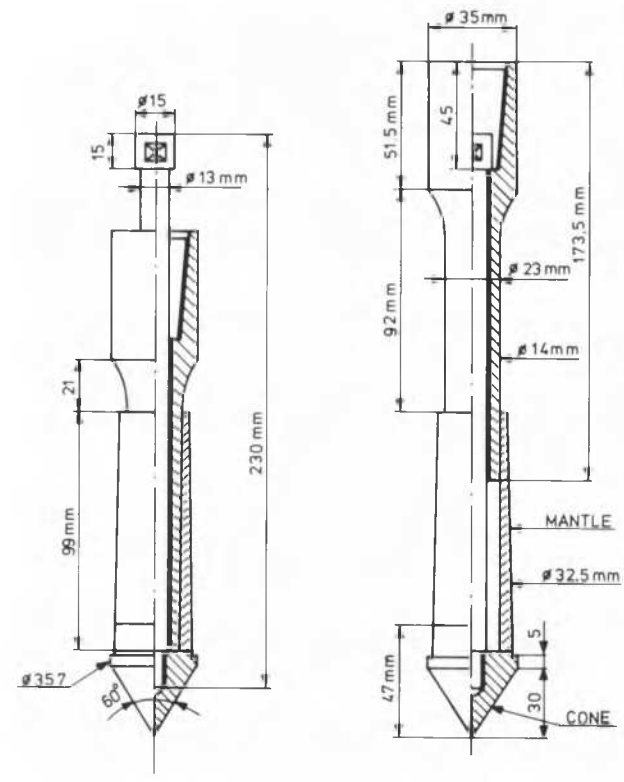


Fig. 5 The Dutch mantle cone penetrometer tip. Symbol: M1.

10.7 Static dynamic penetrometers and preboring cone penetrometers.

Penetration can be increased by the use of static dynamic penetrometers and also by the use of penetrometers equipped with preboring tools.

It must be clearly indicated in the report and on the test graphs when such equipment has been used.

10.8 Precautions, checks and verifications.

10.8.1 Mechanical penetrometers.

10.8.1.1 Push-rods.

There should not be any protruding edge on the inside of the push-rods at the screw connection between the rods (Fig. 13).

10.8.1.2 Inner rods.

The diameter of the inner rods shall be 0.5 to 1 mm less than the internal diameter of the push-rods. The inner rods must slide very easily through the push-rods.

The ends of the inner rods should be exactly at right angles to the axis of the rod and be machine-tooled to a smooth surface.

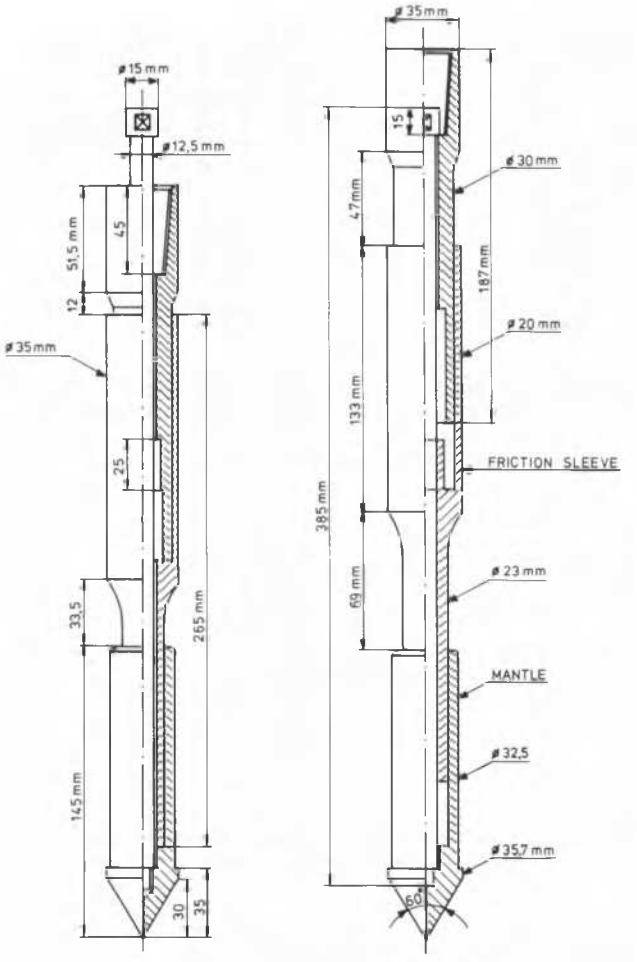


Fig. 6 The Dutch friction sleeve penetrometer tip. Symbol: M2.

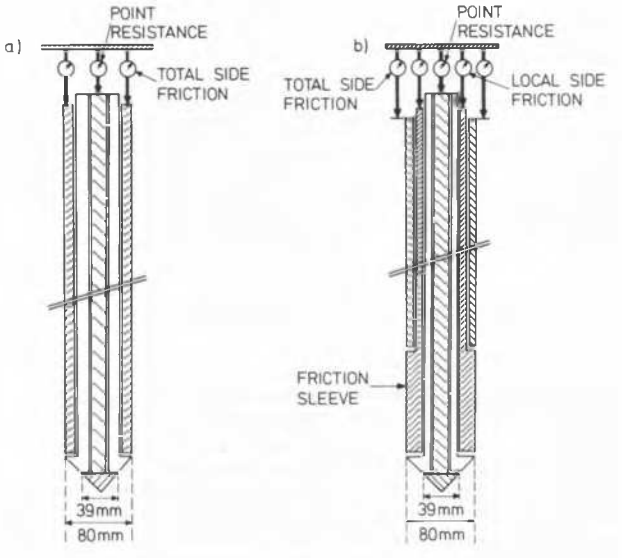


Fig. 9 The Andina cone penetrometer tip (a) and the friction sleeve cone penetrometer tip (b). Symbols: M5.1 and M5.2 respectively.

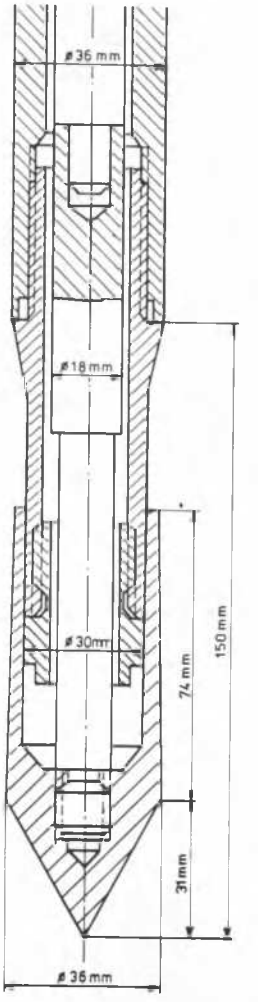


Fig. 7 The U.S.S.R. mantle cone penetrometer tip. Symbol: M3.

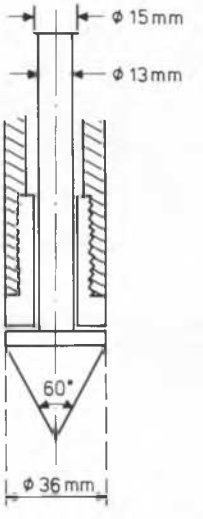


Fig. 8 The simple cone penetrometer tip. Symbol: M4.

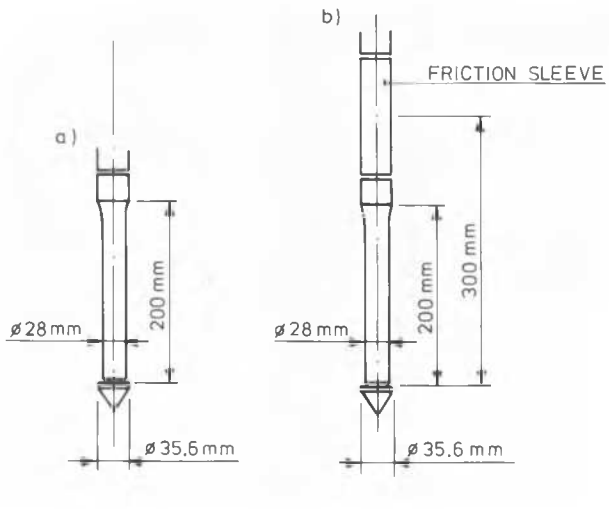


Fig. 10 The Delft electric penetrometer tip (a) and the friction sleeve electric penetrometer tip (b).
Symbols: E1.1 and E1.2 respectively.

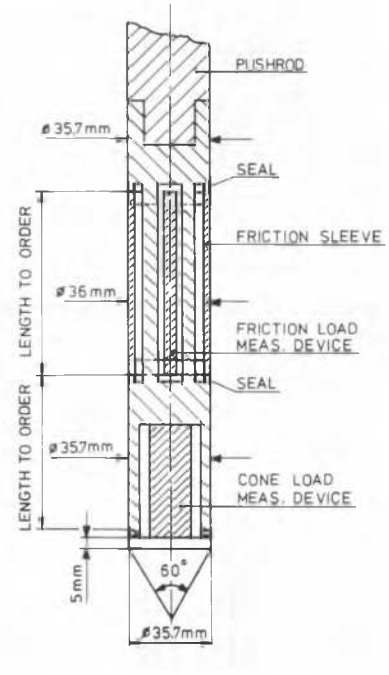


Fig. 11 The Degebo friction sleeve electric penetrometer tip.
Symbol: E2.

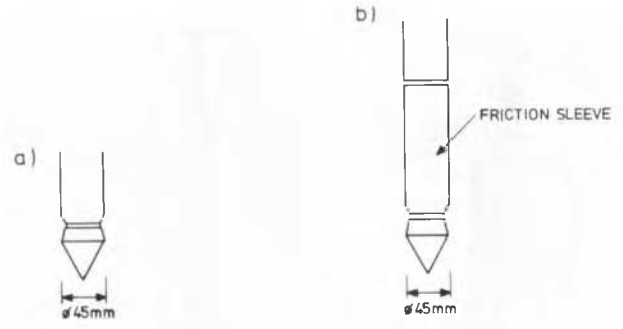


Fig. 12 The Parez hydraulic penetrometer tip (a) and the friction sleeve hydraulic penetrometer tip (b).
Symbols: H1.1 and H1.2 respectively.

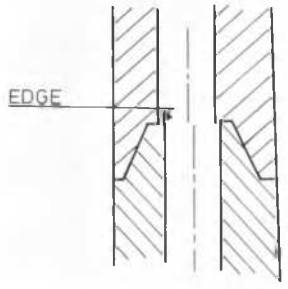


Fig. 13 There should not be any protruding edge at the screw connections between the rods.

The rods must not screw together or be joined in any way which gives them an additional degree of freedom as this has been found to increase the parasitical friction between the rods and the tubing. Before and after the test a check will be made that the inner rods slide very easily in the push-rods, and that the cone and the friction sleeve move easily with respect to the body of the penetrometer tip. For improved accuracy at low values of the resistances, the thrust data registered at the surface should be corrected for the total weight of the inner rods in the case of the cone resistance, and for that of the push-rods and inner rods in the case of the total resistance.

11. EXPLANATORY NOTES AND COMMENTS

Note 1: Definitions 2.11

The denominations "continuous" and "discontinuous" penetration testing are not quite correct, and the denomination "penetration testing with simultaneous pushing, and non-simultaneous pushing of cone and push rods", would be more adequate. However, the denominations "continuous" and "discontinuous" have been maintained, as they are already well established.

Note 2: Definitions 2.16

The friction ratio R_f, being the ratio of the

local side friction f_s to the cone resistance q_c, has to be expressed as a percentage in order to obtain a figure larger than one. Although in the past the friction ratio has been mostly used, there is a tendency to use the friction index I_f, being the ratio of the cone resistance q_c to the local side friction f_s, and which gives directly a figure larger than one. This is the reason why the two quantities have been included in the definitions.

Note 3: The friction sleeve 3.5

The roughness is defined as the mean deviation of the real surface of a body from the mean plane. The roughness is expressed in micrometers (μm).

Note 4: Discontinuous testing 10.4.2

In the case of mechanical penetrometer tips, in order to be certain that the cone and the friction sleeve move sufficiently with respect to the push-rods, due account is to be taken of the elastic shortening of the inner rods. Therefore, at the surface the movement of the inner rods relative to the push-rods must be at least equal to the sum of the minimum imposed movement of the cone plus the elastic shortening of the inner rods.

Note 5: Mechanical penetrometer tips 10.5.1

Continuous testing with a mechanical penetrometer tip is not recommended for high accuracy, as the movement of the inner rods to the push-rods can change its sense at different depths, increasing the margin of the error due to the parasitical internal friction. Furthermore it is necessary to check at least every meter during the test that the inner rods are still free to move relative to the push-rods.

Note 6: 10.5.1 M4

In the case of the simple cone special precautions have to be taken against soil entering the sliding mechanism and affecting the resistance. After extracting the penetrometer tip a check is to be made, in order to be certain that the cone-stem still moves completely freely relative to the bush.

APPENDIX B

RECOMMENDED STANDARD FOR DYNAMIC PROBING

1. SCOPE

The expression probing is used to indicate that a continuous record is obtained from the test in contrast to, for example, the SPT test. The aim of dynamic probing is to measure the effort required to force a point through the soil and so obtain resistance values which correspond to the mechanical properties of the soil. Two procedures are recommended (A and B). Fundamentally the same equipment can be used for both DPA and DPB as for the SPT (cf Table I).

Dynamic probing type A (DPA) should be regarded as a reference test. The friction between the soil and the extension rod is negligible.

Dynamic probing type B (DPB) is simpler and more economical than method A. DPB has more the character of a reconnaissance test than DPA since the friction between the soil and the extension rod is only partially controlled.

1.1 General principles and nomenclature

A hammer of mass M and a height of fall H is used to drive a pointed probe. The hammer strikes an anvil which is rigidly attached to extension rods. The penetration resistance is defined as the number of blows required to drive the penetrometer a distance of 0.2 m. The resistance is within the reference range when the number of blows required to drive the probe 0.2 m is between 5 and 100. The energy of a blow is the mass of the hammer times the acceleration of gravity and times the height of the fall (M.g.H).

The number of blows required for 0.2 m of penetration within the reference range is defined as the N_d-value (N_{dA} and N_{dB} respectively).

Results from different types of dynamic probing may be presented as resistance values q_d (q_{dA}, q_{dB}) or r_d (r_{dA}, r_{dB}) in Pa, kPa or MPa [x], such as :

$$r_d = \frac{MgH}{Ae} \qquad q_d = \frac{M}{M + M'} \cdot \frac{MgH}{Ae}$$

where :
r_d and q_d are resistance values
M is the mass of the hammer
M' is the total mass of the extension rods, the anvil and the guiding rods
H is the height of fall
e is the average penetration per blow
A is the cross-sectional area of the point
g is the acceleration of gravity

The primary use of dynamic probing is in cohesionless soils when static penetration testing is difficult to perform or the dynamic properties of the soil are of special interest (e.g. in connection with driven piles). Dynamic probing can be used to detect soft layers in cohesionless soils and to locate strong layers as, for example, with end bearing piles. The soil type and the cobble and boulder content can be evaluated under favourable conditions. The test is normally not suitable for cohesive soils or very loose cohesionless soils. It is normally not possible to evaluate the mechanical properties of a soil at great depths with dynamic probing type B (DPB) when friction along the extension rods is significant.

1.2 Classification

Two different methods are recommended, type A and type B, to fit different geological conditions. The driving equipment is the same for the two methods.

Dynamic probing A (DPA): drilling mud or casing is used to eliminate friction along the extension rods.

Dynamic probing B (DPB) is performed without drilling mud or casing. The friction along the rods can be estimated by measuring the torque required to rotate the extension rods.

Data for both DPA and DPB are summarised in Table I.

Other types of equipment may be required for special purposes, such as light dynamic probing or heavy dynamic probing (see note 1 para. 6).

2. APPARATUS

2.1 Hammer

The mass of the hammer shall be 63.5 kg ±0.5 kg. The ratio of the length to the diameter of the hammer shall be between 1 and 2. The hammer shall be provided with an axial hole with a diameter which is 3-4 mm larger than the diameter of the guide rod. The shape of the bottom surface of the hammer shall be in accordance with Fig. 1.

2.2 Anvil and guide rod

The anvil shall be rigidly fixed to the extension rods. The mass of the anvil shall be between 10 and 15 kg and the diameter not less than 100 mm and not more than half the diameter of the hammer. The axis of anvil, guide rod and extension rod shall be straight with a maximum deviation of 5 mm per metre. The top surface of the anvil shall be as shown in Fig. 1. The combined mass of the anvil and guide rod must not exceed 30 kg.

[x] Pa (Pascal) = 1 N/m²

Factor	Recommended Standard DPA	Recommended Standard DPB	Remark
Hammer weight, kg	63.5 ± 0.5		
Height of fall, m	0.75 ± 0.02		
Mass of anvil, kg	10 - 15		
Mass of anvil and guide rod, kg	≤ 30		
Standard range, blows/ 0.2 m	5 - 100		
Rebound %	≤ 50		
Length to diameter ratio	1:2		
Rod length, m	1.0-2.0 ± 1‰		
Maximum mass of rod, kg/m	8		
Rod deviation, lower 5 m	4‰		Fig. 3 Appendix A
Rod deviation, other rods	8‰		-"-
Rod eccentricity, mm	0.2		
Rod OD, mm	40 - 45	32 ± 0.3	Remark below
Apex angle	90°		Note 3
Nominal area of point, cm²	30	20	Fig. 2
Point diameter, new, mm	62 ± 0.2	51 ± 0.2	"
Point diameter, worn, mm	60	49	"
Mantle length of point, mm	62 ± 2	51 ± 2	"
Point taper angle, upper	90°		"
Stabilising of hole	Yes	No	

Remark: In DPA ø 32 mm rods are permitted provided they are surrounded by a steadying casing.

Table I Data on dynamic probing equipment DPA and DPB.

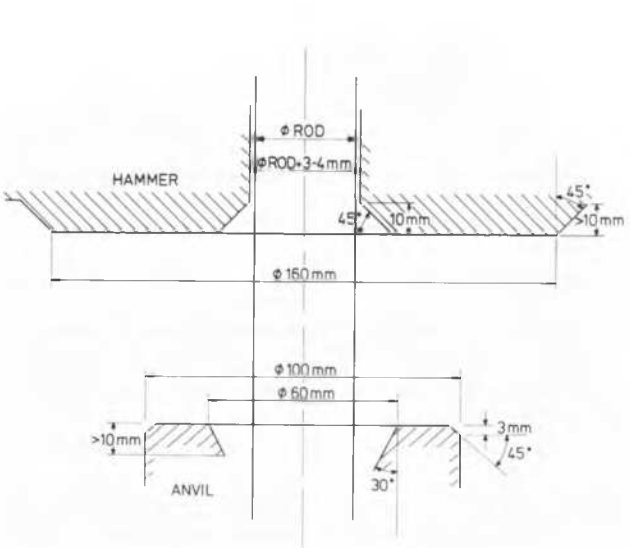


Fig. 1 Design of the contact surfaces of the hammer and the anvil for dynamic probing.

2.3 Height of fall

The hammer shall fall freely and not be connected to any object which may influence the acceleration and deceleration of the hammer. The velocity shall be negligible when the hammer is released in its upper position (note 2 para. 6). The recommended standard height of fall is 0.75 m ± 0.02 m.

2.4 Extension rods

For DPA the mass of the extension rods shall not exceed 8 kg/m. The diameter shall be between 40 and 45 mm. A diameter as small as 32 mm is permitted if the rod is stabilised by casing.

The diameter of the extension rods shall be 32 mm ± 0.3 mm for DPB. Hollow rods may be used.

The rod material shall be of high strength steel with high resistance to wear, have a high toughness at low temperatures and a high fatigue strength. Permanent deformations must be capable of being corrected. The length of the rods shall be 1.0-2.0 m ±1‰. The rods shall be straight. The deviation from the straight axis should not exceed 4‰ for the lower 5 m of rods close to the point and 8‰ for the others. Determination of deviation cf Fig. 3, Appendix A.

The joints shall be flush with the rods (see note 3 para. 6). The maximum allowable eccentricity at each joint is 0.2 mm.

2.5 Point

The nominal area and diameter of the DPA-point are 30 cm² and 62 mm ± 0.2 mm respectively. The nominal area and diameter of the DPB-point are 20 cm² and 51 mm ± 0.2 mm respectively.

The points when new shall have a conical tip with an apex angle of 90°. The lower end of the point may be cut 5 mm from the theoretical point. Above the conical tip the point shall be cylindrical and the cylindrical part shall have a length equal to the diameter +2 mm. The top surface shall be bevelled 90° (see Fig. 2).

The maximum permissible wear is 2 mm with respect to the diameter of the point. The point shall be attached to the rod in such a manner that it does not loosen during the driving.

2.6 General requirements

The radius of all concave surfaces shall be at least 0.3 mm to prevent failure by fatigue.

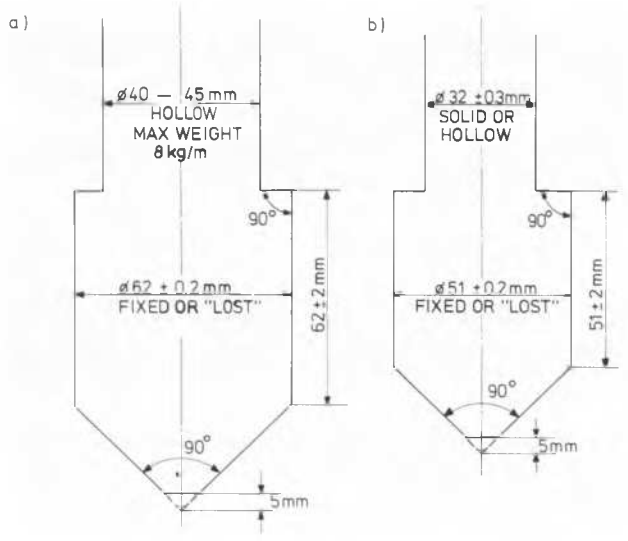


Fig. 2 Points and rod for dynamic probing DPA (a) and DPB (b).

3. TEST PROCEDURE

3.1 General

Criteria for termination of a test should be specified in advance. The depth required will depend on local conditions and the purpose of the particular test.

3.2 Probing equipment

The probing shall be done vertically unless specified otherwise. The maximum deviation of the drilling rig is 2%, 1 (horizontal) to 50 (vertical). The probing equipment shall be firmly supported. The point and the extension rods must be guided at the beginning of a test to keep the rods straight. Pre-boring may be required. The diameter of the bore hole shall be slightly larger than that of the point. The test rig shall be positioned in such a way that the extension rods are not allowed to bend above the ground surface.

3.3 Driving

The rate shall be 20-60 blows per minute. (The recommended rate is 30 blows per minute.) In cohesive soils the blow rate shall not exceed 30 blows per minute. The number of blows shall be recorded every 0.2 m of penetration (see note 3 para. 6).

The driving shall be continuous as far as possible. All interruptions longer than 5 minutes shall be recorded in the site log.

All factors which can influence penetration resistance should be checked continuously. Any deviations from the recommended procedure shall be recorded.

Rotation of the rods is recommended for the DPA test. When casing is used for the DPA the distance between the point and the bottom of the casing shall be at least 0.3 m and not exceed 1.0 m. The clearance between rod and casing shall be small at the bottom of the casing. The contact surface with the extension rods shall be smooth to prevent jamming of the rods. It is advantageous to inject fluid or air under pressure between rod and casing to keep the annulus clean.

If drilling mud is used to eliminate friction between the soil and the rod and to stabilise the hole, the mud shall be injected through holes in the hollow rods near the point. The holes shall be directed horizontally or slightly upwards. The injection pressure shall be sufficient so that the drilling mud fills the annular space between the soil and the rod. The pressure shall not be so high that the fluid is forced out of the borehole (see note 5).

For the DPB test the rods shall be rotated one full turn every metre to keep the hole straight and vertical. When the depth exceeds 10 m the rods shall be rotated every 0.2 m. It is recommended that the torque required for rotation is measured and that a mechanised rotating device is used when the depth is large.

The extension rods shall be examined after each test to check their straightness.

4. REPORTING OF TEST RESULTS

The following information shall be recorded:

a) Location of the probing
   Type of application
   Purpose of probing
   Date of probing

b) Borehole number, elevation and location of the borehole.
   Position of the test rig with respect to the ground surface.
   Elevation or depth of the ground water table.

c) Equipment used.
   Type of point, rod, casing, drilling fluid, injection pressure, type of test.

d) Mass of hammer, height of fall and the number of blows required every 0.2 m of penetration.

e) Elevation or depth where the rods were rotated.

f) Deviations from the normal procedure such as interruptions or damage on rods.

g) Observations made by the operator such as soil type, sounds in the extension rods, indication of stones, disturbances, etc.

An example of a site log is shown in Fig. 3.

PROJEKT:				SHEET NO:
LOCATION:				DATE:
SECTION/HOLE NO:				OPERATOR:
ELEVATIONS: GROUND SURFACE		GROUND WATER TABLE:		REFERENCE LEVEL:
PURPOSE OF TEST:				TYPE:
EQUIPMENT: DYNAMIC PROBING ROD:		CASING:	POINT:	DRILLING FLUID:
DEPTH BELOW REFERENSE LEVEL m	HAMMER kg	HEIGHT OF FALL m	NUMBER OF BLOWS PER 0,2 m	NOTATIONS INTERRUPTIONS, ROTATION, SOUNDS REASON FOR TERMINATING, ROD SHAPE

Fig. 3 Example of site log from dynamic probing.

The probing results shall be presented in diagrams which show the N_A- or the N_B-values on the horizontal axis and the depth on the vertical axis. At each depth the mass of the hammer and the height of fall shall be given. The type of test must be indicated and the reason for terminating the test.

It can be advantageous to transform the N_d-values to resistance values r_d or q_d from one of the equations given in 1.1.

An example of the presentation of test data is shown in Fig. 4.

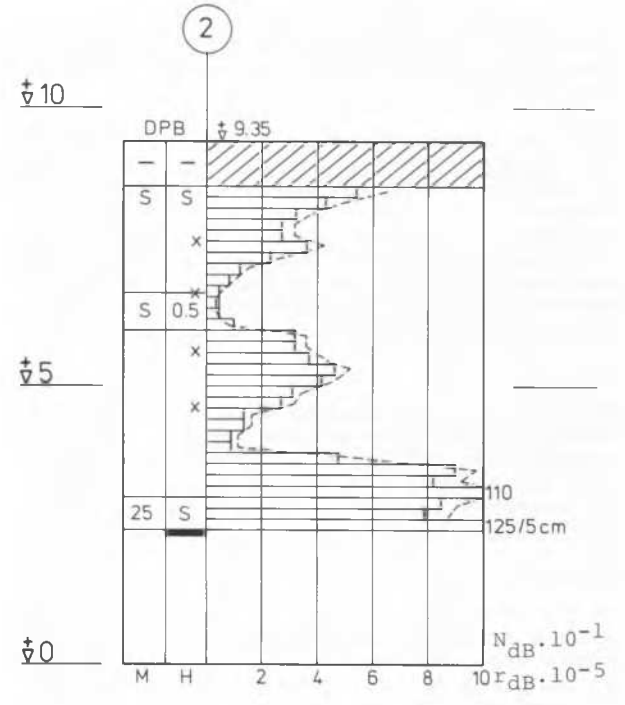
5. PROCEDURES OUTSIDE THE REFERENCE RANGE

The penetration resistance with dynamic probing is within the reference range when 5 to 100 blows are required to drive the penetrometer 0.2 m. The rebound at each blow should be less than 50% of the penetration at the blow.

It is desirable to carry out dynamic probing also outside the reference range in a regulated way: If more than 100 blows are required for 0.2 m of penetration or the rebound is excessive it is recommended to increase the height of fall to 1.0 m. If the rebound is excessive even after the height of fall has been increased, it is recommended that the mass of the hammer is increased to 127 kg. When the penetration resistance is less than 5 blows per 0.2 m of penetration it is recommended to reduce the height of fall to 0.5 or 0.25 m in order to increase the sensitivity of the method.

Outside the reference range, when the height of fall or the mass of the hammer is changed, the penetration resistance is given as N'_d-values (N'_{dA} and N'_{dB} respectively).

It is unlikely that a point with a 60° apex angle will give probing results very different from one with a 90° apex angle. A cone of 60° is permitted if noted in the probing log.



LEGEND: BOREHOLE NUMBER (2)

ELEVATIONS +9.35, +10, +5, ±0

TYPE OF PROBING DPB

S	STANDARD MASS AND HEIGHT OF FALL.
M	MASS IN kg OTHER THAN STANDARD.
H	HEIGHT OF FALL OTHER THAN STANDARD.
×	TURNING OF ROD.
110	NUMBER OF BLOWS EXCEEDING 100.
N_{dB}	BLOWS PER 20cm TEST TYPE B.
r_{dB}	SPECIFIC RESISTANCE VALUE Pa.
	NO MEASUREMENT MADE.
	N_d-VALUES
	r_d-VALUES
	SYMBOL FOR ENDING OF PROBING.

Fig. 4 An example of the presentation of test results from dynamic probing, DPB.

6. EXPLANATORY NOTES

Note 1

Light dynamic probing is frequently used in central Europe. A light dynamic probing method has been developed in West Germany and was described in Geotechnique Vol. 18 No. 1 March 1968. This method has been standardised (German Standard DIN 4094 Sheets 1 and 2). A light dynamic probing method has also been developed and standardised in Bulgaria (Bulgrian State Standard 8994-70). Both methods are described in the Proceedings of the European Symposium on Penetration Testing Stockholm 1974 (Vol. 1, pages 19-21).

Any recommedations for standardisation of light dynamic probing are not presented in this proposal. It is, however, desirable to compare the two methods mentioned above with DPA and DPB.

DPA and DPB ought to cover most of the needs for heavy dynamic probing. There is, however, a need for equipment which corresponds to reduced scale trial pile driving. Such equipment, however, should be highly mechanised with respect to both the driving and the transport of the equipment. Any recommendations for standardisation of heavy dynamic probing are not proposed.

Note 2

The free-falling hammer should be raised slowly to ensure that the inertia of the hammer does not carry it above the prescribed height 0.75 $\pm$ 0.02 m. Also the pick-up assembly should be lowered slowly to avoid significant impact on the hammer.

Note 3

It is advisable to mark the rods every 0.2 m with a permanent engraved mark or similar. Curvature and eccentricity are best measured by coupling a rod together with a straight rod and holding the straight rod in contact with a plane surface.

Note 4

If the resistance varies considerably over a distance of 0.2 m, the resistance should be recorded every 0.1 m.

Note 5

A swivel may be added between the anvil and the top end of the driving rods when the penetration exceeds 1 m to permit the injection of drilling mud when the rod is rotated.

APPENDIX C

RECOMMENDED STANDARD FOR THE SPT TEST

1. SCOPE

1.1 This method describes a procedure for determining the resistance of soils to the penetration of a split-tube sampler and obtaining disturbed samples of the soil in a borehole for identification purposes. The test provides information on soil variability and stiffness.

The test is made by dropping a free falling hammer weighing 63.5 kg onto the drill rods from a height of 0.76 m. The number of blows N necessary to achieve a penetration of 0.30 m (below the seating drive) is regarded as the penetration resistance. (This test was developed in the USA and has been widely known as the "Standard Penetration Test".)

2. APPARATUS

2.1 Boring equipment

2.1.1 The boring equipment shall be capable of providing a reasonably clean hole to ensure that the penetration test is performed on relatively undisturbed soil.

2.1.2 When wash boring, a side-discharge drilling bit should be used but not a bottom-discharge drilling bit. Jetting through an open-tube sampler with water and then testing when the desired depth is reached shall not be permitted.

2.1.3 The process of jetting through an open-tube sampler with drilling mud and then testing when the desired depth is reached may be used, provided the flow and pressure of the drilling mud does not disturb the soil at the depth of the test drive (see clause 3.2.2).

2.1.4 When shell and auger boring, the drilling tool shall have a diameter which is not more than 90% of the internal diameter of the casing or of the borehole if no casing is used.

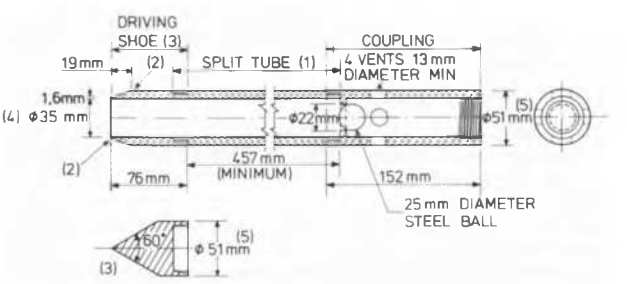
2.1.5 When drilling in soil that will not allow a hole to stay open, casing or drilling mud shall be used.

2.1.6 The diameter of the borehole should be between 60 and 200 mm approximately.

2.2 Split-barrel sampler

2.2.1 The sampler shall have the dimensions shown in Fig. 1.

2.2.2 The drive shoe shall be of hardened steel. It shall be replaced when it becomes significantly damaged or distorted. (See note 1 clause 5.)



NOTES (1) THE SPLIT TUBE MAY CONTAIN A LINER WITH AN INTERNAL DIAMETER OF 35mm

(2) THE CORNERS AT (2) MAY BE SLIGHTLY ROUNDED

(3) IN GRAVELLY SOILS THE DRIVING SHOE MAY BE REPLACED BY A SOLID STEEL CONE OF 51mm DIAMETER AND 60 DEGREE ANGLE

TOLERANCES: (4) ± 1mm

(5) ± 1mm

Fig. 1 Cross section of the SPT sampler.

2.2.3 The central section of the sampler shall be of steel and of split-tube construction to allow examination and easy removal of the sample.

2.2.4 The sampler head shall have four 13 mm (minimum) diameter vent ports and shall contain a 25 mm steel ball check valve seated in an orifice of not less than 22 mm diameter which is located below the vent ports to improve sample recovery when there is water in the borehole. The ball and its seat shall be constructed and maintained so as to give a watertight seal when the sampler is withdrawn. (See note 2 clause 5.)

2.3 Sampler rods

2.3.1 The rods used for driving the sampler should have a stiffness equal to or greater than type AW drill rods (43.7 mm O.D., 34.1 mm I.D. and approximately 6 kg/m weight). For holes deeper than 15 m steadies shall be used at intervals of 3 m, or alternatively rods with a stiffness equal to or greater than type BW drill rods (54.0 mm O.D., 44.4 mm I.D. and approximately 8 kg/m weight). (See note 3 clause 5).

2.3.2 Tolerance on straightness: when measured over the whole length of the rod by rolling against a straightedge, the maximum deviation shall not be greater than 1 in 1000.

2.3.3 The rods should be tightly coupled.

2.4 Drive weight assembly

2.4.1 The drive weight assembly shall comprise:

(a) A steel driving head or anvil screwed to the top of the sampling rod. (See note 4 clause 5.)

(b) A steel hammer of 63.5 kg (±0.5 kg) mass.

(c) A guiding assembly which will ensure that the hammer has a free fall of 0.76 m (± 0.02 m).

Special precautions shall be taken to ensure that the energy of the falling weight is not reduced by friction between the drive weight and the guide. (See note 5 clause 5.)

3. TEST PROCEDURE

3.1 Preparing the borehole

3.1.1 The borehole shall be carefully cleaned out to the test elevation using equipment that will ensure that the soil to be tested is not disturbed by the operation.

3.1.2 The water level in the boring shall at all times be maintained at or slightly above the ground water level. (See note 6 clause 5.)

3.1.3 The drilling tool shall be withdrawn slowly to prevent loosening of the soil in the test section.

3.1.4 Where casing is used, it shall not be driven below the level at which the test is to commence.

3.2 Penetration test

3.2.1 The sampler shall be lowered to the bottom of the borehole and the following information recoreded:

(a) Size and depth of casing.

(b) Depth to the bottom of the borehole.

(c) Water level (or mud where used) in the borehole.

(d) If a solid steel cone is used in place of the driving shoe, this should be stated and referred to as the SPT (cone).

(e) Type of rods.

(f) Amount of penetration of the sampler into the soil under the combined weight of sampler and rods.

(g) Type of hammer.

3.2.2 The sampler shall be driven in two stages, as follows:

Seating drive: A penetration of 0.15 m (which includes the initial penetration of the sampler under its own weight). If the 0.15 m penetration cannot be achieved in 50 blows, the latter shall be taken as the seating drive.

Test drive: A further penetration of 0.30 m. The number of blows required for this 0.30 m penetration is termed the penetration resistance N. If the 0.30 m penetration cannot be achieved in 50 blows (or 100 blows if a solid cone is used), the test drive shall be terminated.

The rate of application of hammer blows should not exceed 30 blows/minute. The number of blows required to effect each 0.15 m of penetration shall be recorded. If the seating or test drive is terminated before the full penetration, the record should state the amount of penetration for the corresponding 50 blows.

3.3 Removal of sample and labelling

3.3.1 The sampler shall be raised to the surface and opened. Place representative sample or samples of the soil into air-tight containers. (See note 7 clause 5.)

3.3.2 Labels shall be fixed to the container with the following information:

(a) Site.

(b) Borehole number.

(c) Sample number.

(d) Depth of penetration.

(e) Length of recovery.

(f) Date of sampling.

4. REPORTING OF RESULTS

4.1 The following information shall be reported (Fig. 2):

(a) Penetration record (as described in clause 3.2.2).

(b) The depths between which the penetration resistance was measured.

(c) Information on the ground water level and the water level in the borehole at the start of each test.

(d) The soil type and description as identified from the sample (with a soil profile of the borehole if the data permit this).

The following information shall also be given with the report:

(e) Date of boring.

(f) Borehole number.

(g) Boring method and size of casing used.

(h) Size and weight of rods used for the penetration test.

(j) Type of hammer and anvil.

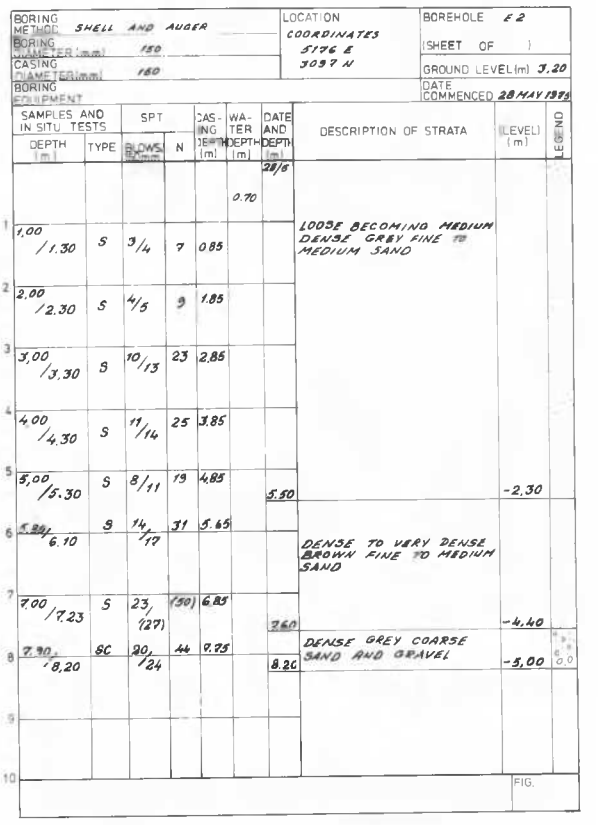


Fig. 2 Example of reporting SPT test results.
Key: S = SPT, SC = SPT (cone).

5. EXPLANATORY NOTES

Note 1. Clause 2.2.2.

The drive shoe of the SPT sampler is not designed to provide inside clearance with the sampling tube. Hence, any significant inward distortion of the cutting edge shall not be permitted.

Note 2. Clause 2.2.4.

Alternative designs of check valves are permitted provided they give equal or better performance.

Note 3. Clause 2.3.1.

The stiffness of the rod used during testing is believed to affect the penetration resistance, especially because a light rod "whips" under the hammer blows.

Note 4. Clause 2.4.1(a).

A loose anvil shall not be permitted. It is an advantage for the striking face of the anvil to be domed 3 mm in 100 mm (approximately) to inhibit glancing blows between the drop weight and anvil.

Note 5. Clause 2.4.1(c).

A hammer incorporating a self-tripping mechanism will overcome the effect of any friction in the lifting tackle and its use is recommended. A hammer with a free fall will give more reproducible results and also smaller N values than a hammer operated by a friction winch with manilla rope to lift and drop the hammer.

The self-tripping hammer should be raised slowly to ensure that the inertia of the hammer does not carry it above the prescribed level in excess of the prescribed free fall of 0.76 m($\pm$0.02 m). Also, the pick-up assembly should be lowered slowly to avoid significant impact on the hammer.

A down-the-hole drive weight assembly acting directly on the sampler and mounted in a watertight chamber is permissible.

Note 6. Clause 3.1.2.

To avoid hydraulic disturbance when boring in sand, the water pressure at the bottom of the borehole should correspond to the piezometric pressure in the surrounding ground at the test level. In artesian conditions, this will not be the same as the pressure corresponding to the standing water table.

Information on the water level in the layer(s) tested shall be recorded. Particular attention should be given where artesian conditions are encountered, as is sometimes found when penetrating through an impervious layer into a pervious layer below water level. Any operation that give an opportunity for an upward flow of water to loosen the soil should also be recorded.

Note 7. Clause 3.3.1.

The sample obtained with the SPT split-tube sampler is used for identification. It must be regarded as disturbed from the point of view of determining deformation or strength properties.

APPENDIX D

RECOMMENDED STANDARD FOR THE WEIGHT SOUNDING TEST (WST)

1. INTRODUCTION

1.1 The Swedish weight-penetrometer consists of a screw-shaped point, rods, weights and a handle. It is used as a static penetrometer in soft soils when the penetration resistance is less than 1 kN. When the resistance exceeds 1 kN the penetrometer is also rotated and the number of rotations for a given settlement is noted. Its ability to penetrate even in stiff clays and dens sands is good. The penetrometer is primarily used to give a continuous soil profile and an indication of the layer sequence and to determined the lateral extent of different soil layers. It is also used to determine whether non cohesive soils are loose, medium-dense or dense and to estimate the relative strengths of cohesive soils. The results obtained in non cohesive soils are also used to calculate the bearing capacity of spread footings and piles.

2. APPARATUS

2.1 Weights

2.1.1 These comprise one 5 kg clamp, two 10 kg weights, three 25 kg weights. Total 100 kg. The weights can be replaced by a dynamometer when the penetrometer is pushed in manually.

2.1.2 The maximim allowable deviation for the weights and the dynamometer scale is ±5%.

2.2 Rod and coupling

2.2.1 The diameter of the rod should be 22 mm. Regarding material see note 1 para. 6.

2.2.2 The deviation from the straight axis should not exceed 4‰ for the lowest 5 m of the rod and 8‰ for the remainder. Determination of the deviation for the rods see Fig. 3, Appendix A. Maximum allowable eccentricity for the coupling is 0.1 mm. Maximum angular deviation for a joint between two straight rods is 0.005 rad.

2.2.3 Flush joints see Fig. 1.

2.3 Point

2.3.1 Manufactured from a 25 mm square steel bar with a total length of 0.2 m. The bar has a 80 mm long pyramidal point. It is twisted to the left over a length of 130 mm as shown in Fig. 2.

2.3.2 The diameter of the circumscribed circle of the point shall not exceed 35.0 ±0.2 mm for a new point and shall not be less than 32.0 +0.2 mm for a worn point. The diameter shall be checked by circular gauges with different inner diameters.

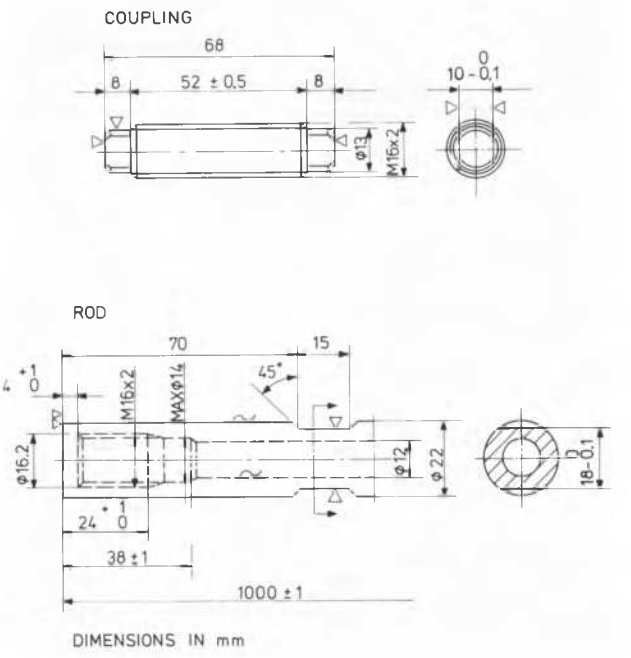


Fig. 1 Recommended tolerances for manufacture of weight penetrometer rods and couplings.

Maximum allowable shortening of the length of the point is 15 mm due to wear. The tip of the point shall not be bent or broken.

2.4 Tools (not standardized)

Two fixed wrenches, a handle, extraction device and augers for preboring.

3. TEST PROCEDURE

3.1 Manual weight sounding

When the penetrometer is used as a static penetrometer in soft soils the test should be made in accordance with clause 3.1.1 and 3.1.2. In stiffer soils the penetrometer should be rotated as described in clause 3.1.3.

3.1.1 The rod is loaded in steps using the following standard loads.

loads in kN	mass in kg
0	0
0.05	5
0.05 + 0.10 = 0.15	5 + 10 = 15
0.15 + 0.10 = 0.25	15 + 10 = 25
0.25 + 0.25 = 0.50	25 + 25 = 50
0.50 + 0.25 = 0.75	50 + 25 = 75
0.75 + 0.25 = 1.00	75 + 25 = 100

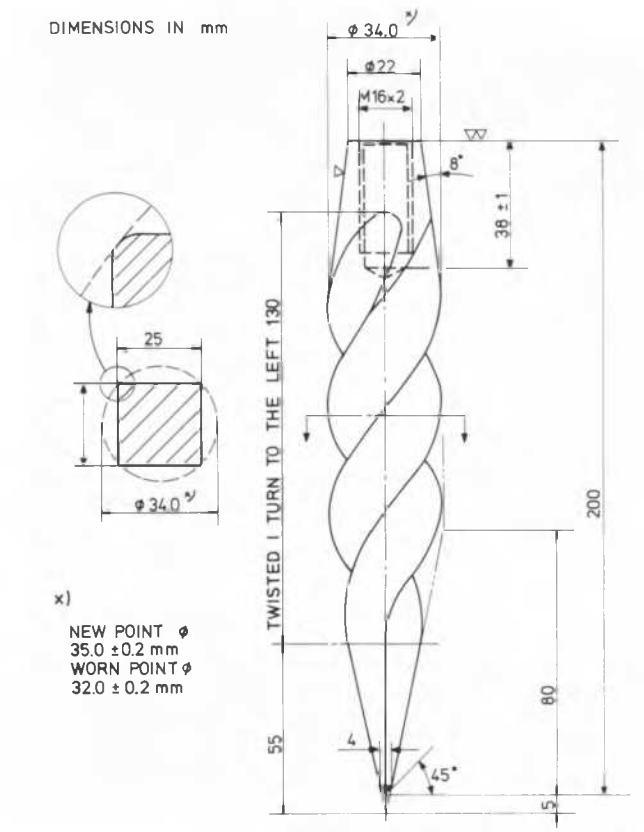


Fig. 2 Recommended tolerances for the manufacture of weight penetrometer points.

3.1.2 The load shall be adjusted to give a rate of penetration of about 50 mm/sec. This means that the rod must be partly unloaded when a layer of stiff soil, such as a dried crust, has been penetrated.

3.1.3 If the penetration resistance exceeds 1 kN or the penetration rate at 1 kN is less than 20 mm/sec the rod should be rotated. The load 1 kN is maintained and the number of half turns required to give 0.2 m of penetration is measured. The rod must not be rotated when the penetration resistance is less than 1 kN.

3.2 Mechanized weight sounding

3.2.1 Tests are carried out in a similar manner as for the manual soundings. The rod is rotated mechanically in stiff soils.

3.2.2 The applied load is measured with a dynamometer attached to the machine.

3.2.3 When the penetration resistance is less than 1 kN and rotation is not required, the engine must be stopped to prevent the vibrations from the engine affecting the measured penetration resistance. The rate of rotation should be between 15 and 40 rpm and should not exceed 50 rpm. The recommended average rate of rotation is 30 rpm. (See note 2 para. 6.)

3.3 General considerations

3.3.1 The possible need to prebore through the upper soil layers shall be estimated in each case. (See note 3 para. 6.)

3.3.2 The criteria to be used for the termination of a WST test shall be stated for each investigation, e.g. exceed the minimum penetration resistance or reach a minimum depth. (See note 4 para. 6.)

4. RECORDING

4.1 Penetration resistance

4.1.1 When the penetration resistance is less than 1 kN the standard load required to give a rate of penetration of about 50 mm/sec shall be recorded against the depth (Fig. 3). It should be noted in the boring log and on drawings whether weights or a dynamometer have been used. (See note 5 para. 6.)

4.1.2 When the penetration resistance exceeds 1 kN, the number of half turns required for every 0.2 m of penetration shall be recorded (Fig. 3).

4.1.3 When the penetrometer is driven by blows of a hammer or some of the weights, the depths penetrated during driving shall be recorded.

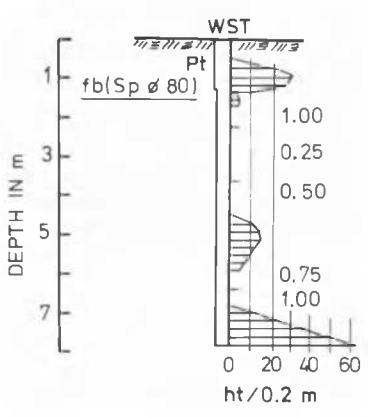
4.2 General notes

4.2.1 All observations which may help in the interpretation of the test results shall be noted in the boring log, e.g. sounds and vibrations in the rods when the point penetrates cohesionless soils (stones, gravel and sand). Also interruptions etc. shall be recorded.

4.2.2 The type of rotating equipment and the rate of rotation shall be noted in the boring log.

5. PRESENTATION OF TEST RESULTS

5.1 The recommended form of presenting the results of weight soundings is shown in Fig. 3.



WST	WEIGHT SOUNDING TEST
ht/0.2m	NUMBER OF HALFTURNS PER **0.2m** OF PENETRATION
Pt	DRY CRUST OF CLAY
fb(Sp ø 80)	PREBORING TO THIS LEVEL WITH 80mm DIAM AUGER

FIGURES TO THE RIGHT IN THE DIAGRAM INDICATE LOADS APPLIED IN kN

Fig. 3 An example of the presentation of test results from weight sounding test (WST).

6. EXPLANATORY NOTES

Note 1. Clause 2.2.1.

The rods and couplings should be made of high tensile steel.

Note 2. Clause 3.2.3.

Differences between manually and mechanically performed tests sometimes occur. Where this may be the case, for example when estimating the relative density of loose cohesionless soils, comparisons between manually and mechanically performed tests must be made.

Note 3. Clause 3.3.1.

In cases where the skin friction resistance along the upper parts of the rod can significantly influence the results, a comparison should be made with a test in a prebored hole. Preboring is normally required through a dry crust or through a fill. When the difference in penetration resistance is large between the two tests, preboring is necessary for all tests within the area. The preboring shall be made using an auger with a minimum diameter of 50 mm. To estimate the thickness of the dry crust the sounding test is performed directly from the ground surface.

Note 4. Clause 3.3.2.

A penetration test to "firm bottom" shall be terminated by striking the rod with a hammer or by dropping some of the weights onto the clamp in order to check that the refusal is not temporary. If it is possible to penetrate the stiff layer the test shall be continued.

Sometimes the weight penetrometer test is followed by percussion boring to deeper levels, e.g. in order to determine the depth to which point-bearing piles need to be driven.

Note 5. Clause 4.1.1.

In soft soils when the penetration resistance is less than 1 kN a dynamometer can be used instead of the weights. In this case the recorded load shall be related to the closest standard loads and shall be recorded in a similar manner.

APPENDICE A - NORME RECOMMANDEE POUR L'ESSAI DE PENETRATION AU CONE (CPT)

1 - OBJET

L'essai de pénétration au cône consiste à vériner dans le sol, à une vitesse suffisamment faible, un train de tubes terminé à sa partie inférieure par un cône, et à mesurer, de manière continue ou à intervalles de profondeur déterminés, la résistance au cône, et si désiré, l'effort total d'enfoncement et/ou l'effort de frottement sur un manchon de frottement.

On effectue les essais de pénétration au cône afin d'obtenir des données relatives à un ou plusieurs des points suivants :

1) la stratigraphie des couches du site et leur homogénéité.

2) la profondeur des couches dures ; la localisation des cavités, vides et autres discontinuités.

3) l'identification des sols.

4) les caractéristiques physiques et mécaniques des sols.

5) la capacité portante des pieux.

2 - DEFINITION

2-1 "Essai de pénétration au cône" (en abrégé C.P.T., d'après l'expression anglaise) : ce terme couvre ce qui était appelé "Essai de pénétration statique" ou "Essai de pénétration quasi-statique" ou "Essai de pénétration hollandais".

2-2 Pénétromètre (appareil) : c'est un appareil qui consiste en un train de tubes cylindriques terminé par un embout appelé pointe du pénétromètre, les dispositifs de mesure pour la détermination de l'effort sur le cône et éventuellement le frottement latéral unitaire et/ou l'effort total.

2-3 Pointe

2.3.1. - Pointe (au *sens propre*) : embout à l'extrémité du train de tiges qui comprend les éléments actifs de détermination de l'effort sur le cône et, éventuellement, de l'effort de frottement latéral unitaire.

2.3.2 - La pointe (au sens conventionnel) : Par convention, si la longueur de la partie de la pointe, au sens propre, située au-dessus du cône est inférieure à 1000 mm, la longueur de tiges à ajouter à la pointe afin d'obtenir la dimension 1000 mm est considérée comme faisant partie de la pointe.

2-4 Cône

C'est la partie du pénétromètre sur laquelle l'effort de pointe est mesuré.

Suivant le principe de l'appareil on distingue :

2.4.1 - Les pointes pénétrométriques à cône fixe: le cône peut seulement avoir des déplacements relatifs très faibles (micrométriques) par rapport aux autres éléments de la pointe (fig. 1).

2.4.2 - Pointe pénétrométrique à cône mobile : Le cône peut se déplacer librement par rapport aux autres éléments de la pointe (fig. 4).

Suivant la forme du cône on distingue :

2.4.3 - Le cône simple dans lequel la longueur de la partie cylindrique prolongeant la partie conique, est au plus égale au diamètre du cône.

2.4.4. - Le cône à jupe, dans lequel la partie conique est prolongée par une jupe *plus ou moins cylindrique, dont* la longueur est supérieure au diamètre de la base du cône.

2-5 Manchon de frottement

C'est la partie de la pointe sur laquelle on mesure localement le frottement latéral unitaire.

2-6 Système de mesure

Le système comprend les dispositifs de mesure eux-mêmes et les moyens de transmission de l'information depuis la pointe jusqu'à un endroit où elle peut être lue ou enregistrée. On peut distinguer par exemple :

2.6.1 - Les pénétromètres électriques qui utilisent un appareillage électrique tel que jauges de contrainte, cordes vibrantes, etc..., inclus dans la pointe.

2.6.2 - Les pénétromètres mécaniques, qui utilisent un train de tiges intérieures pour transmettre l'effort au cône.

2.6.3 - Les pénétromètres hydrauliques et pneumatiques qui utilisent des appareillages hydrauliques on pneumatiques inclus dans la pointe.

2-7 Tubes de fonçage

Il s'agit de tubes de forte épaisseur ou de tiges *utilisés pour foncer* la pointe pénétrométrique et pour guider et abriter le système de mesure.

2-8 Tiges intérieures
Il s'agit de tiges pleines logées dans le tube de fonçage qui prolongent la pointe

d'un pénétromètre mécanique.

2-9 Appareil de fonçage

Matériel qui fonce le pénétromètre dans le sol. La réaction nécessaire est obtenue à l'aide d'un poids mort et/ou d'ancrages.

2-10 Dispositif de réduction du frottement

Petite protubérance locale sur le tube de fonçage placée à une certaine distance au-dessus de la pointe et destinée à réduire le frottement sur le tube de fonçage.

2-11 Essai de pénétration continue et discontinue (voir note 1 - chapitre 10)

2.11.1 - Essai de pénétration dans lequel tous les éléments de la pointe s'enfoncent à approximativement la même vitesse durant la mesure de résistance de cône.

2.11.2 - Essai de pénétration dans lequel seul le cône s'enfonce durant la mesure de la résistance à l'enfoncement, les autres éléments de la pointe restant stationnaires. Quand le pénétromètre comporte un manchon de frottement, la mesure de la somme des résistances de cône et de manchon est obtenue par l'enfoncement simultané du cône et du manchon, les autres éléments de la pointe restant stationnaires.

2-12 La résistance de cône q_c :

La résistance de cône q_c est obtenue en divisant l'effort total sur le cône Q_c par la surface de la base du cône A_c

$$q_c = Q_c : A_c$$

La résistance est exprimée en MPa ou en bars.

2-13 Le frottement latéral unitaire : Il est obtenu en divisant la force Q_s nécessaire à l'enfoncement du manchon de frottement par sa surface latérale A_s

$$f_s = Q_s : A_s$$

Le frottement latéral unitaire f_s est exprimé en MPa ou en bars.

2-14 Effort total d'enfoncement Q_t : Force totale nécessaire pour enfoncer l'ensemble tube-cône dans le sol. Q_t est exprimé en kN

2-15 Effort total de frottement latéral Q_{st}

Il est généralement obtenu par différence entre l'effort total d'enfoncement Q_t et l'effort total sur le cône Q_c

$$Q_{st} = Q_t - Q_c$$

Q_{st} est exprimé en kN comme Q_t et Q_c

Certains pénétromètres permettent la mesure directe de Q_{st}

2-16 Pourcentage de frottement R_f et indice de frottement I_f (voir note 2 - chapitre 10).

2.16.1 - Pourcentage de frottement R_f :

C'est le rapport, du frottement latéral unitaire f_s à la résistance du cône q_c, mesurés à la même profondeur et exprimé en pour-cents.

2.16.2 - Indice de frottement I_f :

C'est le rapport de la résistance de cône q_c au frottement latéral local unitaire f_s mesurés à la même profondeur.

3 - PENETROMETRE NORMALISE RECOMMANDE

3-1 Géométrie générale de la pointe.

Dans l'essai de pénétration normalisé, des pointes avec ou sans manchon de frottement peuvent être utilisées (fig. 1a et fig. 1b).

La pointe du pénétromètre doit avoir le même diamètre que le cône sur une longueur de 1000 mm au-dessus de la base du cône. L'espace entre le cône et les autres éléments de la pointe devra être limité au minimum nécessaire au fonctionnement des organes de mesure, et conçu et réalisé de manière à interdire l'entrée de particules de sol.

Ceci est également valable pour l'espace entre le manchon de frottement, s'il existe, et les autres éléments de la pointe. Le manchon de frottement, s'il existe, et le corps de la pointe devront être parfaitement concentriques.

Dans le cas d'une pointe sans manchon, son diamètre devra être le même que celui de la base du cône avec une tolérance de -0,3 mm et + 1 mm, sur une longueur de 1000 mm (soit environ 30 fois le diamètre de la base).

Dans le cas d'une pointe avec manchon de frottement, la partie de la pointe située au-dessus du manchon de frottement devra avoir le même diamètre que le manchon lui-même sur une longueur de 450 mm (soit environ 12 fois le diamètre de la base) avec une tolérance de -0,3 mm. Les autres parties de la pointe doivent remplir les conditions énumérées ci-dessus concernant une pointe sans manchon.

3-3 Le cône

Le diamètre B de la base du cône est 35,7 mm. L'angle au sommet du cône est de 60°.

Le cône doit se prolonger par une partie cylindrique (fig. 2) d'une hauteur e_1 de 5 mm.

Tolérances de fabrication

Sur le diamètre de la base du cône + 0,3 mm.

$$35{,}70 \text{ mm} < B < 36{,}0 \text{ mm}$$

Sur la hauteur du cône + 0,3 mm.

$$31{,}0 \text{ mm} < e_1 < 31{,}3 \text{ mm}$$

Etat de surface du cône : rugosité < 5/µm

Tolérances d'utilisation

Usure sur le diamètre de la base du cône -1 mm

$$34{,}7 \text{ mm} < B < 36{,}0 \text{ mm}$$

Usure sur la hauteur du cône, -7 mm

$$24{,}0 \text{ mm} < e_1 < 31{,}3 \text{ mm}$$

Usure sur la longueur de la partie cylindrique, -2 mm

Les cônes présentant une usure asymétrique visible doivent être rejetés.

3.4 Dispositif de mesure

Le dispositif de mesure doit être conçu pour mesurer la résistance au cône sans être influencé par un excentrement éventuel de cette force.

3.5. Le manchon de frottement

Le diamètre du manchon de frottement doit avoir, aussi bien à la fabrication qu'en utilisation, au moins la même valeur que celui de la base du cône avec une tolérance de + 0,35 mm.

La surface du manchon de frottement devra être de 150 cm^2 avec une tolérance de $\pm$ 2 %. La rugosité du manchon de frottement à la fabrication doit être de 0,5 µm $\pm$ 50 % (voir note n° 3 - chapitre 10), dans la direction de l'axe du manchon ; en utilisation, cette rugosité ne devra pas devenir inférieure à 0,25 µm . Les projections vers le haut et vers le bas du manchon de friction devront cacher les autres parties de la pointe pénétrométrique.

Le manchon de frottement doit être situé immédiatement au-dessus du cône (fig.1b) L'espace annulaire entre le manchon et les autres parties de la pointe du pénétromètre et les joints doivent satisfaire les mêmes spécifications que celles décrites en 4.3

3-6 Tubes de fonçage

Les tubes de fonçage sont vissés ou fixés les uns aux autres de manière à être solidaires et à former un train de tiges rigidement liées avec un axe rectiligne et continu. La déviation par rapport à l'axe ne devra pas excéder 4 $^0/_{00}$ pour les 5 tiges inférieures et 8 $^0/_{00}$ pour les autres. La manière de déterminer la "déviation" est illustrée à la figure 3.

Pendant la mesure de l'effort total de frottement sur les tubes de fonçage, leur diamètre doit être de 36 mm avec une tolérance de $\pm$ 1 mm sur toute la longueur.

3-7 Matériel de mesure

Les résistances sont mesurées à l'aide de dispositifs fixés au cône et au manchon de frottement, s'il existe, et les signaux sont transmis par un système adéquat à un système d'enregistrement de données.

L'enregistrement exclusif des résultats de l'essai sur enregistreur ne permettant pas un accès direct aux mesures n'est pas recommandé.

3-8 Machine de fonçage

Il est souhaitable que la machine de fonçage ait une course d'un mètre et elle doit foncer les tiges dans le sol à une vitesse constante de pénétration. La machine doit être ancrée et/ou lestée de manière à ne pas se déplacer par rapport au sol lors du fonçage.

3-9 Dispositif de réduction du frottement

Si on emploie un dispositif de réduction du frottement, il doit être situé au moins à 1000 mm au-dessus de la base du cône.

4 - MODE OPERATOIRE DE L'ESSAI NORMALISE

4-1 Essai en continu

Le mode opératoire de l'essai normalisé est celui de l'essai de pénétration continue dans lequel les mesures sont faites alors que tous les éléments du pénétromètre ont la même vitesse de pénétration.

4-2 Verticalité

La machine de fonçage est installée de façon à fournir une direction de fonçage aussi verticale que possible. La déviation maximum tolérée de la direction de fonçage par rapport à la verticale est 2 %. L'axe des tiges de fonçage doit coïncider avec l'axe de la poussée.

4-3 Vitesse de pénétration

La vitesse de pénétration est la vitesse du mouvement descendant de l'élément considéré du pénétromètre au moment où la force sur l'élément est mesurée.

La vitesse de pénétration est de 2 cm/sec. avec une tolérance de ± 0,5 cm/sec. Cette vitesse doit être maintenue tout le temps de l'enfoncement même si les lectures ne se font qu'à intervalles.

4-4 Intervalles de lecture

Une lecture continue est recommandée. L'intervalle entre les lectures ne devra en aucun cas correspondre à plus de 20cm de profondeur.

4-5 Mesure de la profondeur

Les profondeurs doivent être mesurées avec une précision d'au moins 10 cm.

5 - PRECISION DES MESURES

En prenant en compte toutes les sources d'erreurs possibles (frottement parasite des dispositifs d'enregistrement, exentricité de la charge sur le cône ou le manchon, différences de températures, etc...), on doit arriver à une précision meilleure que la plus grande des valeurs suivantes.

5 % de la valeur mesurée
1 % de la valeur maximum du domaine.

La précision doit être vérifiée au laboratoire ou sur chantier en considérant toutes les influences perturbatrices possibles.

6 - PRECAUTIONS, CONTROLES ET VERIFICATIONS

6-1 Avant que le CPT soit effectué, la rectitude des tubes de fonçage et particulièrement des 5 tubes inférieurs doit être controlée. Une méthode de contrôle de la rectitude consiste à tenir le tube verticalement, à le faire tourner rapidement pour faire apparaitre les éventuels défauts d'alignement. Si tel est le cas, le tube est rejeté.

6-2 On doit contrôler régulièrement l'usure du cône et du manchon de frottement.

6-3 Il est également nécessaire de contrôler si l'essai CPT à effectuer n'est pas trop près de carotages déjà effectués ou d'autres essais CPT. Pour les essais CPT à pénétration très profonde il est recommandé de ne pas se placer à moins de 25 diamètres de forage des carotages non tubés ou non rebouchés ou à moins de 1 m d'anciens essais CPT.

6-4 La qualité des joints entre les différents éléments de la pointe pénétrométrique doit être inspectée régulièrement. Avant usage, il faut vérifier que les joints ne comportent pas de particules de sol.

6-5 Au cas où les signaux des appareils de mesure de la pointe sont transmis à la surface par un câble électrique, ce câble doit être continu, et en conséquence il doit être enfilé préalablement dans les tubes de fonçage.

6-6 Les pointes des pénétromètres électriques doivent être compensées vis-à-vis de la température. Si l'écart observé après extraction de la pointe est tel que les conditions de précision définies en 6. ne sont plus respectées, l'essai doit être rejeté.

6-7 Etalonnage

6-7-1 - Quand on utilise des manomètres, il doivent être réétalonnés au moins tous les 6 mois. Pour chaque type de manomètre, il doit y avoir deux exemplaires disponibles sur la machine, chacun avec son propre étalonnage. On doit vérifier à intervalles réguliers le manomètre utilisé pour les essais, par comparaison avec le manomètre de réserve.

6.7.2 - On doit vérifier l'étalonnage des pesons ou des anneaux dynamométriques au moins tous les 3 mois.

Il est recommandé d'effectuer des contrôles réguliers sur chantier avec un appareillage de contrôle approprié.

6-8 Le système de mesure du manchon de frottement doit être sensible aux seules contraintes de cisaillement à l'exclusion des contraintes normales.

7 - DISPOSITIFS SPECIAUX

7-1 Guidage du train de tubes

Un système de guidage du train de tubes doit être prévu dans la partie hors-sol (et éventuellement dans l'eau), de manière à éviter tout flambement.

7-2 Inclinomètres

Afin de suivre les déviations du train de tubes dans le sol, on peut prévoir des inclinomètres incorporés à la pointe

L'utilité d'une telle information est fonction des sols rencontrés ; elle croît avec la profondeur d'essai.

7-3 Tubes de fonçage de plus petit diamètre.

Afin de diminuer le frottement latéral sur les tubes, on peut utiliser des tubes de diamètre inférieur à celui de

la pointe. La distance entre les tubes du petit diamètre et la base du cône doit être au moins de 1000 mm.

8 - PRESENTATION DES RESULTATS

8-1 Les graphiques de mesures doivent comporter les informations suivantes :

1) - Si le pénétromètre et l'essai sont exactement conformes à la norme recommandée, chaque graphique doit comporter la lettre S.

Cette lettre sera suivie par une des lettres suivantes, indiquant le système de mesure :

M = Mécanique

E = Electrique

H = Hydraulique

2) - La date de l'essai et le nom de la société.

3) - Le numéro d'identification de l'essai et sa situation sur le site.

4) - La profondeur à partir de laquelle on a utilisé un dispositif de réduction du frottement, ou des tubes de diamètre réduit. La profondeur à laquelle on a remonté les tubes sur une certaine hauteur afin d'annuler la résistance latérale et après laquelle on a repris le fonçage.

5) Toute interruption anormale dans la procédure de l'essai.

6) Les observations de l'opérateur, portant sur le type de sol, les bruits en provenance du train de tubes, la présence de blocs, les anomalies, etc...

7) Les indications relatives à l'existence et à la profondeur d'excavations, et niveau de l'essai CPT par rapport à la surface du terrain naturel ou artificiel.

8-2 Outre les informations indiquées en 8-1 on devra également mentionner :

1. Le numéro d'identification de la pointe pénétrométrique utilisée.

2. Le nom du responsable de l'équipe ayant réalisé l'essai.

3. Les dates et numéros des certificats d'étalonnage des appareils de mesure.

8-3 Pour la présentation des graphiques, on recommande les échelles suivantes :

Profondeur : 1 unité (arbitraire) pour 1 m.
Résistance de cône q_c : La même unité pour 2 MPa
Frottement latéral unitaire f_s : La même unité pour 0,05 MPa (0,5 bar)
Effort total d'enfoncement Q_t : La même unité pour 5 kN
Effort total de frottement latéral Q_{st} La même unité pour 5 kN

Dans la mesure où les relations précédemment énoncées entreles échelles verticales et horizontales sont respectées, toute latitude est laissée pour le choix des échelles, de manière à ce que l'on puisse utiliser un papier de format normalisé.

8-4 Plan de situation

Pour chaque investigation, un plan de situation très clair doit être dressé, avec des points de référence clairement indiqués, afin que l'emplacement des essais soit défini avec précision.

Dans le cas où la reconnaissance comporte à la fois, essais de pénétration et carotages, on doit indiquer la séquence d'exécution.

8-5 Outre les informations demandées en 8.1 il est recommandé de donner la cote de la surface du terrain à l'endroit des essais. De plus, on doit donner les renseignements suivants dans la mesure où ils s'appliquent :

a) - les lectures éventuelles à l'inclinomètre.

b) - les vérifications effectuées après extraction des tubes et de la pointe.

c) - la profondeur de l'eau restant dans le trou de sondage après essai, ou la profondeur à laquelle le trou s'est effondré.

d) - Si le trou de sondage a été bouché ou non, et si oui, par quelle méthode.

9 - DIVERGENCES PAR RAPPORT A LA NORME

9-1 Généralités

Une spécification générale et très importante est que toute divergence par rapport à la Norme doit être explicitement et complètement mentionnée et décrite sur la feuille d'essai. Afin de simplifier les indications on pourra utiliser les noms et symboles définis en 9-5.

9-2 Divergences concernant uniquement les dimensions et la forme du cône.

9.2.1 - Diamètre de la base du cône : Afin de pouvoir pénétrer plus profondément, on pourra utiliser dans certains cas un cône avec une base plus petite.

On utilise des cônes de plus grand diamètre, soit pour pouvoir incorporer le dispositif de mesure, soit pour pouvoir foncer la pointe à travers des couches plus dures avec moins de risques de dommage.

9.2.2 - Angle au sommet du cône

Afin de réduire le risque de dommage , on peut utiliser un angle au sommet de 90°.

9.2.3 - Tolérances

Toutes les tolérances données pour l'appareil normalisé doivent être adaptées au prorata du diamètre.

9.2.4 - Symboles

Les essais effectués avec un cône non conforme à la Norme ne peuvent pas être représentés par la lettre S . Si tous les autres élèments sont conformes à la Norme, les essais peuvent être caractérisés par les lettres M_{ϕ} , E_{ϕ} , H_{ϕ} , suivies de l'indication B = et α = , donnant les valeurs des caractéristiques non conformes du cône.

9-3 Divergences concernant uniquement la position ou les dimensions du manchon de frottement.

9.3.1 - Si contrairement à la Norme, le manchon de frottement n'est pas placé immédiatement au-dessus de la base du cône, la distance minimum entre la base et la partie inférieure du manchon doit être trois fois le diamètre de la base.

9.3.2. - Surface du manchon

Quand la base du cône utilisé a un diamètre de 35,7 mm, mais que la longueur du manchon de frottement différe de la valeur normalisée, la surface du manchon doit être comprise entre 100 cm^2 et 350 cm^2 .

Quand la base du cône utilisé a un diamètre différent de la valeur normalisée la surface à adopter pour le manchon est obtenue en corrigeant la valeur normalisée proportionnellement à la surface de la base du cône.

9.3.3 - Symboles

Les essais effectués avec un manchon de frottement non conforme à la Norme ne peuvent pas être représentés par la lettre S . Si tous les autres éléments sont identiques à ceux de la Norme, les essais sont caractérisés par les lettres M_{ϕ} , E_{ϕ} , H_{ϕ} , suivies des indications

Hauteur de la partie inférieure du manchon h =

Surface du manchon A_s =

9-4 Essai discontinu au pénétromètre à cône mobile.

9.4.1 - Avec les pénétromètres à cône mobile, il est possible de réaliser des essais continus ou discontinus. La manière dont l'essai est réalisé doit être mentionnée dans le rapport et sur les graphiques.

9.4.2. - Essais discontinus

Dans le cas d'essais discontinus, bien que la vitesse du mouvement descendant de l'appareil de fonçage soit connue, la vitesse de pénétration du cône mobile au moment de la rupture du sol peut être différente de celle du mouvement de la machine de fonçage. Il n'y a correspondance que lorsque les tubes de fonçage sont mis en mouvement continu.

Pour des essais discontinus, le mouvement minimum à imposer au cône ou au manchon de frottement est 0,5 fois le diamètre du cône (voir note 4 - chapitre 10).

9-5 Liste de pénétromètres traditionnels différant de la Norme.

Les pointes pénétrométriques usitées dans plusieurs pays, et différant de la Norme sont données ci-dessous. Elles sont mentionnées par un nom et un symbole destiné à permettre une mention abrégée du type de pointe, sur les graphiques d'essais.

9.5.1 - Pénétromètres mécaniques (voir note 5 - chapitre 10).

M1 La pointe hollandaise à cône à jupe (fig. 4)

M2 La pointe hollandaise avec manchon de frottement (fig. 5)

M3 La pointe à cône à jupe d'URSS (fig. 6)

M4 La pointe à cône simple (fig. 7)

M5.1 La pointe Andina à cônes (fig. 8.a)

M5.2 La pointe Andina avec manchon de frottement (fig. 8.b)

9.5.2 - Pénétromètres à cône électrique

E1.1 La pointe électrique de Delft (fig. 9.a)

E1.2 La pointe électrique de Delft avec manchon de frottement (fig. 9.b)

E2 La pointe électrique du Degebo avec manchon de frottement (fig. 10)

9.5.3 - Pénétromètres hydrauliques

H1.1 La pointe hydraulique de Parez (fig. 11.a)

H1.2 La pointe hydraulique de Parez avec manchon de frottement (fig.11b)

9-6 Précision des mesures

Pour les essais différant de la Norme, deux classes de précision sont définies :
la classe de précision normale : voir chapitre 5.
la classe de précision basse : la précision obtenue doit être meilleure que la plus grande des valeurs suivantes :

10% de la valeur mesurée.

2 % de la valeur maximum de la gamme de mesure.

Dans tous les cas la classe de précision doit être indiquée dans le rapport et sur les graphiques.

9-7 Pénétromètres statiques dynamiques, pénétromètres avec outils de préforage.

La pénétration peut être accrue par l'usage de pénétromètres statiques dynamiques et également par l'usage de pénétromètres équipés d'outils de préforage. L'usage de tels appareils doit être indiqué clairement dans le rapport et sur les graphiques.

9-8 Précautions, contrôles et vérifications

9.8.1 - Pénétromètres mécaniques

9.8.1.1 - Tubes de fonçage

L'intérieur des tubes de fonçage ne doit pas comporter de partie saillante au droit de la connexion vissée (fig. 12)

9.8.1.2 - Tiges intérieures

Le diamètre des tiges intérieures doit être inférieur de 0,5 à 1 mm au diamètre intérieur des tubes de fonçage. Les tiges intérieures doivent glisser très facilement dans les tubes de fonçage.

Les extrémités des tiges intérieures doivent être exactement perpendiculaires à l'axe des tubes et les tiges doivent être usinées de manière à être lisses.

Les tiges intérieures ne peuvent être assemblées ni par vissage ni par tout autre moyen afin de leur laisser un degré de liberté supplémentaire ; il a en effet été constaté que tout assemblage augmente le frottement parasitaire entre les tiges et les tubes.

Avant et après essai, on doit contrôler que les tiges intérieures glissent parfaitement dans les tubes de fonçage et que le cône et éventuellement le manchon de fonçage se déplacent facilement par rapport au corps de la pointe pénétrométrique.

Afin d'augmenter la précision pour les valeurs faibles de résistance, on doit corriger les mesures d'effort enregistrées en surface par le poids cumulé des tiges intérieures en ce qui concerne la résistance de cône, et par celui des tubes de fonçage et des tiges intérieures en ce qui concerne l'effort total.

10 - NOTES EXPLICATIVES ET COMMENTAIRES

NOTE 1 : Définition 2.11

Les dénominations, essai de pénétration "continue" ou "discontinue" ne sont pas tout à fait correctes et on devrait plutôt employer les termes "essai de pénétration à fonçage simultané" ou à "fonçage non simultané du cône et du train de tiges". Toutefois ces dénominations ont été conservées du fait de leur emploi généralisé.

NOTE 2 : Définition 2.16

Le pourcentage de frottement R_f , exprime, en pour-cent, le rapport entre le frottement latéral unitaire f_s et la résistance de cône q_c ; c'est donc un nombre supérieur à un. Bien que, par le passé, ce soit ce rapport qui ait été le plus utilisé, on a maintenant tendance à utiliser l'indice de frottement I_f , défini comme le rapport de la résistance de cône q_c au frottement latéral unitaire f_s et qui donne directement un nombre supérieur à un. C'est pourquoi on a inclus les deux termes dans les définitions.

NOTE 3 : Le manchon de frottement 3.5

La rugosité est définie comme l'écart moyen de la surface réelle d'un solide par rapport au plan moyen. La rugosité est exprimée en microns (µm).

NOTE 4 : Essai discontinu 9.4.2

Dans le cas des pénétromètres mécaniques afin d'être certain que le cône et le manchon de frottement se déplacent suffisamment par rapport aux tubes de fonçage, on doit tenir compte du raccourcissement élastique des tiges intérieures. Aussi, le mouvement imposé en surface aux tiges intérieures par rapport aux tubes de fonçage doit être au moins égal à la somme du mouvement minimum requis pour le cône et du raccourcissement élastique des tiges intérieures.

NOTE 5 : Pénétromètres mécaniques 9.5.1

Il n'est pas recommandé d'effectuer l'essai continu avec un pénétromètre mécanique quand on désire une bonne précision, car le mouvement relatif des tiges intérieures et des tubes de fonçage peut changer de sens à différentes profondeurs, augmentant la marge d'erreur due aux frottements internes parasites. De plus il est nécessaire de contrôler pendant l'essai, au moins chaque mètre, que les tiges intérieures se meuvent toujours librement par rapport aux tubes de fonçage.

NOTE 6 : 9.5.1.M4

Dans le cas du cône simple, il faut prendre des précautions spéciales pour que le sol ne pénètre pas entre les éléments glissants et n'affecte pas la résistance. Il faut contrôler la pointe après extraction afin de s'assurer que le cône se déplace toujours librement par rapport à son siège.

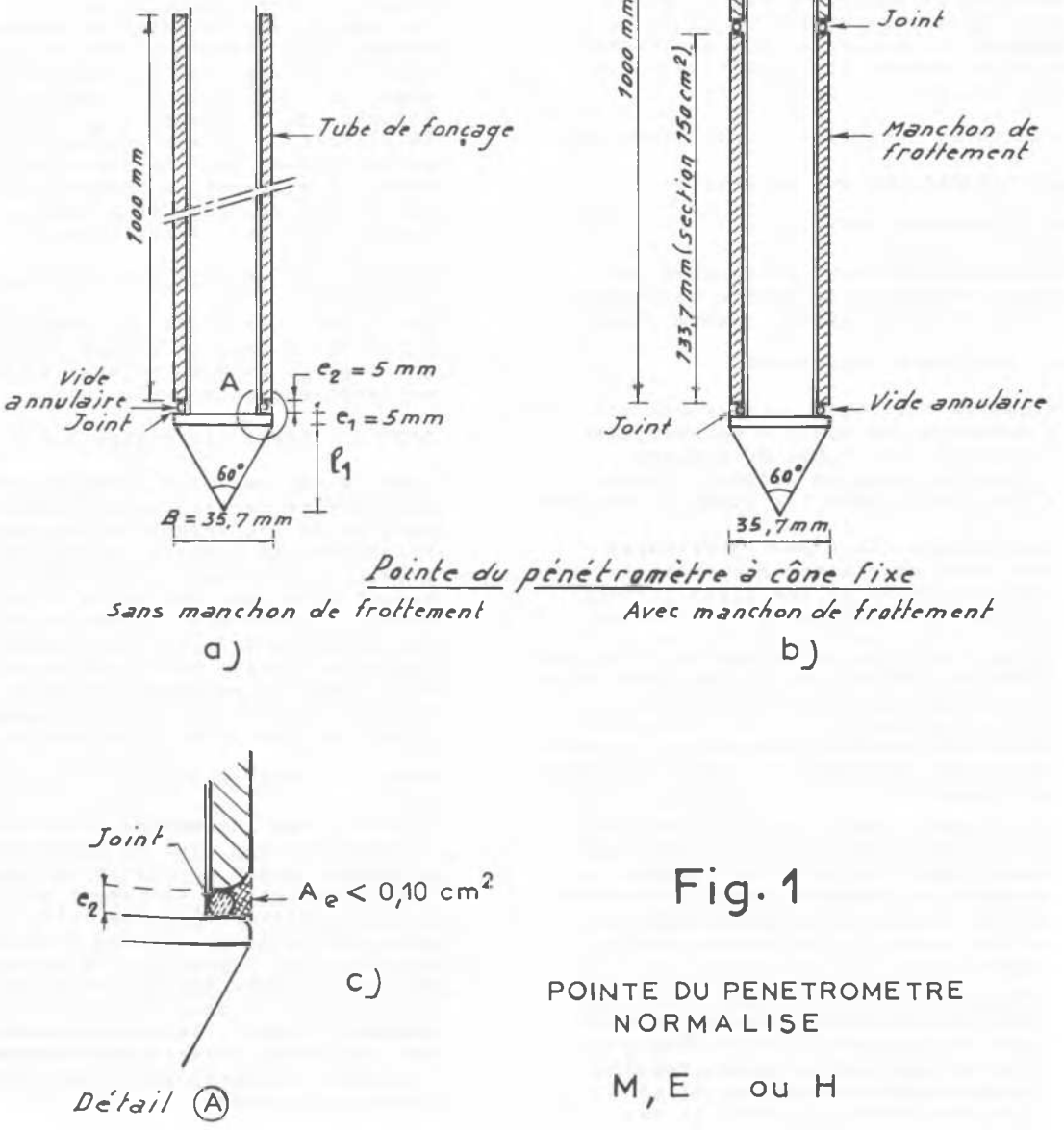
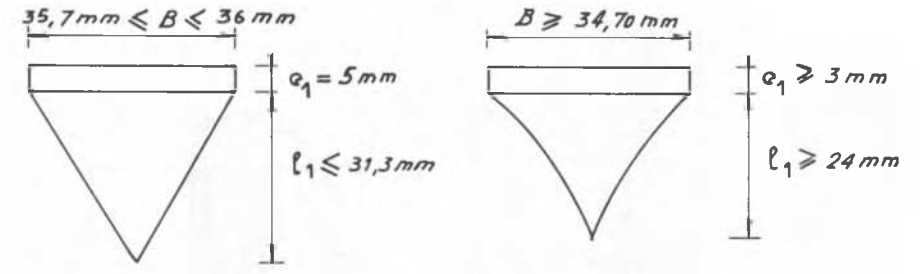


Fig. 1

POINTE DU PENETROMETRE NORMALISE

M, E ou H



Cône après fabrication

a)

Cône après usage

b)

Fig. 2

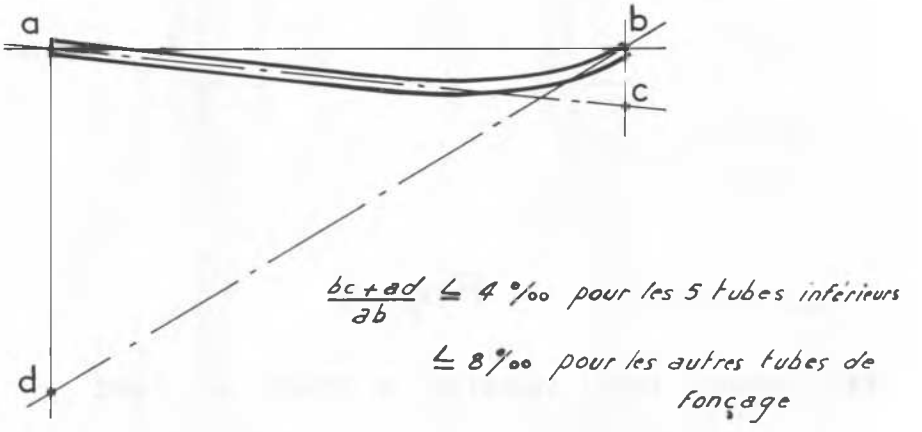


Fig. 3

PENETROMETRE NORMALISE

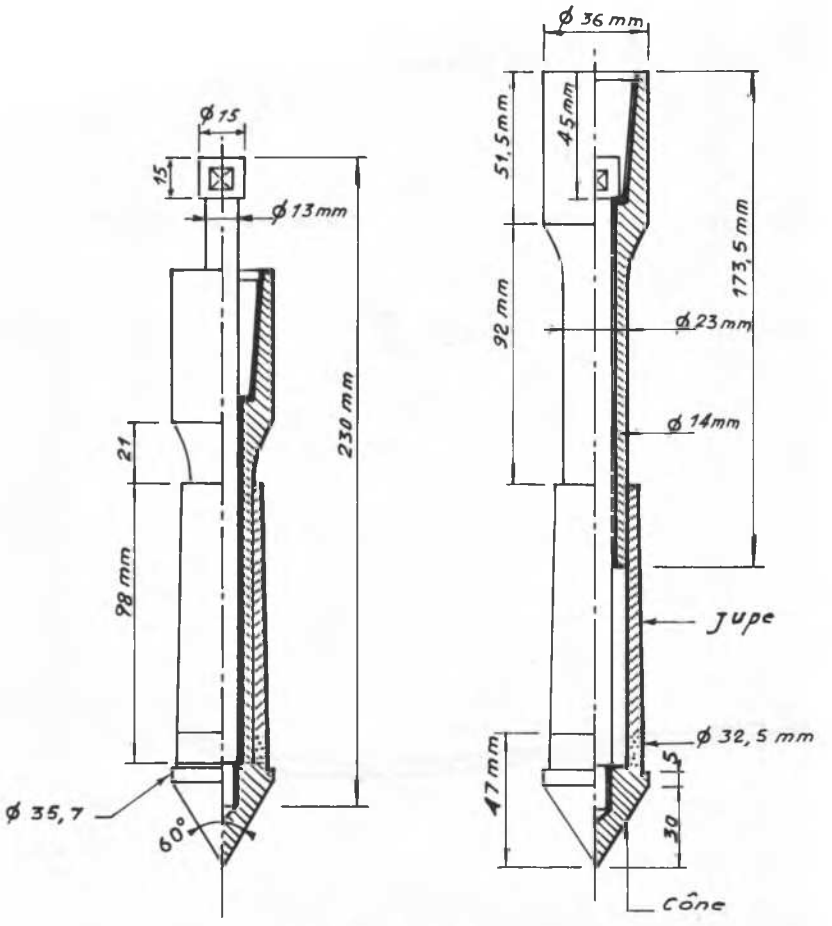


Fig. 4

M1: POINTE HOLLANDAISE A CONE A JUPE

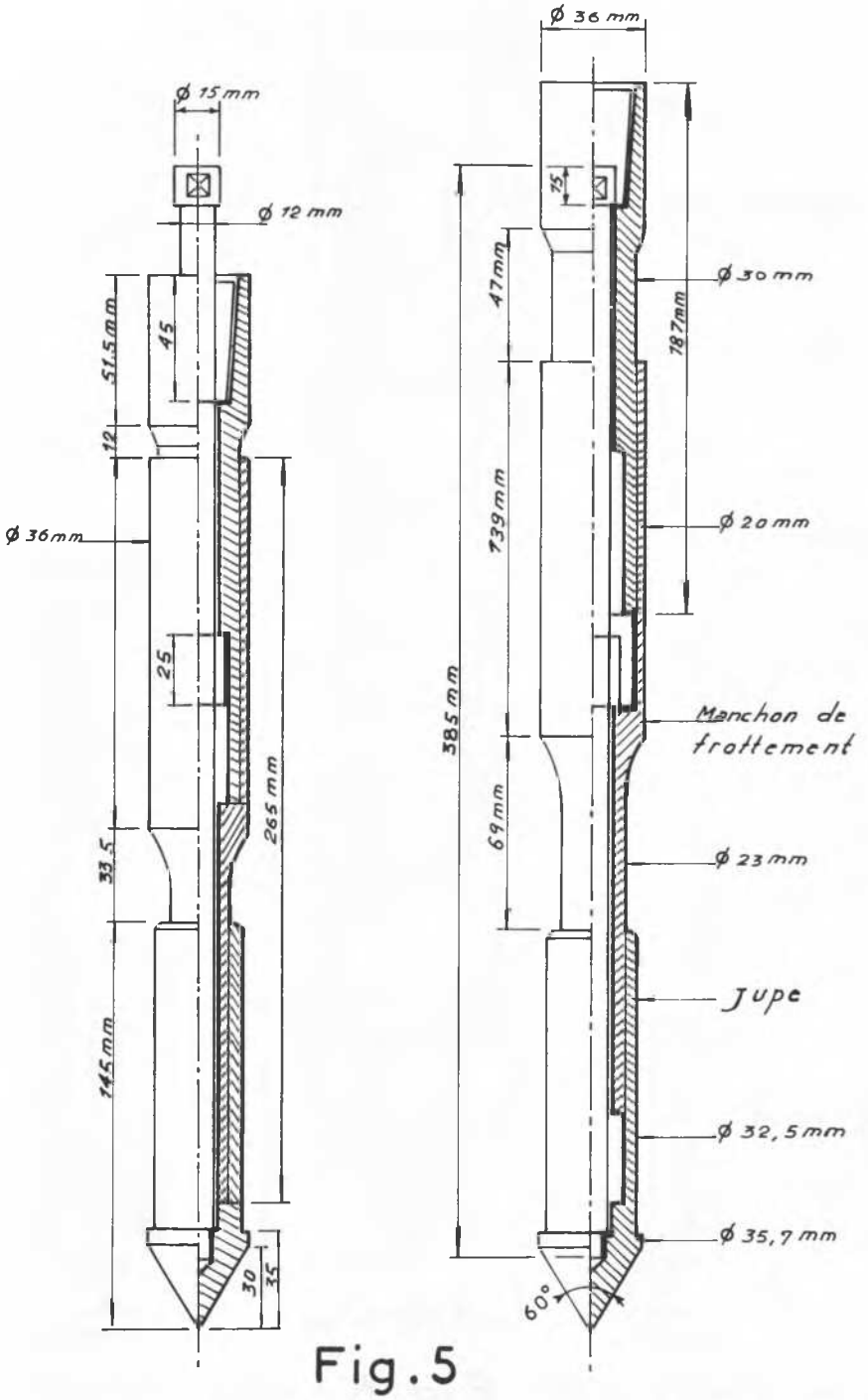


Fig. 5

M2 : POINTE HOLLANDAISE A CONE A JUPE

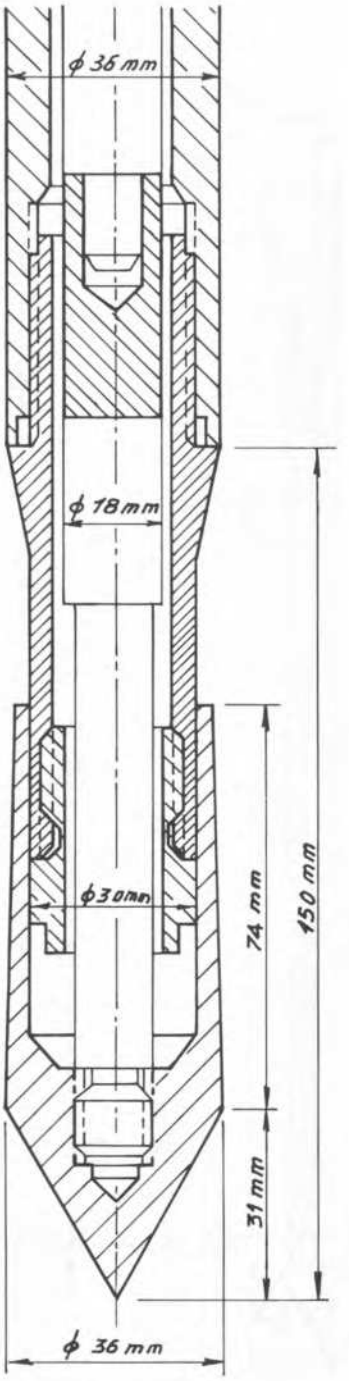


Fig. 6

M3: POINTE A CONE A JUPE d'URSS

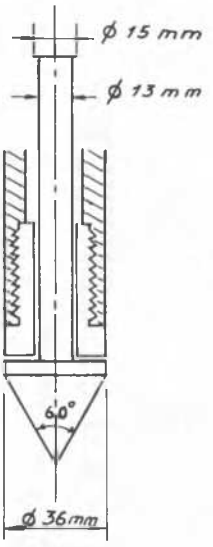


Fig. 7

M4: POINTE A CONE SIMPLE

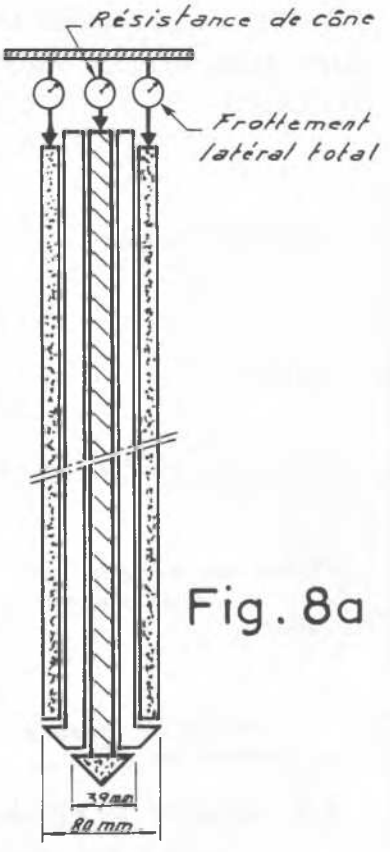


Fig. 8a

M5.1: POINTE ANDINA A CONES

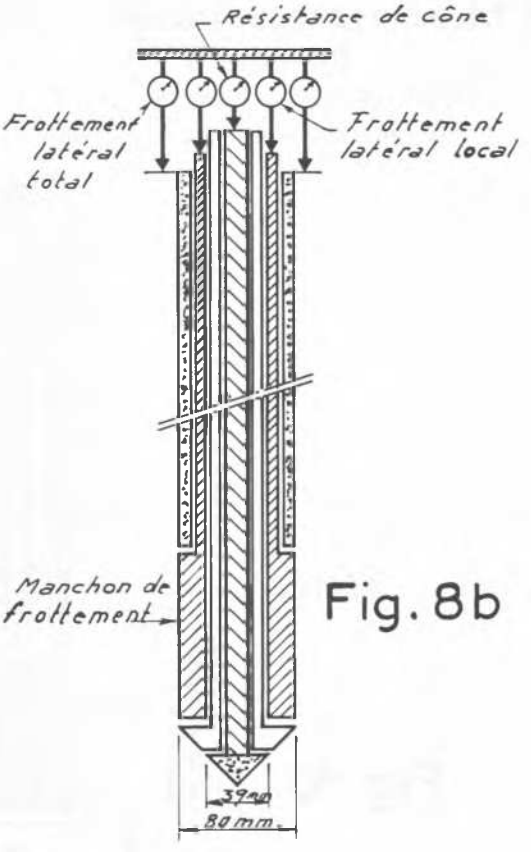


Fig. 8b

M5.2: POINTE ANDINA AVEC MANCHON DE FROTTEMENT

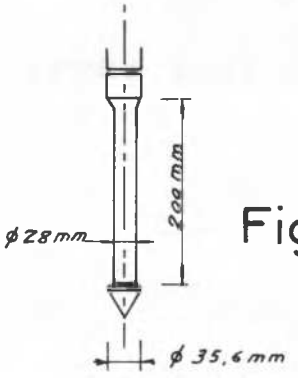


Fig.9a

E1.1_POINTE ELECTRIQUE DE DELFT

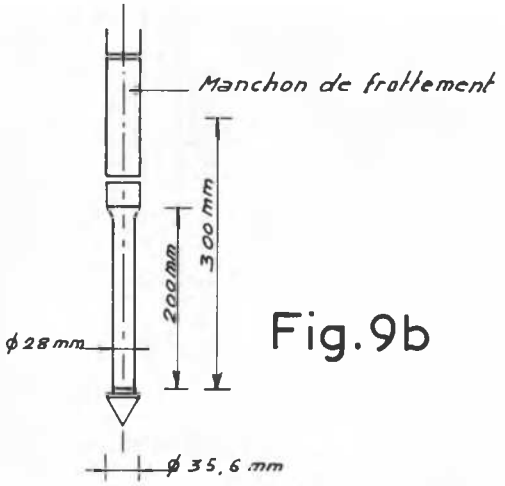


Fig.9b

E1.2_POINTE ELECTRIQUE DE DELFT AVEC MANCHON DE FROTTEMENT

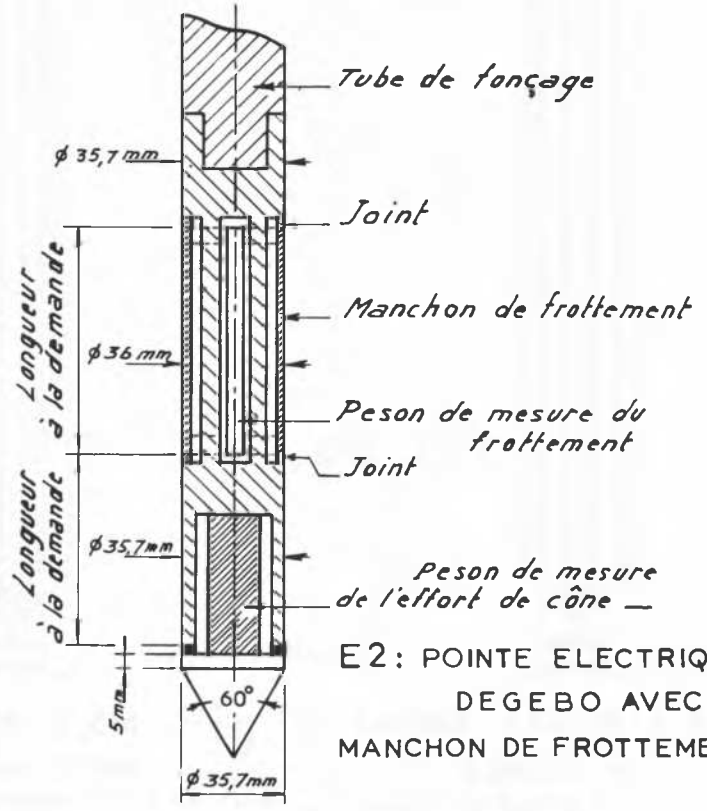


Fig.10

E2: POINTE ELECTRIQUE DEGEBO AVEC MANCHON DE FROTTEMENT

Fig. 11a

H1.1 - POINTE HYDRAULIQUE PAREZ

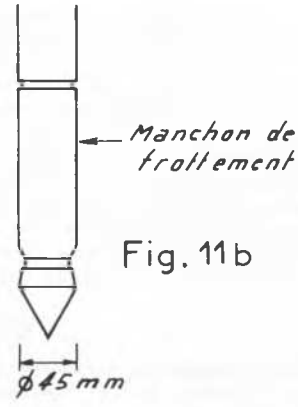


Fig. 11b

H1.2 - POINTE HYDRAULIQUE PAREZ AVEC MANCHON DE FROTTEMENT

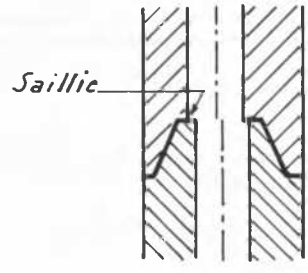


Fig. 12

PARTIE SAILLANTE

APPENDICE B - NORME RECOMMANDEE POUR LE SONDAGE. AU PENETROMETRE DYNAMIQUE

1 - OBJET -

L'expression sondage est utilisée pour marquer que l'essai comporte une mesure continue contrairement, par exemple, à l'essai S.P.T. Le but essentiel de la pénétration dynamique est de mesurer l'énergie nécessaire pour enfoncer une pointe dans le sol et obtenir ainsi des valeurs de résistance qui correspondent aux propriétés mécaniques du sol. Deux procédures, A et B, sont acceptées. Le même équipement de base peut servir à la fois aux essais D.P.A. et D.P.B. et à l'essai S.P.T. (voir tableau 1 - page 5).

La pénétration dynamique type A (D.P.A.*) est considérée comme l'essai de référence. Le frottement entre le sol et le train de tiges est négligeable.

La pénétration dynamique type B (D.P.B.*) est plus simple et plus économique que la méthode A. D.P.B. est davantage un essai de reconnaissance, car le frottement entre le sol et le train de tiges n'est que partiellement maîtrisé.

1.1 - Un mouton de masse M et d'une hauteur de chute H est utilisé pour enfoncer une pointe conique. Le mouton frappe une enclume qui est parfaitement solidaire du train de tiges. La résistance de pénétration est définie par le nombre de coups nécessaire pour un enfoncement de 0,2 m. La résistance est située dans le domaine de référence quand le nombre de coups requis pour enfoncer la pointe de 0,2 m est compris entre 5 et 100. L'énergie de frappe est égale au produit du poids du mouton par la hauteur de chute (M. g. h.).

Lorsque le nombre de coups nécessaire pour une pénétration de 0,2 m est situé dans le domaine de référence, il est appelé nombre N_d (respectivement N_{dA} et N_{dB}).

Les résultats des différents types de pénétration dynamique peuvent être exprimés par des valeurs de résistance q_d (q_{dA}, q_{dB}) ou r_d (r_{dA}, r_{dB}) en Pa, kPa ou MPa [xxx]), telles que:

$$r_d = \frac{M\ g\ H}{A\ e} \qquad q_d = \frac{M}{M + M'} \cdot \frac{M\ g\ H}{A\ e}$$

où q_d et r_d sont les valeurs de résistance

M est la masse du mouton

M' est la somme des masses du train de tiges, de l'enclume et de la tige guide

H est la hauteur de chute

e est la pénétration moyenne par coup

A est la section droite de la pointe

g est l'accélération de la pesanteur

x Dynamic Probing type A
xx Dynamic Probing type B
xxx Pa (Pascal) = 1 N/m^2

L'utilisation principale de la pénétration dynamique concerne les sols pulvérulents quand l'essai de pénétration statique est difficilement mis en oeuvre ou que les propriétés dynamiques du sol présentent un intérêt particulier (ex : en liaison avec des pieux battus). La pénétration dynamique peut permettre de détecter des couches molles dans des sols pulvérulents et de localiser des couches résistantes, par exemple dans le cas de pieux sollicités en pointe. Les sols contenant des cailloux et des blocs peuvent être caractérisés d'une manière acceptable. Normalement l'essai n'est pas adapté aux sols cohérents ni aux sols pulvérulents très lâches. Il semble impossible d'évaluer les propriétés mécaniques d'un sol situé à une grande profondeur avec la pénétration dynamique type B (D.P.B.), lorsque le frottement le long du train de tiges est important.

1.2 - CLASSIFICATION -

D'autres types d'équipement peuvent être requis pour des problèmes spécifiques, tels que les sondages au pénétromètre dynamique léger ou au pénétromètre dynamique lourd (voir note 1, page 10).

Deux méthodes différentes sont acceptées, du type A ou B, pour s'approprier aux différentes conditions géologiques. L'équipement de battage est le même pour les deux cas.

La pénétration dynamique A (D.P.A.) : de la boue de forage ou un tubage de revêtement est utilisé pour éliminer le frottement le long du train de tiges.

La pénétration dynamique B (D.P.B.) est mise en oeuvre sans boue de forage ni de tubage de revêtement. Le frottement le long des tiges peut être estimé par la mesure du couple nécessaire pour la rotation du train de tiges. D.P.B. est semblable à la méthode du sondage dynamique* qui est utilisée en Europe centrale et nordique.

Les caractéristiques nécessaires aux deux méthodes D.P.A. et D.P.B. sont résumées dans le tableau 1 page 5.

2 - APPAREILLAGE -

2.1 - MOUTON -

La masse du mouton doit être de 63,5 kg ± 0,5 kg. Le rapport entre la longueur et le diamètre du mouton doit être compris entre 1 et 2. Le mouton doit comporter un trou axial dont le diamètre est de 3 à 4 mm plus grand que celui de la tige guide. La forme de la base du mouton doit être conforme à la figure 1, page 6.

2.2 - ENCLUME ET TIGE GUIDE -

L'enclume doit être parfaitement solidaire du train de tiges. La masse de l'enclume doit être comprise entre 10 et 15 kg et le diamètre ne doit pas être inférieur à 0,1 m ni supérieur à la moitié du diamètre du mouton. L'axe de l'enclume, de la tige guide et du train de tiges doit être rectiligne, avec une déviation maximale de 5 mm par mètre. La partie haute de l'enclume doit être conforme à la figure 1. La masse totale de l'enclume et de la tige guide ne doit pas excéder 30 kg.

2.3 - HAUTEUR DE CHUTE -

Le mouton doit tomber librement et il ne peut comporter aucun élément qui puisse influencer son accélération et sa décélération. La vitesse initiale doit être négligeable quand le mouton est libéré de sa position haute. La hauteur de chute normalisée est de 0,75 m ± 0,02 m.

2.4 - TIGES -

Pour D.P.B, le diamètre des tiges doit être de 32 mm ± 0,3 mm. Des tiges creuses peuvent être utilisées.

Pour D.P.A, la masse des tiges ne doit pas excéder 8 kg/m. Leur diamètre doit être compris entre 40 et 45 mm. Un diamètre de 32 mm est possible si le train de tiges est à l'abri d'un tubage de revêtement.

Les tiges doivent être en acier de haute résistance au choc, à l'usure et à la fatigue et de grande solidité à basse température. Les déformations permanentes doivent pouvoir être rectifiées. La longueur des tiges doit se situer entre 1 et 2,0 m ± 0,1 %. Les tiges doivent être bien droites. La courbure maximale tolérée est de 1/1000ème pour les tiges neuves et de 2/1000ème pour des tiges usagées. L'excentrement maximum toléré aux joints est de 0,2 mm.

Les tiges doivent comporter des joints lisses (voir note 2, page 10).

2.5 - POINTE -

Le diamètre et la section nominale de la pointe D.P.A. sont respectivement de 62 mm ± 0,2 mm et de 30 cm2. Le diamètre et la section nominale de la pointe D.P.B. sont respectivement de 51 mm ± 0,2 mm et de 20 cm2.

Les pointes neuves doivent avoir une partie conique dont l'angle au sommet de 90°.

L'extrémité de la pointe peut être tronquée de 5 mm.

* *Méthode suédoise appelée "Ram Sounding"*

Au-dessus de la partie conique, la pointe doit être cylindrique sur une longueur égale au diamètre ± 2 mm. La face supérieure doit être perpendiculaire à la partie cylindrique (voir figure 2, page 7).

Le maximum d'usure toléré est de 2 mm par rapport au diamètre de la pointe. La pointe doit être attachée à la tige de façon qu'elle ne puisse pas être perdue pendant le battage.

2.6 - CONDITIONS GENERALES -

Le rayon de toutes les surfaces concaves doit être au moins de 0,3 mm pour éviter une rupture par fatigue.

3 - PROCEDURE D'ESSAI -

3.1 - GENERALITE -

Les critères d'arrêt d'un essai doivent être définis par avance. La profondeur requise peut dépendre des conditions locales et du but de l'essai particulier.

3.2 - EQUIPEMENT PENETROMETRIQUE -

L'essai pénétrométrique doit être effectué verticalement, en l'absence de toutes autres spécifications. Le maximum de déviation toléré pour l'équipement de battage, est de 1 (horizontal) pour 50 (vertical). L'appareillage pénétrométrique doit être stable. La pointe et les tiges doivent être guidées au début de l'essai, afin de maintenir les tiges verticales. Un avant trou peut être nécessaire. Le diamètre du trou de forage doit être légèrement plus grand que celui de la pointe. L'appareillage d'essai est mis en station de telle façon que le train de tiges ne puisse pas fléchir au-dessus du sol.

3.3.- BATTAGE -

La cadence doit être comprise entre 20 et 60 coups par minute. (La cadence recommandée est de 30 coups par minute). Dans les sols cohérents, la cadence de battage ne doit pas excéder 30 coups par minute. Le nombre de coups doit être relevé tous les 0,2 m d'enfoncement (voir note 3 page 10).

Le battage doit être effectué en continu, autant que possible. Toute interruption de plus de 5 minutes doit être notée sur la feuille d'essai.

Tous les facteurs qui peuvent influencer la résistance à la pénétration doivent être contrôlés continuellement. Toutes modifications de la procédure recommandée doivent être signalées.

La rotation des tiges est recommandée pour l'essai D.P.A. Lorsqu'un tubage est utilisé pour le D.P.A, la distance entre la pointe et la base du tubage doit être au moins de 0,3 m sans excéder 1,0 m. L'espace annulaire entre la tige et le tubage doit être faible à la base du tubage. La surface de contact avec le train de tiges doit être lisse pour éviter un grippage des tiges. Il est préférable d'injecter un fluide ou de l'air sous pression entre la tige et le tubage pour maintenir propre l'espace annulaire.

Si la boue de forage est utilisée pour éliminer le frottement entre le sol et la tige et pour stabiliser le trou, elle doit être injectée par des orifices situés dans les tiges creuses près de la pointe. Ces orifices sont dirigés horizontalement ou légèrement vers le haut. La pression d'injection doit être suffisante pour que la boue de forage puisse remplir l'espace annulaire entre le sol et la tige. La pression doit être limitée de façon que le fluide ne puisse pas s'écouler en dehors du trou de sondage (voir note 4 page 10).

Pour l'essai D.P.B, les tiges doivent être tournées d'un tour tous les mètres pour maintenir le trou droit et vertical. Quand la profondeur dépasse 10 m, les tiges doivent être tournées tous les 0,2 m. Il est conseillé que le couple nécessaire pour la rotation soit mesuré et qu'un dispositif de rotation mécanique soit utilisé quand la profondeur est importante.

Les tiges devront être examinées après chaque essai, pour vérifier leur rectitude

4 - PRESENTATION DES RESULTATS D'ESSAI -

Les informations suivantes doivent être notées :

a) Situation du sondage pénétrométrique,

Type d'application,

But du sondage pénétrométrique,

Date du sondage pénétrométrique.

b) Numéro, cote et position du sondage,

Position de l'appareillage d'essai par rapport à la surface du sol,

Cote et profondeur du niveau de la nappe.

c) Equipement utilisé,

Type de pointe, tige, tubage, fluide de forage, pression d'injection, type d'essai.

d) Masse du mouton, hauteur de chute et nombre de coups pour chaque enfoncement de 0,2 m.

e) Profondeur à laquelle les tiges sont soumises à une rotation.

f) Modifications de la procédure normale, telles que des interruptions ou des dégâts sur les tiges.

g) Observations faites par l'opérateur telles que la nature du sol, des bruits dans le train de tiges, présence de pierres, perturbations, etc.

Un exemple de feuille d'essai est donné sur la figure 3 page 8.

Les résultats du sondage pénétrométrique doivent être présentés selon des diagrammes avec les valeurs-P en abscisses et la profondeur en ordonnées. A chaque profondeur, seront indiquées la masse du mouton et la hauteur de chute. Le type d'essai doit être spécifié ainsi que le motif de l'arrêt de l'essai.

Il peut être avantageux de transformer les nombres N_d en valeurs de résistance q_d ou r_d à partir de l'équation donnée en 1.1.

Un exemple de présentation des résultats d'essai est donné sur la figure 4 page 9.

5. PROCEDURES EN DEHORS DU DOMAINE DE REFERENCE

La résistance de pénétration dynamique est située dans le domaine de référence quand 5 à 100 coups sont nécessaires pour enfoncer le pénétromètre de 0,2 m. Le rebond, pour chaque coup, doit être inférieur à 50 % de la pénétration sous le coup.

Il peut être intéressant d'effectuer un sondage pénétrométrique en dehors du domaine de référence, selon un procédé réglementé. En dehors du domaine de référence, lorsque la hauteur de chute ou la masse du mouton est modifiée, la résistance de pénétration est donnée par les valeurs N'_d (respectivement N'_{dA} et N'_{dB}). Si, plus de 100 coups sont nécessaires tous les 0,2 m ou que le rebond est excessif, il est conseillé de fixer la hauteur de chute à 1,0 m. Quand la résistance de pénétration est moindre que 5 coups pour 0,2 m il est recommandé de réduire la hauteur de chute et de la porter à 0,5 voire 0,25 m afin d'augmenter la sensibilité de la méthode. Si le rebond est excessif, alors que la hauteur de chute a été augmentée, il est conseillé de porter la masse du mouton à 127 kg.

Il est peu probable qu'une pointe ayant un angle au sommet de 60° puisse donner des résultats très différents de celle ayant un angle au sommet de 90°. Aussi le cône de 60° est autorisé à condition de le spécifier sur la feuille d'essai.

TABLEAU 1

- RESULTATS DE SONDAGE AU PENETROMETRE DYNAMIQUE -

FACTEURS	NORME D.P.A.	NORME D.P.B.	REMARQUES
Masse du mouton en kg	63,5 ± 0,5		
Hauteur de chute en m	0,75 ± 0,02		
Masse de l'enclume en m	10 à 15		
Plage normale, nombre de coup/0,2 m	5 à 100		
Rebond maximum en %	50		
Rapport longueur sur diamètre du mouton	1 à 2		Figure 1
Longueur de la tige en m	1,0 à 2,0 ± 0,1 %		
Masse maximale d'une tige en kg/m	8		
Courbure maximale, tige neuve en %	0,1		
Courbure maximale tige usagée en %	0,2		
Excentrement maximum des tiges en mm	0,2		
Diamètre de la tige en mm	40 à 45	32 ± 0,3	remarque ci-dessous
Angle au sommet	90°		Note 3
Section nominale de la pointe en cm2	30	20	Figure 2
Diamètre d'une pointe neuve en mm	62 ± 0,2	51 ± 0,2	"
Diamètre d'une pointe usagée en mm	60	49	"
Longueur cylindrique de la pointe en mm	62 ± 2	51 ± 2	"
Angle de décrochement à la face supérieure de la pointe	90°		"
Stabilisation du trou de sondage	Oui	Non	

REMARQUE : Pour le D.P.A, des tiges d'un diamètre de 32 mm sont autorisées si elles sont isolées par un tubage adapté.

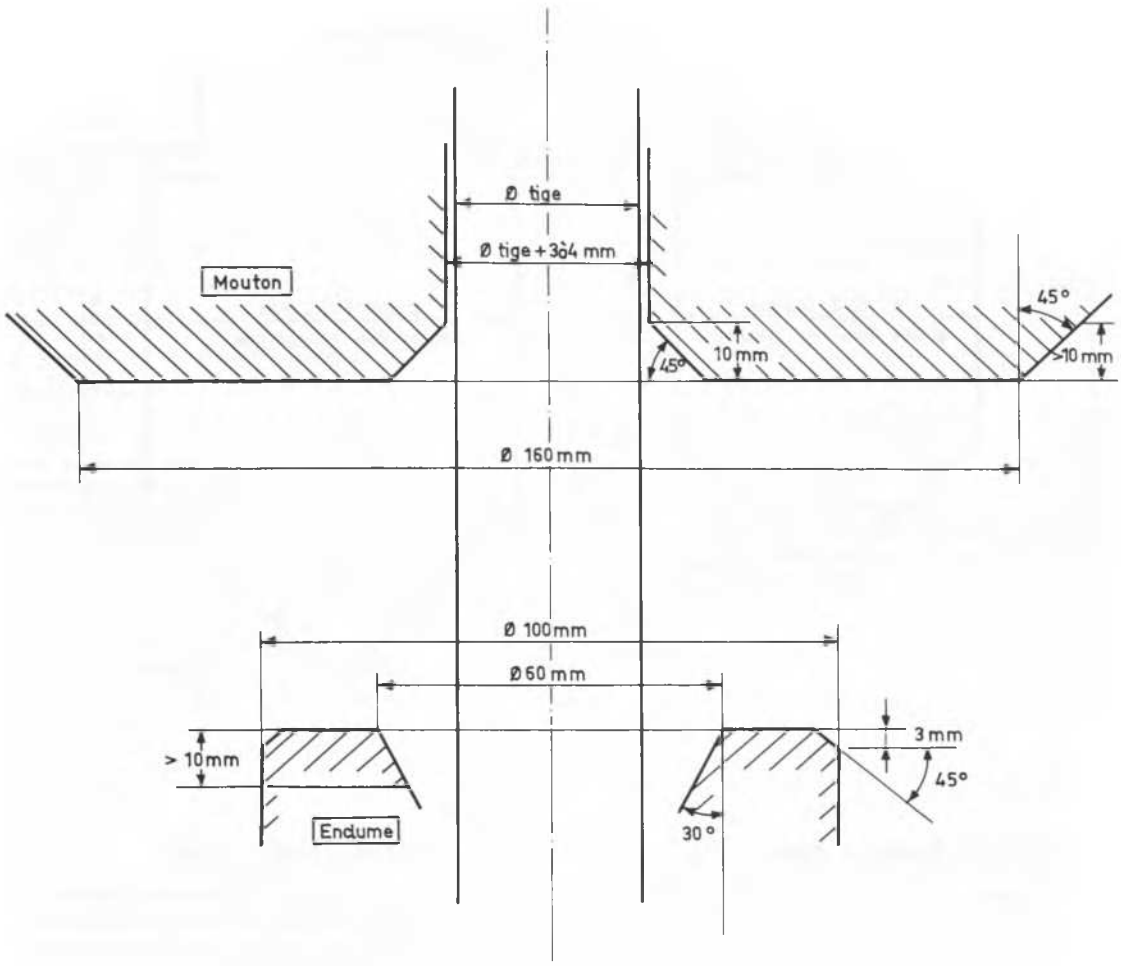
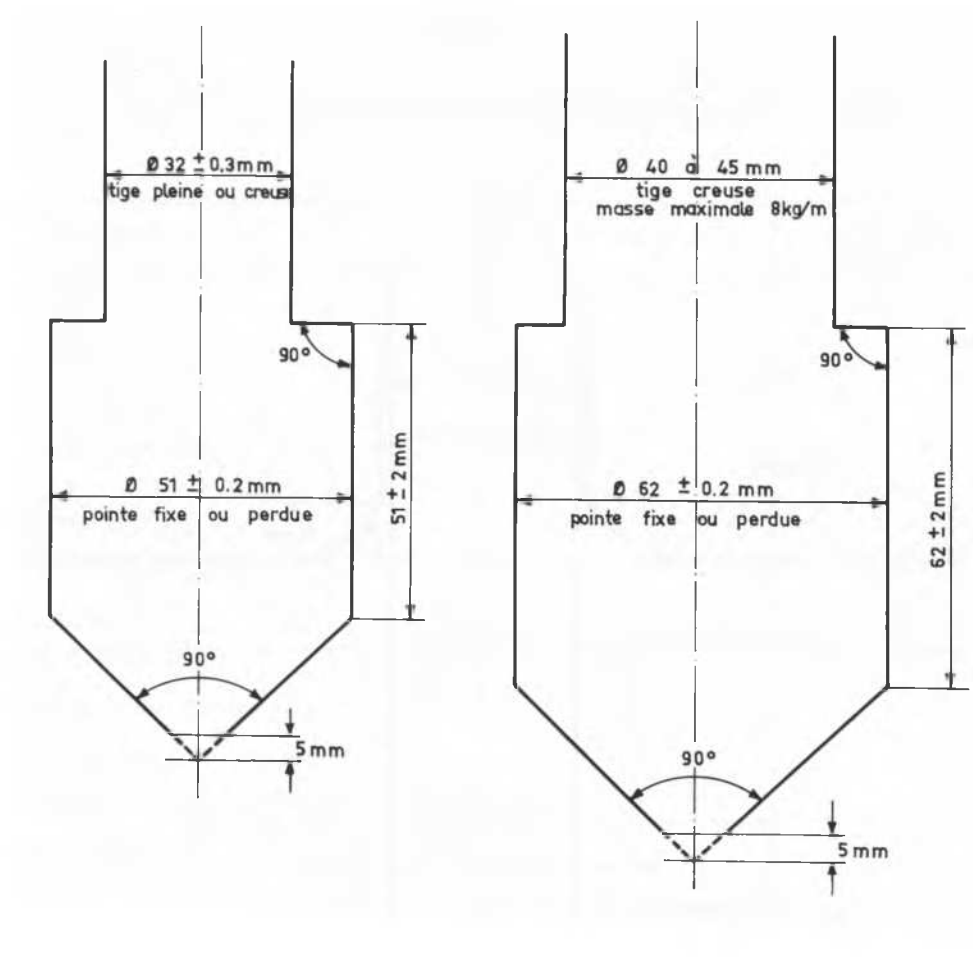


FIGURE 1 - SURFACES DU MOUTON ET DE L'ENCLUME DU PENETROMETRE DYNAMIQUE



a) D.P.B. Pointe et Tige

Note 1

Note 2

b) D.P.A. Pointe et Tige

Des tiges d'un diamètre jusqu'à 32 mm peuvent être utilisées pour D.P.A. si elles sont isolées par un tubage adapté.

Une pointe usée ne doit pas avoir un diamètre inférieur de plus de 2 mm de celui d'une pointe neuve.

- FIGURE 2 - POINTES ET TIGES DE PENETRATION DYNAMIQUE -

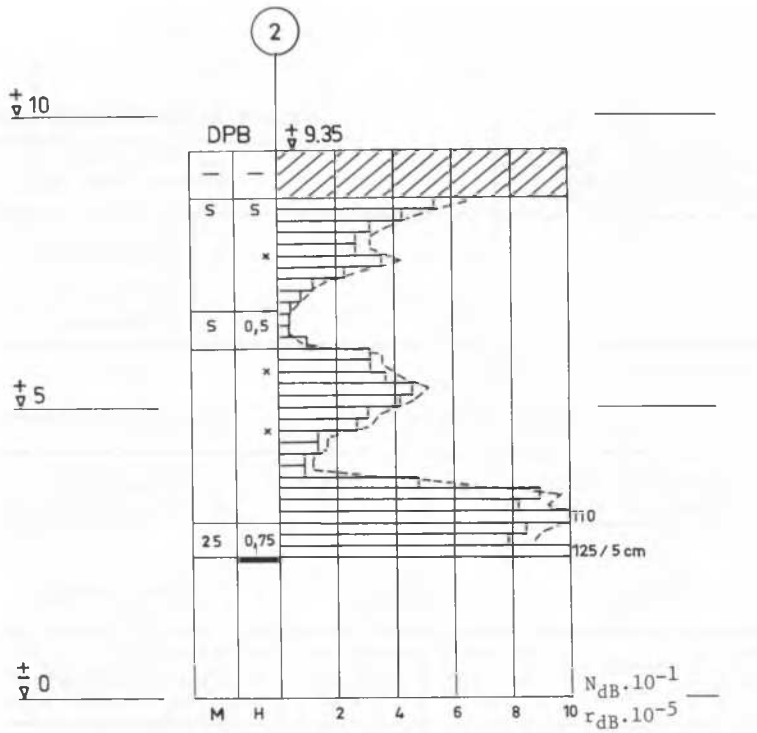
FEUILLE D'ESSAI

SONDAGE AU PENETROMETRE DYNAMIQUE

Projet : Situation : N° du sondage :	Feuille n° : Date : Opérateur :
Cotes : Surface du sol : Nappe aquifère : Niveau de référence :	
But de l'essai :	Type :
Equipement : Tige : Tubage : Pointe : Fluide de forage :	

Profondeur en-dessous du niveau de référence (m)	Mouton (kg)	Hauteur de chute (m)	Nombre de coups pour 0,2 m	Notation : Délai, rotation, bruits Motif de l'arrêt, forme de tiges

- FIGURE 3 - EXEMPLE DE FEUILLE D'ESSAI POUR LA PENETRATION DYNAMIQUE -



LEGENDE : Numéro du sondage (2)

Cote : + 9,35, + 10, + 5, ± 0

Type d'essai : D.P.B.

S = masse et hauteur de chute normales

M = masse adaptée en kg (hors norme)

H = hauteur adaptée en m (hors norme)

x = rotation des tiges

110 = nombre de coups au delà de 100

N_{dB} = nombre de coups pour 20 cm - essai type B

r_{dB} = valeur spécifique de résistance en Pa

Mesures non effectuées

Nombres N_d

Valeur r_d

Symbole pour fin de sondage

- FIGURE 4 - PRESENTATION DES RESULTATS DE PENETRATION DYNAMIQUE -

5 - NOTES EXPLICATIVES -

NOTE 1 -

Le sondage au pénétromètre dynamique léger est fréquemment utilisé en Europe centrale. Une méthode de pénétration dynamique légère a été développée en Allemagne de l'Ouest et a été décrite dans Géotechnique Vo XVIII n° 1, Mars 1968. Cette méthode a été normalisée (norme allemande DIN 4094, feuilles 1 et 2). Une méthode de pénétration dynamique légère a également été développée et normalisée en Bulgarie (norme bulgare 8994-70). Ces deux méthodes sont décrites dans les compte-rendus du Symposium européen sur les essais de pénétration, STOCKHOLM 1974 (vol. 1, pages 19 - 21).

Aucune recommandation, pour la normalisation de la pénétration dynamique légère, n'a été présentée dans cette proposition. Il est cependant utile de comparer les deux méthodes mentionnées ci-dessus avec D.P.A. et D.P.B.

D.P.A. et D.P.B. doivent couvrir la plupart des besoins de pénétration dynamique lourde. Il y a cependant, un besoin d'équipement qui correspond à des essais de battage de pieux à échelle réduite. Toutefois, un tel équipement doit être très mécanisé tant pour le battage que pour le transport du matériel. Aussi, aucune recommandation de normalisation de la pénétration dynamique lourde n'a été proposée.

NOTE 2 -

Il est pratique de marquer les tiges tous les 0,2 m par un rainurage ou autre moyen. La courbure et l'excentrement sont mesurés d'une manière satisfaisante en solidarisant une tige avec une tige rectiligne, et en maintenant cette dernière en contact avec une surface plane.

NOTE 3 -

Si la résistance varie considérablement sur un intervalle de 0,2 m, la résistance doit être relevée tous les 0,1 m.

NOTE 4 -

Un tourillon peut être placé entre l'enclume et l'extrémité supérieure des tiges quand la pénétration excède 1 m, afin d'assurer une injection de boue de forage entre les tiges et les parois du trou de sondage.

APPENDICE C - NORME RECOMMANDEE POUR L'ESSAI SPT

SOMMAIRE

1 - BUT DE LA NORME

1.1 - Le mode opératoire décrit un essai destiné à mesurer la résistance à la pénétration d'un échantillonneur fendu dans les sols et à récupérer des échantillons remaniés du terrain dans un sondage pour les identifier. L'essai donne des renseignements sur les variations de nature et de dureté des sols.
L'essai consiste à laisser tomber en chute libre un marteau pesant 63,5 kg d'une hauteur de 760 mm sur des tiges de forage. Le nombre de coups N nécessaire pour obtenir un enfoncement de 300 mm après un battage de mise en place, caractérise la résistance à la pénétration (cet essai a été développé aux U.S.A. et est très largement connu sous l'appellation "Essai de pénétration standard" (Standard Pénétration Test).

2 - APPAREILLAGE

2.1 - Equipement de forage.

2.1.1. - On doit pouvoir obtenir avec l'équipement de forage un trou de sondage suffisemment propre pour être assuré que l'essai d'enfoncement soit fait dans un terrain relativement peu remanié.

2.1.2 - Quand on réalise le trou de sondage par lançage, celui-ci doit être fait par des orifices latéraux de décharge, mais pas par la base de l'outil de forage. Le lançage à l'eau claire par l'intermédiaire d'un échantillonneur formant un tube ouvert et la réalisation de l'essai quand la profondeur désirée est atteinte ne doivent pas être autorisés.

2.1.3. -
Le procédé consistant à faire le forage par lançage de boue de forage à travers l'échantillonneur et à réaliser l'essai quand la profondeur requise est atteinte peut être employé, à condition que le débit et la pression de la boue de forage aient été réglés pour ne pas perturber le sol soumis à l'essai (voir paragraphe 3.2.2).

2.1.4. -
Lorsque le sondage est fait à la tarière, l'outil doit avoir un diamètre inférieur aux 9/10ème du diamètre du tubage, ou du trou s'il n'est pas tubé.

2.1.5. -
Quand les sols traversés ne permettent pas le forage à découvert, on doit utiliser des tubages provisoires ou de la boue de forage pour éviter les éboulements des parois du trou.

2.1.6. -
Le diamètre du trou de sondage doit être compris entre 60 mm et 200 mm.

2.2 - Echantillonneur fendu

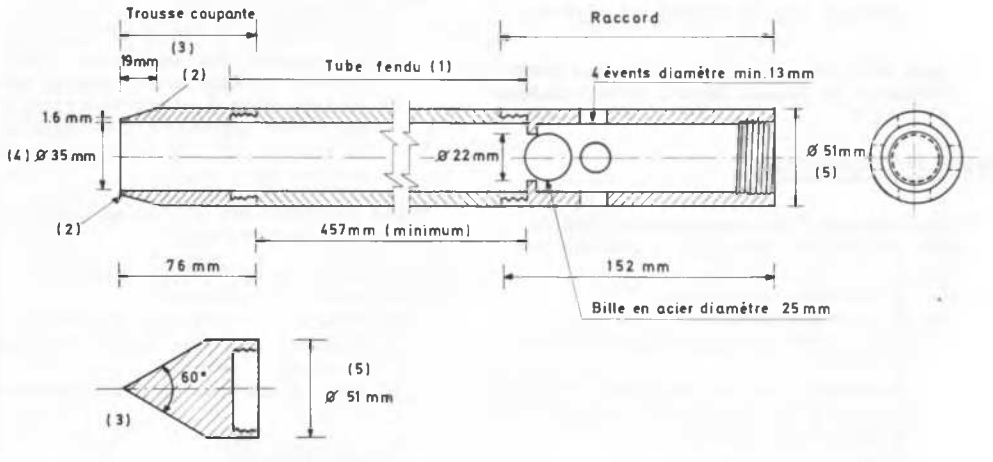
2.2.1. -
L'échantillonneur doit avoir les dimensions indiquées sur la figure 1.

2.2.2. -
La partie inférieure (trousse coupante) de l'échantillonneur doit être en acier traité. Il doit être remplacé dès qu'il est quelque peu abimé ou déformé. (voir note 1).

2.2.3. -
La partie centrale de l'échantillonneur doit être en acier et fendu de manière à premettre commodément d'examiner et de recueillir l'échantillon de sol.

2.2.4. -
La partie supérieure (tête) de l'échantillonneur doit être munie de 4 trous d'évent de 13 mm de diamètre au minimum et contenir une bille d'acier de 25 mm de diamètre formant valve et reposant sur un orifice rond de 22 mm de diamètre au moins, situé en dessous des trous d'évent, afin de permettre la récupération de l'échantillon lorsque le trou de sondage est plein d'eau. La bille et son siège doivent, dans leur conception et au cours de leur utilisation, former une valve étanche lorsque l'échantillon est retiré (voir

note 2).



Notes : (1) Le tube fendu peut contenir une enveloppe d'un diamètre intérieur de 35 mm

(2) Les angles en (2) peuvent être légèrement arrondis

(3) Dans les sols graveleux, la trousse coupante peut être remplacée par un cone plein en acier de 51mm de diamètre et de 60° d'angle au sommet

Tolerances : (4) ± 1 mm

(5) ± 1 mm

Fig. 1 COUPE DE L'ECHANTILLONNEUR S.P.T

2.3. - Tige d'assemblage

2.3.1. -
Les tiges d'assemblage utilisées pour enfoncer l'échantillonneur par battage doivent avoir une raideur égale ou supérieure à celle des tiges AW (43,7 mm de diamètre extérieur, 34,1 mm de diamètre intérieur, poids au ml environ 6 kg). Pour des trous de sondages de profondeur supérieure à 15 m, des stabilisateurs doivent être utilisés avec un espacement de 2 m, ou d'autres tiges de raideur égale ou supérieure à celle des tiges BW (54,0 mm de diamètre extérieur, 44,4 mm de diamètre intérieur, et environ 8 kg/ml de poids). (voir note 3).

2.3.2. -
Tolérance sur la rectitude des tiges : l'écart par rapport à une ligne droite le long de n'importe quelle génératrice doit être inférieur à 1/1200ème de la longueur contrôlée.

2.3.3. -
Les tiges doivent être assemblées étroitement.

2.4. - Ensemble de battage

2.4.1. -
L'ensemble de battage doit comprendre :

a) une tête de battage ou enclume vissée sur les tiges d'assemblage (voir note 4).
b) Une masse frappante (mouton) de 63,5 kg (± 0,5 kg)
c) un système de guidage permettant au mouton de tomber en chute libre de 760 mm (± 0,02 m).

Des précautions spéciales doivent être prises pour s'assurer que l'énergie de la chute du mouton ne soit pas trop réduite par frottement entre le mouton et le guide (voir note 5).

3 - MODE OPERATOIRE

3.1. - Préparation du trou de sondage

3.1.1. -
Le trou de sondage doit être soigneusement nettoyé jusqu'au niveau de l'essai, avec une méthode et des instruments évitant toute perturbation du sol au ni-

veau de l'essai.

3.1.2. -
Le niveau de l'eau dans le trou de sondage doit toujours être maintenu au niveau de la nappe phréatique ou légèrement au-dessus (voir note 6).

3.1.3. -
L'outil de forage doit être retiré lentement pour éviter de perturber le sol au niveau de l'essai.

3.1.4. -
Quand un tubage est utilisé, il ne doit pas être descendu en dessous du niveau auquel sera commencé l'essai.

3.2. - Essai de pénétration

3.2.1. -
L'échantillonneur doit être descendu au fond du trou de forage et les informations suivantes recueillies :
a) Diamètre et profondeur du tubage.
b) Profondeur du trou de sondage.
c) Niveau de l'eau (ou de la boue) dans le trou de sondage.
d) Si un cône plein en acier est utilisé à la place de la trousse coupante, on doit l'indiquer, sous l'appellation de S.P.T. (cône).
e) Le type des tiges.
f) Pénétration de l'échantillonneur dans le sol sous le poids des tiges et de l'échantillonneur.
g) type de marteau.

3.2.2. -
L'échantillonneur doit être enfoncé par battage en deux étapes, de la manière suivante :

Mise en place : pour un enfoncement de 0,15 m (y compris la pénétration initiale sous le propre poids de l'échantillonneur et des tiges). Si cet enfoncement n'est pas obtenu en 50 coups de mouton, le battage de mise en place doit être arrêté à ce nombre de coups.

Essai : enfoncement de 0,30 m après la mise en place. Le nombre de coups nécessaires est la résistance à la pénétration N. Si la pénétration de 0,30 m n'est pas obtenue au bout de 50 coups, (ou 100 coups si le cône SPT est utilisé) l'essai doit être arrêté là.

La cadence de battage ne doit pas excéder 30 coups /minute. Les nombres de coups nécessaires pour obtenir les premiers 0,15 m d'enfoncement et les 0,15 m suivant doivent être notés. Si la mise en place ou l'essai sont terminés avant l'obtention de l'enfoncement total, on doit indiquer la valeur de l'enfoncement obtenu pour les 50 coups de mouton correspondants.

3.3. - Recueil de l'échantillon et étiquettage

3.3.1. -
L'échantillonneur doit être amené à la surface et ouvert. Les ou l'échantillon représentatif du sol doit être placés dans des récipients étanches. (voir note 7).

3.3.2. - Des étiquettes doivent être fixées aux récipients avec les informations suivantes :

a) Nom du chantier
b) Numéro du sondage
c) Numéro de l'échantillon
d) Profondeur de l'essai
e) longueur de l'échantillon récupéré.
f) Date de l'essai.

4. - PRESENTATION DES RESULTATS

4.1. - Les informations suivantes doivent être indiquées :

a) Résultats de l'essai (ainsi qu'indiqué au paragraphe 3.2.2.).
b) Profondeurs entre lesquelles la résistance à la pénétration a été mesurée.
c) Information sur le niveau d'eau dans le sol et dans le sondage avant chaque essai.
d) Le type de sol et la description de l'échantillon (avec une coupe des terrains traversés par le sondage si les renseignements recueillis permettent de l'établir).

Les informations suivantes doivent également figurer dans le rapport :

e) Date d'exécution du sondage.
f) Numéro du sondage.
g) Méthode de forage et diamètre du tubage.
h) Diamètre et poids au ml des tiges utilisées au cours de l'essai.
j) Type de marteau et d'enclume utilisés.

5 . COMMENTAIRES

Note 1 - Clause 2.2.2.
La trousse coupante est prévue pour ne laisser aucun jeu intérieur par rapport au diamètre interne de l'échantillonneur S.P.T.. Par conséquent, une déformation de la trousse coupante vers l'intérieur ne doit pas être tolérée.

Note 2 - Clause 2.2.4.
Le système formant valve peut être conçu de manière différente pourvu qu'il donne un résultat équivalent ou meilleur.

Note 3 - Clause 2.3.1.
La raideur des tiges utilisées peut, croit-on, avoir une influence sur la résistance à la pénétration mesurée, surtout à cause du flambage des tiges sous les coups de mouton si elles sont trop légères.

Note 4 - Clause 2.4.1. (a)
Une tête de battage trop malléable doit être évitée. Il est préférable que la surface de frappe de la tête de battage soit convexe (environ 3 mm pour 100 mm) pour éviter que le mouton ne glisse sur la surface recevant le coup.

Note 5 - Clause 2.4.1. (c)
Un marteau à accrochage automatique supprime les frottements liés au système d'accrochage du mouton et son utilisation est recommandée. Un mouton en chute libre donnera des résultats plus fidèles et des valeurs N plus faibles qu'un système de battage avec poupée, cabestan et corde pour soulever et laisser retomber le mouton.
Avec un marteau à accrochage automatique, le mouton doit être relevé lentement, afin de ne pas dépasser la hauteur de chute libre prescrite (0,76 m + 0,02 m). De même, on devra éviter de faire retomber brutalement le système d'accrochage sur le mouton.
L'emploi d'un marteau agissant directement sur l'échantillonneur, sous la protection d'une enceinte étanche, est autorisé.

Note 6 - Clause 3.1.2.
Afin d'éviter des remaniements dues aux conditions hydrauliques, la charge d'eau dans le sondage doit correspondre à celle de l'eau dans le sol dans la

zone de l'essai. Dans des conditions artésiennes, celle-ci diffèrera de la charge statique de la nappe phréatique.
Des renseignements sur le niveau d'eau dans les couches de terrain soumises aux essais doivent être recueillis. On doit faire spécialement attention lorsque l'on risque de rencontrer des conditions artésiennes, comme quelquefois lorsque l'on traverse des sols imperméables pour atteindre des sols perméables.

Toutes les opérations qui peuvent entrainer une irruption d'eau dans le sondage et un remaniement du sol doivent également être indiquées.

Note 7 - Clause 3.3.1.
L'échantillon recueilli dans l'échantillonneur fendu est utilisé pour l'identification du sol. Il doit être considéré comme remanié pour déterminer des caractéristiques mécaniques du sol.

Méthode de forage	Tarière	Situation	SONDAGE E 2
Diamètre de forage (mm)	150	Coordonnées 5176 E 3097 N	(page)
Diamètre de tubage (mm)	150		Altitude (m) 3.20
Equipement du forage			Commencé le 28 Mai 1975

Echantillons et essais in situ		SPT		Prof. du tubage	Niveau d'eau	Date et prof.	Description des couches	Altitude
Profondeur (m)	Type	Nombre de coups 150mm	N	(m)	(m)	(m)		(m)
					0.70	28/5		
1.00/1.30	S	3/4	7	0.85				
2.00/2.30	S	4/5	9	1.85			Sable fin à moyen gris, lâche devenant moyennement dense	
3.00/3.30	S	10/13	23	2.85				
4.00/4.30	S	11/14	25	3.85				
5.00/5.30	S	8/11	19	4.85		5.50		-2.30
5.80/6.10	S	14/17	31	5.65			Sable fin à moyen brun dense à très dense	
7.00/7.23	S	23/(27)	(50)	6.85		7.60		-4.40
7.90/8.20	SC	20/21	44	7.75		8.20	Sable grossier gris et graviers denses	-5.00

Fig.

Légende : S = SPT SC = SPT (cône) ( ) = essai terminé avant pénétration complète

Fig. 2 EXEMPLE DE PRESENTATION DES RESULTATS SPT (proposition)

APPENDICE D - NORME PROPOSEE POUR L'ESSAI DE PENETRATION PAR CHARGES

1. - INTRODUCTION

1.1. Le pénétromètre suédois à charges comporte une pointe hélicoïdale, des tiges, des poids et une poignée. Il est utilisé comme pénétromètre statique dans les sols mous quand la résistance à la pénétration est inférieure à 1 kN. Quand la résistance dépasse 1 kN, le pénétromètre est enfoncé par rotation et on note le nombre de tours nécessaires pour obtenir un enfoncement donné. Ce pénétromètre possède une bonne capacité de pénétration dans les argiles raides et les sables denses. On l'utilise surtout pour obtenir un profil de sol continu et des indications sur la séquence des couches ainsi que pour déterminer l'extension latérale des différentes couches d'un site. On l'utilise aussi pour déterminer si les sols non cohérents sont lâches, moyennement denses ou denses, et pour estimer les résistances relatives des sols cohérents. Les résultats obtenus dans les sols non cohérents sont également utilisés pour calculer la capacité portante des fondations superficielles et des pieux.

2. - APPAREILLAGE

2.1. Poids.

2.1.1. Ils comprennent un collier de 5 kg., deux poids de 10 kg et trois de 25 kg, soit 100 kg au total. Les poids peuvent être remplacés par un dynamomètre quand le pénétromètre est foncé manuellement.

2.1.2. La tolérance sur les poids et l'échelle du dynamomètre est de ± 5%.

2.2. Train de tiges

2.2.1. Le diamètre des tiges doit être de 22 mm. (Voir Note 1).

2.2.2. L'écart de l'axe des tiges par rapport à l'axe vertical ne doit pas excéder 4‰ pour les tiges situées dans les 5 m inférieurs, et 8‰ pour le reste. (Cet écart est défini sur la figure 3 de l'annexe A). L'excentricité maximale tolérée pour chaque raccord est de 0,1 mm. L'écart angulaire maximum à la jonction de deux tubes est de 0,005 rad.

2.2.3. Raccords lisses : Voir Fig. 1.

2.3. Pointe

2.3.1. La pointe est fabriquée à partir d'une barre d'acier carrée de 25 mm de côté et de 0,20 m de longueur. La barre possède une pointe pyramidale de 80 mm de longueur. Elle est torsadée avec un pas à gauche sur une longueur de 130 mm , comme indiqué sur la Figure 2.

2.3.2. Le diamètre du cercle circonscrit à la pointe ne doit pas être supérieur à 35,0 ± 0,2 mm pour une pointe neuve , ni inférieur à 32,0 ± 0,2 mm pour une pointe usagée. Les diamètres doivent être contrôlés à l'aide de calibres circulaires de différents diamètres intérieurs.

Le raccourcissement maximal toléré pour la pointe du fait de l'usure est de 15 mm. L'extrémité de la pointe ne doit pas être courbée ni cassée.

2.4. Matériel divers (non normalisé)

Deux clés, une poignée, un système d'extraction et des tarières pour le préforage.

3. - MODE OPERATOIRE DE L'ESSAI

3.1. Essai de charges manuel

Quand le pénétromètre est utilisé comme pénétromètre statique dans les sols mous l'essai doit être effectué selon les indications des paragraphes 3.1.1. et 3.1.2. Dans les sols plus raides, le pénétromètre doit être utilisé en rotation comme indiqué au paragraphe 3.1.3.

3.1.1. Le train de tiges est chargé par paliers en utilisant les charges normalisées suivantes:

CHARGES en kN	MASSES en kg
0	0
0,05	5
0,05 + 0,10 = 0,15	5 + 10 = 15
0,15 + 0,10 = 0,25	15 + 10 = 25
0,25 + 0,25 = 0,50	25 + 25 = 50
0,50 + 0,25 = 0,75	50 + 25 = 75
0,75 + 0,25 = 1,00	75 + 25 = 100

3.1.2. La charge doit être ajustée pour obtenir une vitesse de pénétration d'environ 5 mm/s. Cela signifie que le train de tiges doit être partiellement déchargé quand on vient de traverser une couche de sol raide, telle une croûte durcie.

3.1.3. Si la résistance à la pénétration dépasse 1 kN ou si la vitesse de pénétration sous 1 kN est inférieure à 20 mm/s, le pénétromètre doit être utilisé en rotation.

La charge de 1 kN est maintenue et le nombre de demi-tours nécessaire pour obtenir 0,20 m d'enfoncement est mesuré. Le pénétromètre ne doit pas être utilisé en rotation quand la résistance à la pénétration est inférieure à 1 kN.

3.2. Essai de charges mécanisé

3.2.1. Les essais sont réalisés de la même manière que les essais manuels, mais le train de tiges est mis en rotation mécaniquement dans les sols raides. La vitesse de rotation doit être comprise entre 15 et 40 tours par minute, sans jamais excéder 50 tours par minute. La vitesse moyenne recommandée est de 30 tours par minute (Voir Note 2).

3.3. Considérations générales

3.3.1. On décidera dans chaque cas de l'utilité de réaliser un préforage dans les couches supérieures du sol (Voir Note 3).

3.3.2. Le critère à utiliser pour décider de la fin d'un essai doit être précisé pour chaque reconnaissance: on peut s'arrêter par exemple lorsque la résistance à la pénétration dépasse une valeur donnée, ou lorsque l'on atteint une profondeur fixée (Voir Note 4).

4. - RESULTATS

4.1. Résistance à la pénétration

4.1.1. Lorsque la résistance à la pénétration est inférieure à 1 kN, la charge normalisée nécessaire pour donner une vitesse de pénétration d'environ 5 mm/s doit être notée tout au long de l'essai en fonction de la profondeur (Fig. 3). On doit noter sur le log de forage et sur les graphiques si l'on a utilisé des poids ou un dynamomètre (Voir Note 5).

4.1.2. Lorsque la résistance à la pénétration dépasse 1 kN, on doit noter le nombre de demi-tours nécessaire pour chaque enfoncement de 0,20 m (Fig. 3).

4.1.3. Lorsque le pénétromètre doit être foncé par battage (à l'aide d'un marteau ou des poids du pénétromètre) on doit noter les profondeurs ainsi traversées.

4.2. Remarques générales

4.2.1. Toutes les observations qui peuvent aider lors de l'interprétation des résultats doivent être notées sur le log de sondage comme, par exemple, les bruits et les vibrations dans les tiges quand la pointe traverse des sols non cohérents (pierres, graviers et sables). On doit aussi noter les interruptions dans le déroulement de l'essai, etc.

4.2.2. Le type de matériel de rotation et la vitesse de rotation doivent être notés sur le log de sondage.

5. - PRESENTATION DES RESULTATS

5.1. La figure 3 montre la présentation recommandée pour les résultats des essais de pénétration par charges.

6. - NOTES EXPLICATIVES

Note 1. : Paragraphe 2.2.1. Les tiges et les raccords doivent être réalisés en acier à haute résistance.

Note 2. : Paragraphe 3.2.2. Des différences entre les essais manuels et mécaniques se produisent parfois. Lorsque de telles différences sont susceptibles de se produire, comme c'est le cas pour l'estimation des densités relatives des sols lâches sans cohésion, il faut faire des comparaisons entre des essais manuels et des essais mécaniques.

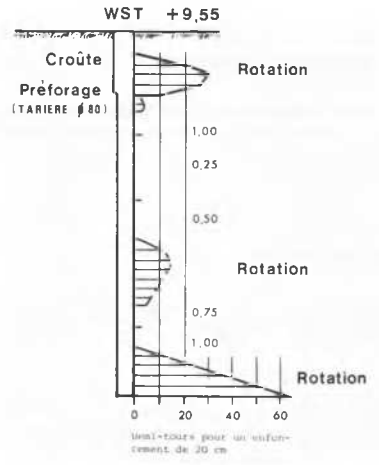
Note 3. : Paragraphe 3.3.1. Dans le cas où le frottement latéral le long de la partie supérieure du train de tiges peut influencer les résultats de façon significative, on doit comparer les résultats à ceux d'un essai exécuté dans un préforage. Le préforage est généralement nécessaire dans les croûtes desséchées et dans les remblais. Lorsque la différence de résistance est grande entre les deux essais, il faut réaliser des préforages pour tous les essais du site. Le préforage doit être effectué à l'aide d'une tarière d'au moins 50 mm de diamètre. Pour estimer l'épaisseur de la croûte durcie, on fait un essai de pénétration à partir de la surface du sol.

Note 4. : Paragraphe 3.3.2. On terminera un essai de pénétration jusqu'au "substratum rigide" en tapant sur le train de tiges à l'aide d'un marteau ou en laissant tomber quelques poids sur le collier pour vérifier que le refus n'est pas temporaire. S'il est possible de traverser la

couche dure l'essai doit être poursuivi.

On fait parfois suivre l'essai de pénétration par charges d'un forage par percussion jusqu'à une plus grande profondeur, afin de déterminer par exemple à quelle profondeur des pieux doivent être foncés.

Note 5. : Paragraphe 4.1.1. Dans les sols mous, quand la résistance à la pénétration est inférieure à 1 kN, on peut utiliser un dynamomètre à la place des poids. Dans ce cas, la charge enregistrée doit être rattachée à la charge normalisée la plus proche et notée de façon semblable.



WST : Essai de pénétration par charges

N_{ht} : Nombre de demi-tours pour 20 cm d'enfoncement

Croûte: Croûte d'argile desséchée

Préforage (tarière Ø 80) : Préforage jusqu'à ce niveau avec une tarière de 80 mm de diamètre

Les chiffres inscrits à droite du diagramme indiquent les charges appliquées.

Fig. 3. Exemple de présentation des résultats d'un essai de pénétration par charges.

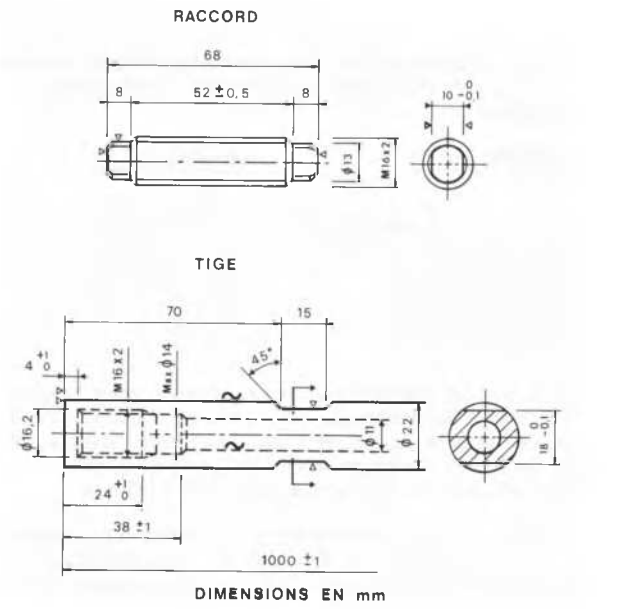
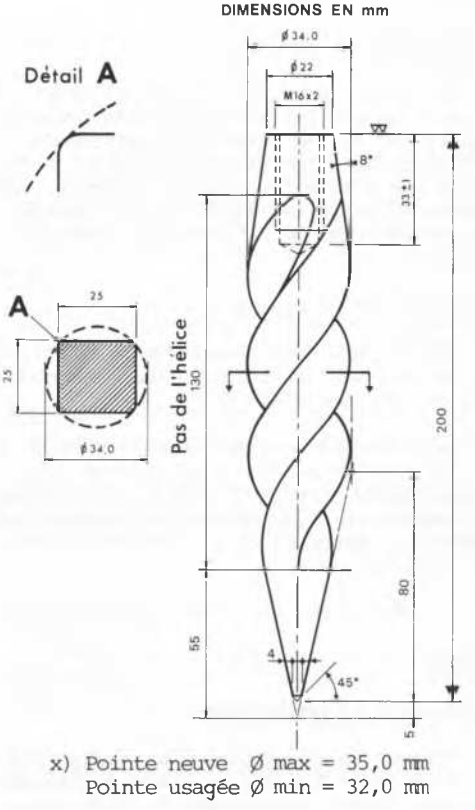


Fig. 1. Tolérances recommandées pour la fabrication de tiges et de raccords pour le pénétromètre à charges.



x) Pointe neuve Ø max = 35,0 mm
Pointe usagée Ø min = 32,0 mm

Fig. 2. Tolérances recommandées pour la fabrication des pointes de pénétromètre à charges.

APPENDIX 6

RAPPORT DU SOUS-COMITE "SYMBOLES, UNITES, DEFINITIONS"

Ce rapport concerne l'activité du Sous-Comité depuis le précédent Congrès International de la Société, tenu à Moscou en 1973.

1. - GENERALITES

1.1 - Missions

Les missions confiées au Sous-Comité comprennent d'abord la préparation d'une 4ème édition du Lexique en huit langues. En réalité, ce document comporte deux parties distinctes, le Lexique proprement dit, et la liste de symboles avec leurs définitions et unités. Ces deux points sont examinés séparément dans la suite.

Par ailleurs, le Sous-Comité a travaillé sur les points suivants:
- liaison avec le Sous-Comité "Normalisation des Essais de Pénétration en Europe";
- éléments de normalisation de l'analyse granulométrique.

1.2 - Composition

Le Sous-Comité comprend un nombre assez important de membres, notamment en raison du travail sur le Lexique en huit langues. Sa composition a légèrement varié de 1973 à 1977; les 13 membres sont actuellement les suivants:

MM.	Baguelin	France,	Président
	Colombo	Italie	
	Folque	Portugal	
	Habib	France	
	Hutchinson	Royaume-Uni	
	Johnson	Etats-Unis	
	Jurgenson	URSS	Vice-Président
	Justo	Espagne	
	Morton	Canada	
	Sandegren	Suède	
	Schultze	Allemagne	
	Ter-Stepanian	URSS	
	Wolski	Pologne	

1.3 - Méthodes de travail

Le Sous-comité a tenu deux réunions, auxquelles une bonne partie des membres a pu assister, la première à Paris, les 11 et 12 septembre 1974 (5 membres présents), la seconde à Vienne, à l'occasion du Congrès Européen, les 21 et 23 mars 1976 (8 membres présents). Ces réunions ont permis de discuter de certains points de présentation du Lexique, et d'avancer considérablement en ce qui concerne la liste des symboles, avec définitions et unités.

Le Sous-Comité a également procédé à la consultation des Sociétés Nationales, à deux reprises, en ce qui concerne la liste des symboles (questionnaires du 28 avril 1975 et du 23 août 1976), une fois en ce qui concerne l'analyse granulométrique.

Cependant, l'essentiel du travail se déroule par correspondance, notamment pour le Lexique. Cette dernière tâche a demandé en outre un travail matériel important pour chacun des correspondants (M. Colombo, pour l'italien; M. Folque, pour le portugais; M.Habib, pour le français; M.Jurgenson, pour le russe; M.Justo, pour l'espagnol; M.Sandegren, pour le suédois; M.Schultze, pour l'allemand), et bien évidemment pour le responsable de l'ensemble, M.Morton, chargé de la mise au point du document. La charge considérable représentée par ce travail, dépassant les possibilités financières de M. Morton et de sa Société, a cependant conduit M. Morton à demander une aide extérieure; répondant à cet appel, le Conseil National de la Recherche du Canada a alloué une somme de 3000 $ pour le poursuite de ce travail. L'attribution d'un financement de 3000 $ par la Société Internationale doit permettre son achèvement.

2. - LE LEXIQUE (cf. Annexe I)

Comme dans l'édition précédente (1967), le Lexique présente les termes usités en Mécanique des Sols et en Travaux de Fondations. Le nombre est resté sensiblement le même (environ 1 500).

Tous les termes ont été passés en revue par chacun des correspondants qui ont, chaque fois que c'était nécessaire, amélioré la traduction de manière à mieux préciser le sens ou à rendre le terme plus intelligible. Le Lexique comporte la liste des termes dans l'ordre alphabétique anglais, numérotés, avec leurs traductions dans les sept autres langues, puis pour chacune de ces langues, un index reprenant les termes dans l'ordre alphabétique de la langue et renvoyant à la première liste par l'intermédiaire des numéros. Cette organisation générale est identique à celle de l'édition précédente de 1967. On a ajouté certaines indications complémentaires:

- les mots définis dans la liste des symboles, qui doit figurer également dans le document, peuvent être repérés grâce à leur numéro souligné, ainsi le lecteur peut se reporter à la définition précise. De plus leur symbole, entre parenthèses, suit le mot.
- les mots dont l'usage, dans une langue donnée, est courant, mais incorrect, sont signalés à l'attention du lecteur par des crochets [ ], de manière à ce que leur emploi soit découragé.

3. - LA LISTE DES SYMBOLES, UNITES, DEFINITIONS (cf. Annexe II)

La précédente liste, adoptée par la Société Internationale au Congrès de Paris en 1961 et figurant dans l'édition du Lexique, comprenait 70 symboles.

Le Sous-Comité propose à l'approbation du Comité Exécutif, une liste élargie à 136 symboles et 20 indices. Cette proposition a été soumise à une consultation auprès des Sociétés Nationales. Malgré des délais qui se sont avérés un peu courts, il a pu être recueilli les observations de 18 pays. Dans l'ensemble, on n'a pas eu d'objection à cette liste. L'enquête a permis en particulier d'effectuer le choix de quatre symboles qui étaient restés controversés au sein du Sous-Comité:

- utilisation de "d" en même temps que "D" pour les diamètres,
- symbole S_r pour le degré de saturation,
- symbole E_{oed} pour le module oedométrique,
- symbole φ' ou ϕ' pour l'angle de frottement.

En ce qui concerne ce dernier terme, il s'agit d'ailleurs du seul changement par rapport à l'ancienne liste (symbole ϕ'). Tous les autres symboles ont été conservés. L'approbation a été unanime pour ce changement.

Dans la liste proposée, on a donné les unités relatives à chaque symbole, ce qui est nouveau par rapport à l'ancienne liste. Les définitions suivent.

La liste figurant en annexe II pourrait être complétée par les symboles principaux utilisés dans les normes proposées par ailleurs pour les essais de pénétration. Il n'a pas été possible de les incorporer à la date d'établissement de ce rapport. La liste, très brève, sera soumise en séance du Comité Exécutif.

L'objectif de cette liste de symboles est qu'ils soient utilisés dans les travaux de la Société Internationale, Congrès Internationaux et Régionaux, et, si possible, qu'ils soient adoptés progressivement par les Sociétés Nationales, membres de la Société Internationale. Si l'on se réfère à l'utilisation des symboles de la liste précédente adoptée en 1961, cet objectif est loin d'être atteint, en particulier dans les travaux de la Société Internationale. Le Sous-Comité propose donc la mesure d'incitation suivante: que dans les bulletins d'organisation des Congrès Internationaux, figure, dans les directives concernant l'établisement des communications, le conseil d'utiliser, chaque fois que possible, les symboles et les unités de la liste qui aura été approuvée par la Société Internationale.

4. - LIAISON AVEC SOUS-COMITE "NORMALISATION DES ESSAIS DE PENETRATION EN EUROPE"

La liaison a été assurée par M. Baguelin, qui a été invité aux séances de travail de ce Sous-Comité. Il était prévu que le Sous-Comité "Symboles, Unités, Définitions" examine les symboles contenus dans les normes proposées pour les essais de pénétration. Le texte définitif de ces normes ayant été mis au point peu de temps avant l'établissement de ce rapport, il n'a pas été possible d'y faire figurer les observations ou propositions du Sous-Comité de Symboles, Unités, Définitions.

Celles-ci seront présentées lors de la séance du Comité Exécutif.

5. - ANALYSE GRANULOMETRIQUE (cf. Annexe III)

Cette étude a été effectuée par M. Justo, qui a lancé une enquête auprès des Sociétés Nationales. 34 responses ont été obtenues. En annexe III, figurent le rapport de M. Justo sur ce sujet, et le tableau récapitulant les réponses. Le Sous-Comité soumet les propositions suivantes, qui résultent de l'étude de M. Justo:

1) Choix des frontières granulométriques suivantes:

argile/limon	0,002 mm
limon/sable	0,06 mm
sable/gravier	2 mm

2) Dans le cas où l'adoption de subdivisions semble souhaitable, choix de l'échelle suivante:

argile	limon			sable			gravier			galets	blocs
	fin	moyen	grossier	fin	moyen	grossier	fin	moyen	grossier		
0.002	0.006	0.02		0.06	0.2	0.6	2	6	20	60	200 (mm)

3) Tracé des courbes granulométriques avec la fonction argileuse à gauche.

Dans la mesure où l'une ou plusieurs de ces propositions seraient adoptées par le Comité Exécutif, elles devraient être portées à la connaissance des membres de la Société et recommandées, avec les dénominations correspondantes de sols, pour les travaux de la Société. Par ailleurs la Société pourrait émettre le souhait que les Sociétés Nationales fassent leur possible pour qu'elles soient progressivement adoptées dans leur pays.

6. - ACTIVITES FUTURE DU SOUS-COMITE

Les missions confiées au Sous-Comité "Symboles, Unités, Définitions" verront pratiquement leur conclusion avec l'édition du nouveau Lexique, devant comporter, outre le Lexique proprement dit, la liste des Symboles, Unités et Définitions telle qu'elle aura été approuvée par le Comité Exécutif.

Il est donc proposé que le Sous-Comité soit dissous.

F. BAGUELIN
Président du Sous-Comité
Symboles, Unités, Définitions

I.S.S.M.F.E.

SUBCOMMITTEE
ON SYMBOLS, UNITS, DEFINITIONS.

List of Symbols, Units and definitions

The recommendations of the International Society of Soil Mechanics and Foundation Engineering for the symbols, units and names of the main concepts used in Soil Mechanics are presented in this document.

The chosen definitions are not necessarily exhaustive. Their purpose is essentially to clarify the meaning of the Symbols. In many cases, it has been assumed that the reader is familiar with Soil Mechanics.

The given units are recommended by the Subcommittee. Any other multiple or submultiple of the basic SI unit may be used.

ex: kPa is recommended; Pa, MPa, ...may be used.

m is recommended; cm ... may be used.

-oOo-

Conventions used :

- for dimensions : L = Length
  T = time
  M = Mass
- for units : m, s, kg, Pa (SI units)
  -° degree (angle)
  1 for dimensionless parameters expressed in actual figure (e.g. $S_r = 0.93$).
  % for the above parameters which can also be expressed in percentage (e.g. $S_r = 93\%$).
  - for parameters which are defined in percentage (e.g. $w_L = 45$).

-oOo-

S.I.M.S.T.F.

SOUS-COMITÉ
DES SYMBOLES, UNITÉS, DÉFINITIONS.

Liste de Symboles, Unités, Définitions

Ce document présente les recommandations de la Société Internationale de Mécanique des Sols et de Travaux de Fondations pour les symboles, unités, et dénominations des principales notions utilisées en Mécanique des Sols.

Les définitions retenues n'ont pas la prétention d'être exhaustives. Elles visent essentiellement à éclairer le sens des symboles et s'adressent à un lecteur déjà averti en Mécanique des Sols.

Les unités indiquées pour chaque symbole sont celles que recommande le Sous-Comité. On peut utiliser tout autre multiple ou sous-multiple de l'unité de base.

ex: *kPa est recommandé, mais on peut utiliser : Pa, MPa, ...*
m est recommandé, mais on peut utiliser: cm.

-oOo-

Conventions adoptées :

- *pour les dimensions* : L = *longueur*
  T = *temps*
  M = *masse*
- *pour les unités* : m, s, kg, N, Pa (*unités SI*)
  -° *degré (angle)*
  1 *pour les grandeurs sans dimension exprimées nombre réel (ex:* $S_r = 0,93$)
  % *pour les mêmes grandeurs qui peuvent être exprimées également en pourcents - (ex:* $S_r = 93\%$).
  - *pour les grandeurs qui sont définies en pourcents. (ex:* $w_L = 45$).

-oOo-

SYMBOL *SYMBOLE*	DIMENSION *DIMENSION*	UNIT *UNITE*	ENGLISH TERM DEFINITION	FRANÇAIS *TERME* *DEFINITION*
			1 - General / *Généralités*	
L,l	L	m	length	*longueur*
B,b	L	m	breadth	*largeur*
H,h	L	m	height	*hauteur*
D,z	L	m	depth	*profondeur*
d,D	L	m	diameter	*diamètre*
A	L^2	m^2	area	*aire*
V	L^3	m^3	volume	*volume*
t	T	s	time	*temps*
v	$L\,T^{-1}$	m/s	velocity	*vitesse*
a	$L\,T^{-2}$	m/s^2	acceleration	*accélération*
g	$L\,T^{-2}$	m/s^2	acceleration due to gravity ($g = 9,81\ m/s^2$)	*accélération de la pesanteur* ($g = 9,81\ m/s^2$)
m	M	kg	mass	*masse*
ρ	$M\,L^{-3}$	kg/m^3	density	*masse volumique*
γ	$M\,L^{-2}T^{-2}$	kN/m^3	unit weight	*poids volumique*
F (1)	-	1	factor of safety	*coefficient de sécurité*
π	-	1	3.1416	*3,1416*
e	-	1	2.7183	*2,7183*
ln a	-	1	natural logarithm of a.	*logarithme naturel de a.*
lg a	-	1	logarithm of a base 10.	*logarithme décimal de a.*

SIGNS / *SIGNES*

A "prime" applies to effective stress.	*Le "prime" indique une contrainte effective.*
A "bar" above a symbol relates to average property.	*Le surlignage indique une valeur moyenne.*
A "dot" above a symbol denotes derivative with respect to time.	*Un point au-dessus d'un symbole indique la dérivation par rapport au temps.*
Prefixe "δ" or "Δ" denotes an increment or a change.	*Le préfixe "δ" ou "Δ" indique un accroissement ou une variation.*

(1) The symbol "γ", recently adopted for the design of structures by the International Organisation for Standardization in its Standard ISO-3898, is also used (instead of F) in Soil Mechanics, but only when calculating the loads for the design of structures.

Le symbole "γ" adopté récemment pour le calcul des structures par l'Organisation Internationale de Normalisation dans sa Norme ISO-3898, est aussi utilisé en Mécanique des Sols, mais seulement pour la détermination des charges à prendre en compte pour le calcul des structures.

u	$ML^{-1}T^{-2}$	kPa	pore pressure *stress (above atmosphere pressure) in the water in the voids of a fully saturated soil.*	pression interstitielle *pression (en excès sur la pression atmosphérique) de l'eau dans les vides d'un sol parfaitement saturé.*
u_w	$ML^{-1}T^{-2}$	kPa	pore water pressure *stress in the water in the voids of a partially saturated soil.*	pression de l'eau interstitielle *pression de l'eau existant dans les interstices d'un sol partiellement saturé.*
u_a	$ML^{-1}T^{-2}$	kPa	pore air pressure *stress in the air in the voids of a partially satured soil.*	pression de l'air interstitiel *pression de l'air existant dans les interstices d'un sol partiellement saturé.*
σ	$ML^{-1}T^{-2}$	kPa	total normal stress *stress (above atmospheric pressure) acting perpendicularly to a given plane.*	contrainte normale totale *contrainte (en excès sur la pression atmosphérique) agissant perpendiculairement à un plan donné.*
σ'	$ML^{-1}T^{-2}$	kPa	Effective normal stress *normal stress transmitted by intergranular contacts ($\sigma' = \sigma - u$ for saturated soils).* *Note : $\bar{\sigma}$ should be avoided.*	contrainte normale effective *contrainte normale transmise par contacts intergranulaires ($\sigma' = \sigma - u$ pour les sols saturés).* *Note : $\bar{\sigma}$ est à éviter.*
τ	$ML^{-1}T^{-2}$	kPa	shear stress *stress acting tangentially to a given plane.*	contrainte de cisaillement *contrainte agissant tangentiellement à un plan donné.*
σ_1	$ML^{-1}T^{-2}$	kPa	major principal stress *maximum stress acting on one of the three orthogonal planes where shear stresses are equal to zero.*	contrainte principale majeure *contrainte maximale agissant sur l'un des trois plans orthogonaux où les contraintes de cisaillement sont nulles.*
σ_2	$ML^{-1}T^{-2}$	kPa	intermediate principal stress *intermediate stress acting on one of the the three orthogonal planes where shear stresses are equal to zero.*	contrainte principale intermédiaire *contrainte intermédiaire agissant sur l'un des trois plans orthogonaux où les contraintes de cisaillement sont nulles.*
σ_3	$ML^{-1}T^{-2}$	kPa	minor principal stress *minimum stress acting on one of the three orthogonal planes where shear stresses are equal to zero.*	contrainte principale mineure *contrainte minimale agissant sur l'un des trois plans orthogonaux où les contraintes de cisaillement sont nulles.*
σ_{oct}	$ML^{-1}T^{-2}$	kPa	average stress or octahedral normal stress *defined as* : $(\sigma_1 + \sigma_2 + \sigma_3) : 3$	contrainte moyenne ou contrainte normale octaédrique *définie par* : $(\sigma_1 + \sigma_2 + \sigma_3) : 3$
τ_{oct}	$ML^{-1}T^{-2}$	kPa	octahedral shear stress *defined as* : $\sqrt{(\sigma_1 - \sigma_2)^2 + (\sigma_2 - \sigma_3)^2 + (\sigma_3 - \sigma_1)^2} : 3$	contrainte de cisaillement octaédrique *définie par* : $\sqrt{(\sigma_1 - \sigma_2)^2 + (\sigma_2 - \sigma_3)^2 + (\sigma_3 - \sigma_1)^2} : 3$

ε	-	1,%	linear strain	déformation relative linéaire (ou dilatation linéaire)
			change in length per unit length in a given direction	*variation de longueur d'une longueur unité dans une direction donnée.* (*Nota: le terme "dilatation linéaire" n'est à utiliser que dans le cas où les accroissements de longueur sont notés positivement).*
γ	-	1,%	shear strain	distorsion
			change of the angle between two planes originally perpendicular to each other (expressed in radian)	*variation de l'angle de deux plans primitivement perpendiculaires (exprimée en radian).*
ε_1	-	1,%	major principal strain	déformation relative principale majeure
			maximum strain corresponding to one of the three orthogonal directions the shear strains of which are equal to zero.	*dilatation maximale relative à l'une des trois directions orthogonales pour lesquelles la distorsion est nulle*
ε_2	-	1,%	intermediate principal strain	déformation relative principale intermédiaire
			intermediate strain corresponding to one of the three orthogonal directions the shear strains of which are equal to zero.	*dilatation intermédiaire relative à l'une des trois directions orthogonales pour lesquelles la distorsion est nulle.*
ε_3	-	1,%	minor principal strain	déformation relative principale mineure
			minimum strain corresponding to one of the three orthogonal directions the shear strains of which are equal to zero.	*dilatation minimale relative à l'une des trois directions orthogonales pour lesquelles la distorsion est nulle*
$\dot{\varepsilon}$	T^{-1}	s^{-1}	linear strain rate	déformation linéaire relative
			rate of change of ε	*vitesse de variation de* ε
$\dot{\gamma}$	T^{-1}	s^{-1}	shear strain rate	vitesse de distorsion
			rate of change of γ	*vitesse de variation de* γ
ν	-	1	Poisson's ratio (μ is also used)	coefficient de Poisson (μ est également utilisé)
			ratio between linear strain changes perpendicular to and in the direction of a given uniaxial stress change	*rapport entre les deux déformations linéaires relatives respectivement perpendiculaire et parallèle à la direction d'une sollicitation uniaxiale*
E	$ML^{-1}T^{-2}$	kPa	modulus of linear deformation	module de déformation linéaire
			ratio between a given normal stress change and the linear strain change in the same direction (all other stresses being constant)	*quotient de la variation d'une contrainte principale par la déformation linéaire relative obtenue dans la même direction, les autres contraintes restant inchangées.*
G	$ML^{-1}T^{-2}$	kPa	modulus of shear deformation	module de cisaillement
			ratiobetween a given shear stress change and the corresponding shear strain change (all other stresses being constant)	*quotient de la variation d'une contrainte de cisaillement par la distorsion correspondante (les autres contraintes restant constantes)*

K	$ML^{-1}T^{-2}$	kPa	modulus of compressibility	module de compressibilité
			ratio between an isotropic stress change and the corresponding volume change per unit volume	*quotient d'une variation de la contrainte isotrope par la variation relative de volume qu'elle provoque*
μ	–	1	coefficient of friction	coefficient de frottement
			maximum ratio between shear and normal stress at point of contact between two solid bodies	*rapport maximum entre contrainte de cisaillement et contrainte normale au point de contact entre deux corps solides*
η	$ML^{-1}T^{-1}$	kPa.s	coefficient of viscosity	coefficient de viscosité
			shear stress required to maintain a unit difference in velocity between two parallel layers of a fluid a unit distance apart	*contrainte de cisaillement nécessaire pour maintenir une différence de vitesse égale à l'unité entre deux plans parallèles du fluide distants d'une longueur unitaire*

III - PHYSICAL PROPERTIES OF SOIL / *PROPRIETES PHYSIQUES DU SOL*

a) Density and unit weights / *Masses et poids volumiques*

ρ_s	ML^{-3}	kg/m^3	density of solid particles	masse volumique des particules solides
			ratio between mass and volume of solid particles	*quotient de la masse des particules solides par leur volume*
γ_s	$ML^{-2}T^{-2}$	kN/m^3	unit weight of solid particles	poids volumique des particules solides
			ratio between weight and volume of solid particles	*quotient du poids des particules solides par leur volume*
ρ_w	ML^{-3}	kg/m^3	density of water	masse volumique de l'eau
γ_w	$ML^{-2}T^{-2}$	kN/m^3	unit weight of water	poids volumique de l'eau
ρ	ML^{-3}	kg/m^3	density of soil	masse volumique du sol
			ratio between total mass and total volume of soil	*quotient de la masse totale du sol par son volume*
γ	$ML^{-2}T^{-2}$	kN/m^3	unit weight of soil	poids volumique du sol
			ratio between total weight and total volume of soil	*quotient du poids total du sol par son volume*

ρ_d	ML^{-3}	kg/m^3	density of dry soil	masse volumique du sol sec
			ratio between mass of solid particles and total volume of soil	*quotient de la masse des particules solides par le volume total du sol*
γ_d	$ML^{-2}\ T^{-2}$	kN/m^3	unit weight of dry soil	poids volumique du sol sec
			ratio between weight of solid particles and volume of soil	*quotient du poids des particules solides par le volume total de sol*
ρ_{sat}	ML^{-3}	kg/m^3	density of saturated soil	masse volumique du sol saturé
			ratio between total mass and total volume of completely saturated soil	*quotient de la masse totale du sol complètement saturé par son volume total*
γ_{sat}	$ML^{-2}\ T^{-2}$	kN/m^3	unit weight of saturated soil	poids volumique du sol saturé
			ratio between total weight and total volume of completely saturated soil	*quotient du poids total du sol complètement saturé par son volume total*
ρ'	ML^{-3}	kg/m^3	density of submerged soil	masse volumique du sol déjaugé
			difference between density of soil and density of water	*différence entre la masse volumique du sol et la masse volumique de l'eau*
γ'	$ML^{-2}\ T^{-2}$	kN/m^3	unit weight of submerged soil	poids volumique du sol déjaugé
			difference between unit weight of soil and unit weight of water	*différence entre le poids volumique du sol et le poids volumique de l'eau*
e	-	1	void ratio	indice des vides
			ratio between volume of voids and volume of solid particles	*rapport entre le volume des vides et le volume des particules solides*
n	-	1,%	porosity	porosité
			ratio between volume of voids and total volume of soil	*rapport entre le volume des vides et le volume total du sol*
w	-	-	water content	teneur en eau
			ratio between weight of pore water and weight of solid particles (expressed in percentage)	*rapport entre le poids de l'eau interstitielle et le poids des grains solides (exprimé en pourcents)*
S_r	-	1,%	degree of saturation	degré de saturation
			ratio between volume of pore water and volume of voids	*rapport entre le volume de l'eau interstitielle et le volume des vides*

b) Consistency / *Consistance*.

w_L	-	-	liquid limit	limite de liquidité
			water content of a remolded soil at transition between liquid and plastic states (determined by a standard laboratory test)	*teneur en eau d'un sol remanié au point de transition entre les états liquide et plastique (déterminé par un essai normalisé de laboratoire)*
w_P	-	-	plastic limit	limite de plasticité
			water content of a remolded soil at transition between plastic and semi-solid states (determined by a standard laboratory test)	*teneur en eau d'un sol remanié au point de transition entre les états plastique et solide avec retrait (déterminé par un essai normalisé de laboratoire)*

w_S	-	-	shrinkage limit	limite de retrait
			maximum water content at which a reduction of water content will not cause a decrease in volume of the soil mass	*teneur en eau maximum pour laquelle une réduction de teneur en eau ne cause plus de diminution de volume du sol*
I_P	-	-	plasticity index	indice de plasticité
			difference between liquid and plastic limits	*différence entre les limites de liquidité et de plasticité*
I_L	-	-	liquidity index	indice de liquidité
			defined as $(w - w_P) : I_P$	*défini par* $(w - w_P) : I_P$
I_C	-	-	consistency index	indice de consistance
			defined as $(w_L - w) : I_P$	*défini par* $(w_L - w) : I_P$
e_{max}	-	1	void ratio in loosest state	indice des vides dans l'état le plus lâche
			maximum void ratio obtainable by a standard laboratory procedure	*maximum de l'indice des vides obtenu dans un essai normalisé de laboratoire*
e_{min}	-	1	void ratio in densest state	indice des vides dans l'état le plus dense
			minimum void ratio obtainable by a standard laboratory procedure	*minimum de l'indice des vides obtenu dans un essai normalisé de laboratoire*
I_D	-	1,%	density index	indice de densité
			defined as $(e_{max} - e) : (e_{max} - e_{min})$	*défini par* $(e_{max} - e) : (e_{max} - e_{min})$

c) Grain size / Granulométrie

D, d	L	mm	grain diameter	diamètre de grain
			grain size as determined by sieve analysis or wet mechanical analysis	*taille de grain déterminée dans l'analyse granulométrique par tamisage ou sédimentométrie*
D_n, d_n	L	mm	n percent-diameter	diamètre à n pour cent
			diameter corresponding to n percent by weight of finer particles	*diamètre correspondant à un tamisat de n pourcent sur la courbe granulométrique (n% des particules ont des dimensions inférieures à ce diamètre)*
C_U	-	1	uniformity coefficient	coefficient d'uniformité
			defined as : D_{60}/D_{10}	*défini par :* D_{60}/D_{10}

d) Hydraulic properties / *Propriétés hydrauliques*.

h	L	m	hydraulic head or potential	charge hydraulique ou potentiel hydraulique
			sum of pressure height (u : γ_w) and geometrical height (z) above a given reference level	*somme de la hauteur piézométrique (u : γ_w) et de la hauteur géométrique (z) au-dessus d'un niveau de référence*
q	$L^3 T^{-1}$	m^3/s	rate of discharge	débit
			volume of water seeping through a given area per unit of time.	*volume d'eau percolant à travers une section donnée d'un sol, par unité de temps*
v	$L T^{-1}$	m/s	discharge velocity	vitesse d'écoulement
			rate of discharge per total unit area perpendicular to direction of flow	*débit qui s'écoule à travers une section totale unitaire du milieu, perpendiculaire à la direction de l'écoulement*
i		1	hydraulic gradient	gradient hydraulique
			loss of hydraulic head per unit length in direction of flow	*perte de charge hydraulique par unité de longueur dans la direction de l'écoulement*
k	$L T^{-1}$	m/s	coefficient of permeability (or hydraulic conductivity)	coefficient de perméabilité (ou conductivité hydraulique)
			ratio between discharge velocity and corresponding hydraulic gradient (v : i).	*quotient de la vitesse d'écoulement par le gradient hydraulique correspondant (v : i)*
j	$ML^{-2} T^{-2}$	kN/m^3	seepage force	force de filtration (ou d'écoulement)
			the force due to flow with which the seeping water acts upon the soil particles in a unit volume of soil ($j = i.\gamma_w$)	*force volumique exercée sur les grains solides du sol par un écoulement : $j = i.\gamma_w$)*

IV - MECHANICAL PROPERTIES OF SOIL / *PROPRIETES MECANIQUES DU SOL*

a) Sampling / *Prélèvement*

C_a	-	%	area ratio (of a sampler)	indice de surface (d'un carottier)
			defined as $(D_2^2 - D_1^2) : D_1^2$ with D_1 = inner diameter of cutting nose, D_2 = outer-diameter of cutting nose.	*défini par $(D_2^2 - D_1^2) : D_1^2$ avec D_1 - diamètre intérieur de la trousse, D_2 diamètre extérieur de la trousse*
C_i	-	%	inside clearance ratio (of a sampler)	indice de jeu intérieur (d'un carottier)
			defined as $(D_3-D_1) : D_1$ with D_1=inner diameter of cutting nose, D_3= inner-diameter of container.	*défini par $(D_3-D_1) : D_1$ avec D_1 = diamètre intérieur de la trousse, D_3= diamètre intérieur du conteneur.*

C_o	-	%	outside clearance ratio (of a sampler)	indice de jeu extérieur (d'un carottier)
			defined as $(D_2-D_4) : D_4$ with D_2= outer diameter of cutting nose, D_4= outer diameter of barrel shaft.	*défini par (D_2-D_4): D_4 avec D_2 = diamètre extérieur de la trousse, D_4= diamètre extérieur du corps du carottier.*

b) Consolidation (one dimensional) / *Consolidation (uni-dimensionnelle)*

m_v	$M^{-1}LT^2$	$(kPa)^{-1}$	coefficient of volume change	coefficient de compressibilité
			ratio between change of volume per unit volume and corresponding change of effective normal stress : $m_v=(e_o-e):[(1+e_o).\Delta\sigma']$	*quotient de la variation relative de volume par la variation correspondante de la contrainte effective normale : $m_v=(e_o-e):[(1+e_o).\Delta\sigma']$*
E_{oed}	$ML^{-1}T^{-2}$	kPa	oedometric modulus	module oedométrique
			defined as $E_{oed} = 1 : m_v$	*défini par $E_{oed}= 1 : m_v$*
C_c	-	1	compression index	indice de compression
			slope of virgin compression curve in a semi-logarithmic plot "effective pressure-void ratio": $Cc = -\Delta e : \Delta lg\sigma'$	*pente de la courbe de compression vierge dans un diagramme semi-logarithmique "contrainte effective-indice des vides": $Cc=-\Delta e: \Delta lg\sigma'$*
C_s	-	1	swelling index	indice de gonflement
			average slope of an unload-reload cycle in a semi-logarithmic plot of effective pressure-void ratio, $C_s = -\Delta e : \Delta lg\sigma'$	*pente moyenne d'un cycle déchargement-rechargement dans un diagramme semi-logarithmique contrainte effective--indice des vides, $C_s=-\Delta e: \Delta lg\sigma'$*
C_α	-	1	rate of secondary consolidation	taux de consolidation secondaire
			slope of the final portion of the change of volume per unit volume-time curve in a semi-logarithmic plot : $C_\alpha= -\Delta e :[(1+e_o) . \Delta lg\ t]$	*pente de la partie finale de la courbe variation relative de volume-logarithme du temps dans un diagramme semi-logarithmique : $C_\alpha= -\Delta e :[(1+e_o) . \Delta lg\ t]$*
c_v	$L^2\ T^{-1}$	m^2/s	coefficient of consolidation	coefficient de consolidation
			defined as $c_v = k: (m_v\gamma_w)$	*défini par $c_v= k: (m_v\ \gamma_w)$*
d or H	L	m	drainage path	distance de drainage
			thickness of layer drained on one side only, or half-thickness of layer drained on both sides	*épaisseur de la couche drainée sur une face seulement ou mi-épaisseur de la couche drainée sur deux faces*
T_v	-	1	time factor	facteur temps
			defined as $T_v= t\ c_v: d^2$, t being the time elapsed since application of a change in total normal stress	*défini par $T_v= t\ c_v: d^2$, t étant le temps écoulé depuis l'application d'une variation de contrainte normale totale*

U	-	1,%	degree of consolidation	degré de consolidation
			ratio of mean effective stress increase at a given time to mean final effective stress increase	*rapport de l'augmentation moyenne de la contrainte effective à un instant donné à l'augmentation finale moyenne de la contrainte effective*
σ'_{vo}	$ML^{-1}T^{-2}$	kPa	effective overburden pressure	contrainte effective verticale initiale en place
			in-situ effective vertical pressure existing prior to sampling or excavation	*contrainte verticale effective existant en place préalablement au prélèvement ou à l'excavation*
σ'_{p}	$ML^{-1}T^{-2}$	kPa	preconsolidation pressure	pression de préconsolidation
			maximum vertical effective past pressure	*pression verticale effective maximum subie dans le passé*

c) Shear strength / *Résistance au cisaillement*

τ_f	$ML^{-1}T^{-2}$	kPa	shear strength	résistance au cisaillement
			shear stress at failure in rupture plane through a given point	*contrainte de cisaillement, lors de la rupture, dans le plan de rupture en un point donné*
c'	$ML^{-1}T^{-2}$	kPa	effective cohesion intercept	cohésion effective
φ' or ϕ'	-	-°	effective angle of internal friction	angle de frottement effectif
			shear strength parameters with respect to effective stresses. Defined by the equation: $\tau_f = c' + \sigma' \tan \phi$	*paramètres de résistance au cisaillement en contraintes effectives, définis par l'équation :* $\tau_f = c' + \sigma' \, tg \, \phi$
c_u	$ML^{-1}T^{-2}$	kPa	apparent cohesion intercept	cohésion apparente
φ_u or ϕ_u	-	-°	apparent angle of internal friction	angle de frottement apparent
			shear strength parameters with respect to total stresses. Defined by the equation : $\tau_f = c_u + \tan \phi_u$. *In undrained situation, with saturated cohesive soils,* c_u *is also called undrained shear strength.*	*paramètres de résistance au cisaillement en contraintes totales, définis par l'équation :* $\tau_f = c_u + tg \, \phi_u$. *Pour les sols cohérents saturés en sollicitation non drainée,* c_u *est appelé également cohésion non drainée.*
c_r	$ML^{-1}T^{-2}$	kPa	remoulded undrained shear strength	cohésion remaniée
			shear strength of remoulded soil in undrained situation	*cohésion du sol remanié en situation non drainée*
S_t	-	-	sensitivity	sensibilité
			ratio between undrained shear strength of undisturbed and of remoulded soil: $S_t = c_u : c_r$	*rapport entre les cohésions non drainées d'un sol à l'état intact et à l'état remanié:* $S_t = c_u : c_r$.
τ_R	$ML^{-1}T^{-2}$	kPa	residual shear strength	résistance résiduelle au cisaillement
			Ultimate shear strength in rupture plane w which a soil maintains at large displacement	*résistance ultime, dans le plan de rupture, que le sol conserve aux grands déplacements*

c'_R	$ML^{-1}T^{-2}$	kPa	residual cohesion intercept	cohésion résiduelle
φ'_R or ϕ'_R	-	-°	residual angle of internal friction	angle de frottement résiduel
			residual shear strength parameters with respect to effective stresses, defined by the equation : $\tau_R = c'_R + \sigma' \tan \varphi'_R$	*paramètres de résistance résiduelle au cisaillement, définis par l'équation :* $\tau_R = c'_R + \sigma' tg \varphi'_R$

d) in-situ tests / *essais en place.*

STATIC PROBING / *ESSAIS DE PENETRATION STATIQUES (CPT)*

q_c	$ML^{-1}T^{-2}$	kPa	static point resistance (or cone resistance)	résistance de pointe statique (ou résistance de cône)
			average pressure acting on the conical point in the standard static penetration test	*pression moyenne agissant sur la pointe conique dans l'essai normalisé de pénétration statique*
f_s	$ML^{-1}T^{-2}$	kPa	local side friction	frottement latéral unitaire
			average unit side friction acting on the friction sleeve in the standard static cone penetration test	*frottement latéral par unité de surface du manchon de frottement dans l'essai normalisé de pénétration statique au cône*

DYNAMIC PROBING / *ESSAIS DE PENETRATION DYNAMIQUES.*

q_d	$ML^{-1}T^{-2}$	kPa	dynamic point resistance	résistance de pointe dynamique
q_{dA}, q_{dB}			*average pressure acting on the conical point in the standard dynamic penetration test (q_{dA}, and q_{dB} for tests of type A and B, respectively).*	*pression moyenne agissant sur la pointe conique dans l'essai normalisé de pénétration dynamique- (q_{dA} et q_{dB} pour les essais de type A et B, respectivement).*
r_d	$ML^{-1}T^{-2}$	kPa	dynamic resistance	résistance dynamique
r_{dA}, r_{dB}			*standardized result of the dynamic penetration test (r_{dA} and r_{dB} for test of type A and B, respectively)*	*résultat normalisé de l'essai de pénétration dynamique (r_{dA} et r_{dB} pour les essais de type A et B, respectivement)*
N_d	-	-	number of blows per 20 cm	nombre de coups par 20 cm
N_{dA}, N_{dB}			*standardized result of the dynamic penetration test (N_{dA} and N_{dB} for tests of type A and b, respectively)*	*résultat normalisé de l'essai de pénétration dynamique (N_{dA} et N_{dB}, respectivement)*

STANDARD PENETRATION TEST / *ESSAI SPT*.

N	-	-	SPT blow count	nombre de coups SPT
			standardized result of the Standard Penetration Test (number of blows for 30 cm)	*résultat normalisé de l'essai SPT (nombre de coups pour 30 cm)*

WEIGHT SOUNDING TEST / *ESSAI DE PENETRATION PAR CHARGES (WST)*

N_{ht}	-	-	number of half-turns for 20 cm	nombre de demi-tours pour 20 cm
			standardized result of the weight sounding test	*résultat normalisé de l'essai de pénétration par charges*

PRESSUREMETER TEST / *ESSAI PRESSIOMETRIQUE*

p_1	$ML^{-1}T^{-2}$	kPa	pressuremeter limit pressure	pression limite pressiométrique
			limit pressure defined in the standard Ménard pressuremeter test	*pression limite définie dans l'essai pressiométrique normal Ménard*
E_M	$ML^{-1}T^{-2}$	kPa	pressuremeter modulus	module pressiométrique
			conventional modulus defined in the standard Ménard pressuremeter test.	*module conventionnel défini dans l'essai pressiométrique normal Ménard*

PRACTICAL PROBLEMS / *PROBLEMES PRATIQUES*

a) Earth pressure / *Poussée des terres*

δ	-	-°	angle of wall friction	angle de frottement sol-mur
			angle of friction between wall and adjacent soil	*angle de frottement entre le mur et le sol adjacent*
a	$ML^{-1}T^{-2}$	kPa	wall adhesion	adhésion sol-mur
			adhesion between wall and adjacent soil	*adhésion entre le mur et le sol adjacent*
K_a, K_p	-	-	active and passive earth pressure coefficients	coefficients de poussée et de butée des terres
			dimensionless coefficients used in expressions for active and passive earth pressure	*coefficients sans dimension intervenant dans les expressions de poussée et de butée*
K_o	-	-	coefficient of earth pressure at rest	coefficient de pression des terres au repos
			ratio of lateral to vertical effective principal stress in the case of no lateral strain and a horizontal ground surface	*rapport entre les contraintes effectives horizontale et verticale à déformation horizontale nulle et lorsque la surface libre du sol est horizontale*

b) Foundations / *Fondations*

B	L	m	breadth of foundation	largeur de la fondation
L	L	m	length of foundation	longueur de la fondation
D	L	m	depth of foundation beneath ground	profondeur de la fondation au-dessous du niveau du terrain
Q	$ML\ T^{-2}$	kN	applied (axial) load	charge (axiale) appliquée
q	$ML^{-1}T^{-2}$	kPa	applied (axial) pressure	pression (axiale) appliquée
q_l	$ML^{-1}T^{-2}$	kPa	limit pressure	pression limite
Q_p	$ML\ T^{-2}$	kN	point resistance force	force de résistance de pointe
q_p	$ML^{-1}T^{-2}$	kPa	point resistance pressure	pression de résistance de pointe (d'un pieu)
Q_s	$ML\ T^{-2}$	kN	total shaft resistance	résistance latérale totale
q_s	$ML^{-1}T^{-2}$	kPa	unit shaft resistance	résistance latérale unitaire
H	$ML\ T^{-2}$	kN	lateral force applied to a foundation	force latérale appliquée à une fondation
s	L	m	settlement	tassement
e	L	m	eccentricity	excentricité
			distance of point of application of force to center line of the base of the foundation	*distance du point d'application de la force à l'axe de la base de la fondation*
δ	-	-°	inclination of load	inclinaison de la charge
			angle of load force with perpendicular to base of foundation	*angle de la charge avec la normale à la base de la fondation*
k_s	$ML^{-2}T^{-2}$	kN/m^3	modulus of subgrade reaction	module de réaction
			ratio between change of vertical stress on a rigid plate and corresponding change of vertical settlement of the plate	*quotient de la variation de la contrainte verticale sur une plaque rigide par la variation correspondante de tassement vertical de la plaque*
N_c, N_q, N_γ	-	-	bearing capacity factors	facteurs de capacité portante
			dimensionless coefficients used in expressions for bearing capacity as a function of c and ϕ	*coefficients sans dimension intervenant dans les expressions de la capacité portante en fonction de c et ϕ*
i_c, i_q, i_γ	-	-	correction factors for inclination	coefficients de correction d'inclinaison
			correction factors for the bearing capacity factors in the case of an inclined load.	*coefficients de correction des facteurs de capacité portante dans le cas d'une charge inclinée.*

c) Slopes / *Pentes*

H	L	m	vertical height of slope	hauteur verticale du talus
D	L	m	depth below toe of slope to hard stratum	profondeur du substratum rigide sous le pied du talus
β	-	-°	angle of slope to horizontal	angle d'inclinaison du talus avec l'horizontale
$\bar{\tau}$	$ML^{-1}T^{-2}$	kPa	average shear strength mobilized along sliding surface	résistance au cisaillement moyenne mobilisée le long de la surface de glissement
R	-	-	residual factor *defined as* : $R = \frac{\tau_f - \bar{\tau}}{\tau_f - \tau_R}$	indice de résistance résiduelle *défini par*: $R = \frac{\tau_f - \bar{\tau}}{\tau_f - \tau_R}$
r_u	-	-	pore pressure ratio *ratio between the in-situ pore pressure and the total overburden pressure* : $u : \gamma z$.	coefficient de pression interstitielle *rapport entre la pression interstitielle en place et la charge totale des terres*: $u : \gamma z$.

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VI - SUBINDEXES / *INDICES*

Subindex / *Indice*	Applies to / *Se rapporte à*	
a	air, active (earth pressure) or allowable	*air, actif (poussée) ou admissible*
c	cohesion or consolidation	*cohésion ou consolidation*
d	dry state	*état sec*
f	failure or final	*rupture ou final*
h	horizontal	*horizontal*
i	immediate or initial	*immédiat ou initial*
p	passive (earth pressure) or preconsolidation.	*passif (butée) ou préconsolidation*
q	surcharge	*surcharge*
r	radial or remoulded	*radial ou remanié*
R	residual	*résiduel*
s	solids	*particules solides*
t	time	*temps*
u	undrained conditions or pore-pressure	*conditions non drainées ou pression interstitielle*
v	vertical	*vertical*
w	water	*eau*
x, y	two orthogonal horizontal axes	*deux axes orthogonaux horizontaux*
z	vertical axis	*axe vertical*
γ	weight of soil or rock	*poids du terrain*
ϕ	angle of internal friction	*angle de frottement interne*
o	at rest or initial conditions	*conditions au repos ou conditions initiales*
1, 2, 3	principal directions	*directions principales*

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APPENDIX 7

REPORT OF THE ACTIVITIES OF THE INSTITUTE FOR PUBLICITY AND EXCHANGE OF GEOMECHANICS COMPUTER PROGRAMS AND OF THE SUB-COMMITTEE APPOINTED BY THE EXECUTIVE COMMITTEE OF ISSMFE TO ADVISE CSIRO AND TO ADVISE THE EXECUTIVE COMMITTEE WITH RESPECT TO THE ACTIVITIES OF THE INSTITUTE.

1. INTRODUCTION

1.1 At the meeting of the Executive Committee of ISSMFE during the VIIIth International Conference in Moscow, a proposal was submitted from the Australian National Society recommending the establishment of an Institute for Publicity and Exchange of Geomechanics Computer Programs (IPEGCP). The proposal was accompanied by an offer from the Division of Applied Geomechanics, Commonwealth Scientific and Industrial Research Organization, Australia (CSIRO), to operate the Institute on a voluntary basis if so desired (although the proposal and offer were not necessarily linked).

1.2 The proposal was based upon the recognition of a need to treat geomechanics computer programs as a valuable component of the total supply of information to engineers. In principle, the functions of the proposed Institute embraced the processes of encouraging adequate documentation of programs followed by the straightforward process of recording and of dissemination of this important type of information.

1.3 Both the proposal and the offer were accepted in a unanimous vote of the Executive Committee.

1.4 The wording of the proposal from the Australian National Committee is as follows:

'PROPOSED SCHEME FOR PUBLICITY AND EXCHANGE OF GEOMECHANICS COMPUTER PROGRAMS (to be organized under the auspices of ISSMFE)
Submitted by the Australian Geomechanics Society.

1. The Secretariat of the ISSMFE would appoint an Institute to act as a central clearinghouse for publicity on programs. (If necessary, CSIRO, Division of Applied Geomechanics, would be prepared to act in this capacity). The modus operandi of the Scheme would be subject to agreement between the Secretariat and the management of the Institute.

2. Scientists and engineers around the world who had developed, tested and fully documented computer programs would be invited to submit them to the Institute together with proforma details regarding the program: e.g. what it does
input - output arrangements
running costs
forms available (listing, cards, tapes)
charges for making available
name and address of person for further details.

3. The Institute would check that standards of documentation above a defined minimal level were observed by contributors.

4. At least twice a year the Institute would publish booklets containing the accumulated proformas of well-documented programs. The Institute would accept no responsibility for the correctness or accuracy of the programs. Any correspondence stimulated by distribution of the booklets would be addressed to the program originators and not to the Institute. The booklets may also contain discussions or any errors or problems with programs as reported by users or the originators.

5. The booklets would be distributed by the Secretaries of all National Committees and to any individuals or organizations who would subscribe to the ISSMFE amounts calculated to cover the running costs of operating the service. The fact that the service was available could be advertised in the various soil mechanics journals and newsletters around the world.'

1.5 The records of the endorsement of the proposal are contained in Minute 19 and Minute 38 of the official Minutes of the meeting of the Executive Committee.

1.5.1 Minute 19 is worded as follows:

'The proposal from Australia (Appendix V) that an Institute for the publicity and exchange of geomechanics computer programmes should be set up was introduced by the Australian Vice-President. He repeated the offer from CSIRO to run such an institute and this was warmly accepted on the understanding that it would not involve ISSMFE in anu financial cost. He proposed that the President should be asked to set up a sub-committee to advise with respect to the scheme. This was seconded by Professor de Beer and was carried unanimously.'

1.5.2 Minute 38 is worded as follows:

'The President, in consultation with Professor Kerisel agreed that the following new Committees should be appointed:

(i) A Sub-Committee to deal with advertisements in the List of Members (including Professional cards).

(ii) A new Conference Advisory Sub-Committee to act for the next four years.

(iii) A Budget and Finance Sub-Committee to make recommendations on the subject of dues.

(iv) A Sub-Committee to advise CSIRO on the Institute for the publicity and exchange of geomechanics computer programmes.

It was agreed that the members of these committees need not be named at this juncture and delegates were invited to make suggestions as to names of suitable persons to serve either to the President or to Professor Kerisel.'

1.6 A Sub-committee was appointed by the Executive Committee as follows:

Dr. G. D. Aitchison (Chairman)	Australia
Mr. A.E. Furley	United Kingdom
Mons. J.P. Giroud	France
Prof. Za-Chieh Moh	Thailand
Prof. E. Togrol	Turkey
Prof. C. Viggiani	Italy

1.7 In addition to the original list of nominations for the Sub-committee, the President appointed Dr. C. M. Gerrard as Secretary and Professors H. Meissner (F.R. Germany), B. Ladanyi (Canada) and R.L. Schiffman (USA), as members.

2. REPORT OF ACTIVITIES

2.1 The activities which followed the endorsement of the proposal and the appointment of the Sub-committee members are reported below (2.3 and 2.4) in two parts, viz.:

2.11 those activities (2.3) relating to the implementation of the above proposal within the original terms of reference and with advice to CSIRO (see Minutes 19 and 38 above) from the Sub-committee members,
and

2.12 those activities (2.4) relating to the further definition of the functions of the Institute (or equivalent body) for the Publicity and Exchange of Geomechanics Computer Programs and to the requirement for the endorsement of relevant terms of reference by the Executive Committee.

2.2 Rather surprisingly the two sets of activities outlined in 2.11 and 2.12 above (and further detailed in 2.3 and 2.4 below) came into conflict to the severe detriment of progress.

2.21 It was assumed by the writer, upon notification of appointment as Chairman of the Sub-committee, together with advice that the offer by the Division of Applied Geomechanics, CSIRO (under the leadership of the writer) to operate IPEGCP had been accepted, that the terms of reference contained in the proposal (1.4 above) were endorsed adequately to provide a basis for the operations of the Institute (in accordance with these terms of reference) during the period between the VIIIth and IXth Conferences.

All early action by the writer followed this assumption which seemed to be reasonable since it offered an extended trial of the proposed system at no cost to members of ISSMFE.

2.22 However, it became apparent following the Istanbul meeting of the Executive Committee of ISSMFE that the Executive did not consider that any such mandate for immediate action had been given. Indeed, it was then stressed that the first function of the Sub-committee should be to agree on new terms of reference and methods of operation - not necessarily closely related to those originally proposed - and again requiring approval by the Executive Committee.

2.23 In the circumstances of para. 2.22 above, the current role of IPEGCP is unclear. Equally unclear is the ability of any agency to act as voluntary sponsor for the relevant activities since the level of commitment is undefined.

2.24 Regrettably the impasse between the intention of the original submission and the intention of the Executive Committee as interpreted at Istanbul has led to a period of hiatus in the activities of IPEGCP.

This hiatus can only be resolved by an adequate clarification of terms of reference and methods of operation prior to endorsement by the Executive Committee and the subsequent acceptance by a sponsoring agency.

2.3 Activities relating to the functions of IPEGCP as defined in the submission to the VIIIth Conference

Following the VIIIth Conference it was accepted that the responsibilities for action (in terms of the original proposal) passed through the Australian National Committee to CSIRO for the operation of IPEGCP and, through the undersigned, as Sub-committee Chairman, to members of the Sub-committee for advice on the operation of IPEGCP.

2.31 An action group was established within the Division of Applied Geomechanics under the leadership of the undersigned and Dr. C. M. Gerrard.

2.32 In correspondence with all committee members, opinions were invited concerning scope of activities, material to be handled, format to be used and principles to be adopted in the selection and publication of abstracts.

2.33 It proved to be entirely feasible to accommodate all points raised by all committee members with only one exception. (Professor Schiffman submitted an alternative proposal which would have required a scale of operation incompatible with the resources of CSIRO: nevertheless such a dissenting viewpoint was accepted as a legitimate topic for presentation for consideration by the Executive Committee at the IXth Conference).

2.34 A period of 1½ years was required to establish contact and effect the above exchange of views. Thereafter the support of committee members was sought in the procuring and transmission of properly documented geomechanics computer programs.

2.35 The first volume of abstracts was published in accordance with the concensus opinion as to scope, format, etc. in November 1975. The contents were as follows:

Sequence Number	Program Name	Short Description
001	FM-UKA	Stress redistribution in soils and jointed rocks by finite element
002	SOLID SAP	Static analysis program for three-dimensional solid structures
003	SAP IV	Structural analysis program for static and dynamic response of linear systems
004	NONSAP	Structural analysis program for static and dynamic response of non-linear systems
005	FOCALS Version 2	Soil foundation (and/or structure) interaction on layered soil system
006	PLANE	Multiple strip loads on ortho-rhombic half space
007	SLIPSYST	Slope stability package
008	WEDGE	3-dimensional wedge stability program
009	RETWALL	Simple retaining wall design program
010	PIVERT	Calcul des efforts et déformations de long d'un pieu traversant des sols à comportement irréversible en état élasto-plastique Calculations of stresses and deformations along a pile driven through soils with irreversible behaviour in elasto-plastic state

2.36 It was planned to continue publication on a twice-yearly basis. However, the problems outlined in Section 2.2 above intervened leaving the role of IPEGCP ill-defined. Publication was therefore discontinued for the time being.

2.37 A second volume of abstracts has been compiled for publication early in 1977.

2.4 Activities relating to the further definition of the functions of an Institute (or an equivalent body) and to the requirement for the endorsement of new terms of reference by the Executive Committee

2.41 A considerable volume of correspondence has passed between all members concerning the functions and modus operandi of the Institute (or equivalent body).

2.41.1 A concensus viewpoint was reached early as the basis for original action but a strong note of dissent was recorded from one committee member (Professor Schiffman).

2.41.11 The requirements of an alternative Institute to perform the functions desired by the dissenting committee member are of a totally different scale to those which are presently available (in CSIRO, Australia) or which are believed to be available elsewhere.

2.41.12 The dissenting viewpoint is therefore presented briefly as a minority recommendation on the understanding that, given adequate sponsorship on a scale far exceeding that currently available, the Executive Committee may wish to debate the advantages and disadvantages of both proposals.

2.41.13 It should be emphasised that there is a necessary link between the level of ambition of the proposal and the resources available to a sponsoring organization.

2.42 The Australian National Committee of ISSMFE (which committee also serves as the Australian National Committee of the International Society of Rock Mechanics and the International Association of Engineering Geology), in an endeavour to widen the range of contacts available for the gathering of information concerning geomechanics computer programs, made formal submission to the International Society of Rock Mechanics (ISRM) and the International Association of Engineering Geology (IAEG) inviting affiliation with the Institute.

2.42.1 Although ISRM reacted favourably to this invitation and appointed several representatives, this course of action by the Australian National Committee was criticised by the Secretary General of ISSMFE.

2.42.11 It appears that the Australian National Committee placed undue reliance upon the office of Coordinating Secretary of the abovementioned three Societies in expecting that parallel action as proposed, would be welcomed.

As a result of some misinterpretation (by the undersigned) of the functions of the coordinating Secretariat, some unfortunate gaps in communication ensued. Any apparent but unintentional inter-society discourtesies are regretted.

2.42.2 It remains the belief of the Australian National Society and of the present IPEGCP that the Institute should serve the requirements of members of ISRM and well as of ISSMFE to whatever extent may be possible without conflict of controlling interests.

3. RECOMMENDATIONS

3.1 IT IS RECOMMENDED that a continuing attempt should be made to operate an Institute for Publicity and Exchange of Geomechanics Computer Programs.

3.11 As an essential prerequisite to any decision for the continuing operation of such an Institute (in present or revised form) IT IS STRONGLY RECOMMENDED that the functions of the Institute, the responsibilities of the operating agency, the functions of an advisory committee and the responsibilities of its members and the functions and responsibilities of any other appointed person or committee should be clarified.

3.12 IT IS STRONGLY RECOMMENDED that, if approval is given by the Executive Committee to any continuing operations of such an Institute and if a Sub-committee is appointed to fulfil relevant functions *an attempt should be made to convene a meeting of all Sub-committee members during the IXth Conference.*

3.2 The further recommendations of this report are submitted in two parts i.e. PART A - those based upon a majority viewpoint (paras. 3.3 to 3.4) and PART B - those based upon a minority viewpoint (paras. 3.4 to 3.44). The two sets of recommendations do not reflect technical differences but merely differences of scale of operation.

PART A

3.3 Based upon the experience of the present IPEGCP and the concensus of opinion of the present Sub-committee:

IT IS RECOMMENDED THAT

3.31 The functions of the Institute should be:

3.31.1 To act on behalf of the membership of ISSMFE to collect and disseminate all relevant information concerning geomechanics computer programs.

3.31.2 To encourage scientists and engineers from among the membership of ISSMFE and other kindred institutions to take the necessary steps to complete the documentation of all of their important geomechanics computer programs and to forward abstracts of these programs for publication by the Institute.

3.31.3 To act (through a relevant Sub-committee) to ensure that all programs listed in the Institute's publications fulfil the basic requirements of availability and completeness of documentation and further to warrant that the program has passed the scrutiny of at least one independent referee.

3.32 The responsibilities of the agency operating the Institute should be those of:

3.32.1 maintaining correspondence with Sub-committee members and others in endeavours to accumulate information concerning properly documented geomechanics computer programs.

3.32.2 arranging (normally through Sub-committee members) for the review of all material supplied in order to assure a definable standard of accuracy in the published material

3.32.3 publication of the reviewed abstracts and

3.32.4 operation without cost to members of ISSMFE (other than for basic charges for the published abstracts to cover the costs of printing and postage).

(NOTE: These responsibilities are currently accepted by the Division of Applied Geomechanics, CSIRO, Australia. Although Australia is still willing to continue in this role it is suggested (by Australia) that it would be preferable for another organization in another country to accept these responsibilities in future).

3.33 The functions and responsibilities of a Sub-Committee (to be appointed by the Executive of ISSMFE) and of its members should be:

3.33.1 A member of the Sub-committee should act, on behalf of IPEGCP, but in the capacity of an individual expert within his own sphere of influence, (a) to identify all available sources of geomechanics computer programs, (b) to encourage the authors of such programs to submit them for publication (after refereeing) in IPEGCP Abstracts, (c) if possible, also to act as a referee as to the quality and completeness of documentation of programs submitted through the Sub-committee member or otherwise.

3.33.2 A member of the Sub-committee should in the capacity of an individual expert, within his own field of expertise, offer advice to the Institute concerning new trends in geomechanics computer programs and possible improvements in the methods of operation and/or styles of publication adopted by the Institute.

3.33.3 The membership of the Sub-committee should act corporately on behalf of the membership of ISSMFE to advise the Executive of ISSMFE (through the Chairman of the Sub-committee) of the progress made by the Institute and of any changes in the structure and/or methods of operation of the Institute which are considered to be desirable.

(NOTE: The present members of the Sub-committee were appointed without prior knowledge of the tasks confronting them. Any new appointments should be made against the above-defined responsibilities).

3.34 The functions and responsibilities of the Chairman of the Sub-committee should be:

3.34.1 To direct the Institute for Publicity and Exchange of Geomechanics Computer Programs in the performance of those functions submitted for approval to the Executive of ISSMFE and approved at the last preceding meeting of the Executive of ISSMFE.

3.34.2 To stimulate the membership of the Sub-committee to undertake the responsibilities of their appointments (both as representatives of IPEGCP and of the Executive of ISSMFE).

3.34.3 To report, on behalf of the Institute and on behalf of the members of the Sub-committee as to progress made by the Institute and as to proposals for possible changes in the structure and/or methods of operation of the Institute.

(NOTE: The above responsibilities are currently accepted by the undersigned (Dr. G.D. Aitchison) who does not wish to accept nomination for a further period in this office).

PART B

3.4 The following is an ALTERNATIVE PROPOSAL submitted by R.L. Schiffman on 14 November 1975. This proposal was reviewed and endorsed by the Executive Committee of the U.S.National Society for Soil Mechanics and Foundation Engineering (Geotechnical Engineering Division of the American Society of Civil Engineers). It is recommended that the following proposal be adopted.

3.41 Introduction

Ideally, the use of computer-based techniques in geotechnical engineering is a function of three interdependent factors. First, the geotechnical engineering problem must be amenable to analytical predictive modelling, or data analysis, which can

be translated to a computer program. Second, the computer programs used in geotechnical engineering should be available to the profession in a usable fashion. Third, the geotechnical engineer should be able to use the available computer programs with confidence in the integrity of the algorithms used, and the capabilities of the computer code to accurately translate the algorithms to usable and useful results.

This document outlines a set of proposed objectives of the ISSMFE Sub-committee on the Exchange of Computer Programs in Geomechanics, a set of proposed recommendations to be brought to the Executive Committee of ISSMFE, and a set of proposed continuing sub-committee activities.

3.42 Proposed Objectives

It is proposed that the sub-committee adopt the following objectives.

1) To undertake, in behalf of the ISSMFE, activities which will assist the geotechnical engineering profession in exchanging information related to the utilization of computer-based techniques.
2) To develop concepts of computer-based technology transfer which will increase the efficiency and application base of computer utilization in geotechnical engineering.

The objectives defined above are to be accomplished on an international level with due regard and consideration of on-going national activities.

3.43 Immediate Recommendations

It is proposed that the two following recommendations be placed before the ISSMFE Executive Committee at its next meeting.

1) In recognition of the increasing use of computers in geotechnical engineering analysis, design and construction, it is recommended that the ISSMFE urge each national society to specifically incorporate computer activities within its technical and policy committee structure.
2) As a means of facilitating computer related information exchange within the geotechnical engineering profession, it is recommended that the ISSMFE encourage each national society to urge its membership to submit information concerning computer program availability to Geotechnical Abstracts for publication. Publication will be in the current, short narrative form.
It is noted that Geotechnical Abstracts maintain classifications which permit the abstracting of computer programs. It is further noted that in the past, programs have been abstracted in Geotechnical Abstracts. It is intended that submission of the above recommendation to the ISSMFE Executive Committee be conditioned upon the endorsement of the German National Society of Soil Mechanics and Foundation Engineering and the ISSMFE Information Advisory Committee. The intent of this recommendation is to use the services of Geotechnical Abstracts as a mechanism for providing publicity concerning program availability. Geotechnical Abstracts will not have any responsibility beyond the publication of short narrative abstracts. The publication of detailed program information will be the responsibility of each national society through procedures defined by the national society.

3.44 Proposed Activities

The following is a series of proposed activities listed in their suggested order of action. The activities outlined below are conceived as international counterparts to on-going national efforts.

1) The monitoring of the effectiveness of the use of Geotechnical Abstracts proposed above.
2) The preparation of a globally oriented position paper on software coordination for geotechnical engineers. The contents proposed for the paper are as follows:
   a) Need for software coordination.
   b) Software coordination requirements.
   c) Staging of software coordination.
   d) Suggested models for organized software coordination.
3) The preparation of working papers on the following subjects.
   a) Criteria for evaluation and testing of computer programs in geotechnical engineering.
   b) Guidelines for documentation of computer programs based upon global use of the programs.
   c) Guidelines for global distribution of computer programs.
   d) Style guidelines for geotechnical engineering programs.
   e) Language specifications for new computer languages oriented toward geotechnical engineering.
4) The preparation of State-of-the-Art reports on the use of computer-based techniques in geotechnical engineering.

At such time as the papers outlined in (2), (3), and (4) are produced, they will be submitted to a recognized, agreed upon journal of international stature for publication.
All the activities proposed above are considered as global studies which will be complimentary to on-going national efforts.

3.5 The plan for sub-committee action proposed above does not recommend the establishment of a new organization or journal under ISSMFE auspices at this time. It is conceivable that at some future time, such an organization and/or journal might be desirable and viable. It is recommended that any ISSMFE endorsement of the said endeavor be contingent upon unambiguous agreement that policy control must rest with the ISSMFE Executive Committee. Furthermore, it is recommended that any committees or sub-committees appointed by ISSMFE be clearly chartered as agents of ISSMFE and charged with necessary and sufficient policy control functions.

4. GENERAL COMMENT

4.1 It would be easy to place undue emphasis upon the difficulties of communication (and of comprehension of intentions) during the establishment phase of a new international activity. Such over-emphasis of initial difficulties could lead to a possibly ill-considered decision regarding the next phase) i.e. the developmental and operational phase) of such an activity.

4.2 The purpose of reporting these initial difficulties (and the purpose of proposing a new sponsorship) is that of highlighting the need for careful consideration by the Executive Committee of the *details* of its allocation of responsibilities (to Institutes and to Committee members).

4.21 The long intervals between meetings of the Executive Committee and the difficulties of arranging other meetings in person between a truly representative group of committee members combine to suggest that committee activities can only be fruitful if a complete understanding of responsibilities can be reached at the outset.

4.22 The alternative of limiting committee membership to a single geographic region in order to facilitate person-to-person meetings is not desirable and is not necessary if proper attention is given to pre-planning.

4.3 It is a pleasure to be able to place on record the fact that a very large measure of verbal support has been given (both by members of ISSMFE and by members of kindred societies) to the proposed activities of the Institute. It is in the hope that this support can be translated into more tangible form that I submit this report* with its recommendations for continued sponsorship of this activity.

G.D. Aitchison — February 25, 1977
Chairman, Sub-committee for Publicity and Exchange of Geomechanics Computer Programs
Director, Institute for Publicity and Exchange of Geomechanics Computer Programs

* *This report is intended to cover all of the view-points expressed by Committee members to this date (February 25, 1977) (the final date for submission of agenda material for the Executive meeting at the IXth Conference). Committee members, at this date, have had only a limited period in which to comment upon the draft of this report. All comments received have been accommodated. However, it is expected that the interval between this date and the date of the meeting of the Executive Committee will provide an opportunity for all necessary further discussions. Amendments arising from these further discussions will be presented at the meeting of the Executive Committee.*

APPENDIX 8

REPORT ON THE WORK OF THE TOKYO CONFERENCE ADVISORY COMMITTEE

1. At the Executive Committee meeting held in Mexico City in 1969 a Sub-Committee was set up under the chairmanship of Dr. D.H. MacDonald to advise on the organization of future conferences. The Sub-Committee circulated a questionnaire to National Societies and the replies were carefully analysed. The report of the Sub-Committee was discussed at the Sydney Executive Committee meeting in 1971 and the recommendations were generally accepted. One of these was that a Conference Advisory Committee should be set up for each conference to advise the Organising Committee set up by the host country as to the wishes of the ISSMFE with regard to technical aspects affecting the Conference. By the time of the Sydney meeting it was too late to appoint such a committee for the Moscow (1973) conference but as soon as the decision was made to hold the 1977 conference in Tokyo, the President appointed a Conference Advisory Committee with the following membership:

The President	*Prof. J. Kerisel*	(Chairman)
Vice-President for the Region	*Dr. Z-C Moh*	(V.P Asia)
One member nominated by the Japanese	*Prof. M. Fukuoka*	
Secretary General of last Conference	*Dr. N.S. Chetyrkin*	
The Secretary General	*Prof. K. Nash*	(Secretary)

The Japanese were invited to send an additional observer to each meeting and this role was filled by Prof. T. Akagi and Prof. A. Nakase on different occasions.

2. The committee met first in Moscow when a few general principles were agreed. Then, six months later, in January 1974, the Secretary General paid a visit to Japan and discussed:

(i) Conference dates
(ii) location
(iii) a schedule for the events leading up to the Conference and the dispatch of the final volume of the Proceedings
(iv) quality of the Proceedings
(v) visas, etc
(vi) organisation of Executive Committee
(vii) simultaneous translation
(viii) registration fees
(ix) organisation of the technical sessions
(x) possible topics for Main and Specialty Sessions
(xi) post-Conference tours.

3. A full report on these discussions was circulated to the other members of the Conference Advisory Committee and they provided the main Agenda for the full Sub-Committee when it met in Stockholm in June, 1974.

4. Meanwhile an invitation had been issued to all National Societies for suggestions as to topics for both Main and Specialty Sessions. These were considered at length by the Committee meeting at Stockholm and eventually topics for four main sessions and twelve specialty sessions emerged, with appropriate names attached to each one.

5. The Committee also spent some time in considering the allocation of space to the various National Societies in the Proceedings. It seemed to the Committee that the time had come to place this matter on a more rational basis and as a first step towards this end the President agreed to produce an outline scheme for the 1977 Conference.

6. When the Committee next met at Istanbul in March, 1975 the various possible Reporters for the Main Sessions and Organizers for the Specialty Sessions had been approached and it was then possible to consider the final draft of Bulletin No.1. This had already been translated into French by courtesy of the French National Society and once approved the Japanese Organising Committee were able to have it printed and to have it dispatched.

7. From this it can be seen that the first 21 months of the 4-year cycle are extremely critical in the planning of the Conference for by then the whole shape of the Conference must be determined. The remaining work can be carried out by correspondence and by the Secretary General acting on behalf of the Committee.

8. Thus the Secretary General will have visited Tokyo four times in the interval leading up to the Conference (Jan.1974, May 1975, July 1976 and May 1977) as a result of which the Conference Advisory Committee has kept closely in touch with the thinking of the Organising Committee.

9. The Organising Committee has kept closely to the schedule laid down at the beginning: thus the various Bulletins have appeared and the Proceedings have been printed so that they can be distributed exactly as planned. For all this the Organizing Committee is to be warmly congratulated.

10. The Conference Advisory Committee met in Stockholm at the time of the European Symposium on Penetration Testing and in Istanbul at the time of the Istanbul Conference on Soil Mechanics and Foundation Engineering. The members of the Sub-committee thus had an additional reason for being in Stockholm and Istanbul at these times, and the organisers of these conferences provided considerable hospitality.

11. During the Secretary General's visits to Tokyo his expenses have been met by the Organizing Committee. Two of the airline fares were an expense against the ISSMFE and for the others advantage was taken of trips to the Far East for other reasons, thus minimising the cost to the International Society.

JKTLN *Secretary*
Conference Advisory Ctee

APPENDIX 9

REPORT CONCERNING THE ACTIVITIES OF THE PERMANENT CO-ORDINATING SECRETARIAT

Since the meeting of the Executive Committee of the International Society on Soil Mechanics and Foundation Engineering in Istanbul in 1975, the committee of the Secretaries General has met three times in Brussels:

at the 20th of June 1975
at the 26th of June 1976
and the 3rd of June 1977

At the meeting of 1977, Dr. Wolters, Secretary General of I.A.E.G. could not attend the meeting and was replaced by Professor Calembert, past president of the Association.

The Secretary of the Permanent Co-ordinating Secretariat or his deputy have, since the Executive Committee meeting in Istanbul, assisted to the following meetings:

-meeting of the Executive Committee meeting of IAEG at Krefeld in 1975:
-meeting of the Executive Committee meeting of ISRM at Salzburg in 1976.

The activities of the Permanent Co-ordinating Committee have been the following:

1. Uniform directives for submission and publication of Proceedings

In the bulletins of every conference or symposium are always given in detail how the contributions must be presented, and are given recommendations for the presentation of figures, drafts, and also for slides. If an agreement were reached for uniform directives, these could be printed in one pamphlet, to which reference could be made, allowing to save money.
As however the possibility must be provided to adapt the directives to the rapidly evoluing techniques, it was agreed that the question of the Uniform Directives should be handled by a committee, consisting of the Secretaries General, which can discuss this problem during their annual meeting and who will take expert advice if necessary. Therefore proposals should be made to the respective executive committees in order to appoint the Secretary General to represent their Society on the committee of Uniform Directives for Submission and Publication of Proceedings.
The Committee of the Secretaries General agreed on the following points:

1) Printing of the publications (proceedings, etc...) in international A4 size; proposal to be presented for decision to the respective Executive Committees. This proposal has already been approved by the Executive Committees of ISRM (Salzburg) and IAEG (Sydney).
2) to pay attention to the existing ISRM publications on
   a) selection and arrangements for projection
   b) preparation of lecture illustrations.
3) that if uniform directives concerning presentation of papers, figures, projection of slides, etc... are printed, the printing costs should be a charge against the International Society. The bulletins of the conferences would remain a charge against the Organizing Committee of the Conference.

The committee of Secretaries General will, starting from a preliminary draft, introduced by Dr. Wolters, study further this problem.

2. Co-ordinating Committee on Literature Classification

This co-ordinating committee has now been agreed by the Executive Committees of the 3 International Societies. The members of the committee are:

ISSMFE	N. Flodin (Sweden)	*Chairman*
	H. Kuhn (FRG)	
	F. Jørstad (Norway)	
ISRM	R. Floss (GFR)	
	W.A. Judd (USA)	
IAEG	Prof. Maximov (USSR)	
	Prof. Doyen (Belgium)	
	Dr. Dearman (England)	

In November 1976 there has been a meeting in Cologne, where however only the delegates of

ISSMFE were present. These delegates decided to send a reviewed version of the International Geotechnical System to the delegates of ISRM and IAEG. These delegates asked that in the future the date of the meeting should be fixed sufficiently long beforehand, in order to be able to take the necessary arrangements. In a letter to the secretariat Mr. Flodin suggests that he should be replaced as chairman by Mr. Kuhn.
Mr. Flodin stresses that a first personal contact of all delegates to discuss the rather intricate problem of literature classification is necessary, and that such a problem cannot be handled exclusively by correspondence. This puts however the problem of the travel expenses, as the P.C.S. has no funds for covering such expenses. Thus these expenses should be covered by the organizations where the delegates are working, which supposes that these organizations are willing to give an indirect support to international scientific co-operation. The other co-ordinating committees face also the same problem. Without some indirect support, the activities of the co-ordinating committees are practically impossible. The meeting place should be chosen in order that the travel costs should be reduced as much as possible, and the meeting time could perhaps coincide with a conference or symposium organized by one of the International Societies. For instance will be held in Stockholm in September 1977 a Rock Store Conference organized jointly by the ISRM and IAEG. Perhaps the chairman, Mr. Flodin could take action in this direction.

3. Asian Information Center for Geotechnical Engineering (A.G.E.)

The Committee of Secretaries General expressed their concern concerning a possible unfavourable influence of the activities of the AGE on the Geotechnical Abstracts. They expressed the wish that these activities should be conceived in such a way, that such unfavourable influence should be avoided. Therefore a collaboration between the Co-ordinating Committee on Literature Classification and AGE seems desirable.

4. Definition of the fields of interest of the 3 Societies

A letter of Professor de Mello suggested that the field of interest of the three Societies should be better defined in order to avoid interference and duplication. The committee of Secretaries General, referring also to the statutes of the Societies, sees no possibility of making a sharp distinction between the fields of interest of the three Societies. A certain overlapping is unavoidable, but in specific cases a co-ordination, for instance, by means of jointly organized symposia on specific subjects is possible.

5. Mailing list of the proceedings

The committee of Secretaries General agreed that each Society should send a copy of the proceedings of each conference to the Secretary General of the two other Societies and to the co-ordinating Secretariat.

6. Amalgamation of the 3 International Societies

The problem of the amlgamation is periodically put forward by the Australian or New Zealand Geomechanics Society. The problem of the amalgamation is however not within the competence of the Co-ordinating Secretariat, whose duty is to co-ordinate the activities of distinct International Societies but not to amalgamate. Therefore the committee of Secretaries General decided that proposals of amalgamation will in the future not be put on the agenda of the meetings of the P.C.S.

7. Publishing of a joint list of members of ISSMFE, ISRM and IAEG

The committee of Secretaries General discussed the possibility of publishing a joint list of members of ISSMFE, ISRM and IAEG. There were objections from the side of ISSMFE and IAEG to do so in a next future. The ISSMFE agreed however to indicate in its list by a special mark, those of its members which are also affiliated to one or two of the other Societies.

8. Table of fees

The Secretaries General had a very fruitful exchange concerning the way the membership fees are established in their respective Societies.

9. Running of Conferences and Symposia

The President of the ISRM, Professor Habib, submitted the problem of the running of conferences: number of contributions, how to reduce the numbers and way of fixing the quota. The committee of Secretaries General had an exchange of ideas about this problem, and also the problem of the languages and the translations.

10. Co-ordinating Committee on Symbols, Units and Definitions

During a meeting in Paris the Presidents of the 3 International Societies insisted for the setting up of a Co-ordinating Committee on Symbols, Units and Definitions. This proposal was agreed by the Committee of Secretaries General, which should put it before their respective Executive Committees. The ISRM has designated as members:

Prof. M. Langer (FRG)
Prof. H. Pincus (USA)
Mr. P. Dufaut (France)

The ISSMFE decided in Istanbul that Mr. Baguelin should be asked to appoint three members of the Subcommittee on Symbols, Units and Definitions of ISSMFE as members of the co-ordinating committee. Until yet this designation has not been made. The IAEG also agreed to participate in a co-ordinating committee on symbols, units and definitions. The members are:

Prof. Sirgirov (USSR)
a member to be designated by the French Society
a member to be designated by the British Society

Until yet the names of these two members have not been received. Unfortunately it takes a very long time to get the names of all the members, with the consequence that the co-ordinating committee cannot start to work.

11. Joint committee for the exchange of Computer Programs in Geomechanics

The Institute for Publicity and Exchange of Geomechanics Computer Programs, made formal submission to ISRM and IAEG, inviting affiliation with the Institute. The ISRM at Denver made a favourable decision. However all this is linked with rather intricate but fundamental problems of organization and interdependence, which was thoroughly discussed by the committee of Secretaries General. The decision was taken that both ISRM and IAEG should wait to take further steps, until the relationship of the Institute for Publicity and Exchange of Geomechanics Computer Programs and the ISSMFE should be clarified.

12. Extension of the Permanent Co-ordinating Secretariat to other Societies

The committee of Secretaries General decided that for the moment the Permanent Co-ordinating Secretariat should not be extended to the International Association for Hydro-Geology, nor to other Societies, as for instance the International Society of Tunneling. However there should be no objection that a Secretary General should invite a Secretary General of another International Society, to join him as an adviser and an observer for some special points on the Agenda.

13. Co-ordinating Committee on Site Investigation

The setting up of a co-ordinating committee on Site Investigation was agreed by the ISRM. The member of ISRM is Professor Serafim (Portugal). This committee was also agreed by IAEG. However until yet the names of the delegates have not been officially notified to the Permanent Co-ordinating Secretariat. The name of Dr. Price (U.K.) has been advanced but has not confirmed until yet. The setting up of this committee is on the agenda of the Tokyo meeting of the Executive Committee of ISSMFE.

14. Co-ordinating Committee on Sampling

The setting up of the Co-ordinating Committee on Sampling has been agreed by the ISRM. The delegate is Dr. Bieniawski, South Africa. The IAEG has no own committee. IAEG is of the opinion that sampling is a part of Site Investigation, and that there should be but one committee on Site Investigation and Sampling. If the two other International Societies should prefer to have two separate committees, IAEG should only delegate an observer to the Co-ordinating Committee on Sampling. The setting up of a Co-ordinating Committee on Sampling is on the agenda of the Tokyo meeting of the Executive Committee of ISSMFE. Also the delegates should be designated.

From the report can be deduced that the work of the Permanent Co-ordinating Secretariat is not easy, and that it takes months and years before the co-ordinating committees can start working. When the names of the delegates will be available, there still remains the problem of the travel costs, which can only be solved by the goodwill of the institutions, where the delegates are working.

The most effective contribution of the Permanent Co-ordinating Secretariat for the moment being, is the possibility given to the Secretaries General to meet yearly, and to have a large exchange of ideas and of their mutual problems.

Prof. Dr. ir E. De Beer
Secretary of the Permanent Co-ordinating Secretariat

APPENDIX 10

REPORT OF THE VICE-PRESIDENT FOR AFRICA, 1973-1977

Africa is a large region with only 6 national societies: South Africa, Rhodesia, Morocco, Tunisia, Ghana and Nigeria. The sixth member, the Nigerian Geotechnical Association joined the membership of ISSMFE only in 1976. The South African National Society is by far the largest with a total membership of 516.

During the review period, efforts were made to stimulate interest in soil mechanics and to encourage the formation of national societies within the region. In particular letters were sent to eleven universities in various African countries which were without national societies and to a number of individuals in other organisations considered to be connected with the practice of soil mechanics. The response has not been very encouraging, but it is felt that the effort should continue.

Communication between many groups in the region (particularly between the societies in South Africa and Rhodesia and those in the other countries) continued to be a major problem throughout the period under review, and we still have to depend on the literature and correspondence from a few national societies to compile our report. It is particularly sad to report that owing to these impediments to communication (arising mainly out of the policies of the various Governments) the Vice-President was not able to participate, in person, in the 6th Regional Conference in Durban.

CONFERENCES AND SYMPOSIA

During the period under review, the major activity in the region was the 6th Regional Conference for Africa which was held in Durban, South Africa from 8th-12th September, 1975. The main themes of the Conference were:

Properties of Soils and Construction Materials
Engineering in Rock
Piled Foundations
Embankments.

The Conference attracted considerable attention, recording the attendance of some 200 delegates, of whom 12 were from overseas. Amongst our distinguished guests were, the Secretary-General of the ISSMFE, Professor J.K.T.L. Nash, Professor V.B.de Mello and Dr. J.B. Burland. A total of 39 papers were presented in the five main sessions. Additional papers and contributions were presented in the speciality sessions. The proceedings of the conference have been published in two volumes. Volume I of the proceedings contained 36 papers on the various topics and Volume II contained the special lectures and a summary of the discussions which took place at the conference. The proceedings are obtainable from the publishers - Messrs. A. A. Balkema of Cape Town, South Africa. Grateful thanks are extended to Mr. George Donaldson and his organising committee for the arrangements for the conference.

At its final Session the 6th Regional Conference adopted two resolutions for action by the various national societies:

(i) In view of the increasingly urgent need in all countries of Africa for accurate and comprehensive geological maps and the need of such maps for the planning and effective design of development projects, the national societies should be encouraged through ISSMFE to request the national authorities in their respective countries to undertake the production of geological maps which include the delimitation of superficial and residual materials.

(ii) The national societies should be encouraged to approach the appropriate educational authorities in their countries to urge the establishment of training facilities for engineering geologists.

Other symposia included the symposium on Exploration for Rock Engineering and the symposium on Terrain Evaluation.

The Symposium on Exploration for Rock Engineering was held in Johannesburg from the 1st to 5th November 1976. This symposium was jointly sponsored by the South African National Society of ISSMFE and the National Group of the ISRM. It was attended by about 170 delegates. A total of 40 papers were presented. The proceedings of the symposium have been published in two volumes obtainable from the publishers - Messrs. A.A. Balkema of Cape Town, South Africa.

The Symposium on Terrain Evaluation was arranged jointly by the Association of Engineering Geologists and the National Society of ISSMFE of South Africa in February, 1975. 16 papers were presented which are being published and which will be available from the Geotechnical Division of the South African Institution of Civil Engineering.

VENUE FOR THE 7TH REGIONAL CONFERENCE

For much the same reason as that which prevented the Vice-President from attending the 6th Regional Conference in Durban, the task of deciding on the venue for the Seventh Regional Conference has presented rather a seemingly unsurmountable problem. The current situation in the region is such that a strict adherence to the minute 21 of the Istanbul Executive Committee meeting might make the holding of the conference in any of the member countries almost unacceptable. It is hoped that a decision of the executive committee might help fix a venue for the Seventh Regional Conference.

PUBLICATIONS

Technical papers and articles of interest are regularly published in engineering journals in the member countries. In addition to these journals, we are reliably informed that the South African Society introduced a new letter, "Ground Profile" in 1974.

APPENDIX 11

REPORT OF THE VICE-PRESIDENT FOR NORTH AMERICA, 1973-1977

Introduction

This report covers the most important events in Geotechnical Engineering over the period Oct. 1973-Feb 1977, as reported by the national committees of Canada, Mexico and the USA, affiliated to the International Society for Soil Mechanics and Foundation Engineering. It also presents a summary of information regarding 1) the state of development of Geotechnical Engineering in Central America and the Caribbean, 2) the V Pan American Conference held in Buenos Aires, Argentina, in November 1975, and 3) other activities in the Region.

Activities of National Societies

Canada. The Canadian Section of the ISSMFE is a joint endeavour of the Geotechnical Society and the Associate Committee on Geotechnical Research. The Canadian Geotechnical Society, officially founded in 1972, has 740 members and comprises eleven local sections. In 1974 the Engineering Geological Division was established and has been recognized as the Canadian National Group of the International Association of Engineering Geology.

A Geotechnical conference is held annually, the last two being the 28th at Montreal (October 1975) and the 29th at Vancouver (October 1976); attendance at each was about 300 members.

The Society issues a newsletter five times a year with information about its own activities as well as those of the ISSMFE. The Canadian Geotechnical Journal is published by the National Research Council every three months and is now in its fourteenth year.

The Society has undertaken the publication and periodic revision of the Canadian Manual on Foundation Engineering, which is an advisory document for the National Building Code of Canada.

The Associate Committee has subcommittees in the fields of Soil Mechanics, Muskeg, Permafrost, Snow and Ice Engineering, and Urban Engineering Terrain Problems, which organize seminars, symposia and lectures. The Permafrost Subcommittee is preparing a manual on the subject and an Organizing Committee has been nominated to make arrangements for the III International Conference on Permafrost, Canada, 1978.

Mexico. The Mexican Society for Soil Mechanics (SMMS), founded in 1957, has a total of 411 members. In 1973 a group of engineers interested in problems of Rock Mechanics established a society (SMRM) independent of the SMMS; the membership of the SMRM is about 130.

The SMMS organizes a National Meeting every two years; the VII was held in Guadalajara (Nov.1974) and the VIII in Guanajuato (Nov. 1976). Since 1971 the Society founded the Nabor Carrillo Lecture in memory of one of its most outstanding members, distinguished professor of Soil Mechanics.

The First Lecture (Nov.1972, Mexico City) was delivered by Prof. Arthur Casagrande, the Second (Nov 1974, Guadalajara) was presented by Prof. Ralph B. Peck, and Prof. Arpad Kezdi gave the Third Lecture in Guanajuato (Nov. 1976). Furthermore, in collaboration with other institutions and with Mexican universities, the Society has promoted short courses and lectures, having organized recently four symposia on small reservoirs, foundations in mined areas, instrumentation and deep foundations built in-situ. The SMMS publishes the proceedings of National Meetings (two volumes), the Nabor Carrillo lectures (bilingual version), as well as papers and discussions contributed to symposia. Every two months a bulletin or newsletter is distributed among its members.

United States. The National Committee for ISSMFE is represented by the Geotechnical Engineering division of the American Society of Civil Engineers, formerly the Soil Mechanics and Foundations Division. According to the ISSMFE list of members for 1972, membership totalled 734; this has since increased to 1300.

The Geotechnical Engineering Division encompasses 13 technical committees covering such diverse fields as soil properties and soil dynamics, deep and shallow foundations, computer applications, embankment-dams and slopes, engineering geology, rock mechanics, earth retaining structures, grouting, environmental concerns in geotechnical engineering, placement and improvement of soils, reliability and probabilistic concepts in geotechnical engineering designs. Enrollment in this Division totals 15204 members. Through a number of national meetings and conventions held annually in different parts of the USA and abroad, the Geotechnical Engineering Division constitutes the most active group devoted to the advancement of soil mechanics and foundation engineering in North America.

Technical papers and related discussions are published monthly in the Journal, which has already issued 103 volumes. Descriptions of important earth works and foundations, as well as brief notes on practical applications of soil mechanics are published in Civil Engineering, the ASCE magazine. Furthermore, specialists are kept well informed through the ASCE News. At about yearly intervals and upon the recommendation of the Executive Committee of the Division, a distinguished engineer is invited to deliver the Terzaghi Lecture at an appropriate meeting of the ASCE; so far twelve Lectures have been given and

published in the Journal of the Geotechnical Engineering Division.

Almost every year, the Geotechnical Engineering Division organises a Specialty Conference, one of the most prominent events in Soil Mechanics and Foundation Engineering in the USA; the last three Specialty Conferences have dealt with the following subjects: Analysis and Design in Geotechnical Engineering (Austin, Texas, in June 1974); In Situ Measurement of Soil Properties (North Carolina State University, Raleigh, in June 1975)' Rock Engineering for foundations and Slopes (Boulder, Colorado, in August 1976).

Central America and Caribbean Countries

In order to ascertain the state of development of the Geotechnical Engineering in the eleven countries of Central America and the West Indies (The Caribbean), a questionnaire was sent to universities and engineers in these areas. The results of this inquiry may be summarized as follows:

In Central America and the Caribbean Countries there are 12 engineering schools where Soil Mechanics and Foundation courses are offered as part of the academic training of civil engineers. 18 facilities (mainly governmental) to test soils are available. The number of private firms that deal with foundation designing and earthwork is about 40. It is estimated that some 175 engineers work on geotechnical problems, but most of them as a supplementary activity to the design and construction of structures.

The Dominican Republic already has a Soil Mechanics and Foundation Engineering Chapter within their Society of Civil Engineers, Architects and Topographers. Engineers from Costa Rica, Cuba, El Salvador, Guatemala, Nicaragua and Panama expressed a favourable opinion regarding the formation of national committees in the near future. The groups of specialists in the remaining countries of the area are small (less than 10).

Pan American Conferences

From November 17th to 22nd, engineers from throughout America met at Buenos Aires, Argentina, upon the occasion of the Vth Pan American Conference on Soil Mechanics and Foundation Engineering, an ISSMFE regional event. Six main sessions covered subjects such as stress-deformation relationships, special soils, excavations and deep foundations, tunnels in soils, and earth and rockfill dams, including the seismic design of these structures. These were complemented by technical visits, two lectures and social activities.

The VI Pan American Conference will be held in Lima, Peru (1979). The Peruvian National Society is already working on the topics for discussion and on technical visits.

Ecuador and Canada have extended invitations to hold the VII Pan American Conference (1983) in their countries.

Revista Latinoamericana de Geotecnica

This technical magazine edited by the Venezuela Society for Soil Mechanics and Foundation Engineering was founded in 1973 with the purpose of promoting the publication and discussion of papers related to geotechnical problems in Latin America. Due to economical limitations and lack of written contributions publication has been irregular. So far six issues have appeared. At the V Pan American Conference (Nov.1975), the delegates of national societies agreed upon a more realistic quota per member and a list of potential contributors.

Glossary of Technical Terms

Under the sponsorship of the Institute of Engineering, UNAM, and the Mexican Society for Soil Mechanics, a glossary of technical terms in Spanish, Portuguese, English and French, has been prepared with the help of several Latin American societies. It incorporates the terms adopted by countries of the region as synonyms for those proposed by the National Societies of Spain and Portugal.

The glossary is based upon the one published in 1957 by the Organizing Committee of the III International Conference (Switzerland) and was complemented with terms from other similar sources. Copies will be sent to the ISSMFE, Secretary General and the National Societies that contributed to its preparation and will be available at the IX International Conference.

Raul J Marsal

APPENDIX 12

REPORT OF THE VICE-PRESIDENT FOR SOUTH AMERICA, 1973-1977

In common with his colleagues this Vice-President interpreted the privilege of writing his report of personal assessment of the main lines and items of development in geotechnique in his region as an honour in trust, to serve his member Societies within the International community. However, having waited for their direct communications, especially requested by letter, so long as to incur deserved personal criticism for failing to meet all deadlines for submitting the report, he now begs leave to use the case as the cue for earnest apologies to the Officers and Executive Committee members of the International Society, for this and other failings in prompt actions and communications. Perhaps those among you who have given our eager young region the privilege of working with us may be kind enough to attest to the fact that it is far from the traditional connotation of "leaving things for tomorrow", since what assails us is the accelerating pressure of civil, mining, and industrial engineering works that are "required for yesterday", in the face of which the persons are all too few, and the petty technicalities to overcome quite exhausting. The spirit is indeed strong, as strong as we have had the honour to encounter anywhere: it is the tremendous rate of change of things around us, enveloping us, that set us back in our effectiveness. Doubtless the greatest homage that we of South America may render to the deeper leadership of such "gurus" as Terzaghi, Taylor, Skempton, Casagrande and so many others at whose feet we learned, is to recognize that no other field of professional endeavour in our countries has so continually stimulated enthusiasm and personal effort at the level at which some of our colleagues dedicate themselves to soil mechanics and geotechnical engineering.

The present summary report is based on the formal replies received within the past week from the Brazilian and Equatorian National Societies, besides data from personal files.

1. Generalities suggesting principles for orientative action.

The actions of the Vice-Presidents on behalf of the Society have hitherto had little possibility of crystalizing into effective measures: there has been no transfer of files from the outgoing to the incoming holder of the office, and, within the activities of the National Societies and of the International Society itself, there has been no specific function accompanying the office along with the recognition, friendly and honouring, attached to the election. The office is essentially passive, and thus the report presentation at the end of the four years would naturally limit itself to a summary compilation of the activities developed by the National Societies. However, besides such a recording of the really small items that punctuated the four years of office, the following simple thoughts are offered to future Vice-Presidents as useful, within the expectation that the office will naturally grow into some executive importance.

1.1 With the kind support of the Venezuelan Society a permanent file has been organized for all documents and correspondence concerning the South American Vice-Presidency. The election to the office will rightly continue to seek a judicious balance between personal attributes and the need for some circulation in geography: but the institutional requirements of the Society are for a permanent organized repository of all papers that reflect the problems and solutions hitherto faced. It is hoped that all Vice-Presidencies will likewise institute their permanent-file Secretariat. In consideration of item 1.3 below, the Caracas Vice-Presidencial file has been instituted simultaneously for the South American Vice-Presidencies of Rock Mechanics and Engineering Geology.

Moreover, considering the acute lack of technical publications in South America it is hoped that the present permanent Vice-Presidencial file will be automatically extended to icnorporate a technical documentation centre; it is earnestly requested that all institutions that distribute geotechnical literature of any kind (whether gratis or paid for) automatically send to the permanent filing Secretariat a single copy of each and every paper or publication. Thus, as a future step, the South American geotechnicians and their National Societies may be served by a copying service for distribution of papers on special request.

1.2 It is very important in our region to recognize that things are most often done on the basis of individual enthusiasms, and that the men of greater initiative generally hold affiliations and may seek office and leadership in a number of closely related Societies. Thus efforts must be made, on the basis of personal contacts, to strike a balance between favouring the enthusiasms, individual and cyclic, and avoiding a successive splintering of Societies and technical bulletins. Taking Brasil (and possibly Colombia) as examples, it must be emphasized that most of the geotechnical activity has been concentrated on earth-rock dams, and the dominant

vehicle has been the Committee on Large Dams. Geotechnicans have been the ones to initiate new lines of activity and corresponding Societies: mention may be made of the new Brazilian Committee of the International Tunnelling Association, participation in ICASP (International Conference on Application of Statistics and Probability in Civil Engineering), introduction of Finite Element Analysis in Civil Engineering, and direct promotion of interest in Offshore Technology, and in Seismic Activity and Risks.

1.3 In an area where residual soils (mature, with no apparent remnant of the parent-rock structure, and with geotechnical behaviour satisfactorily established through conventional Soil Mechanics) and saprolites (soils of appearance and behaviour dominated by relict parent-rock structure) predominate, it is fundamental to maintain a close tie between Engineering Geology, Soil Mechanics and Rock Mechanics. It would be utopian to establish a single Society as has been done in Australia under the name of Geomechanics. Our National Societies have acted very ably to permit and foster activity (which means independence) while avoiding pulverization. Improved coordination is being worked out hoping to include, for instance, reduced fee propositions for members coparticipating in two or three of the sister Societies. Such cooperation has been enhanced by the fact that for a short period of overlap the three Vice-Presidencies have had the good fortune of falling on persons who have held membership in all three Societies and residence in the same city (Sao Paulo).

1.4 Regarding vehicles for routine publication of technical papers, special mention must be made of the efforts at cooperation for greatest effectiveness, firstly on a regional basis and secondly on the basis of cross-region language links. The Revista Latinamericana de Geotecnia, Caracas, established by agreement (Mexico, 1969) between all the Ibero-American Societies (i.e. including Mexico from the North American region, but without inclusion of French-speaking countries of America) to be the single technical journal, has made a renewed effort at regularity after the firm commitments assumed by the National Societies at the Panamerican Conference, Buenos Aires, Nov. 1975: accordingly the 4-issue volume for 1976 and the first issue for 1977 have been regularly distributed including papers contributed by Brasil, Mexico, Ecuador and Venezuela; and the 2nd issue of the 1977 volume is in print as scheduled. Very special thanks are due to Juan Carlos Hiedra Lopez for his immense personal efforts, and to the Venezuelan Society for their strong and patient backing. The case is of further interest as an example of an international endeavour being pushed by acceptance, by each National Society, of a certain quota of responsibility regarding papers, subscriptions, and financial support: each Society is then left to work out its internal logistics for meeting the global commitments.

The Brazilian Society has simultaneously maintained an agreement for close support to the Portuguese Society's journal Geotecnia, Lisbon, in the hope of sustaining a single geotechnical journal for the Portuguese language.

English translations, or synopses at the least, are included in both journals.

1.5 First steps towards creating new National Societies were taken at the request of interested parties from Bolivia and El Salvador. For both cases the Secretary General's circular letter of instructions was sent out alongside with suggestions regarding the structures adopted by the Southeast Asian Society and the Brazilian Society, for decentralized local activity (because of geographic and communicational difficulties) concomitant with centralized National direction for international affairs: moreover, the Australian Geomechanics joint-society solution was suggested as a possible model. It is hoped that the two new Societies will soon materialize and join the International Society. In the case of El Salvador, which would be attempting to form a Central-American Society for all neighbouring countries (under the possible name of Associacion Centro-Americana de Geotechnia) it is hoped that their desire will be expressed and ratified regarding joining either the South American or the North American region of ISSMFE.

2. Summary of activities of the National Societies.

2.1 Argentina No formal reply was received to our request for information. The outstanding event represented by the 5th Panamerican Conference, Buenos Aires, Nov.1975, has been mentioned in the report of the Vice-President for the North American region. Our Argentinian colleagues deserve every recognition and compliment for a most successful conference, both technically and socially, despite well-known difficulties faced by the country and profession at the time.

2.2 Brasil Geotechnical engineering has been very active both directly within the National Society and indirectly through other bodies in which itself and its members have played a strong part.

Three Brazilian Seminars on Large Dams were held, the 9th in Nov. 1973, the 10th in April 1975, and the 11th in Nov.1976. In each there have been between a dozen and a score of technical papers on geotechnical engineering for embankment dams.

The principal achievement was the 5th Quadriennial Brazilian Congress of Soil

Mechanics, Sao Paulo Oct.1974, with T.W. Lambe, M. Rocha, A. Mayer, B.A. Kantey, and A. Muir Wood as special guests and personalities from abroad. Moreover, participation in the Buenos Aires Panamerican Conference was very great, including one general report and 34 papers. Further participation in International Conferences has included, principally, the 2nd International Conference on Engineering Geology, Sao Paulo Aug. 1974, the 3rd International Conference on Rock Mechanics, Denver Sept.1974, the 12th International Congress of Large Dams, Mexico 1976, the 2nd International Conference on Statistics and Probability applied in Civil Engineering, Stuttgart Sept. 1975, among others.

Locally there was in Sao Paulo a Seminar on Shield Tunnelling, April 1975, sponsored by the Metro, two Seminars sponsored by the postgraduate program COPPE-Univ. of Rio de Janeiro, on Finite Element Methods applied to Soil Engineering (Sept. 1974) and Field Instrumentation in Soil and Foundation Engineering (Nov.1975), and also the First Brazilian Congress of Engineering Geology, Rio de Janeiro Aug. 1976.

Present planning is for the 6th Brazilian Congress to be held in Rio de Janeiro, July 1978, alongside with a Symposium of the ISRM on Rock Mechanics for Dam Foundations.

The Society is working at revising and complementing existing Standards and Codes on testing and foundation design. It distributes automatically to all its members the issues of the Revista Latino-americana de Geotecnia, Caracas, and of the Portuguese journal Geotecnia, Lisbon. It worked as the principal contributor in the preparation of the Portuguese terms for the revised Geotechnical Vocabulary.

2.3 Ecuador The Society has been very active and has submitted the following list of activities in reply to our query:

(a) I Equatorian Symposium on Geotechnique: zoning for the City of Guayaquil, Oct. 1974. (b) II Equatorian Conference on Soil Mechanics and I Conference on Geotechnique, Aug. 1975. Drs. O. Moretto of Argentina, E. Juarez Badillo of Mexico, J.W. Hilf of the U.S.A., and myself (Brasil) had the honour to attend this very successful conference as special foreign guest lecturers. (c) Seminar on Seismic Risk in Ecuador, Oct.1976. (d) Equatorian Seminar on soils of the Tropical-Andes, being held in Guayaquil, July 1977.

The Society has published 10 issues of the Equatorian Bulletin of Geotechnique, and a Geotechnical Vocabulary (Parts I, II, III, Sept.1976) including terms in use in Ecuador together with their English and Portuguese equivalents.

2.4 Chile No special communication was received concerning activities of the Chilean Society.

2.5 Colombia No special communication was received from Colombia. Through personal contacts it is known that there is considerable activity in embankment dam engineering, reported principally through the ICOLD.

2.6 Peru No special communication was received from Peru. As mentioned in the report of the Vice-President for North America, intense activity has started in preparation for the 6th Panamerican Conference, considerable correspondence having been exchanged already regarding choice of topics. Very laudably the principal topics of interest are centering on problems of regional importance, such as tropical soils, soil mechanics applied to mining, and seismic and soil dynamics.

The election of Peru for the seat of Conference and of Professor F. Martinez of Chile as the incoming Vice-President met with unanimous support, with the intent and expectation that the sister Societies of the Adean Region will thereby receive the awaited and well-deserved boost.

2.7 Venezuela No formal reply was received from Venezuela. It is well-known however, that there is very intense professional activity, and the South American Region owes much to the Society's consistent efforts through sponsorship of the common journal and filing Secretariat.

A very well attended and successful Seminar on Embankment Dams was held in Sept.1976 (5th Seminar on Soil Mechanics). Professor R. Marsal, and myself, had the privilege to participate among the special foreign guest lecturers.

The Society has continued to publish its own journal, the Boletin, of which to my knowledge Numbers 39 (March 1974) through 44 (Dec.1976) have been distributed.

3. Important final comment.

Regarding Soil Mechanics and Geotechnical Engineering in our Region I herewith take the liberty to express my personal concern on two important factors that have appeared, and may expand, in detriment to the real needs of the profession. Firstly there is the rapid advance of big organizations and compartmentalization, coupled with absurdly rapid job turn-overs, as a result of which few young geotechnicians are getting the opportunity for contact with the entire problem and, principally, for the closing of the cycle of experience by seeing the performance of the very structures for which they conducted the investigations and design. Secondly, there is the disproportionate advance of office and computer soil mechanics

by the most talented young men, attracted to the novelties, without having had the intimacy with the feel for soil as it is, and as it behaves and misbehaves in field and laboratory tests.

In the light of such fears of serious problems that already beset us, and beset us most because of the laudable eagerness of a young region, it was felt that Professor Peck's 2nd Nabor Carrillo Lecture brought a very important message. In my opinion, what our Geotechnical Engineering most needs is to reflect deeply on Professor Peck's message, which in a sense renews the fundamental concepts of the very birth of Soil Mechanics under Terzaghi.

Victor F.B. de Mello

APPENDIX 13

REPORT OF THE VICE-PRESIDENT FOR ASIA, 1973-1977

1. GENERAL

The geographical zone of Asia covers a vast area and the population in this continent constitutes a significant proportion of the world population. Majority of the countries in the region are in the development stage, therefore, activities in the area of geotechnical engineering were, in general, not comparable with other regions, such as Europe and North America. A good indication of the development in the Asian region during the past four years is the increase of number of member societies of the ISSMFE from 7 in 1973 to 9 in 1977. However, the total membership did not change greatly.

There was a great drop in the membership from the Indian National Society, probably due to the change of the dues structure of the ISSMFE in 1973.

2. NINTH INTERNATIONAL CONFERENCE

The most important activity of the Asian Region during the 1973-77 period is of course the hosting of the Ninth International Conference in Tokyo by the Japanese Society of Soil Mechanics and Foundation Engineering. Since the acceptance of invitation by the Executive Committee of ISSMFE in Moscow, the Japanese Society has been working very actively in preparation of the Conference. Fig.1 shows the organization for the 9th Conference. The Organizing Committee has worked closely with the ISSMFE Conference Advisory Committee which consists of the President of ISSMFE as Chairman, the Secretary General, the Vice President for Asia, the Secretary General of the 8th Conference and two delegates from the Japanese Organizing Committee.

Five Bulletins have been issued and distributed to all national societies, i.e. Bulletins No.1 and 2, Special Bulletins No.1 and No.2, and Bulletin for Post Conference Tours. The first two volumes of the Proceedings will be published soon.

3. REGIONAL CONFERENCE

One of the highlights of the regional activities during a four year period was the holding of regional conference. The Fifth Asian Regional Conference was held on 19-22 December 1975 in Bangalore, hosted by the Indian Geotechnical Society. The conference was attended by about 250 participants from 9 countries. Due to the location of the conference, the number of foreign participants was regretably small. The conference was divided into four sessions with 66 papers accepted for publication. The topics of the four sessions were: Regional Deposits, Partially Saturated Soils, Foundation and Excavation, Soil-Structure Interaction. Professor G.A. Leonards of the Purdue University, USA, delivered a guest lecture on Some Fundamental Misconception in Modern Practice of Soil Engineering.

The past four regional conferences were held at:

New Delhi, India, 1961
Tokyo, Japan, 1964
Haifa, Israel, 1967
Bangkok, Thailand, 1971

The Sixth Conference is scheduled to be taking place in Singapore in 1979 under the sponsorship of the Southeast Asian Society of Soil Engineering.

4. ACTIVITIES OF NATIONAL SOCIETIES

(A) India

The total number of membership of the Indian Geotechnical Society as of 1977 stands at 1146, however, only 189, slightly over 15% of the total membership belongs to the ISSMFE. Comparing to the number 446 in 1974, there was a great drop in the membership. This does not indicate a drop in the interest in the ISSMFE, but perhaps a reflection to the new dues structure introduced by the ISSMFE in 1973.

The current officers are: Dr. B.K.Ramiah, President; Dr. T.Ramamurthy, Hon.Secretary; Dr.R.K.Bhandari, Hon.Jt.Secretary; Shri M.L.Malhotra, Executive Secretary.

The Indian Geotechnical Society is planning to hold the First National Symposium on Expansive Soils at Harcourt Butler Technological Institute, Kanpur, U.P in December 1977.

(B) Indonesian

The Indonesian Association of Geotechnical Engineers submitted an application for membership in the ISSMFE to the Secretary General in February 1977. This application will be discussed at the Executive Committee in Tokyo.

(C) Iran

The Iranian Society of Geotechnical Engineers was first admitted to the ISSMFE at the Executive Committee meeting held in Moscow in 1973. However due to government formalities, the Society was only recently approved by the government. The membership is 30.

The members of the Board of Directors are:
H. Pouroushasb, H.Dezfulian, E.S.Nabari, M.Baybourdi and Y.Eskandari.

(D) Israel

The current membership of the Israel National Society is 119. The officers of the Society are Professor Joseph G.Zeitlen, President and S.Frydman, Secretary.

During the past four years, the Society has sponsored the following conferences, seminars and special lectures:

(i) April 1974: Symposium on the use of slurries in Foundation Construction (Tel-Aviv)
(ii) March 1975: Symposium on Retaining Walls (Tel-Aviv)
(iii) November 1975: Symposium on Load-Settlement Relations of Foundations in Israel (Tel-Aviv).
(iv) April 1977: Symposium on Dynamic and Repeated Loading of Soil (Tel-Aviv).
(v) December 1975: First Memorial Lecture for G. Kasiff (Late National Secretary) by G.Leonards: Some Fundamental Misconceptions in Modern Practice of Soil Engineering.
(vi) December 1976: Second Memorial Lecture for G. Kassiff, by J. Uzan: Measurements of Flow characteristics in Expansive Clay.

(E) Japan

The Japanese National Committee (or National Society) on Soil Mechanics and Foundation Engineering is a part of the Japanese Society of Soil Mechanics and Foundation Engineering. The former, a member of the ISSMFE, has a current membership of 368 while the later has a much larger membership. The 1977 membership amounted to a 50% plus increase over the 1974 membership. The current officers are Professor Masami Fukuoka, President, and Dr. Tsutomu Kimura, Secretary.

Besides being the organizer for the Ninth International Conference, the Japanese Society sponsored the following conferences and symposiums:

(i) Research Conference on soil mechanics and foundation engineering - annually in Spring, app. 800 participants
(ii) Symposium on soil mechanics and foundation engineering - annually, app. 300 participants
Oct.1973 - Masado (granite soil)
Nov.1974 - Consolidation Tests and the interpretation of the results
Dec.1975 - Uniaxial and triaxial shearing tests and their application to field problems
Nov.1976 - Quality control in construction works.

The following members have received decorations and prizes awarded by the Japanese government:

Dr. Matsutaro Fuji-i: decoration of the first degree in 1974
Prof.Masami Fukuoka: special prize award in 1975
Mr. Gaiichi Togashi: national prize award in 1976
Prof. Takeo Mogami: national prize award in 1976.

(F) Pakistan

The Pakistan National Society was admitted to the ISSMFE by the Executive Committee at its meeting in Moscow in 1973. No activities have ever been reported since then. The Society's dues to the ISSMFE are in arrears.

(G) PROC

The National Committee of PROC has paid their dues to the ISSMFE diligently during the past four years. However, as has been the case for more than 8 years, no individual name has been listed. The VP has never received any response to his letters.

(H) Southeast Asia

The Southeast Asian Society of Soil Engineering has a membership of 220, an increase of 17% from the 1974 figure. The current officers are Professor Peter Lumb, President, and Dr.A.S.Balasubramaniam, Secretary.

The SE Asian Society has organized the following two conferences:

(i) Fourth Southeast Asian Conference on Soil Engineering held in Kuala Lumpur, Malaysia, 1975.
(ii) Workshop on Geotechnical Information Systems, held in Bangkok, Thailand, April, 1976.

Two conferences under the sponsorship of the Society will be held in July 1977 in Bangkok just prior to the Tokyo Conference. These are the Fifth Southeast Asian Conference on Soil Engineering and the International Symposium on Soft Clay.

The Society will host the Sixth Asian Regional Conference in Singapore in 1979: Chairman of the Organizing Committee is Dr. Tan Swan Beng.

This year the Society will celebrate its tenth anniversary at the time of the Fifth Conference.

Professor Chin Fung Kee, the immediate Past President of the Society, has been honored by the award of an Honorary Doctorate Degree from the University of Singapore in 1976. Professor Sean Mackey, one of the founding members of the Society was honored by the award of an Honorary Doctor of Science Degree from the University of Hong Kong in 1977.

(I) Syria

The Syrian Geotechnical Society is a new member of the ISSMFE admitted in 1975 by the Secretary General under the authorization of the Executive Committee. The Society's current membership is 11. The officers are: K. Kayyal, President, F.S. Mawlawi, Secretary and W. Kanaan, Treasurer

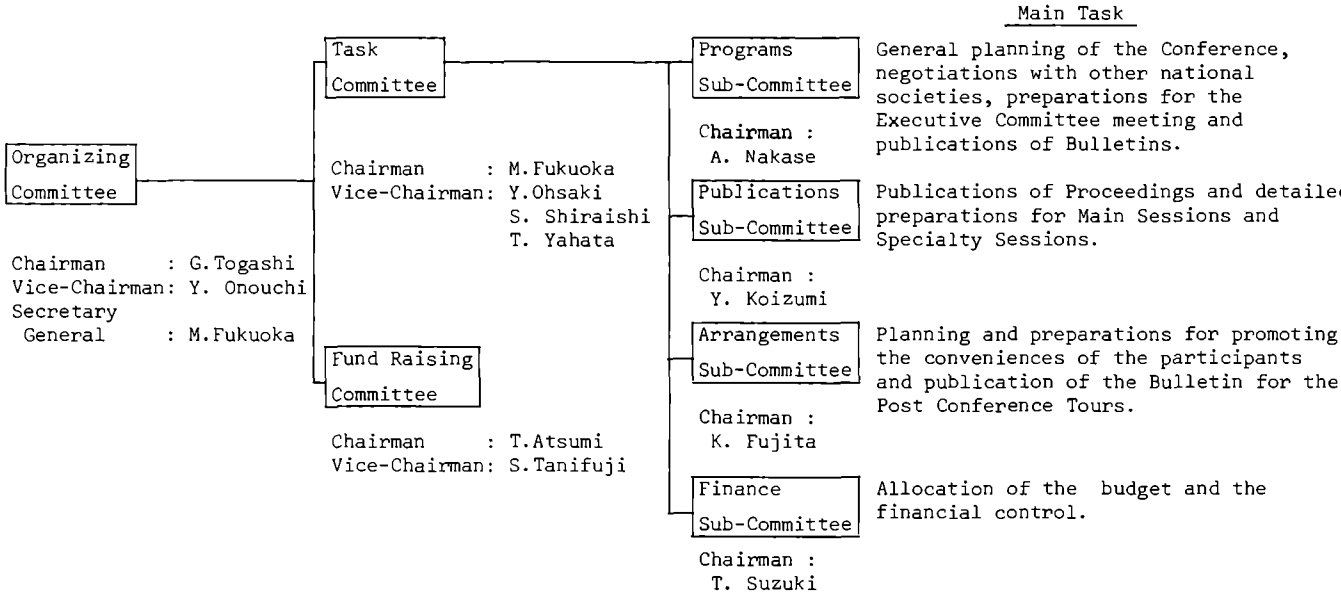
The Society has sponsored a conference on Design of Foundations on Compressible Soils in conjunction with the Iraqi Society of Engineers in October 1975. The conference was attended by 300 participants from 9 countries.

5. PUBLICATIONS

Conference Proceedings, Journals and other publications published by the various national societies in Asia are tabulated in the attached Table, in which the cost and availability are also shown.

-Za-Chieh Moh-

ORGANIZATION FOR THE NINTH INTERNATIONAL CONFERENCE



PUBLICATIONS AVAILABLE FROM THE ASIAN REGION

Title of Publication	Year	Place	Language	Publisher	Price
Proceedings, 5th Asian Regional Conf. on SMFE	1975	Bangalore India	English	Prof. B.V. Ranganatham, C.E. Dept., Indian Inst. of Sc. Bangalore 560012, India	US$50.
Indian Geotechnical Journal	Quarterly	India	English	Indian Geo.Technical Society, c/o The Inst. of Engineers (India), Bahadur Shah Zafar Marg, New Delhi, 110002, India	US$12 by surface mail US$24 by air
Newslong	Periodical	Iran	English & Persian	Iranian Society of Geotechnical Engineers c/o Tehran Berkeley P.O.Box 41-2995, Tehran, Iran	Free
Soils and Foundations	Quarterly		English	Japanese Society of SMFE, Toa Bekkan Bldg, 13-5, 1-Chome, Nishi-Shinbashi, Minato-ku, Tokyo, Japan	US$10 per year
J. of the Japanese Society of SMFE	Quarterly		English & Japanese		
Tsuchi to Kiso	Monthly		Japanese		
Books on Soil Mechanics & Foundation Engineering 1973 to 1976, 18 books published			Japanese		
Proceedings, 4th S-E Asian Conference on Soil Engineering	1975	Kuala Lumpur Malaysia	English	Division of Geotechnical Engineering, AIT P.O.Box 2754, Bangkok, Thailand	US$30
Proceedings, Workshop on Geotechnical Information Systems	1976	Bangkok Thailand	English	AGE, P.O. Box 2754, Bangkok Thailand	US$6
Geotechnical Engineering, J.of the S.E.Asian Society of Soil Engineering	semi-annual	Bangkok Thailand	English	Editor, G.E. AIT, P.O. Box 2754, Bangkok Thailand	US$5 for individuals and US$12 for multi users.

APPENDIX 14

REPORT OF THE

VICE-PRESIDENT FOR AUSTRALASIA

1973-1977

ORGANISATION

In both Australia and New Zealand the national groups representing the International Society for Soil Mechanics and Foundation Engineering also represent the International Society for Rock Mechanics (ISRM) and the International Society for Engineering Geologists (IAEG). The three areas of interest are grouped together under the title "geomechanics" which has become fully accepted in the Australasian region, and which is roughly synonymous with the term "geotechnical engineering" as used elsewhere.

The Australian Geomechanics Society is sponsored by the Institution of Engineers, Australia, and by the Australian Institute of Mining and Metallurgy, while the New Zealand Geomechanics Society is under the sponsorship of the New Zealand Institution of Engineers, of which it forms a Technical Group.

The arrangement whereby a single national society represents the three international organisations (ISSFME, ISRM and IAEG) functions smoothly. It is generally felt that the interchange of information and ideas between the three at national as well as local level has been profitable for all concerned. There are probably several reasons that this form of organisation works well in the Australasian Region, yet has not found favour elsewhere. In New Zealand particularly, the small numbers of people engaged either in rock mechanics or engineering geology, and their wide dispersal throughout the country, make it difficult to support an independent national society for either ISRM or IAEG. Another probable reason is that, either as a matter of training, tradition, or perhaps temperament, there is less narrow specialisation in this part of the world.

Suggestions have been made, emanating principally from the Australian Geomechanics Society, that the sort of co-operation now practised successfully at national level should be extended to the international level, by the amalgamation of the three international societies. This suggestion has not been well received, and the proposal for amalgamation of the ISSFME, ISRM and IAEG has now been withdrawn.

It is the Vice-President's opinion that the present organisational framework within the Region is working very satisfactorily; that this arrangement might well be copied in some other countries where conditions favour it; and that, while at international level there are three organisations in the sphere of geomechanics, this entails no real disadvantage.

REGIONAL ACTIVITIES

The major event within the period under review was the Second Australia-New Zealand Conference on Geomechanics, held in Brisbane, in 1975. Regional conferences have been held regularly since 1952. These were known as Regional Conferences of the International Society for Soil Mechanics and Foundation Engineering until 1971, when the Melbourne conference, in recognition of the widened role of the Geomechanics Societies was entitled The First Australia-New Zealand Conference on Geomechanics.

The 1975 Brisbane conference was markedly successful technologically, and attracted 300 registrants, many from New Zealand and from countries outside the Region. The Australian Geomechanics Society was honoured by the attendance of the entire executive of the IAEG who had made the journey from Europe.

The next Regional Conference on Geomechanics is planned to take place in New Zealand, in May, 1980.

Co-operation between the Australian and New Zealand Geomechanics Societies progressed considerably during the period, particularly after a joint meeting in the course of the Brisbane Conference, when many matters of mutual interest were discussed. An agreement on co-operation has been adopted by both Societies and is now operative.

AUSTRALIAN ACTIVITIES

Currently, there are over 400 members of the Australian Geomechanics Society.

One activity which came to fruition during the period under review was the establishment of a body to further the interest of tunnelling in Australia. Early in the period an Australian Tunnelling Committee was set up but this quickly developed into the Australian Tunnelling Association. This is still part of the AGS, and has been a very active body which has organised both the first and second Australian Conferences on Tunnelling. At the first Conference, Melbourne 1974, the theme was, 'Re-shaping Cities Using Underground Construction'. The theme of the second Conference, Melbourne 1976, was, 'Design and Construction of Tunnels and Shafts'. Both Conferences proved to be outstandingly successful with very large registrations and most fruitful papers and discussions. The Association is active

in a number of other spheres and has working groups in each of the following - Standardisation, Research, Subsurface Planning, Contractual Sharing of Risks, and Safety.

Apart from its major Conferences the principal technical activities of the AGS are vested in its groups which are located in each state capital. These activities have continued very strongly in all states throughout the period 1973-1977. Queensland, Victoria, New South Wales, Western Australia, South Australia and Tasmania all have strong groups which meet on a monthly basis with the presentation of technical papers, the organisation of symposia, the printing and sale of lecture notes and the arrangement of technical visits and inspections. The strength of the AGS comes principally from the activities of these groups and reports from the elected representatives from each state are made to the formal half-yearly meetings of the AGS Committee.

Subgroups of the Society contribute to a number of other activites, sometimes in association with other organisations. These include the Institution of Geomechanics Computer Programs and the Standards Association of Australia. The latter produces standards and codes of practice on site investigation, testing of soils for engineering purposes, domestic footings, piling, and the like.

Another important activity of the AGS is the publication of the Australian Geomechanics Journal. Since the first issue in 1971 this has been published once per year. However with growing confidence in its ability to obtain a sustained flow of high quality papers it has now been decided to publish twice per year.

An invitation has been extended to New Zealand authors to publish papers in the Journal.

NEW ZEALAND ACTIVITIES

Membership of the New Zealand Geomechanics Society, at the end of 1976, stood at 278. This is a remarkably high membership for a country of only 3 million inhabitants. About 88% of the members are affiliated with ISSFME, 21% with IAEG and 11% with ISRM. (Some members have more than one affiliation.) The Management Committee of the Society, which has a Vice-Chairman to represent each of the international societies, meets three times per year, usually in Wellington.

Every year or so, a national symposium is organised, usually in one of the smaller cities. "Geomechanics in Foundation Engineering" was the topic in Wanganui, in 1973. Over 120 people attended the symposium entitled "The Stability of Slopes in Natural Ground", in Nelson. Proceedings, including discussion, were published in 1975, and provide a useful reference. They cover not only technical, but also legal, town-planning and insurance aspects of slope stability. A further symposium, on Tunnelling, is planned this year, in Hamilton.

The Geomechanics Society regularly organises several sessions at the Annual Conference of the New Zealand Institution of Engineers. The activities have included the presentation of technical papers, a workshop session on earth pressures on retaining walls and a discussion of a New Zealand provisional standard code of practice: "Design of Foundations for Buildings".

The first New Zealand Geomechanics Lecture (inaugurating a series) was entitled "The Significance of Geomechanics in the Economic Development of New Zealand" and given by Mr. J.W. Ridley, M.P., in 1974. The second was presented by Dr. C.P. Wroth, "A Fresh Look at the Damaged Caused to Buildings by Settlement". In each case, the lecture was presented at Auckland, Wellington and Christchurch, and was well attended.

The Society is becoming more actively engaged in the preparation of standards covering aspects of geotechnical engineering. Directly or indirectly, it has co-operated with The Standards Association of New Zealand in the production of NZS 4204P, relating to foundations for small structures; 4205P, "Code of Practice for the Design of Foundations for Structures"; 4402 "Methods of Testing Soils for Civil Engineering Purposes" and 4431P "Earth Fills for Residential Development".

New Zealand Geomechanics News continues to be published twice yearly. This is basically a newsletter, but some technical papers have also been included. Some geomechanics papers of general engineering interest are published in *New Zealand Engineering*. Recently the New Zealand Institution of Engineers has started publishing *Proceedings of Technical Groups*, some issues of which are entirely devoted to papers on geomechanics. (The Geomechanics Society is the largest Technical Group of the NZIE.) Believing that there is a dearth of information for the intelligent layman, the Society has published two booklets, entitled "House Foundations" (for builders and prospective house-owners) and "Slope Stability in Urban Development" (for city and borough councillors, planners and lawyers). It is hoped that these will fulfil the clear need for information for non-technical people.

CONCLUSION

Clearly, the subject of soil mechanics and foundation engineering is being vigorously persued within the Region. Association under the general title of 'Geomechanics" with members of the IAEG and ISRM has in no way diminished our endeavours but has proved advantageous to all concerned. Geomechanics is flourishing in Australasia!

APPENDIX 15

REPORT OF THE VICE-PRESIDENT FOR EUROPE, 1973-1977

ON THE EVENTS IN GEOTECHNICAL ENGINEERING

It is an honouring duty of the Vice President to survey the whole scene of work in soil mechanics and foundation engineering in the respective Region and to prepare a report on it to the Executive Committee, on the occasion of International Conferences. He does this in order to promote coordination and international cooperation, exchange of information among the member Societies, for the advancement of knowledge and engineering practice.

I think I should start my report on the grave losses the International Society suffered during the past four years. Early in 1976, Albert Caquot, member of the Institut the "great old man" of Soil Mechanics in France, passed away. He was one of the first persons who realized the importance of Soil Mechanics also in the field of practical applications. He laid down, as early as in 1934, the foundations of the Theory of Plasticity as applied to soils. The book **"Equilibre des massives à frottement interne"** continued the long series of the splendid achievements of French ingenuity and clarity. His other book **"Traité de la mêcanique des sols"**, written together with his son-in-law, Professor Kerisel, provided the French speaking world with the basic tools for practical work and a fine textbook for students. We will keep the name and work of Albert Caquot in grateful memory.

The Austrian Society lost one of its founding members, its long time President, dr. Wilhelm Aichhorn. He worked mainly in the field of Soil Mechanics of road construction and had valuable results in research of soil stabilization. He introduced soil mechanics investigation into road design in Austria and was an enthusiastic fighter for new ideas. He initiated the series of the Danube European Conferences.

The British Geotechnical Society announced the death of dr. Leonard F. Cooling. He worked as head of the British Building Research Station and in this capacity he had attended all the International Conferences until Moscow. He was the real pioneer of Soil Mechanics in Britain, he was among the founders of the International Society and created an outstanding school of soil mechanics. His example will be remembered in the Society, in Britain and in the world as well.

The Yugoslav Society announced with deep sadness the loss of one of its outstanding members, of Professor Krsmanovic. A member of the Academy of Sciences and Arts of Bosnia and Hercegovina, he was the founder of the Geotechnical Institute at the University of Sarajewo. The French Society announced in 1975 the passing of its President Jacques Florentin; his untimely death was a tragic loss for the whole Society, since he was a dedicated man and devoted servant to it. Perhaps, I may add a personal note of sympathy while I'm announcing these tremendous losses, since I have the privilege to have known all these personalities personally and I am fully aware that Soil Mechanics has been made the poorer by their passing, in a measure, we can hardly appreciate.

May I ask you, fellow members of the Soil Mechanics family, to stand up for a minute and remember life and achievements of these splendid personalities. We remember also the other members of the family who passed away in the past four years but cannot be listed here.

In order to be able to prepare my report, a circular letter was sent to the European National Societies which asked them to send in their respective reports. However, until the end of May, only fifteen countries responded in merito to this letter, therefore my present report will be rather incomplete and won't cover the whole activity of the Region.

The fifteen countries are the following: Austria, Czechoslovakia, Denmark, Federal Republic of Germany, Finland, France, German Democratic Republic, Greece, Hungary, Ireland, Romania, Sweden, Switzerland, Turkey, Yugoslavia. These national reports will be covered as full as possible; from all the other countries, only some important events which came to my knowledge, will be mentioned.

I start my report with the most important event in the Region and still I remain in strict alphabetical order. This event was the 6th European Regional Conference of the International Society. This was held in Vienna, Austria, in March 1976. It also commemorated the fiftieth anniversary of the publication of Terzaghi's book: **Erdbaumechanik auf bodenphysikalischer Grundlage** in Vienna, in the year 1926. Mrs. Ruth Terzaghi and several pioneers of Soil Mechanics working in close collaboration with Terzaghi / Arthur and Leo Casagrande, H. Borowicka, J. Hvorslev, K. Kienzl, O. Kretschmer, K. Langer, P. Siedek and Ch.Veder / in the early twenties, attended the meeting which made the Conference a very special event, and recalled the pioneering spirit of those days.

The main themes of the Conference were devoted to deep foundations and deep excavations. The Proceedings filled three volumes, presenting over 100 papers, 70 oral and written contributions and seven general reports. The meeting aroused a great interest, over a thousand persons representing 32 nations attended it. The Conference was a real example of perfect organization and a plain success from scientific and practical point of view and was highlighted by accompanying social events.

In Czechoslovakia, the development is characterized by an expansion and broadening of activity in the field of Soil Mechanics, in theory as well as in practice. Every year more than 25 papers are published many of them presenting important contributions from representatives of the younger generation. Several valuable monographs have also

been published. The Czechoslovak group held a number of national conferences and seminars discussing general and local problems. The Institute of Theoretical and Applied Mechanics organizes, for example, regular seminar lectures in Prague and regular conferences in Brno on progressive methods in foundations engineering. In 1977, the National Group will host the 5th Danube European Conference.

The life of the Danish Geotechnical Society consisted, for the past three to four years, of 4 to 5 meetings discussing various topics. Most speakers have come from Denmark, a few from other Scandinavian countries. In 1975, the Society organized the Nordic Geotechnical Meeting which is held every four years in one of the Nordic countries. In 1975, 280 participants attended the meeting, having discussed physical characteristics of soils, soil stabilization, pile research, soil mechanics in road construction. Among the special lectures the one on experiences from failures and another one on use and abuse of computers in Soil Mechanics deserve special mention. The Proceedings includes more than 50 papers.

During 1976 a working group was busy with the new edition of the Danish Building Code for Foundation Engineering. The New Code was scheduled for publication in April 1977; English translation is under preparation.

The Finnish Geotechnical Society celebrated, in 1976, its 25th anniversary. Between 1973 and 1977 they organized three to five society meetings every year and seminars for the members on topical problems. Every year, one or two courses are held with subjects like foundations in difficult subsoil conditions, precast concrete piles, field testing etc. In 1977, the yearly Finnish Soil Engineering Symposium will be devoted to research and developments in soil mechanics. A group of authors collective published a series of booklets on site investigations.

Scandinavian countries keep traditionally close contact also in the field of Soil Mechanics. One example is the organization of regular Nordic Soil Engineering Symposia. Other forms of international cooperation / e.g. with soil engineering organizations of the USSR / also add to the activities of the Society.

The French National Society / Comité Français de la Mécanique des Sols et des Fondations/ is usually very active and this has been proven also in the period under consideration.

The group has monthly meetings. The papers presented at these meetings are usually published regularly /"Cahiers"/. Since 1973, there have been 5 of them, each containing 5 to 6 publications from various fields / penetrometers, reinforced earth, earthworks, etc./. The French group intends to publish a new journal devoted entirely to Soil Mechanics, in French; the first issue being due in 1977.

The Group lists six lectures delivered by foreign scientists, in the frame of the meetings, and three special symposia /"Journées d'Etudes"/. The first was held in 1973, in Cannes /Soil and sub-soil and safety of the structures/, the second in 1975, in Orléans /"Dispersion of physical characteristics of soils"/, the third in 1977, in Paris /"Water, soil and construction"/. These meetings are usually jointly organized by the Societies for Rock Mechanics and for Engineering Geology.

A few years ago, the French Society decided to create a Committee for the Coordination of Research. The Committee promotes the exchange of information and intends to coordinate research projects for organizations which carry out research in the field of Soil Mechanics in France.

The "Deutsche Gesellschaft für Erd- und Grundbau" which forms, at the same time, the respective National Group of our Society in the Federal Republic of Germany, organized several conferences. Important work has been done in the various committees of the Society. This Society works in close cooperation with the International Societies for Rock Mechanics and for Engineering Geology, thus the foundation problems can be jointly attacked and solved. This is also reflected in the themes of several national and international gatherings / Sinkholes and subsidence engineering-geological problems related to soluble rocks, 1973; Engineering Geology, 1977; 2nd National Conference on forming cavities in rock, 1974/.

The regular Conferences /"Baugrundtagung"/ of the German Society are held in every second year. In 1974, 1200 members attended this Conference in Frankfurt; participants also came from the Netherlands, Belgium, Austria and Switzerland. Among the themes, usually constructional problems, special foundations, and foundation pits are in the foreground and important discussions take place, since participants came mostly from the construction industry.

Visits to construction sites included the subway in Frankfurt, television tower with 16m deep foundation pit with slopes, high-rise building construction. For members with a more theoretical interest in the field of Soil Mechanics, a Specialty Session was held in the frame of the same Conference, on monotone time dependent processes in the subsoil. The Session was attended by 300 members.

The second Conference, in 1976, was held in Nürnberg, with the participation of 1100 members. Many participants came from abroad. The Conference served again to review the general status of foundation engineering in the Federal Republic and to present details on some important construction projects. This time, the Specialty Session was centered on some difficult problems, e.g. construction of slurry-trench walls, on off-shore foundations, and on chemical solidification methods.

The Society organized, in 1975, the 2nd International Conference on Applications of Statistics and Probability in Soil and Structural Engineering. The first conference of this kind was held in Hong-Kong. The number of participants /82/ was limited, they represented 22 countries. The main topics of the Conference: 1-2 Design Philosophy/Structures and Soils, respectively/; and 3-4 Design Parameters/again, Structures and Soils/; there were 52 countributions. The papers have been published in three volumes; these contain a wealth of information on the rapid development in this important field of research. The excellent General Reports presented also an overall view of the state of the art.

In covering the activity of the German Society, the work done in the Committees should also be mentioned; the committee intend to give direct practical help in many questions of Geotechnique.

The Society of the German Democratic Republic is a rather young member of the International Society. In September 1976, they held their 2nd International Symposium, on the bearing capacity of rigid cast-in-place piles. There were two introductory lectures on the subject followed by a lively discussion. The group worked intensively on new official standards; the members are active at solving the foundation problems of dwellings /several tens of thousands/ and of industrial projects. The reconstruction of old cities with unfavourable soil conditions requires much ingenuity. National meetings on local problems were held in 1975 and 1977 in Dresden.

In Greece, the Hellenic Society of Soil Mechanics and Foundation Engineering organized, in the past four years, thirteen lectures on various subjects, with guest speakers. The text of the lectures was printed in two volumes of the Journal of the Society. The Greek report also lists 23 research papers authored by the members of the group. The first Soil Mechanics textbook has also been published. The number of the active members has doubled in the last four years.

The Hungarian National Society continued its activity under the auspices of the Hungarian Academy of Sciences /Committee for Soil and Rock Mechanics/. They jointly organized the Fifth Budapest Conference, with international participation. The three main topics were 1. Physical properties of soils; 2. Design and construction of deep foundations, and 3. Stability of earthworks and deep excavations. The volume of the Proceedings contains 49 papers, from 17 countries; the twenty Hungarian papers reflected well the timely problems of this area. The subjects were keenly discussed in the respective sessions. The regular sessions of the National Society have usually an informative character, while lectures and discussions are held in other gatherings. The main problems are furnished by the construction of the Budapest Subway, yearly a length of 1 to 1,5 km is completed. Many special methods have been invented and successfully applied. It deserves special mention that a collection of pile loading tests has been compiled and yearly augmented and evaluated.

The youngest member of the International Society in Europe, Ireland reports on papers and discussions on a pumped storage project, on the foundation of a bridge and on the aspects of Civil Engineering in the peat industry.

Romania organized, after the 8th International Conference, a meeting to gather information on the advancements reached in Moscow. Several outstanding guest speakers held lectures in Bucharest. Upon the invitation of the Romanian Government, a Seminar on construction in seismic regions and regions having difficult ground conditions was held, under the auspices of the UN Economic Commission. On three working sessions, design, construction and control of structures to be erected in such areas and problems of international cooperation were discussed. In September 1975, the Third Romanian National Conference was held on three themes: determination of soil properties, soil-structure interaction, and foundation methods and technology. 87 papers have been published in the Proceedings.

The report of the Swedish Geotechnical Society is traditionally rich and comprehensive. I mention first that the Society had its Silver Jubilee in 1975. In Sweden, an extensive committee activity is going on. The Penetration Research Committee was in charge of the first European Symposium on Penetration Testing /ESOPT/ which gave a real impetus to the further development of penetration. Delegates from 32 countries were present, they discussed 26 national state-of-the-art reports.

The papers documented national standards and codes of practice from about 20 countries. Thus, the Proceedings give an almost complete summary of existing national penetration methods in different parts of the world. The second volume reports on the various activities during the Symposium, the third includes 65 papers submitted by specialists, the papers cover the entire area of penetration testing and interpretation. There was a splendid exhibition and field demonstration of equipment. The material will certainly help our Committee toward international standardization. In Sweden, studies of the bearing capacity of friction piles as function of the results of penetration testing have been made. The Swedish activity on development and standardization of penetration methods has continued after ESOPT; they worked out a proposal for European standards of weight sounding and dynamic testing, respectively.

The Laboratory Committee intends to standardize Swedish laboratory methods and equipment. Of the total 10 parts, six have been published so far /soil structure, grain size distribution, compaction, consistency limits, volume and weight ratios, permeability and capillarity/. The individual brochures have an excellent appearance and a fine typography.

A special committee of the Society worked out a Geotechnical Dictionary, issued in 1975.

An international symposium on Frost Action in Soils was held in 1977, organized by the University of Lulea, with three topics: water transport, ice formation in soils, and technical aspects of frost action.

It has to be mentioned that an extensive research and development work is going on in Sweden in the field of driven piles, by the Pile Research Commission of the Swedish Academy of Engineering Science.

The Swiss Society /Société Suisse de Mécanique des Sols et des Roches/ organized five national conferences, on the following topics:

1/ geotechnical problems with large projects in Wallis (1975); 2/ bracing of open cuts and pits, deep retaining structures; 3/ geotechnical problems in the area of Schaffhausen; 4/ actual calculation methods in foundation engineering; 5/ engineering geology. The number of participants was between 130 and 360. The contributions have been published by the Society (Publications 90 to 94). The list of other publications contains, since 1973, approx. 10 titles.

In Turkey, Terzaghi Memorial lectures were held in 1973, immediately after the 8th International Conference. The meeting was organized by the Department of Civil Engineering of Bogazići University, Istanbul, in memory of the late Professor Terzaghi

who had worked in Istanbul from 1916 to 1925. Six invited papers were presented and five invited panel speakers participated in the discussions. The meeting was highlighted by the presence of Mrs. Ruth Terzaghi and the reminiscences of Karl Terzaghi, presented by her and by others, who had witnessed his activity there. The Proceedings of the Conference add greatly to our knowledge on his working methods and human qualities, and it contains facsimile of many documents.

In 1973, the Turkish National Society held a Conference on Soil Mechanics and Foundation Engineering in Istanbul. After the Conference, the group and the City of Istanbul were hosts of the Executive Committee of the International Society. The following themes were discussed: engineering properties and behaviour of soils; case studies of field behaviour, analysis and design in Geotechnics. There were two special lectures on Geotechnique of the Istanbul Area and on theoretical analysis and design.

The Yugoslav Society organized, in 1974, the 4th Danube European Conference on Soil Mechanics and Foundation Engineering, which was attended by 250 participants from the Danube countries. The main themes of the Conference: hydraulic structures on the Danube and in its river basin, road construction on weak soils and foundations on heterogeneous holocene deposits with complex stress-strain-time relationships. There were approx. 40 written contributions to the Proceedings (2 Vols). The Conference proved again that the Danube basin presents several particular Soil Mechanics problems to the civil engineers which have to be discussed among Danubian countries.

In 1975, a Symposium on the design and construction of diaphragm walls was held in Beograd, organized by the Yugoslav Civil Engineering Center. The 13th National Conference of the Society assembled in Budva and discussed 1/ soil properties, sampling and testing, 2/ foundations and 3/ problems of earth dams, slope stability and open excavations. In 1976, a three-day Symposium on grouting problems was held in Zagreb, which was attended by more than 300 participants.

Although no national report has arrived, I have to mention two events here, since I have had personal experiences. In the United Kingdom, the British National Society continued the system of the Rankine Lectures: every year, a well known authority is invited to deliver this lecture which made tradition and fame in the passing years. In 1974, Gibson spoke on the analytical method in Soil Mechanics, in 1975, our President, Professor Kerisel on old structures in relation to soil conditions.

In Poland, the Polish Geotechnical Society started a new series of conferences, and organized in Gdansk, the First Baltic Conference on Soil Mechanics and Foundation Engineering. There were 200 participants from 27 countries who listened to special lectures and attended the main sessions on theoretical and experimental bases, on shallow and deep foundations and on stability of earth structures on bedrock.

The Norwegian Geotechnical Society inaugurated the Laurits Bjerrum Memorial Lecture. The first lecture was held in Oslo, in 1975, by Kenney, Canada; on formation of geotechnical characteristics of glacial lake varved clay.

Arriving at the end of my report based on the communications I received from National Societies, I think that I am entitled to give a few general remarks. First, we are witnessing a rapid expansion of Soil Mechanics in Civil Engineering; we may say that we arrived at a state when it is unthinkable to design a major civil engineering project without the help and use of Soil Mechanics. Every civil engineering curriculum in technical Universities includes a course in it and laboratories are busy in exploring, testing and consulting. One has the feeling, however, that in some cases this investigation goes too far, and causes unnecessary delays and expenses. I am convinced that with the accumulation of experience, evaluated on the basis of sound theoretical and practical knowledge, a balance will be soon restituted.

My second remark concerns the change in the character of the publications: we may read more on case histories, on practical applications and in-situ measurements and less on theoretical investigations. I think this is a healthy way of development; the practical experiences, the well interpreted results of measurements, the more profound knowledge of the properties of granular media will create the basis from where a new theoretical upspring may well start.

Árpád Kézdi

APPENDIX 16

REQUIREMENTS FOR AN ISSMFE EXECUTIVE COMMITTEE MEETING

Dates:

1. Meetings of the Executive Committee are held (Constitution Para 27) at the time of the International Conference and, if required, at a suitable time between Conferences.

2. The dates on which the various meetings have been held are shown below:

Year	Conference	Date	Exec. Ctee Date	Associated Conferences
1936	Harvard	22-26 June	*Informal Mtg 25 June*	
1948	Rotterdam	22-26 June	*Informal Mtgs 22,24 June*	
1953	Zurich	17-21 August	15,16,26 August	
1957	London	12-21 August	12, 20 August	
1961	Paris	17-22 July	17,19,22 July	
1965	Montreal	8-15 September	7,8,9,13,15 September	
1969	Mexico City	25-29 August	22,23 August	
1971			Sydney: 4,5 August	6th Australasian Regional (Melbourne 9-13 August)
1973	Moscow	6-11 August	2, 3 August	
1975			Istanbul: 3,4 April	Special Conf. SMFE (Istanbul 1,2 April)
1977	Tokyo	11-15 July	8,9 July	

3. The recent practice has been to hold the 'Conference' Executive Committee meeting on two successive days at the end of the week preceeding the Conference. The intermediate Executive Committee meeting is held two years later, at the beginning of April, and this date is, in fact, quite critical, for if the Executive Committee is to vet the programme for the Conference following, Bulletin No.1 cannot be issued until the Committee has met.

Numbers attending

4. In addition to the President and Vice-Presidents, each National Society may send up to two representatives to a meeting of the Executive Committee. There are also the Chairmen of the Sub-Committees and a few other persons. Since the ISSMFE is not in a position to pay the expenses of representatives the cost must fall on the National Society or on the individual member. It is therefore desirable that the meetings should take place at the time of another conference in order to justify the expense of travel and when this is done there is a mutual benefit for the conference is strengthened by the presence of many distinguished persons from all over the world.

5. The numbers attending the recent Executive Committee meetings have been as follows:

Mexico City ..... 82 Sydney ..... 35 Moscow ..... 45 Istanbul 50

and a typical breakdown of the attendance might be as follows:

National Societies	20 x 2	40
	10 x 1	10
President, Vice Presidents, Secretary General		8
Chairmen of Sub-Committees		2
Past Presidents and observers		6
		66

Each National Society is asked to supply the names of its representatives in advance of the meeting and to indicate (for the purposes of catering, etc) whether or not they will be accompanied by their wives. In all there could be (say) 100 people to look after when it comes to entertaining.

Facilities

6. The room in which the meeting is held may be a small lecture room (Mexico City), a board-room (Moscow) or a hotel ball-room (Sydney, Istanbul). The National Society representatives sit in alphabetical order with the name of the Society clearly shown on cards. The President, who chairs the meeting, and the Secretary General, must be clearly audible and visible to all present. The Vice-Presidents and the Chairmen of the Sub-Committees may sit apart from the others and provision may also be made for Past Presidents and Observers. Microphones are provided and for the 'Conference' Executive Committee meeting there is simultaneous English/French translation. The proceedings are tape-recorded.

7. Close to the committee room must be a room for the secretarial work. The draft minutes must first be typed as they are produced by the Secretary General during the course of the meeting and copies must be provided at the end so that the official minutes may be approved and signed. (By Law 14). Each representative returns to his home with a copy of the Minutes and a further copy is posted to the Secretary of each National Society.

8. Such a tight schedule has been achieved by providing the Secretary to the Society with high quality equipment (electric typewriter and high speed copier).

Meals and entertainment

9. The Executive Committee normally considers about 20 items during its two days of meetings. This is an intensive programme and the breaks for coffee, lunch and tea on both days must be well organised. On the evening of the first day there is usually a reception or a dinner for the representatives and their wives and this provides a valuable opportunity for relaxed discussion between delegates about contentious matters.

Expense

10. To be host to the Executive Committee is expensive, though for the 'Conference' meeting the cost can be absorbed to a considerable extent into the cost of the conference itself. If accommodation, staff and equipment have to be specially provided, plus hospitality, the cost can be considerable. The ISSMFE is especially indebted to the Mexican, Australian, Russian and Turkish National Societies who have generously acted as host in recent years.

J.K.T.L.N.
March, 1977.

APPENDIX 17

REPORT

BUDGET AND FINANCE SUBCOMMITTEE

Introduction

The Budget and Finance Subcommittee of ISSMFE has considered the budget requirements for a four-year period and the ways and means of obtaining adequate funding. A procedure for dues computation was formulated at the Istanbul Executive Committee meeting in April 1975, and since has been modified by the Subcommittee to include the recommendation contained in the attachment to this report. This recommendation requires action by the Executive Committee of ISSMFE.

Recommendations

1. The finances of ISSMFE should be reviewed on an annual basis with the objective of closing out the year with a balanced budget.
2. The dues should be reviewed biennially and adjusted, as necessary, to cover ordinary operating expenses.
3. The group number of a member country should be determined in accordance with the procedure as set forth in the attachment to this report.
4. Extraordinary and unanticipated expenses should be defrayed by:
   (a) Placing a surcharge on the sale of conference proceedings. Surcharges obtained from the sale of proceedings to other than conference participants should be made payable to ISSMFE on a semiannual basis - the first payment to be made six months after the first calendar day of the year following the conference. Similar surcharges should be placed on the sale of regional proceedings.
   (b) Providing space for exhibits during international conferences and a portion of the income generated given to the Society.
5. As part of its commitment in hosting international and regional conferences, the host country should:
   (a) Pay all travel and out-of-pocket expenses of the President, Secretary General and Regional Vice President in relation to the planning and preparation of international and regional conferences, as well as all associated secretarial salaries and expenses, and overhead.
   (b) Bear the expense of the preparation, printing and mailing of the membership list.

At the Istanbul meeting, it was planned that revenues would be approximately US $24,000 per annum. Since 1973, a number of changes in currency and inflation have occurred. There is an important need to index the Society's income to inflation and to revise dues automatically on a biennial basis. This matter of indexing should be considered by the Executive Committee and the Subcommittee should be instructed on further study and formulation of a plan of procedure.

Respectfully submitted,

(Sgd) E. D'Appolonia

E. D'Appolonia, Chairman
Budget and Finance Subcommittee, ISSMFE

Members: J.W. de Graft Johnson
Chin Fung Kee
H.W. Koenig
A.C. Meigh
M.J. Pender
S. Prakash

ATTACHMENT

RECOMMENDATION OF THE BUDGET AND FINANCE SUBCOMMITTEE OF ISSMFE FOR EXECUTIVE COMMITTEE ACTION

DETERMINATION OF GROUP NUMBER FOR EACH ISSMFE MEMBER COUNTRY

The proposed method uses two criteria: Criterion A relating to the Gross National Product using a geometrical progression, and its subsidiary Criterion B relating to the Gross National Product per capita using an arithmetical progression. In detail, the criteria are:

MAIN CRITERION A - GROSS NATIONAL PRODUCT, U. S. DOLLARS, 10^6

GNP ($ 10^6)	Group Number
<5,000	1
5,000 to 10,000	2
10,000 to 20,000	3
20,000 to 40,000	4

40,000 to 80,000	5
80,000 to 160,000	6
160,000 to 320,000	7
320,000 to 640,000	8
640,000 to 1,280,000	9
>1,280,000	10

SUBSIDIARY CRITERION B - GROSS NATIONAL PRODUCT PER CAPITA, U. S. DOLLARS

GNP/Per Cap.($)	Group Number
<500	1
500 to 1,000	2
1,000 to 1,500	3
1,500 to 2,000	4
2,000 to 2,500	5
2,500 to 3,000	6
3,000 to 3,500	7
3,500 to 4,000	8
4,000 to 4,500	9
4,500 to 5,000	10
5,000 to 5,500	11
5,500 to 6,000	12

The method used to compute the Group Number requires first a selection based on Criterion A and a selection based on Criterion B. Where the number based on Criterion B is greater than or less than the number based on Criterion A, then the Group Number based on Criterion A is increased or decreased accordingly by one unit to arrive at the final Group Number. The data, the Gross National Product, and the Gross National Product per Capita should be based on the latest edition of the World Bank Atlas. A sample computation based on the 1977 edition is shown on Table I.

TABLE I

EXAMPLE COMPUTATION

(1)	(2)	(3)	(4)	(5)	(6)	(7)
REGION	COUNTRY	GROSS NATIONAL PRODUCT*		GROUP NO.		PROPOSED GROUP NO.
		TOTAL (10^6)	PER CAPITA ($)	CRITERION A	CRITERION B	
AFRICA	Ghana	4130	430	1	1	1
	Morocco	7070	430	2	1	1
	Nigeria	20810	280	4	1	3
	Rhodesia	3200	520	1	2	2
	S.Africa	30180	1210	4	3	3
ASIA	China	244640	300	7	1	6
	India	80410	140	6	1	5
	Indonesia	21780	170	4	1	3
	Iran	41440	1250	5	3	4
	Israel	11630	3460	3	8	4
	Japan	446026	4070	8	9	9
	Pakistan	8760	130	2	1	1
	S.E.Asia	9060	1030	2	3	3
	Syria	3990	560	1	2	2
AUSTRALASIA	Australia	71080	5330	5	11	6
	New Zealand	13070	4310	3	9	4

EUROPE	Austria	33310	4410	4	9	5
	Belgium	55430	5670	5	12	6
	Bulgaria	15420	1780	3	4	4
	Czechoslovakia	48860	3330	5	7	6
	Denmark	32470	6430	4	13	5
	Finland	22030	4700	4	10	5
	France	285780	5440	7	11	8
	FRG	388670	6260	8	13	9
	GDR	62710	3710	5	8	6
	Greece	18830	2090	3	5	4
	Hungary	22810	2180	4	5	5
	Ireland	7170	2320	2	5	3
	Italy	156510	2820	6	6	6
	Netherlands	71120	5250	5	11	6
	Norway	23360	5860	4	12	5
	Poland	84660	2510	6	6	6
	Portugal	14650	1630	3	4	4
	Romania	23080	1100	4	3	3
	Spain	87250	2490	6	5	5
	Sweden	59100	7240	5	15	6
	Switzerland	50680	7870	5	16	6
	Turkey	29460	750	4	2	3
	U.K.	200830	3590	7	8	8
	U.S.S.R.	598640	2380	8	5	7
	Yugoslavia	27820	1310	4	3	3
NORTH AMERICA	Canada	139260	6190	6	13	7
	Mexico	63050	1090	5	3	4
	U.S.A.	1413530	6670	10	14	11
SOUTH AMERICA	Argentina	37380	1520	4	4	4
	Brazil	95920	920	6	2	5
	Chile	8680	830	2	2	2
	Colombia	11640	500	3	2	2
	Ecuador	3310	480	1	1	1
	Peru	11110	740	3	2	2
	Venezuela	22780	1960	4	4	4

* *Based on World Bank figures for 1974*
published 1976 (received April 1977)

APPENDIX 18

INTERNATIONAL SOCIETY FOR SOIL MECHANICS AND FOUNDATION ENGINEERING

RECEIPTS AND PAYMENTS ACCOUNTS

Examined by Deloitte, Plender Griffiths & Co and signed 30 March 1977, London

RECEIPTS	*Year to 1976.2.29*	*Year to 1977.2.28*
Subscriptions (including arrears)	$18 335.38	*$23 270.44*
Advertising (arrears)	93.50	
	$18 428.88	*$23 270.44*
PAYMENTS		
Personnel charges	5 919.19	*9 051.17*
Travelling expenses	1 409.87	*3 919.74*
Postage and telephone	402.54	*965.46*
Photocopying	318.30	*471.63*
Sundry expenses	274.77	*259.16*
	$ 8 324.67	*$14 667.16*
Balance at end of year	$25 813.88	*$34 417.16*†

† $22 617.17 + $11 800.99
assuming $1.70 = £1.00

APPENDIX 19

MEMBERSHIP OF ISSMFE SUB-COMMITTEES 1975-77

BUDGET AND FINANCE

Dr. E. D'Appolonia	(Chairman)	USA
Prof. Chin Fung Kee		Malaysia
Dr. JWS de Graft Johnson		Ghana
Dr. H.W. Koenig		FRG
Dr. A.C. Meigh		U.K.
Mr. M.J. Pender		New Zealand
Prof. S. Prakash		India

INFORMATION ADVISORY

Mr. J. DeSalvo	(Chairman)	U.S.A.
Monsieur F. Schlosser		France
Mr. N. Flodin		Sweden
Prof. I. Sovinc		Yugoslavia
Mr. H. Kuhn		F.R.G.
Mr. W. Norup		U.S.A.
Mr. F. Jørstad		Norway
Prof. Z-C Moh		S.E. Asia
Dr. A. Silveira		Brazil
Prof. H. Kishida		Japan

STANDARDIZATION OF PENETRATION TESTING IN EUROPE

Dr. B. Broms	(Chairman)	Sweden
Dr. H. Zweck		FRG
Prof. E. de Beer		Belgium
Mr. S. Rodin		UK
Prof. E. Schultzé		FRG
Prof. G. Stefanoff		Bulgaria
Prof. Yu G Trofimenkov		USSR
Ir. W.J. Heijnen		Netherlands
Dr. T. Kallstenius		Sweden
Mr. F. Baguelin		France
Dr. U. Bergdahl	(Secretary)	Sweden

USE OF PROFESSIONAL CARDS

Prof. V.F.B de Mello	(Chairman)	S.America
Dr. J.W. de Graft Johnson		Africa
Prof. Z-C Moh		Asia
Prof. P.W. Taylor		Australasia
Prof. A. Kezdi		Europe
Prof. R.J. Marsal		N. America

COMPUTER PROGRAMMES

Dr. G.D. Aitchison	(Chairman)	Australia
Monsieur J.P. Giroud		France
Prof. C. Viggiani		Italy
Prof. Z-C Moh		S.E. Asia
Dr. E. Togrol		Turkey
Mr. A.E. Furley		U.K.
Dr. H. Meissner		F.R.G.
Prof. R.L. Schiffman		U.S.A.
Prof. B. Ladanyi		Canada
Dr. C.M. Gerrard	(Secretary)	Australia

CONFERENCE ADVISORY COMMITTEE (IX)

President, Prof.Kerisel (Chairman)	France
V-P Asia, Prof. Z-C Moh	S.E. Asia
Secretary of VIIIth Conf, Dr.Chetyrkin	USSR
Prof. Masami Fukuoka	Japan
Secretary General, Prof.Nash	U.K.

SYMBOLS, UNITS, AND DEFINITIONS

Mr. F. Baguelin	(Chairman)	France
Dr. L. Jurgenson		USSR
Prof. J.N. Hutchinson		UK
Mr. A.I. Johnson		USA
Mr. E. Sandegren		Sweden
Prof. E. Schultze		FRG
Dr. G. Ter-Stepanian		USSR
Prof. J.L. Justo		Spain
Prof. Colombo		Italy
Mr. J. Morton		Canada
Mr. J.B. Folque		Portugal
Prof. P. Habib		France
Prof. W. Wolski		Poland

(The position of the Committees from 1973-75 appears in Appendix 8 of the Istanbul Minutes)

Opening Session

Séance Inaugurale

Peacock Room, Imperial Hotel, July/Juillet 11,1977

PARTICIPANTS

Mr. G. Togashi, Chairman, Organizing Committee Ninth International Conference

Prof. Y. Ochi, President, The Science Council of Japan

Prof. J. Kerisel, President, International Society for Soil Mechanics and Foundation Engineering

Mr. S. Hasegawa, Minister, The Ministry of Construction of Japan

Mr. Y. Onouchi, Vice-Chairman, Organizing Committee, Ninth International Conference

Prof. T. Akagi, Secretary, Programs Sub-Committee, Ninth International Conference

Prof. M. Fukuoka, President, Japanese Society of Soil Mechanics and Foundation Engineering

Prof. R. B. Peck, Past President, International Society for Soil Mechanics and Foundation Engineering

Mr. G. Togashi

Ladies and Gentlemen, on behalf of all the members of the Organizing Committee, it gives me great pleasure to have the honor of declaring the opening of the Ninth International Conference on Soil Mechanics and Foundation Engineering. Since it was decided in Moscow in 1973 that this conference would be held in Tokyo, four years have already passed. During this period, there have been considerable changes in international political and economic affairs, and a variety of difficulties has also arisen in the activities which we carry on in the field of soil mechanics and foundation engineering. At one time, there were even worries whether the Tokyo conference could be held. Nevertheless, these difficulties have been overcome, leading to today's opening of this conference, something that is the result of our pure enthusiasm and international cooperation for the sake of our art and science.

In 1936, the First International Conference on Soil Mechanics and Foundation Engineering was held at Harvard University. I understand that Professor K. Terzaghi, a truly international figure, and Professor A. Casagrande who is prevented by illness from being with us here, joined their efforts and keen foresight to bring about this conference, as you all know. A little over a decade after the birth of modern soil mechanics and foundation engineering then, our predecessors turned the conference into a forum for the international exchange of information, a truly epoch-making development.

The belief of Professor Terzaghi and the other founders that soil mechanics and foundation engineering know no national boundaries, and the beliefs of us who have come after them have encouraged us to overcome a variety of barriers during these 41 years and bring about eight fruitful international conferences, which have vigorously contributed to the development of our science and technology. Here again, in Tokyo, specialists in the field of soil mechanics and foundation engineering have gathered together from around the world to exchange the latest knowledge and experiences on the highest level. This opportunity to strengthen the friendship and mutual understanding over international boundaries is appreciated with the greatest pleasure and sincere gratitude by every member of the Organizing Committee.

Here in Japan, the doorway to the Far East, soil mechanics and foundation engineering already have a history of half a century, and the Japanese Society of Soil Mechanics and Foundation Engineering founded in 1948 has grown to a membership of about 14,000. One important prerequisite for the advancement of soil mechanics is the nature of local soils and in this regard, Japan has extremely poor soil conditions in general. On the plains and along the coasts, the subsurface conditions generally consist of thick alluvial deposits or special volcanic soils. The mountain regions and ocean floors, although no traces of continental glaciers are present, the history of large-scale techtonic movements and ceaseless volcanic activities is carved deeply into the earth everywhere presenting one of the most complex foundation conditions in the world.

In addition to such geologic conditions, the

typhoons and frequent earthquakes that strike Japan every year without fail bring damage to all parts of our country. The measures necessary to protect constructions from such assaults of nature is one of the most important themes for soil mechanics and foundation engineering in Japan.

Soon we will hear a presentation by Professor Fukuoka, President of the Japanese Society of Soil Mechanics and Foundation Engineering, regarding the present status of geotechnical engineering in Japan. Particularly during the last 20 years large-scale civil engineering projects have been constructed one after another here in Japan, and many of these had to be built under almost the poorest soil conditions imaginable. In making such projects feasible, Japanese soil mechanics and foundation engineers have played an important role, which in turn has contributed to the remarkable development of our science and technology. Through some of the reports to be presented here, the technical visits and the post-conference tours, we hope to profit greatly from your professional observations, opinions and criticisms on our approaches to our problems of soil mechanics and foundation engineering.

We sincerely hope that this Tokyo conference opened here today with the participation of scientists and engineers in the field of soil mechanics and foundation engineering from around the world will achieve a full exchange of information and deepening of mutual understanding through the conference's activities, thereby fulfilling the aims of the conference.

In conclusion, on behalf of the Organizing Committee, may I offer every participant here our welcome to Japan and our hopes that you will see Japan, learn more about Japan, and enjoy Japan during your stay here.

Professor Y. Ochi

Ladies and gentlemen, at the opening ceremony of the Ninth International Conference on Soil Mechanics and Foundation Engineering, it is my great honor to have an opportunity of extending my congratulations to all the participants on behalf of the Science Council of Japan.

Firstly I would like to extend a hearty welcome to the President and other executive members of the International Society for Soil Mechanics and Foundation Engineering and also to the scientists coming over to Japan from many a region of the world to attend this Conference. At the same time I express my heartfelt gratitude to those concerned for their efforts variously made to support the organization of the Conference.

Soil mechanics and foundation engineering, the main subjects of this Conference, are basically connected with such scientific sectors as civil engineering, architecture and agricultural engineering, and moreover, have proved to be a basic science having a penetrating influence on road construction, bridge building and manufacturing of construction machinery as well as on the production of iron, steel, power, city gas and gasoline.

To say particularly of soil problems, the complexity of soil constituents and its formation is so great with an infinite variety of soil properties that it shows different geological conditions from region to region. Accordingly, the scientific or technical methods on soil mechanics and foundation engineering seem to have developed specifically from country to country.

In this Conference I expect to learn significant reports and discussions not only on such complex soil properties as their stress, deformation, strength and dynamics characteristics, but also on the effects of these properties on foundations and structures. The Conference attended by all the scientists and experts coming from many parts of the world, will bring, I am sure, many great contributions to development of the world-wide field of soil mechanics and foundation engineering and also of its related sciences and techniques.

The Science Council of Japan has tried to do its best for the progress and development of sciences and is convinced of the importance of international exchange in scientific matters more than any other fields. All the participants are expected to take this opportunity to promote mutual cooperation among nations and make it more significant in the true sense of the word.

Finally, I would like to express my sincere wishes for a successful conference, needless to say for the brilliant future of the International Society for Soil Mechanics and Foundation Engineering. Thank you.

Professor J. Kerisel

Monsieur le Ministre, Monsieur le Président, Mesdames, Messieurs, Lorsque notre Comité Exécutif s'est réuni à Istambul, il y a deux ans, les perspectives concernant l'ouverture de cette conférence internationale, ici à Tokyo, se présentaient sous un jour sombre. Des difficultés se présentaient: elles ont toutes été aplanies et nous avons aujourd'hui la joie d'être réunis très nombreux dans ce 9e Congrès International organisé par nos amis japonais.

Dans notre Comité Exécutif d'il y a deux jours, nous avons reconnu que les difficultés que je viens d'évoquer n'étaient pas particulières au 9e Congrès, et nous avons pris, à l'unanimité, toutes mesures pour qu'il n'en soit plus ainsi à l'avenir. C'est donc sous le signe de l'assentiment général et de la collaboration la plus attentive que débute ce congrès.

Ce congrès se tient dans un pays qui a plus que des lettres de noblesse en mécanique des

sols. Le Japon s'est en effet fait connaître par des travaux remarquables dans ce domaine. Il est parmi ceux qui utilisent au maximum la troisième dimension en profondeur, qu'il s'agisse de réseaux souterrains de communication, de parkings, de magasins enterrés ou de tunnels sous-marins qui vont battre tous les records du monde de longueur et d'audace dans un pays secoué périodiquement par des tremblements de terre. En dépit de ceux-ci et de la médiocrité des sols, il fait circuler les trains les plus rapides du monde.

Par ailleurs, les travaux de ses chercheurs et en particulier du Prof. Mogami, sur les milieux granulaires, d'autres sur la liquéfaction des sables et dans bien d'autres domaines, sont connus de nous tous. En laboratoire, l'appareil vraiment triaxial de Shibata et Karube permettant de faire varier indépendamment les trois contraintes principales a ouvert la voie à de larges recherches.

Enfin, par nécessité, devant le développement énorme de son industrie, sur une superficie utilisable relativement restreinte, le Japon est confronté avec des questions d'environnement, en ce qu'elles ont trait à la mécanique des sols et je n'ai pas manqué d'être frappé par le fait qu'à la séance de spécialité n°11 consacrée à ce sujet, plus du tiers des communications sont présentées par vos nationaux.

Il était donc juste que le Congrès se tint chez vous, et nombre d'entre-nous sont impatients de participer aux visites prévues pendant et après ce congrès. A vrai dire, lorsque l'on examine à la fois le programme de nos sessions principales, de nos sessions spéciales, de nos visites techniques et des films sur des sujets très originaux et variés, on est conduit à penser qu'il faudrait avoir un certain don d'ubiquité pour satisfaire entièrement sa curiosité.

Il me souvient qu'au 7e Congrès International à MEXICO, le Président du Comité d'Organisation, pour nous sensibiliser aux problèmes de sa capitale, nous avait déclaré: "Entre le moment où s'ouvre le présent congrès et celui auquel il se terminera, l'immeuble dans lequel vous vous trouvez aura tassé de 2 millimètres, mais rassurez-vous, il nous reste encore 2.300m au-dessus du niveau de la mer". Je remarque, Monsieur le Président, que très discrètement, vous n'avez pas voulu nous dire: "Entre le début de ce 9e Congrès et sa fin, vous avez telle probabilité de ressentir un tremblement de terre de telle magnitude". Mais, même si vous nous aviez fait cette déclaration, nous n'en aurions été nullement effrayés car d'une part, la lecture du rapport général du Prof. Yoshimi sur la dynamique des sols nous a rassurés, et d'autre part, nous savons que les fondations et structures de l'Hôtel Impérial ont été calculées pour être "earthquake resistant".

En ouvrant ces débats, je voudrais saluer ici la présence du Président de la Société Internationale de Mécanique des Roches M. Habib et de M. Shinohara qui représente l'Association Internationale des Travaux en Souterrains.

Il est d'usage que le Président de la Société fasse le point moral et technique de notre Association. Je voudrais d'abord vous dire que notre société est toujours très vigoureuse et que ses effectifs en font l'une des sociétés les plus importantes des sciences des terres.

Quelques nations nous ont quittés, d'autres nous ont joints, mais nous comptons toujours cinquante nations. Dans le rapport de notre Vice-Président pour l'Australasie, j'ai même noté l'exemple de la Nouvelle Zélande qui avec ses 3 millions d'habitants ne compte pas moins de 250 membres et dans celui de notre Vice-Président pour l'Europe j'ai remarqué qu'aux congrès bi-annuels en République Fédérale Allemande il y avait largement plus de 1.000 participants. Il y a là les marques d'un enthousiasme certain pour la mécanique des sols.

Dans l'intervalle de ces quatre ans, j'ai noté du point de vue social, en dehors des conférences régionales et nationales et des conférences sur des sujets particuliers, une tendance aux grands regroupements régionaux qui s'est matérialisée très heureusement par des conférences très suivies comme la Danubienne et celle des Etats Baltes; à croire que dans ces rencontres autour d'un fleuve ou d'une mer, c'est le gradient hydraulique qui est l'élément moteur de nos convergences.

En dehors de ces manifestations, nous avons eu les trois grandes conférences internationales rappelant le souvenir des savants en mécanique des sols: RANKINE, TERZAGHI, NABOR CARILLO. J'ai assisté à deux d'entre elles récemment. Elles sont toujours très intéressantes, mais nous nous efforcerons dans l'avenir d'apporter une meilleure coordination entre le choix des sujets traités et de ceux qui sont traités dans les conférences régionales.

Le souvenir spécial de gratitude que nous devons à Karl TERZAGHI, notre président fondateur, me conduit à vous rappeler que le Congrès Panaeuropéen qui s'est tenu à Vienne l'an dernier marquait le cinquantième anniversaire de la parution de son fameux livre ERDBAUMECHANIK et que son souvenir y a été évoqué spécialement par le Prof. Arthur CASAGRANDE en présence de Mrs. TERZAGHI.

Deux de nos anciens présidents, les Prof. SKEMPTON et PECK, sont parmi nous à ce congrès. Vous les entendrez au cours de deux conférences spéciales, mais je suis heureux de les saluer spécialement. Nous avons à regretter l'absence du Prof. Arthur CASAGRANDE. Ce sera le premier de nos congrès auquel il est dans l'impossibilité physique d'assister. J'ai senti toute la tristesse qu'il avait à me le dire au cours d'un récent entretien, et je lui ai adressé un télégramme de bons voeux en votre nom à tous. Egalement, j'ai exprimé tous nos bons

voeux de convalescence au Prof. TSYTOVICH, figure légendaire de nos congrès, et qui fut au centre de l'organisation de notre dernier congrès à Moscou.

Si attentif que soit votre Président aux diverses manifestations auxquelles il a assisté, il serait incapable de faire le point de nos connaissances s'il n'avait pas à sa disposition les rapports rédigés par les rapporteurs généraux qui ont été nommés aux Congrès Régionaux, et pour le présent Congrès International. Leurs rapports, pour la première fois, sont systématiquement le fruit d'une équipe d'ingénieurs appartenant à des pays très divers, de sorte que, à travers la barrière des langues, nous sommes en présence d'une véritable synthèse.

J'avais l'espoir que vous puissiez tous lire ces rapports et recevoir en temps voulu les deux premiers volumes de nos comptes-rendus, si bien présentés par le Comité d'Organisation Japonais. Mais un grain de sable - et ceci n'est-il pas excusable lorsqu'on s'occupe de mécanique des sols - s'est introduit dans le circuit de la distribution de ces volumes qui étaient prêts il y a déjà deux mois, de sorte qu'un certain nombre d'entre-vous ont été privés de la possibilité de lire les communications et les rapports généraux.

Si l'on examine ces rapports, à première vue on pourrait être empreint d'un certain pessimisme à lire certaines conclusions de nos rapporteurs: les essais de laboratoire sont déformants, la prévision précise des tassements et de leurs vitesses est délicate; on s'interroge encore sur les valeurs résiduelles du sol à prendre en compte dans la prévision des glissements de terre; certaines corrélations sont dangereuses, etc..; enfin, certains problèmes fondamentaux comme celui des fondations profondes restent toujours non résolus.

Toutes ces conclusions nous parviennent au moment où les administrations, les propriétaires, les architectes pensant que nous, ingénieurs des sols, sommes devenus de plus en plus savants, deviennent de leur côté de plus en plus exigeants. Lorsque nous travaillons dans notre propre pays aussi bien qu'à l'extérieur de nos frontières, on nous demande davantage. Il y a une vingtaine d'années, au moment du plein essor dans le renouveau de la mécanique des sols, l'indulgence était plus grande mais aujourd'hui nos erreurs nous sont d'autant moins pardonnables qu'elles peuvent avoir des conséquences considérables, qu'il s'agisse de grands barrages, bâtiments très hauts ou de centrales nucléaires. En même temps, les praticiens privés sont obligés de constater combien les compagnies d'assurances sont réticentes pour les assurer. On ne peut pas manquer par ailleurs d'être frappés par l'attitude différente des autorités dans différents pays à l'égard des résultats que l'on attend de nous en ce qui concerne les tassements. A Mexico, si je suis bien informé, pour obtenir le permis de construire, il suffit de prouver que le tassement ne sera pas supérieur à 30 cm: dans d'autres pays au contraire, l'ingénieur des sols est mis en cause pour des tassements extrêmement faibles. Notre position au-dessous du niveau du sol est particulièrement inconfortable puisque nous sommes responsables de tous les dommages qui adviennent aux superstructures.

Ce droit à l'erreur qui nous est de plus en plus refusé, joint à une importance croissante des problèmes et des risques, exige de nous un effort supplémentaire et des méthodes de plus en plus sûres, et en face des constatations de nos rapporteurs, nous pourrions être enclins à un certain désanchantement.

Fort heureusement, je n'ai fait qu'isoler dans le tableau ci-dessus que les éléments défavorables et il y a dans les rapports généraux bien des éléments qui nous incitent sinon à l'optimisme, du moins à une meilleure appréciation des choses.

Dans la plupart des domaines, nous comprenons de mieux en mieux ce qui se passe; nous connaissons les principaux paramètres qui interviennent et nous savons les écueils à éviter. Nous connaissons l'ordre de grandeur des erreurs possibles, et demain peut s'ouvrir pour nous sinon la possibilité de faire des synthèses très importantes, du moins de nous mettre pleinement d'accord sur des procédures semi-empiriques qui, appliquées entre des limites bien précises, nous permettront d'agir en toute sécurité. Et comme le souligne très bien le Prof. LADD, même si nous devions nous contenter de cela, nous pourrions en être fiers car le comportement des sols naturels est l'un des plus variables et difficiles à analyser.

C'est sur cette note optimiste que je voudrais conclure. Je ne doute pas un instant que notre 9e Congrès International fasse faire un nouveau pas en avant à la discipline scientifique qui nous est si chère.

Mr. S. Hasegawa

Ladies and Gentlemen, at the opening ceremony of the Ninth International Conference on Soil Mechanics and Foundation Engineering I would like to offer my hearty congratulations.

The Ministry of Construction has made it its main objective to bring forth an improved home land with more amenities: firstly to improve environmental conditions by providing such means as sewerage, parks and residences; secondly to secure safety to protect the lives and properties of the people from natural disasters, by constructing flood control works and providing special measures for the densely populated urban areas; and thirdly to lay down a firm foundation on which the steady long-term socio-economic development can be expected, by constructing major highway networks, developing water resources, etc.

As a prerequisite to provide any of such measures, satisfactory foundation works will

have to be constructed. It is fully realized that these projects have close connections with soil mechanics and foundation engineering which have made remarkable progress in this country. I think it is unnecessary to draw your attention to the fact that Japan in general has such physical characteristics as weak ground, excessive rainfall and frequent earthquakes. They often cause natural disasters such as landslides, washouts and liquefaction of the ground. How to prevent these disasters is now one of our most important and urgent problems. In this connection, we look forward to the further development of soil mechanics and foundation engineering so that our investigations for the causes of natural disasters and our remedial measures will become more effective.

It is indeed significant to have this International Conference in Japan and to receive a number of experts from abroad with whom we can exchange opinions as well as scientific information, thus strengthening our mutual friendship. I hope this Conference will promote cooperation among nations as well.

In the middle of this hot summer, I sincerely hope that all the participants here will be healthy and be satisfied with the fruits of the conference. Finally, I express my wishes that I shall never be the second in looking forward to the brilliant future of the International Society for Soil Mechanics and Foundation Engineering. Thank you for your attention.

Mr. Y. Onouchi

At the end of the opening ceremony of the Ninth International Conference on Soil Mechanics and Foundation Engineering, I would like to speak briefly on behalf of the Japanese Organizing Committee. This is the first time for the International Conference to be held in Asia. In spite of the long distances that many of you had to travel, you have gathered here from some 50 countries, representing almost all the member countries of the International Society for Soil Mechanics and Foundation Engineering. As of July 10, the registrants of the Tokyo Conference totalled 1618 and the accompanying persons 334. The Organizing Committee greatly appreciates such enthusiastic participation.

We also consider it a great honor to have a large number of distinguished guests present at this opening ceremony, including President Kerizel and the other officers of the International Society; the representatives of various national societies; and the Minister of Construction and others from the Japanese Government. We are highly honored by your presence.

For the five days beginning today, this conference will bring forth four Main Sessions and 12 Specialty Sessions to discuss almost every phase of soil mechanics and foundation engineering. The first and second volumes of the Proceedings were published in April; the number of papers submitted from all over the world totalled 239, in addition to which four state-of-the-art reports were included therein. A number of papers have also been received by the Organizers of the Specialty Sessions and active discussions are expected in these sessions.

Special lectures are to be given by four eminent speakers including two former Presidents of the International Society, Professor Skempton and Professor Peck. Special lectures on the theory and the practice of soil mechanics and foundation engineering in Japan will be delivered, respectively, by Professor Mogami, the former Vice President of the Asian region and Dr. Fujii, the former President of the Japanese National Railways.

During the conference, you will have ample opportunities to visit some of the leading research institutes in this country and some interesting construction sites in the Tokyo area. In addition, a technical exhibit related to soil mechanics and foundation engineering will be held at the conference hall and technical films will be shown throughout the conference period.

For those accompanying participants, a Ladies Program has been organized to assist them to fully enjoy their visit to Japan.

At the reception this evening and Friday's dinner, we hope that both participants and accompanying persons together will enjoy meeting old friends and making new ones, to strengthen the international goodwill and mutual understanding.

In conclusion, it is our sincerest hope that this international gathering will contribute to the exchange of new knowledge and experience from around the world and the further development of soil mechanics and foundation engineering.

Professor T. Akagi

Ladies and Gentlemen, the latter half of the morning session consists of presentation of the Honorary Memberships of the Japanese Society of Soil Mechanics and Foundation Engineering to the five distinguished contributors to the world of soil mechanics and foundation engineering to which in fact all of us here belong to, and also of a lecture entitled "State of Geotechnical Engineering in Japan" by Dr. Fukuoka, President of the Japanese Society of SMFE.

The Board of Direction as well as the Annual General Meeting of the JSSMFE held last May unanimously decided to elect the five recipients as Honorary Members in appreciation of their great contributions. It gives me great pleasure as a member of the JSSMFE and a director on the Board of Direction to call upon Dr. Fukuoka, President of the JSSMFE.

Professor M. Fukuoka

I would now like to present the Honorary Membership of the Japanese Society of Soil Mechanics and Foundation Engineering to the following five distinguished gentlemen.

First is Professor A.W. Skempton, Professor of the Imperial College of Science and Technology in London, who served as President of the International Society for Soil Mechanics and Foundation Engineering from 1957 to 1961.

Next is Professor A. Casagrande, who served as President of the International Society from 1961 to 1965 and who has long been Professor at Harvard University. Sickness has unfortunately prevented him from being here with us.

Third, Professor R.B. Peck, Professor at the University of Illinois for many years and President of the International Society from 1969 to 1973.

Fourth, Professor J. Kerisel, who has been President of the International Society since 1973 and is President of Simecsol of France.

Finally, Professor J.K.T.L. Nash, Secretary General of the International Society since 1969 and Professor at Kings College in London.

There is no need, I am sure, to introduce them to you in detail, as they have made major contributions to the development of the International Society for Soil Mechanics and Foundation Engineering. They have followed the footsteps of Professor K. Terzaghi, the father of soil mechanics and foundation engineering and the first President of the International Society. They have guided our Society, producing outstanding results in promoting the development of our specialized knowledge and technology. For this they fully deserve our respect and gratitude.

Since the First International Conference on Soil Mechanics and Foundation Engineering was held at Harvard University, Japan has participated in every International Conference. The Japanese Society of Soil Mechanics and Foundation Engineering was established in 1948, evolved from the Japanese National Committee for the International Society, and has since then grown steadily to its present membership of about 14,000. It is indeed our pleasure that we have been able to overcome all the difficulties with becoming hosts of this Ninth Conference and we are able to contribute thereby to the development of soil mechanics and foundation engineering and international goodwill as well. The successful beginning of this conference is a tribute to the wholehearted cooperation of the International Society's President, the Secretary General, and the various national societies, to whom we are grateful. We also wish to express our sincere appreciation for the helpful advice given by the past presidents. To us, the sense of amity which pervades this conference is a sign of the continued future development of the International Conference.

In order to give an expression to this feeling of appreciation felt by all the members of the Japanese Society, we revised the constitution of our society which made possible our Annual Meeting in last May to nominate these five gentlemen as Honorary Members of the Japanese Society of Soil Mechanics and Foundation Engineering.

We would thus like to present them with the certificates and commemorative gifts. The gift is a tie-pin made of Japanese pearl. The white of the pearl symbolizes purity, and it is round and brightly sparkling. While the pearl also represents a variety of other qualities, as a purely Japanese-made item, we thought that it would be an appropriate gift for the newly-elect honorary members. We hope that they will accept it as a sign of our appreciation and use it in happiness for many years to come. Now I would like to ask them to come forward as I call their names.

Professor Skempton
Professor Casagrande
Professor Peck
Professor Kerizel
Professor Nash

To our new honorary members we offer our best wishes for good health and success as they continue their professional and academic activities and our request for their further contributions. We express our hopes for the speedy recovery of Professor Casagrande who is unfortunately not with us today.

Professor R.B. Peck

Professor Fukuoka, Distinguished Gentlemen, Ladies and Gentlemen. On behalf of the recipients, all of them, of course including myself, but particularly Professor Casagrande who could not be here, may I say that we are honored and touched to receive this distinction.

We are honored because we have recognized for so long that the Japanese National Society has been such an active society, active since 1948, as evidenced by many things including the very excellent periodical, "Soils and Foundations," with which I am sure you are all acquainted, and which would be a major effort on the part of any national society; and certainly including the preparation for and conduct of this Meeting. These two things alone indicate the vitality of the Japanese National Society, and we are indeed honored to be associated with it.

We are touched because we understand that it took some special acts to make honorary membership possible for those of us who have not previously been members of the society, and we greatly appreciate this particular distinction, to be able to become members of your family. We thank you very much indeed.

THE STATE OF GEOTECHNICAL ENGINEERING IN JAPAN

Prof. Masami Fukuoka

President,
Japanese Society of Soil Mechanics
and Foundation Engineering

Distinguished Guests, Ladies and Gentlemen. On this occasion of the Ninth International Conference on Soil Mechanics and Foundation Engineering in Tokyo, it is my honor, as the President of the Japanese Society of Soil Mechanics and Foundation Engineering, to address such an eminent audience on the theme of the state of geotechnical engineering in Japan.

Our country, Japan, is located on the eastern end of the Asian Continent facing the Pacific Ocean. It consists of four major islands and numerous small islands, stretching north to south some 2,500 kilometers, and east to west about 1,500 kilometers. The total area of this country is about 370,000 square kilometers with the population of approximately 110 million.

The climate is quite varied. In the south, it is subtropical, whereas in the north, it is sub-frigid. The climate in the central part of Japan is generally moderate. Because of the presence of the backbone mountain range running through the main island, however, we have much snowfall on the side of the Sea of Japan in winter.

The geology is extremely complex, with practically every type of rock and soil ranging from the Palaeozoic to the Quaternary.

There are many volcanoes, erupting and spreading volcanic ashes which distribute throughout Japan. Some of the rocks that constitute mountains have such low strengths that there are many faults and zones of shattered rocks. Throughout the country, therefore, there are several tens of thousands of landslides.

Japan is situated in the circum-Pacific earthquake belt. We have had frequent earthquakes including the great Kanto Earthquake in 1923 and the Niigata Earthquake in 1964.

In the summer season, typhoons generated in the tropical region move to the north, bringing strong rainfalls ranging from 500 to 1,000 millimeters per day, which cause floods and landslides as well as erosions along the coasts.

Because of the excessive pumping of the groundwater, subsidence occurs in many alluvial plains in this country. In some of the areas in Tokyo, the subsidence up to 4.5 meters has been recorded for the past 50 years. Along with the industrial development, we have problems of polluted air and water, and noises. In estuary deltas, there are loose sand strata, which liquefy during earthquakes. In lakes, coastal regions or valleys, there are peat strata which cause embankments to settle excessively and even to show instability.

In Japan, pile foundations were used for the first time around 1870, in connection with construction of the piers for a railroad bridge, using cypress wood. Thereafter pine trees were also used quite extensively. At present, pre-cast concrete piles and steel pipe piles are being used at an annual rate of about six million tons each. Also cast-in-place concrete piles are employed extensively.

Since pile driving is not allowed in urban areas, various measures have been devised. Fig. 1 shows a special pile driving rig, developed by the Japanese Association for Steel Pipe Piles. The hood covers the entire rig to minimize the noise quite successfully.

Cast-in-place concrete piles have an advantage that they do not produce noise, but the disadvantage is that slime tends to accumulate at the bottom of the borehole to such an extent that it reduces the point bearing capacity. To cope with this problem, a method has been developed that first solidifies the bearing stratum by grouting, and then installs cast-in-place concrete piles, thus the point bearing capacity of which is improved remarkably.

There is also a method to reduce the driving resistance of pre-cast concrete piles; water jet with pressures as high as several hundred atmospheres are ejected from the tip of the pile while a static load is applied to the head of the pile. When the tip of the rig reaches the desired depth, high pressure jet is stopped and the pile is jacked down against the weight of the driving rig, Fig. 2.

The hood opened before pile driving

Driving a pile with the hood closed

Fig. 1 Covered pile driver to minimize driving noise
(courtesy of the Japanese Association for Steel Pipe Piles)

In Japan, the use of pneumatic caissons began after the great Kanto earthquake of 1923. To build the Bandai bridge consisting of concrete arches in Niigata around 1930, pneumatic caissons were installed for its foundations. In 1964, Showa Ohashi bridge supported by steel pipe piles fell down during the Niigata earthquake, whereas the Bandai bridge did not. Because of this, caissons were highly regarded.

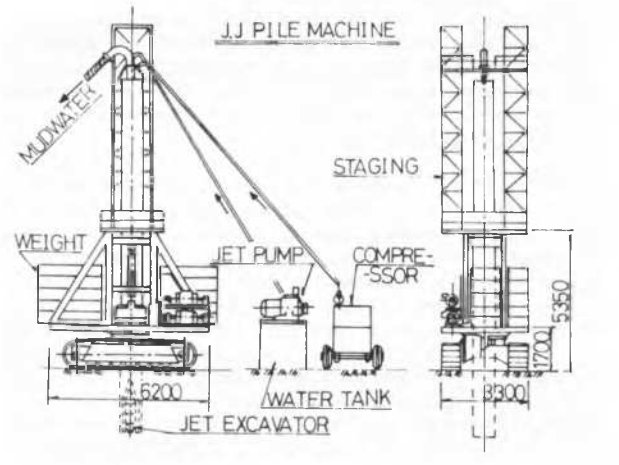
The caissons used for the Minato Ohashi bridge in Osaka are 40 by 40 meters in plan and 35 meters in height. In sinking caissons, pipe piles were driven in double rows with deep wells installed inside the interior row. The groundwater lowered thus made it possible to reduce the air pressure inside the caisson. An electrical shovel which can rotate 360 degrees works on rails attached to the ceiling of the working chamber.

Fig. 3 shows the cross-section of a pneumatic caisson used for the foundation for blast furnaces for the Ohgishima steel mill in the Bay of Tokyo. It was 55 meters in depth and 31 by 31 meters in plan. The method of construction is the same as that of the bridge in Osaka. By means of the deep well method, water was pumped out at a rate of 2.5 cubic meters per minute, thus successfully reducing the water pressure by 2 atmospheres.

In this country, caissons consisting of steel pipe piles have been used, in which pipe piles are driven in circular or elliptical or rectangular forms with all the heads connected so that they act as a caisson. Fig. 4 shows an example. First steel pipe piles are driven, and then pumping starts from the inside. After pumping, reinforcement bars are placed, and concrete is poured to construct the connecting slab. Concrete for the bridge pier is next poured on its top. This method ensures safety and the construction schedule required. It has also been used for foundations of some steel mill blast furnaces.

Many improvements have been made in the open-cut method. One of them is called the "Strut Preload" method. After the second stage excavation is completed, the second stage struts are jacked to press the sheet piles outward to such an extent that a space is created between the sheet piles and the foundation soil at the bottom of the excavation. Then the third stage excavation is carried out, and the same procedure repeated until the excavation reaches the required depth. According to this method, a fairly large working space is made available, the strength of struts is improved, and removal

of struts after excavation is simple; all assures the safety of construction. Earth pressures on steel piles and strut loads are measured, and the excavation can proceed with a computer analysis being performed concurrently.



CAPACITY

JACK THRUST	50ton x 2 = 100ton
JACK STROKE	1,500mm
COUNTER WEIGHT	65 - 85ton
TOTAL WEIGHT	100ton
CONTACT PRESSURE	16ton/m^2 (at 100ton)
PILE DIAMETER	500 - 1,000ϕ
NORMAL DEPTH	0 - 50m
WATER PRESSURE	0 - 700kg/cm2

Fig. 2 Pile installation by jetting and jacking instead of driving (courtesy of Kumagai Construction Co.)

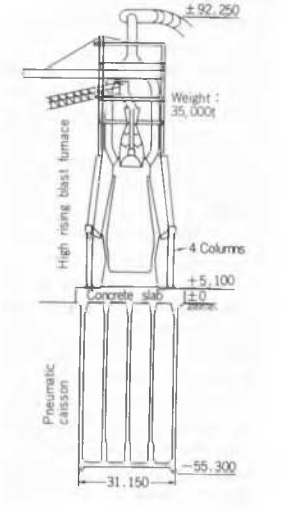


Fig. 3 Pneumatic caisson for a blast furnace, Ohgishima steel mill (courtesy of Shiraishi-Kiso Co.)

Fig. 4 Steel pipe pile caisson under construction (courtesy of Kawasaki Steel Works Co.)

Diaphragm walls are used for excavations, but the constructed walls should be of such a high quality that they will perform satisfactorily as permanent structures. The high quality is assured by the use of precast concrete panels as underground walls. After the panels are placed in the trench, compressed air is blown, through the pipes which have been installed in the panels, at the bottom of the trench exciting the slurry. Then two types of cementing agents are poured from the top of the trench, which then jells the mixed slurry. After about three weeks, the compressive strength of the jell reaches 3 to 5 kg/cm^2. The drilling mud is forced to circulate, minimizing its required quantity.

To excavate the trench for diaphragm wall construction, the "Rotary Cutters" capable of controlling the accuracy automatically are employed. The excavated materials are solidified, if necessary. Construction control is made possible by means of a supersonic wave instrument which measures the width of the trench being excavated. Special connectors link firmly units of diaphragm walls, and also the constructed walls and the inner structure. Fig. 5 shows a method of constructing high-quality diaphragm walls in this country.

In fabricating steel frame structures for the underground section, first continuous diaphragm walls are constructed. Then, auger holes are drilled, in which steel members are installed to reinforce the walls. Thus both the underground and above-ground works can proceed simultaneously. The Setagaya Substation of the Tokyo Electric Power Company was constructed in this manner.

Fig. 5 Diaphragm wall construction by the SSS method (courtesy of Shimizu Construction Co.)

Fig. 6 Apparatus to remove gravel, part of a slurry mole (courtesy of Tekken Construction Co.)

In the urban areas, the shield method is used quite frequently. Significant improvements have been made in the machinery and construction methods. The Japanese Railway Construction Public Corporation excavated an undersea water tunnel crossing Morigasaki Canal near Tokyo Bay by means of a slurry mole. The shield machine shown in Fig. 6 is capable of drilling a tunnel the outside diameter of which is as large as 7.29 meters. This equipment successfully drilled through a very soft alluvial soil and a diluvial stratum of cemented sand and clay with no blowout incident. This method enables safe, continuous excavation by balancing the porewater pressure at the head being excavated by means of the increased supply and pressure of water to the outlet adjustment tank. For water supply, clean water may be used, and there is no need for bentenite mud.

Driving steel pipes horizontally forms a shape of roof in the ground which counteracts the downward earth pressures, and makes it possible to drive a tunnel beneath the pipes. Fig. 7 shows a few cross sections with pipes installed over the portion to be excavated by this method. The diameters of the pipes used range from 114 to 1,500 millimeters, with the maximum length of 120 meters. Fig. 7 illustrates the construction of a subway station by this method connecting two excavated shield tunnels. This "Steel Pipe Roof" method has also successfully been used to drill through fault zones encountered in the Shinkansen's Kanmon Undersea Tunnel between Honshu and Shikoku.

There are many long railway tunnels in Japan. Because most of our mountains are volcanic and rocks are very often porous, a great deal of water often comes out during tunnel excavations, causing depletion of well water and of rice paddy water. During the construction of Haruna tunnel of Johetsu Shinkansen, wells dried up at a place 2 kilometers away from the central line of the tunnel. Also, highway engineers are investigating a possibility of driving a tunnel through a hot spring area where the temperature of the ground is as high as 100 degrees in centigrade. Dr. Fujii's Special Lecture tomorrow will refer to some interesting problems encountered during construction of Seikan Undersea Tunnel.

Across Tokyo Bay, there is a plan to build a road which will consist of a long sunken tunnel in the central section of the road with bridges at the both ends. The length of the road is about 16 kilometers. This is going to be one of the largest civil engineering projects in Japan. There are already several sunken tunnels completed along the shores of Tokyo Bay. Fig. 8 shows one of them. Each concrete box is 37.4 meters in width, 8.8 meters in height and 115 meters in length. Nine boxes are connected in tandem and form an undersea tunnel, 1,035 meters in length. In the project area there is a soft clay deposit, about 30 meters in thickness. A careful dynamic analysis was conducted taking into consideration the effect of strong earthquakes, and the flexible joints were provided to connect these boxes. Fig. 9 gives part of the records taken by seismographs placed inside the tunnel.

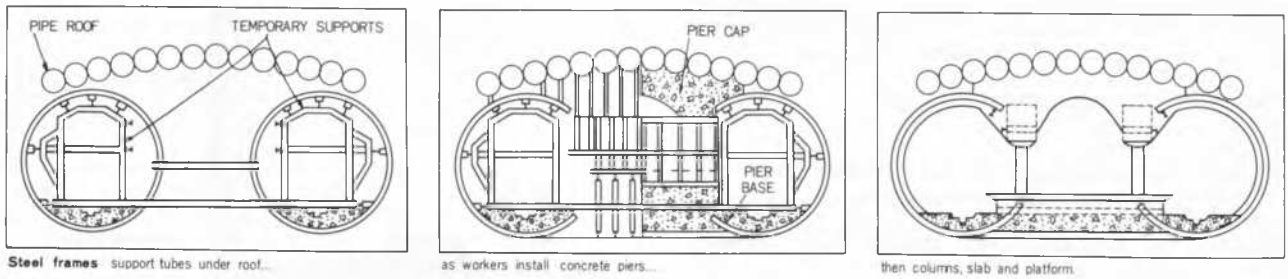


Fig. 7 "Steel Pipe Roof" method to construct a subway station (courtesy of Hazama Construction Co.)

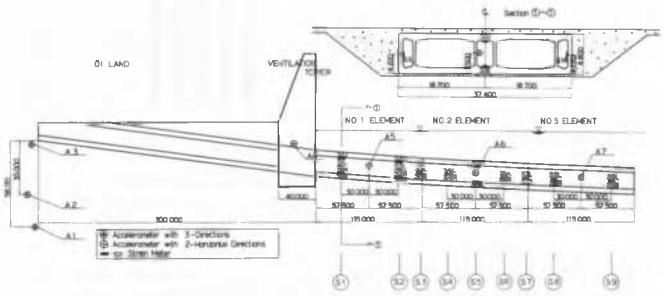


Fig. 8 Sunken tunnel in Tokyo Bay (courtesy of Taisei Construction Co.)

The bending moments obtained from these measurements were compared with those predicted on the basis of the theoretical analysis. In Fig. 10, the solid line indicates the bending moments calculated from the theory and circles show those obtained from the measured results. Reductions of the bending moment at the joints between the boxes indicate the effectiveness of the flexible joints.

As a source of cleaner energy, LNG is becoming increasingly important in our cities. LNG is stored underground, and around an underground LNG storage tank, continuous walls are built. Because the temperature of LNG is about 50 degrees below zero in centigrade, the soil around it is permanently frozen.

One of the best known methods to strengthen weak foundations here is sand compaction piles. Also, loose sand is densified by the same method. Fig. 11 shows the installation by means of a special mandrel consisting of a steel pipe with the bottom end closed and with a vibrator attached on its top. After the mandrel penetrates the weak foundation to the required depth, sand is poured through the mandrel as its bottom is opened. As the mandrel is withdrawn, the sand is ejected and compacted by vibration, forming a compacted sand pile in the ground. It is possible to install sand piles with the maximum diameter of 2 meters to the maximum depth of 40 meters. These monstrous sand compaction piles are driven from large barges to stabilize soft sea bed foundations.

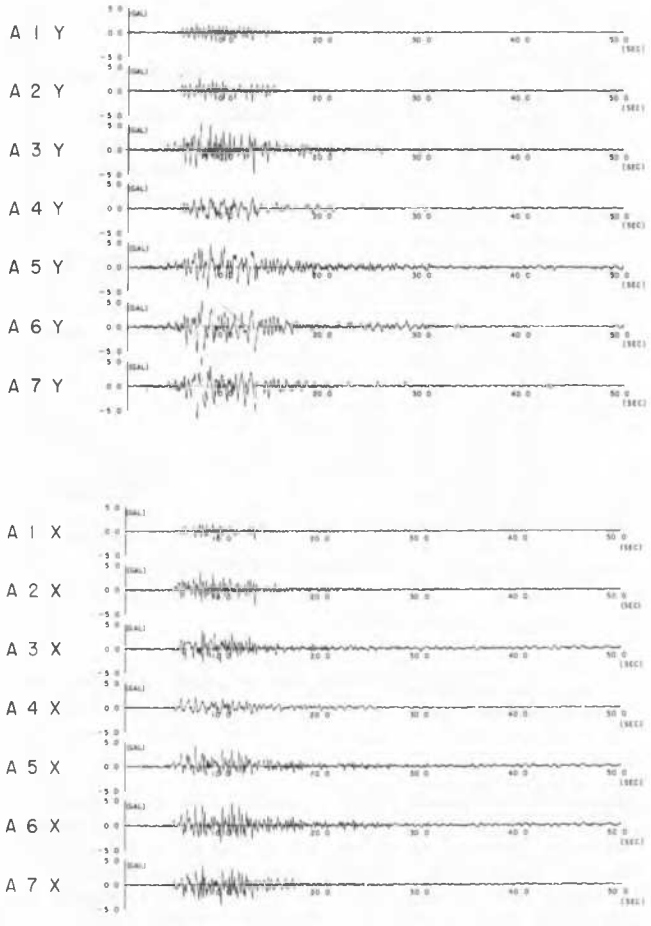


Fig. 9 Records of accelerations measured during an earthquake (courtesy of Taisei Construction Co.)

Note : X and Y indicate horizontal and vertical components, respectively. See Fig. 8 for the locations of the seismographs A1 through A7.

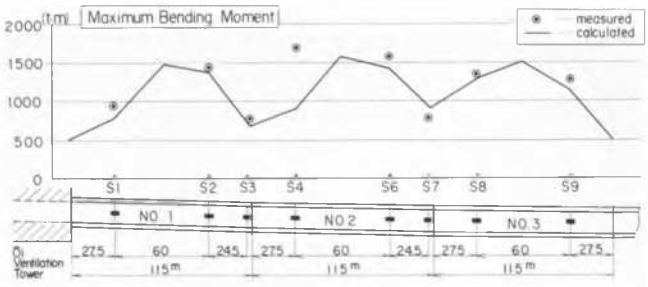


Fig. 10 Maximum bending moments in a sunken tunnel during an earthquake (courtesy of Taisei Construction Co.)

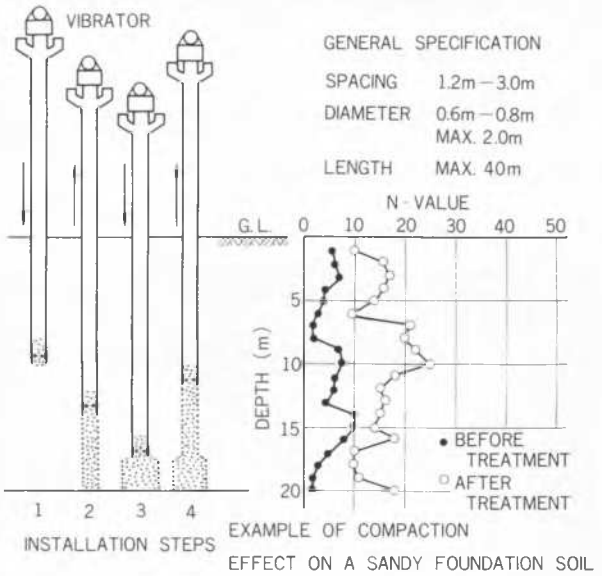


Fig. 11 Installation of a sand compaction pile (courtesy of Fudo Construction Co.)

Cardboard drains were brought from Sweden in 1964. More than a dozen large drivers were manufactured here for installation of cardboard drains and first used in the Seto Inland Sea area. In the Bay of Hiroshima a factory was built on the reclaimed land stabilized by cardboard drains. The improved land was 39 hectares where about 160,000 wicks to a depth of 20 meters and 50,000 wicks to 12 meters in depth were installed.

Piles made of lime are increasingly being used here to stabilize weak clay foundations. Also, a research program has been carried out by the Port and Harbor Research Institute, the Ministry of Transport, to reinforce soft foundation soils by mixing lime and cement

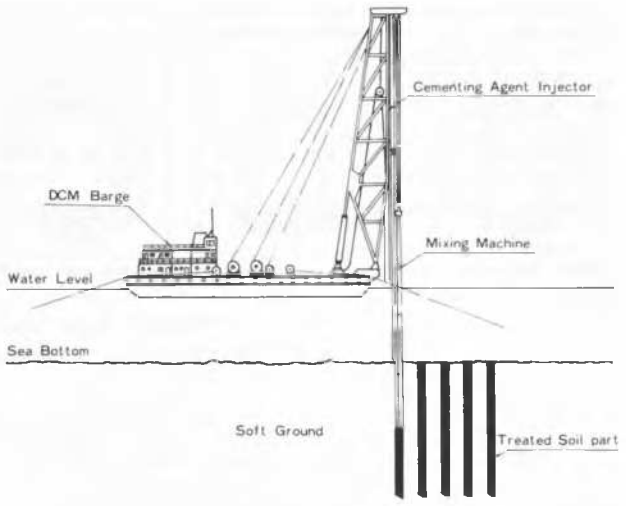


Fig. 12 Deep Cement Mixing method (courtesy of Takenaka Construction Co.)

with the in-situ soils. Fig. 12 shows one of such stabilization measures in actual use, in which a cement stabilizer is being mixed with the in-situ soil in a drilled hole. The mixing machine, mounted on a large barge, is capable of improving soft strata to a depth of 20 to 60 meters.

Cement, water glass, and organic chemicals have been used for grouting to stabilize weak foundation soils. Several years ago, there was an unfortunate incident; some grouted chemical polluted well water. Since then, the Government has forbidden the use of chemicals other than cement and water glass.

In order to make the grouting more effective, a special equipment has been developed that ejects high-pressure water jet mixed with air first. This produces cracks and voids in the soil into which a grout agent is injected subsequently. This method makes it possible to construct walls and columns in the soft foundation soil by grouting.

Volcanic ashes consist of materials erupted by volcanoes. In the southern part of Kyushu, there is a wide distribution of Shirasu consisting of a volcanic ash. When the surface soil covering Shirasu is removed for a housing development project, for instance, a downpour of rain easily erodes Shirasu slopes. Last year a heavy rain caused a large slide in the Shirasu area, 70 meters high and 40 meters wide. The slided materials overran the slope toe some 40 meters claiming nine fatalities.

It used to be considered that as long as the cut was perpendicular, the Shirasu slopes would be safe. Large-scale field studies conducted in connection with road construction have shown, however, that a 1 on 1 slope for cuts and a 1 on 1.8 slope for fills are the most satisfactory.

The Kagoshima Airport was constructed on the Shirasu soil. An embankment, 40 meters in height, consisted of alternating layers of Shirasu and loam, on which a runway, 2,500 meters long and 45 meters wide, was safely constructed. The total earthwork required amounted to 3.5 million cubic meters.

For reclaiming land for coastal industrial areas, large-scale filling or reclaiming operations have been in progress. During reclamation for the Ohgishima Industrial Complex in Tokyo Bay, the fill materials were transported across the bay from the borrow area located some 40 kilometers away. Soils were excavated by 30-ton scrapers, transported by large belt-conveyors to the coast and then ferried by barges across Tokyo Bay. A total of some 80 million cubic meters of soil was moved to reclaim the area, 5.15 million square meters.

In order to minimize the negative skin friction, steel pipe piles coated with asphalt have been used in the reclaimed area. Such piles used in Ohgishima totalled several hundreds of thousands of tons.

In the Asian Continent, the art of dam building was fairly well advanced even in the ancient periods. This art was brought to Japan about 1500 years ago. Survey techniques and mathematics were developed to build dams. It has long been known that compaction of soils increases their strength and makes them more impervious. It was also known that the volume of the soil excavated from the borrow pit during transportation was about 1.25 times that of the in-place natural soil, and after compaction, it was reduced to 0.75 times the original volume.

One of the oldest and the most famous ones is Manno Pond in the Island of Shikoku, built first around the early eighth century. Early in the ninth century it failed, but was rebuilt by the famous Buddhist Kukai-Shonin. After that it has repeated failures and reconstructions a number of times. This dam speaks very eloquently of all the troubles our ancestors have had for improving the art of dam building. In 1854, this dam again failed due to an earthquake.

Some 1,800 dams have been built for agricultural use in this country since about the first century. In 1976 alone, over 200 irrigation dams were under construction; the numbers of earth dams and rockfill dams are about the same totalling approximately 80% of those under construction. Most of the earth dams are less than 40 meters in height, but some rockfill dams are higher than 100 meters. In the next ten years, it is expected that 4 billion cubic meters of water will be required mainly for irrigation purposes, and many large dams will have to be built to provide new water resources, most of them under difficult conditions. It will call for many high rockfill dams, which in turn will promote the rapid advancement of the technology involved, geotechnical engineering for dam construction in particular.

Of the river dikes, the most famous is the Manda Dike for Yodo River in Osaka, built in the fifth century. Soils were compacted by wooden poles and human steps. It is said that the famous warrior-general, Takeda Shingen, in the sixteenth century took advantage of his people carrying portable shrines to celebrate festivals in order to compact the embankment by letting them dance on the road on the dike.

Most of the rivers in Japan are protected by levees and dikes to cope with small to medium floods. In the typhoon season every year, however, failures take place. To strengthen levees and dikes is one of our urgent research subjects.

Many hydropower dams are built lately with pumped storage arrangements. Among the rockfill dams under construction, the highest is Takase Dam of the Tokyo Electric Power Company. It is 176 meters high and its volume 11.4 million cubic meters.

Earthquakes are most feared in regard to the stability of dams, and various studies have been made to improve the stability when subjected to strong earthquakes. In the embankment of Kisenyama Dam of the Kansai Electric Power Company, seismograms were installed. For the first time, field dynamic experiments were conducted there using large vibrators. Subsequently some observational data were obtained during earthquakes and an extensive analysis performed on the basis of various assumptions. It has been found as a result of these studies that the natural frequencies and the mode of vibrations do not change regardless of the magnitude of the accelerations.

The proposed bridges connecting the Main Island of Honshu and the Island of Shikoku are one of the largest civil engineering projects in this country. Most of the site investigations have been completed, and some construction works have already commenced. In connection with the foundations, however, large scale experiments, field studies and theoretical researches are still being performed. In terms of soil mechanics and foundation engineering, the bearing capacity of the foundations and the stability against earthquakes are particularly important. Many difficulties are anticipated with construction because the foundations will have to be placed under the sea. The largest plate loading test conducted so far employed a plate, 3 meters in diameter, but it did not reach failure. Last year three load tests were conducted using a plate, 2 meters in diameter, and they were loaded to failure. These tests and researches are useful not only for building these particular bridges but for designing and building other bridges and structures.

The bridges connecting Honshu and Shikoku will be supported mainly by caisson foundations, but a new type of foundations called the multi-column foundations have been proposed. These foundations were in fact used for Ohshima Bridge in the Inland Sea. Fig.

13 shows the cross section of one of the piers, P-4, consisting of 9 steel pipe piles, each 3.5 meters in diameter and 36 meters in length. Because the excavation is to be made at the sea bottom, under-water blasting will be necessary. For this purpose, an experimental under-water blasting was conducted which included such items as the effects upon fish resources.

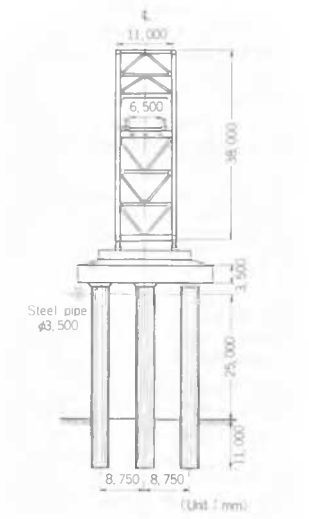


Fig. 13 Multi-column foundation for Ohshima Bridge (P-4)
(courtesy of Taisei Construction Co.)

Since most of the major ports and harbors are situated on soft alluvial soils and have experienced damages due to earthquakes including the Kanto earthquake, our research efforts have been focussed on the aseismic design for breakwaters and piers. Among the recently constructed ports which specialize in handling petroleum, Kiire in Kyushu has one of the largest sea berths in this country. It accommodates an oil tanker as large as 500,000 tons and is supported by steel pipe piles ranging from 900 to 2,300 millimeters in diameter and weighing about 12,000 tons in total.

For the first time in the world the Nagasaki airport was built entirely in the sea; an island was cut and the sea reclaimed. Since the sea bed included soft compressible materials, large scale pre-loads were placed to stabilize the foundations. Thus the airport, 156 hectares, was constructed with about 20 million cubic meters of earthwork successfully completed.

Construction of many new roads and highways started just about the time when the first Shinkansen was under construction. Major geotechnical engineering problems encountered were instability and excessive settlements of embankments on soft ground, difficult earthwork involving volcanic ash soils such as Kanto loam and Shirasu, frequent landslides in the mountainous regions and problems related to the base course and subgrade for the pavement. Numerous field studies were conducted including full-scale experiments and long-term observations of the completed works. In urban areas, many elevated expressways were constructed. Construction of grade separation works for railroads and highways are difficult because the traffic has to be maintained during construction.

There are many landslides moving at very slow rates in natural slopes or cuts in this country. The remedial measures commonly employed here to arrest such movements include excavation, drainage, installation of piles and wells, and combinations of these. Bending moments developed in piles as calculated and measured are being reviewed for establishing a more rational design method.

Including liquefaction of sand during earthquakes, consolidation and shear characteristics of clays and characteristics of compacted soils, the results of our fundamental research on soil mechanics and foundation engineering will be reported during the conference.

I have very briefly introduced the history and the current state of geotechnical engineering in Japan with some examples of works completed and under construction. Methods or machines used in some instances were imported from other countries. Because of Japan's unique geology, topography, climate, culture and land use, many of the imported machines and knowhows had to be modified so as to suit our local requirements.

The same is true for our knowledge of soil mechanics and foundation engineering. Our land is mostly mountainous, the geology is complex, and there are many faults and joints in the bedrock. Even on the plains, thick deposits of extremely soft soils often prevail, and there are volcanic ashes difficult to deal with. In addition, we have frequent earthquakes, typhoons and landslides.

It is hoped that on this occasion of the Ninth International Conference on Soil Mechanics and Foundation Engineering, the participants from abroad will visit personally with the Japanese participants so that we may benefit from your views and observations. We do invite you to see some of our completed works and construction sites.

I acknowledge with thanks the contributions of many people who have made available slides and other data for this lecture. Thank you very much for your kind attention.

Reception

Réception

Peacock Room, Imperial Hotel, July/Juillet 11,1977

Mr. G. Togashi

We are all glad to have you at this reception for the Ninth International Conference on Soil Mechanics and Foundation Engineering, and speaking on behalf of the Organizing Committee, I would like to open this reception with a word of heart-felt welcome to you all.

Tokyo is both old and new. For example, just behind the Imperial Hotel runs the Shinkansen "bullet trains", built just ten years ago, but just a short walk will also take you to the Imperial Palace, whose construction started in 1457. Since then over the last five centuries, this city has been the center of Japan's political, economical, and cultural developments, under both the former name of Edo and the modern name of Tokyo. Edo became the capital named Tokyo only 100 years ago. Tokyo is a mixture of the old and the new, the quiet and the dynamic, perhaps unrivaled in the world for its unique atmosphere. Just as is the case with many other major cities, Tokyo in general has very poor, complex foundation conditions. This means, however, that we soil mechanics and foundation engineers do not have to worry about losing jobs for the time being.

In September 1923, Tokyo was struck by a monstrous earthquake, and the poor subsurface conditions, combined with fire and many poorly constructed structures, caused massive damage. Since many of you come from lands with few or no earthquakes, it was suggested to generate a once-in-a-century earthquake as an unforgettable attraction of the Tokyo Conference. Fortunately the suggestion was rejected by the Organizing Committee. To tell the truth, however, the enthusiasm of some of the young people actively participating in the planning of the Conference makes me wonder if they have truly been obedient to the rejection.

Yesterday, the general election for the House of Councillors was held here in Japan. Over the preceeding weeks, Tokyo has been the focus of the heated election campaigns for the sake of our free and democratic society. Now the election is all over, and we are glad that things have calmed down and a quieter atmosphere now prevails for this Conference.

In closing, allow me to express my sincere hope that this Conference will be a huge success to every one of you here, and that you will thoroughly enjoy your stay in the always young and old metropolis of Tokyo.

Professor J. Kerisel

In order to keep this occasion as simple as possible, and to ease the burden on our interpreters, Professor Nakase has asked me to give an English summary of these few words. I will try to do so in the certainty that I am not breaking any Charter of the Trade Union of interpreters as my English is so bad.

On behalf of the ISSMFE I express my thanks to Mr. Togashi, Chairman of the Organizing Committee. This reception provides perfect relaxation after the first technical skirmishes of this afternoon, and it permits us to have better acquaintance with our Japanese friends and with our new members and their ladies.

Such opportunities are really necessary. There are no fewer than 1750 persons present this evening: moreover, at each congress a younger generation replaces the older ones. In Moscow we had only two members who had attended all the congresses; neither were able to come this time. You have said that the City of Tokyo is a mixture of the old and the new and also of quietness and dynamics. So it is for our society. Here we have a small group of older ones and in some few years time they shall have moved into the group of quiet ones but we have great faith in the vigour of the present younger generation.

We know that after this reception, you have provided another one for us which will make us more familiar with the traditional artistic Japan. The Scientific World has already a great esteem for the abilities of your country. After this conference, this esteem, no doubt, will have increased but to this appreciation we will add a large "thank you" for the generosity of this hospitality.

Professor T. Akagi

Thank you very much for your thoughtful and

kind remarks for this very humble reception. I say this is humble, in accordance with our time-honored tradition of modesty. For instance, when you are given something good and valuable by your Japanese friend, even though you know he is sure it is good and valuable, he would say, "Please have this, although this is the lousiest thing in the world." So our humble reception is ready to start with lousy decorations all over, which however, have converted the intense academic atmosphere which had prevailed in this hall heatedly up until a couple of hours ago into a more sociable and comfortable one.

Now let me tell you something about a couple of decorations we have in front of us. This, on your left, is what we call Tanabata decoration. On July 7, boys and girls in this country set up bamboo trees, large and small, and decorate them by attaching their notes of wishes such as good harvest, the health of somebody dear and even their young love. As a matter of fact, this old custom comes from a sad legendary love story between a princess and a little poor boy who were allowed to meet only once a year on July 7.

That one, on your right, is the ladder decoration. The ladder of this sort was used by fire brigades in the old Tokyo which was known for its frequent fires. Your Japanese hosts and hostesses tonight will be happy to give you further details on these. You may well find what I have just said is utterly wrong.

Now, ladies and gentlemen, we have another old custom which we would like to demonstrate right in front of you all. Like a bottle of champaign broken for a newly launched ship, we have an old custom of breaking a Sake barrel to celebrate something new or something that has just started like this Ninth International Conference which opened today. This act of breaking a Sake barrel should be carried out by somebody exceptionally competent and distinguished. May I now invite Dr. Nash, Secretary General of the International Society, and Dr. Moh, Vice President of the Asian Region to do this act of honor for us. After Sake is ready to be served for everybody, please try it in our traditional Sake cup or a box-shaped wooden bowl.

An entertainment program entitled "Summer Festival of Japan" will take place between 9:00 and 10:30 pm at Fuji Room on the third floor. This program will present a variety of Japanese dances and songs as well as the traditional acrobatics and magics. Those who wish to remain here, please do so until 10:00 pm. In either way we hope all of you have an enjoyable and pleasant evening.

Closing Session

Séance de Clôture

Peacock Room, Imperial Hotel, July/Juillet 15,1977

PARTICIPANTS

Prof. J. Kerisel, President, International Society for Soil Mechanics and Foundation Engineering

Prof. M. Fukuoka, elected President of the International Society for Soil Mechanics and Foundation Engineering

Mrs. J. Kerisel, in the name of ladies

Prof. S. Hansbo, in the name of next host country

Mr. G. Togashi, Chairman, Organizing Committee, Ninth International Conference

Prof. T. Akagi, Secretary, Programs Sub-Committee, Ninth International Conference

Professor J. Kerisel

Monsieur le Président, Mesdames et Messieurs, Nous voici arrivés presque au terme de ce 9e Congrès. Il arrive souvent que du premier jour au dernier jour faiblisse l'attention des congressistes. Je n'ai rien observé de tel, mais au contraire j'ai été réconforté par les très larges audiences de nos participants à toutes nos manifestations, qu'il s'agisse des visites techniques, de l'exposition, ou de nos sessions principales ou spéciales. Tout le monde sera d'accord pour dire que cette conférence a été un grand succès et il m'appartient, en premier lieu, au nom de la Société Internationale, de vous remercier, Monsieur le Président, de la magnifique organisation de ce congrès. Un certain nombre d'entre-nous dans cette salle ont dans le passé connu la charge de l'organisation du Congrès International, et ils savent combien de longues heures et d'efforts soutenus il faut lui consacrer. Réunir les fonds nécessaires n'est déjà pas une tâche facile au niveau de 2.000 participants, mais ceci n'est pas suffisant: il faut une large dose d'enthousiasme, de ténacité et un esprit très méthodique pour arriver à ce que la conférence soit parfaitement réussie sur le plan scientifique et social. Et sur le plan social, il n'est que d'observer la spontanéité avec laquelle lundi dernier nos participants sont montés sur la scène danser Awaodori pour comprendre que la partie était gagnée dès le départ par nos amis japonais.

Vous avez tous formé une équipe tellement soudée que je ne saurais me risquer à distinguer les noms des plus actifs participants à cette organisation. Mais au risque d'en oublier, je voudrais proposer des remerciements chaleureux:
- au Président TOGASHI
- au Vice-Président ONOUCHI
- au Prof. MASAMI FUKUOKA. J'aurais l'occasion de reparler de lui bientôt.

et à l'infatigable Prof. AKIO NAKASÉ.

Je demanderai à ma femme de remercier dans quelques instants, les dames du Comité d'Organisation.

L'Advisory Committee qui avait défini les grandes lignes d'organisation du présent congrès avait prévu 4 Conférences Spéciales. Il appartenait à nos amis japonais de désigner les auteurs de ces conférences spéciales. Leur choix a été excellent.

Quoi de plus remarquable en effet que la description par le Dr. FUJII de la variété des techniques les plus évoluées qui ont permis la réalisation de ce SHINKANSEN, chemin de fer qui bat tous les records de vitesse sur le sol le plus ingrat. Qu'il s'agisse des techniques de stabilisation de remblais sur sols mous ou de percement des deux tunnels du SHIN KANMON ou du SEIKAN, je pense que le SHINKANSEN fera école en mécanique des sols et contribuera dans les pays en développement à la création de transports ferroviaires à grande vitesse quelles que soient les difficultés du sol.

La conférence de notre distingué ancien président Prof. A.W. SKEMPTON nous donne un magnifique exemple de la grande honnêteté intellectuelle que nous devons tous avoir en n'hésitant pas à retoucher nos conceptions. Elle aura une grande portée à la fois scientifique et économique car pourront être réduits les coûts des travaux qui résultaient précédemment d'un calcul avec une cohésion effective voisine de zéro et un angle de frottement effectif pas supérieur à la valeur résiduelle. Sa conférence montre enfin que seules des observations très soignées

poursuivies très longtemps sur un sol bien catalogué - en l'espèce, une argile surconsolidée fissurée - peuvent faire avancer nos connaissances fondamentales.

C'est un des plus difficiles sujets de la Mécanique des Sols qu'a traité devant nous le Prof. MOGAMI. Il nous a montré la multiplicité des théories dans le domaine de la prévision des déformations des milieux granulaires, mais à travers leur diversité, il a mis en évidence un caractère commun qui est d'établir une relation entre des rapports de contraintes et les variations des déformations relatives. Il rejoint par ailleurs les conclusions du Prof. LADD sur l'influence très grande de l'anisotropie dans les milieux granulaires.

Enfin, la conférence du Prof. PECK nous a fait faire un séjour dans l'Olympe des anciens Présidents et nous ignorions que à toutes ses qualités de chercheur et d'ingénieur, notre ancien président ajoutait celle d'un historien.

Certains de nos participants ont pu trouver qu'il y avait un certain recouvrement entre les sujets des sessions principales. Il est en effet difficile d'avoir une bonne définition du général et du spécial.

Mais tout au moins, il est réconfortant de trouver certaines convergences de vue dans les conclusions qui se dégagent des discussions aux séances principales. Je voudrais essayer d'en noter certaines:

1. Les essais de laboratoire et ceux in situ ne sont pas compétitifs, mais complémentaires.

2. Pour les sables, les essais in situ sont les mieux appropriés tant est grande, nous a dit le Prof. LADD, la difficulté de reproduire exactement au laboratoire la structure anisotropique inhérente.

3. Pour les argiles, en laboratoire, la procédure SHANSEP mise au point par le M.I.T. offre, semble-t-il, une large possibilité d'études correctes pour les argiles normales.

4. Bien entendu, tout comme à chaque congrès, partisans et adversaires des procédures en contraintes totales ou effectives, se sont affrontés.

Partageant les conclusions des trois rapporteurs généraux des sessions principales 1 - 2 - 3, je pense aussi que seul le calcul en contraintes effectives a une valeur vraiment scientifique.

Au Comité Exécutif, au cours de la discussion qui a précédé l'approbation d'une nouvelle liste de symboles que je recommande à votre attention pour l'avenir, le Prof. JANBU a été jusqu'à proposer - et je crois qu'il a entièrement raison sur le fond - que l'angle de frottement effectif et la cohésion effective ne soient plus désignés par ψ' et C', mais bien par ψ et C en réservant les primes et indices aux états non draînés. Il n'a pas insisté sur ce point pour ne pas troubler nos habitudes, mais l'idée est à retenir. Il a demandé aussi - non sans raison semble-t-il - que l'on normalise ce qu'il appelle l'attraction $a = \frac{C}{tg\psi}$. Physiquement, c'est bien le total de la contrainte normale et de cette attraction qui, par l'intermédiaire du frottement, donne la résistance au cisaillement.

Il est incontestable que les états non draînés sont des états non pas fondamentaux mais composites, très sensibles à l'histoire des contraintes et à la vitesse de déformation. C'est notamment pour avoir ignoré de prendre en compte ce paramètre que l'on a enregistré tant de ruptures de levées sur sols mous. Les corrections proposées par BJERRUM sur C_u en fonction de l'indice de plasticité ne sont d'ailleurs qu'un aspect de la variation importante de C_u en fonction de la vitesse de déformation lorsque la plasticité de l'argile augmente.

Bien sûr, il n'est pas du tout glorieux de constater, comme nous l'a montré le Prof. JAMIOLKOWSKI, qu'il y a parfois plus qu'un rapport de 1 à 2 entre les cohésions draînées à profondeur égale que nous apportent les pressiomètres, les Vane Test et les essais de laboratoire C K_o U. Mais notre progrès incontestable aujourd'hui vient de ce que nous savons maintenant expliquer ces différentes.

De sorte que, à condition que l'on soit parfaitement conscient de tout ceci, je pense que lorsque l'on ne dispose pas d'un laboratoire très bien équipé et d'opérateurs entraînés, il est admissible d'appliquer la procédure des contraintes totales.

J'ai noté d'ailleurs que le Prof. LADD a reconnu qu'il n'était pas en mesure lorsqu'il emploie la procédure des contraintes effectives, de prévoir la valeur du coefficient A au moment de la rupture. J'ai noté aussi que les auteurs d'exemples d'application de la méthode des contraintes effectives sont assez discrets sur les lignes équipotentielles de pressions interstitielles qu'ils prennent en compte dans leurs calculs.

5. On a comme toujours parlé des interprétations des essais in situ et des corrélations.

Aussi bien le Prof. LADD que le Dr. BURLAND ont insisté sur l'absolue nécessité de n'appliquer ces corrélations qu'avec circonspection. Tout le monde les suivra dans cette voie: nous avons besoin de corrélations mais nous devons les considérer comme un mal nécessaire. Les plus pernicieuses sont d'ailleurs celles contre nature comme celles par exemple qui consistent à déduire un tassement de consolidation des données d'un essai in situ non draîné. Le Prof. SKEMPTON au 5e Congrès à Paris dénonçait déjà la nocivité de ce qu'il appelait le "handbook" engineering

ou encore, le "handbook" state of mind.

6. Concernant les essais in situ, le Prof. LADD a déploré le manque de procédure normalisé. Je voudrais lui dire comme à vous tous que ses voeux sont exaucés car pendant ces derniers quatre ans, un très grand travail de normalisation des essais in situ a été fait par notre Sous-Commission des Essais de Pénétration en Europe.

Nous avons dû reconnaître que dans le passé la tentative d'une normalisation sur le plan mondial a été vouée à l'échec. Elle se heurtait à trop d'habitudes et d'intérêts commerciaux. Nous avons donc repris la chose sur le plan européen. Et cela a débuté au Congrès Européen de Stockholm sur les essais de pénétration in situ en 1974 au cours duquel il y a eu une excellente prise de conscience et après laquelle une impulsion très énergique a été donnée aux études. Finalement, notre Comité Exécutif vient d'approuver les propositions qui lui ont été soumises par le Président de sa Sous-Commission de Normalisation des Essais de Pénétration en Europe, présidée par le Prof. BROMS. Ce qui veut dire qu'en Europe désormais les essais de pénétration statique et dynamique au cône, les S.P.T. et le Weight Sounding Test sont soumis à normalisation, et celle-ci porte non seulement sur la géométrie ou la masse des appareils mais sur la procédure des essais.

En votre nom à tous, je voudrais féliciter spécialement les membres de cette Sous-Commission qui ont abouti là à un travail très profitable pour notre société. Une publication spéciale de ces Standards sera faite et je souhaite qu'elle trouve un écho dans toutes les nations qui avaient leurs propres Standards et leurs Codes of Practice.

7. Je voudrais aussi insister sur ce que l'on pourrait appeler une certaine mode dans les essais.

Nos premiers congrès internationaux étaient remplis de rapports sur les essais C.B.R. On n'en parle plus guère aujourd'hui. Quand le Vane Test est apparu, on lui prédisait un très brillant avenir: on est beaucoup plus réservé aujourd'hui, en raison des difficultés de son interprétation.

Ne repoussons surtout pas de nouveaux appareils très prometteurs comme le pressiomètre autoforeur ou la sonde TORSTONSSEN, mais restons conscients toujours du fait que chaque appareil comporte à la fois des limites dans la simulation des phénomènes réels et surtout de leurs interprétations.

8. L'approche statistique a un avenir brillant en mécanique des sols à condition de l'utiliser avec un grand discernement, comme l'a montré la session de spécialité n°6. Elle doit être appliquée à un échantillon correct, un seul échantillon pouvant concerner un détail géologique en apparence mineur mais dont dépend en fait toute la sécurité. Elle ne peut remplacer l'expérience et le jugement de l'ingénieur.

9. Saluons une notion nouvelle qui nous est proposée par le Dr. BURLAND, celle de fonctionnabilité. A côté de l'échelle Beaufort pour les vents, l'échelle Mercalli pour les tremblements de terre, nous avons l'échelle Burland pour qualifier les péchés véniels ou mortels des ingénieurs des sols. Au-delà de la magnitude 6 de l'échelle Burland, retenons bien qu'ils sont promis aux plus grands châtiments.

10. Une autre notion moins subjective et très réaliste est celle des pieux envisagés comme réducteurs de tassements différentiels, notion intermédiaire entre les conceptions extrêmes du radier portant et des pieux portants.

11. J'ai été très sensible à la présentation par le Dr. BURLAND, des résultats des différentes méthodes de tassement. Elle montre que ce sont les méthodes les plus sophistiquées qui donnent le minimum de précision et que le bon vieil oedomètre est encore très recommandable dans beaucoup de circonstances.

12. La classification du Prof. MORGENSTERN des matériaux à structure fine vis-à-vis du calcul de la stabilité des pentes, doit être retenue par tous et surtout par ceux qui seraient facilement enclins à des généralisations abusives. Il a remarquablement mis l'accent sur les différences fondamentales de comportement des sols artificiels ou naturels, saturés ou partiellement saturés, dilatants ou non.

13. Paradoxalement, c'est en dynamique des sols, comme nous le montre le Prof. YOSHIMI, que l'on trouve le meilleur accord entre les essais in situ et les essais de laboratoire pour déterminer les vitesses de propagation et les modules de distorsion.

Les phénomènes de liquéfaction dans les sols ont perdu une partie de leur mystère mais nécessitent encore des recherches.

Telles sont les quelques remarques que j'ai pu faire en suivant les sessions principales. Elles sont bien loin d'être exhaustives. Je sais que beaucoup de séances de spécialité ont connu un véritable succès. La création des séances de spécialité ne remonte qu'à 8 ans. Elles s'imposent de plus en plus et il conviendra sans doute, devant l'expérience acquise, de codifier ou normaliser certains aspects de leurs organisations.

Je voudrais en tout cas remercier tout spécialement leurs organisateurs et co-organisateurs.

Il n'est pas d'usage d'exposer ici le travail en profondeur réalisé dans l'administration de la Société. J'ai déjà fait allusion à la

modification de nos statuts pour éviter le retour des difficultés que nous avons rencontrées. Je voudrais seulement ajouter que la distribution du nombre de pages aux prochains congrès se fera suivant une procédure normalisée.

Je voudrais exprimer mes remerciements à nos cinq Vice-Présidents qui s'en vont. Ils ont eu à coeur de prendre une part active dans la vie de leurs régions, de stimuler la recherche et de représenter la Société avec éclat. Je les remercie de leur coopération et je voudrais que les Prof. KEZDI, MARSAL, de MELLO, ZA CHIEH MOH, P. TAYLOR, se lèvent pour recevoir nos applaudissements.

Mes remerciements vont aussi aux membres de nos sous-comités dont vous venez de voir l'action dans certains domaines techniques comme celui de la normalisation des symboles et des essais.

Enfin, si je puis être compris d'un grand nombre d'entre-vous, c'est grâce à l'équipe d'interprètes de Madame DE BRY LATEIMER et aux interprètes japonais. Ils ont assimilé en peu de temps notre langage très spécial. Ils ont résisté le plus souvent victorieusement aux rushs de certains de nos orateurs. Je vous demande de les applaudir.

Il est par ailleurs un devoir impérieux pour moi, c'est de remercier chaleureusement celui qui m'a permis par son travail intense, son tact, sa diplomatie de mener à son terme ma tâche de président. J'ai nommé notre Secrétaire Général le Prof. NASH. Je lui demande à lui aussi de se lever pour recevoir vos applaudissements.

Paraphrasant un vieil auteur classique de mon pays, RACINE, je dirais que "Invisible et présent, il est de notre grande société l'âme toute puissante".

C'est grâce à ses efforts incessants que les problèmes qui nous inquiétaient tant à Istamboul ont pu être résolus. Il ne ménage ni son temps, ni sa peine, et je crois pouvoir dire que nous avons formé une équipe soudée sans la moindre divergence de vues sur nos problèmes. Et c'est avec une grande joie que, au Comité Exécutif, nous avons accueilli sa déclaration selon laquelle il acceptait de servir notre société pendant au moins deux ans encore.

Il y a deux secrets que le Président sortant doit vous révéler au cours de la séance de clôture: le premier est le nom de la nation qui organisera le prochain congrès.

Messieurs et Mesdames, du IXe au Xe Congrès, nous nous transporterons de l'antique EDO sur les rives du Pacifique vers les rives de la Baltique dans la citée bâtie par les Vikings au 9e siècle, la Venise du Nord. J'ai nommé Stockholm. L'invitation qui nous a été présentée par le Président Suédois, le Prof. Sven HANSBO a été adoptée par votre Comité Exécutif. Je lui demande de se lever pour recevoir vos applaudissements. Il vous expliquera dans un instant comment il envisage le Xe Congrès. Nous ne doutons pas un instant que la Suède aura à coeur de faire aussi bien que nos amis japonais. Nous n'oublions pas que la Suède est la patrie d'éminents savants: ATTERBERG, OLSSON, PETTERSON et FELLENIUS.

De plus, votre Comité Exécutif a décidé en raison d'une circonstance spéciale et qui a toute son importance, de fixer le lieu du XIe Congrès en 1985. 1935 fut la date de notre 1er Congrès qui se tint aux Etats-Unis à HARVARD. Ils ont présenté une invitation pour ce XIe qui marquera le cinquantième anniversaire du 1er Congrès. Cette invitation qui a été présentée par le Prof. SEED a été accueillie à l'unanimité. Prof. SEED, voulez-vous vous lever?

Au Comité Exécutif, samedi dernier, après six tours de scrutin, la blanche main de la gracieuse déléguée du Danemark, Mademoiselle HELLE STRØMANN, allait ouvrir le quarante-cinquième bulletin, le dernier, celui qui devait désigner le Président de notre Société Internationale pour les quatre ans à venir. Cette élection avait atteint un "suspense" rarement égalé. Elle ouvrir ce bulletin: il portait le nom du Professeur FUKUOKA. Mon cher ami, permettez-moi de vous féliciter chaleureusement et de rappeler certains aspects de votre brillante carrière. MASAMI FUKUOKA. Vous êtes né en 1917 à la Préfecture de HYOGO. Après de brillantes études à l'Université de Tokyo, vous entrez au PUBLIC WORKS RESEARCH INSTITUTE dont vous êtes devenu le Directeur en 1970. En 1971, vous êtes nommé Professeur de GEOTECHNICAL ENGINEERING de l'Université de Tokyo. Toute votre vie a été consacrée à l'enseignement et à la recherche. Dans ce dernier domaine, vous avez fait preuve d'une grande originalité et de beaucoup d'imagination.

Dès 1955, vous proposez, en vue du calcul de fondations sous l'effet des tremblements de terre, des mesures in situ au moyen d'un tube en caoutchouc inséré dans un forage. Le tube est rempli d'eau sous pression. Cette méthode, connue sous le nom de LLT method est analogue à celle du pressiomètre et elle a connu une large application.

Vous faites avancer largement la technique du prélèvement des échantillons intacts dans les sols sableux liquéfiables. Vous êtes l'artisan du développement au Japon du Swedish weight sounding et vous fûtes membre du Sampling Committee de notre société.

Le second aspect de votre activité est lié à d'utiles méthodes de calcul des murs de soutènement.

Un troisième aspect de vos recherches embrasse les glissements de terrains et vous êtes nommé expert par le gouvernement à propos d'un glissement expérimental très difficile à expliquer.

Enfin, vous vous êtes fait une solide réputation dans le domaine de la prévision des

tassements et affaissements causés par des pompages excessifs. Là encore, le gouvernement a fait appel à vous et le Ministre de la Science et de la Technologie vous décerne une médaille.

Je suis convaincu que la société est maintenant en de bonnes mains.

Mon Cher MASAMI FUKUOKA, le symbole d'autorité du Président est un marteau. Comme vous le savez, il est fait du bois d'un pieu en bois servant de fondation à une église norvégienne datant du lle siècle. Il a déjà fait son tour du monde à Paris, Montréal, Mexico, Moscou. Bientôt, vous le ramènerez à son berceau en Scandinavie au 10e Congrès.

Prof. FUKUOKA, je suis heureux de vous transmettre ce symbole avec toutes mes vives félicitations et mes meilleurs voeux.

Professor M. Fukuoka

Mr. Chairman, Mr. President, Ladies and Gentlemen. First of all, I would like to thank Professor Kerisel for his thoughtful remarks about the Organizing Committee.

It is a great honor for me to stand before you as the new President of the International Society for Soil Mechanics and Foundation Engineering. And I am grateful to the Executive Committee for having faith in me.

On behalf of all the members of the International Society, I would like to take this opportunity to thank President Kerisel for his excellent management of the International Society for the past four years. He showed us that the International Society has no border, no racism, and we are united in one profession having the duty to promote the peace and welfare of the mankind, and this duty is extremely important.

The next International Conference is to be held in Sweden in 1981. In Sweden, there is a quick clay known as the glacier clay. In Sweden they have been engaged in advanced studies on the analytical methods of slope stability and have developed their own technologies such as card-board drains. I do not think it is necessary to say that they also have beautiful forests and lakes for sightseeing.

Now allow me to say a few words as the President of the Japanese Society of Soil Mechanics and Foundation Engineering. First of all, I would like to express our sincere gratitude to the overseas and domestic participants. Your participation is essential for the success of the Conference.

Then I would like to thank the key-role members of the Conference, that is, the Chairmen and General Reporters of the Main Sessions and the Organizers of the Specialty Sessions, and many others assisting in conducting technical sessions. I am proud to say that the Tokyo Conference has been successful. However, we would not have been able to make this Conference successful without these key-role members.

I am also grateful to the members of the Conference Advisory Committee who have supported us for the past four years. They are the President - Professor Kerisel, the Secretary General - Professor Nash, the Vice President for Asia - Dr. Za-Chieh Moh, and the Secretary General to the Moscow Conference - Dr. Chetyrkin.

My thanks are also extended to many members of the Organizing Committee. They are Mr. Togashi - Chairman, Mr. Onouchi - Vice Chairman, Mr. Atsumi - Chairman of the Fund Raising Committee, and the members of the Sub-Committees.

As you know, this Conference is sponsored by both the Science Council of Japan and the Japanese Society of Soil Mechanics and Foundation Engineering. As the President of the JSSMFE, I would like to thank Professor Ochi, President of the Science Council of Japan.

You may be well aware that the Tokyo Conference has come at the time of a world-wide economical depression. In spite of these difficulties, I must say we are fortunate to have received so much financial support from various sources in Japan. Last but not least, I would like to express our sincere gratitude to these many enthusiastic supporters.

We hope to see you again in Stockholm in 1981, and say "God dag."

Mme. J. Kerisel

Mesdames, Mesdemoiselles, Messieurs, Je ne vous cacherai pas une certaine inquiétude de ma part quand m'a été confiée la mission de remercier devant un auditoire aussi large, les dames japonaises, organisatrices du Congrès. Mais grâce à leur initiative, chaque jour a été rempli de si passionnantes découvertes que c'est un réel plaisir de leur exprimer ici toute ma gratitude au nom de notre groupe féminin.

Sous des directives expertes, celles de Mrs. ADACHI entre autres, nous avons appris à composer des bouquets de façon plus artistique et plus originale.

Au village de Bonsai, beaucoup de découvertes non moins attachantes nous attendaient: les poupées japonaises aux somptueux costumes, puis les différentes phases de leur confection auxquelles l'artisan nous proposait de nous essayer. Après avoir admiré ces merveilles de l'artisanat local, le groupe a retrouvé la splendeur des jardins japonais qui dans leur immensité contrastent avec ces arbres, ces plantes miniaturisées dont les Japonais ont le secret.

Dimanche, le Mont Fuji que chacun souhaite

voir au moins une fois au cours de son existence, nous offrit un magnifique spectacle. Contraste frappant entre le calme majestueux de ce site, de son lac aux eaux tranquilles, et l'intense activité de l'immense cité qu'est TOKYO. De retour dans cette ruche bourdonnante, tout un panorama sur la cité s'impose du haut de la tour de TOKYO.

Nous n'oublierons pas non plus nos visites aux temples Shintoiste et Bouddhiste leur mystère, leur caractère de sérénité dans la beauté de leur cadre de verdure, le tout si bien commenté par nos guides: chaque jour se renouvelait un accueil d'une courtoisie raffinée pendant un repas suivant le rite japonais.

Comment enfin, à la cérémonie des kimonos, trouver les mots pour exprimer la poésie et le charme de cette présentation.

Coloris, dessins et broderies y étaient en parfaite harmonie avec le rythme des saisons et avec la grâce de celles qui les portaient.

En terminant, permettez-moi de vous rappeler un souvenir personnel qui m'est revenu à l'esprit au cours du voyage.

J'habitais dans une villa française au bord de la Loire, un pavillon au milieu d'un jardin. Rocailles, plantes, arbres et fleurs miniaturisés s'y côtoyaient, donnant au printemps un spectacle féérique. L'architecte paysagiste de talent qui l'avait créé était passionnément épris de l'harmonie des parcs de son pays. Je souhaitais alors, sans oser y croire, connaître un jour la source de son inspiration: le Japon. Permettez-moi donc, au nom de l'ensemble de notre groupe de dames et en mon nom personnel, de remercier à nouveau très chaleureusement les organisatrices japonaises du Comité d'Organisation.

En m'excusant de ne pas pouvoir les citer toutes, je voudrais adresser un merci tout spécial à Mrs. KANO HOSHINO et à Mrs. MASAMI FUKUOKA et à toutes celles qui ont pris la peine de nous expliquer la civilisation et les coutumes de leur pays. Qu'elles soient assurées que grâce à leur initiative, à l'exquise courtoisie de leur accueil, nous quitterons le Japon avec un grand regret, mais en emportant cette vision des choses qui fait que, comme le disent nos amis anglais:

"Beauty is a joy for ever".
Merci.

Professor S. Hansbo

Ladies and Gentlemen, From our distinguished president we all know by now that Sweden will be hosting the next international conference in 1981. Our former and our new presidents have been kind enough to say some appreciating words about Sweden and Swedish soil mechanics history and I hope that what they said will encourage most of you who are here to start saving money for a long but, I hope, rewarding journey to Stockholm 4 years from now. One might wonder how a small society, like the Swedish one, dares to offer itself to act as host for an International Conference like this with an ever increasing number of participants and with ever increasing financial engagement. Had we but known what we have now experienced about the tremendous input of work and money required for this conference I believe that the butterflies in our stomachs would have started their contained flights far earlier than they actually did.

But there is one consolation. Our Nordic sister societies have promised to do their best - not to say utmost - to help in organizing, not only post conference tours but also the conference itself. It is my sincere hope that they will also be able to contribute financially. It is also a consolation that the new president knows Swedish. In my opinion, and, as we just heard from Mme Kérisel, in the opinion of all the participants, including accompanying persons, this conference has been a great success. We have enjoyed a remarkable hospitality and politeness from our Japanese hosts and from the Japanese people in general.

The conference has been extremely well organized, the Proceedings in excellent print and binding and, according to what I have heard from those who have had spare time to be outside this hotel, the weather much better than expected - in all: we have experienced a most pleasant, human and scientifically enriching week. I can only promise that we in the organizing committee of the next conference shall do our best to satisfy the high expectations and to fulfill the requirements placed upon us after this successful conference. The Japanese Society has set an example to be followed.

On behalf of the Swedish Geotechnical Society I wish you all heartly welcome to the 10th International Conference in early June 1981. Bring as many accompanying persons and as much money as possible.

Välkomna! Domo arigato!

Mr. G. Togashi

Ladies and Gentlemen, on behalf of the Organizing Committee, I should like to say a few words upon closing the Ninth International Conference on Soil Mechanics and Foundation Engineering.

Although the Organizing Committee did their best, this is the very first time for us to hold an international conference of this scale, and there might have been, I am afraid, some points that you are not satisfied with. I sincerely hope that they are not serious enough to spoil the purpose of the Conference. I trust that all of the participants have found this Tokyo Conference sufficiently significant and attained their objectives.

Professor and Mrs. Kerisel have just given us

warm-hearted words, and if the Tokyo Conference has been as worthwhile as their kind remarks suggest, then we owe this to all the key-role members of the Main and Specialty Sessions who must have spent tremendous amount of time and done their best. On behalf of the Organizing Committee, I should like to express my profound appreciation for the efforts of these members, especially those of the General Reporters and of the Organizers.

I sincerely hope that the accomplishments of the Tokyo Conference will contribute to the further development of soil mechanics and foundation engineering and to the better understanding among us, scientists and engineers.

I hope to have an opportunity to have a word with each one of you later on in person, but I should like again to express our appreciation on behalf of the Organizing Committee, for the cooperation of the participants who have come from all over the world.

With the friendship that we have cultivated internationally, and with the sorrow of parting, I declare the Ninth International Conference on Soil Mechanics and Foundation Engineering closed.

Professor T. Akagi

Ladies and gentlemen, the moment has almost arrived to close the Ninth International Conference on SMFE in Tokyo. In the remaining precious short time, we wish to give you a brief moment of reflection. In order that these last moments may leave a pleasant memory of the Tokyo Conference, they will be devoted to the presentation of six old Japanese songs.

Ladies and gentlemen, here is the Nikikai Chorus Group.

Professor T. Akagi

Although we now close the Tokyo Conference, we would like to present a brief film show tc the participants of the IX ICSMFE, particular ly to those who will unfortunately have to leave this country without having an opportunity to appreciate and enjoy the beauty of Japan. This film entitled "Four Seasons of Japan" will last about half an hour, and we hope you will enjoy it. Those who have to leave us here now, we hope to see at the Farewell Banquet this evening.

Banquet

Rose Room, Tokyo Kaikan, July/Juillet 15, 1977

Mr. G. Togashi

Good evening, Ladies and Gentlemen, I believe all of you here today, having been in Japan at least for a week, have become fairly well acquainted with the Japanese language through various exotic experiences. I do not think it is necessary for me to tell you what "Sayonara" means.

The word "Sayonara" always reminds me of the essay called "North to the Orient" by Anne Lindberg. In this essay she compares expressions of good-byes in several languages and explains "Sayonara" as follows:

> "Sayonara" says neither too much nor too little. It is a simple acceptance of fact. All understanding of life lies in its limits. All emotion, smoldering, banked up behind it. But it says nothing. It is really the unspoken good-bye, the pressure of a hand, "Sayonara".

I should like to point out that the subtle feeling found behind the everyday words like "Sayonara" is the foundation of the Japanese culture, tradition, and art that you have seen or will be seeing during your stay.

Well, the feeling I have toward all of you this evening is that I can find no other expression but to say to all of you "Sayonara". And here again I thank all of you for your kind cooperation for the success of the Tokyo Conference. Sayonara.

Professor J. Kerisel

Monsieur le Président, Mesdames et Messieurs, J'ai déjà exprimé au Comité d'Organisation ma profonde gratitude pour les longues heures d'efforts intensifs passées par ses membres dans la préparation de ce congrès.

Je limiterai donc mes commentaires sur ce point à la fin de ce banquet bien que de tels remerciements soient encore insuffisants, mais je voudrais être l'interprète de tous les maris qui ont eu la joie de venir ici, accompagnés de leurs épouses. Ils sont les plus heureux des hommes parce que quand ils reviendront chez eux, leur vie de ménage sera véritablement un paradis.

Lorsqu'ils s'éveilleront le matin, leurs femmes viendront leur souhaiter une bonne journée avec en mains un bouquet de fleurs, savamment assemblées dans la plus pure tradition japonaise et le soir quand ils reviendront épuisés après une journée de travail intensif, ils trouveront une poupée habilement conçue par leurs épouses en pensant à eux.

Elles seront d'une courtoisie et d'une prévenance parfaite et unis dans leur bonheur, leurs maris fonderont le club des ingénieurs des sols qui ont eu le privilège de venir au Japon. Chaque fois qu'ils se réuniront, ils égréneront les souvenirs de ce mémorable voyage et lèveront leurs verres à la santé de leurs distingués amis japonais.

Alors, Monsieur le Président, transmis par l'éther à travers les océans et les kilomètres qui nous séparent, vous entendez un vibrant "CAMPAI".

Professor J.K.T.L. Nash

Mr. President, Mr. Togashi, Ladies and Gentlemen; I have been privileged to work in a University for more than 30 years and now the children of my early students are starting to come back to me as students themselves. It is a mark of approval. And the fathers sometimes say (in front of their sons) "I can well recall many things you told me" - here I swell with pride thinking perhaps about secondary consolidation or dilating sands. Alas no! The things that a student recalls (and here we have only to think back to our own student days) are quite different. I am praised for words which (unknown to me) helped him chose his wife or to emigrate to Africa!

And so with Conferences. At the Rotterdam Conference I recall the street cars going over a wide open plain which contained no buildings - turning through 90° down an imaginary street and turning yet again. It was wonderful that the dark days had passed and that we were meeting in friendship.

Thirteen years later many will recall the Paris Conference and the boat-trip on the Seine. It was so crowded that Laurits

Bjerrum and I on the upper deck were unable to reach the food below and we got only a small bottle of champagne which was passed along to us.

Or at Mexico City on that fantastic night of rain for the final banquet to which Ralph Peck has already referred. Laurits had written in his speech that the ISSMFE was growing so fast that the host country never knew how many would turn up to the next session - but when that happened at the banquet itself decency compelled him to cut that bit out of the speech!

One of my memories of the Moscow conference was of Dr. D'Appolonia elated with enthusiasm for the Conference - only to be downcast a few minutes later on receiving the information that his wife and family were in Kiev and their luggage was in Leningrad when they were all supposed to be in Moscow.

Now, like the memories of my old students, I believe these past "failures" or errors add greatly to our affection for a conference. Perhaps they are all part of a sophisticated plot by the host country to create this warmth. We love the French the more on account of that boat trip and the Mexicans for their banquet.

Tonight (who knows) the Japanese may well have planned a simulated earthquake to spill our coffee into our laps and this will go down in the annals of the Society!

During these last four years I have tremendously enjoyed getting to know Masami Fukuoka, Akio Nakase, Toshinobu Akagi, Kenji Ishihara and many others besides. This friendship is a fundamental tenet of our Society and when we say "International" we mean among all Nations.

At Mexico in 1969 twelve people were honoured who had attended all seven Conferences since the first in Harvard in 1936. At Moscow there were two Gregory Tschebotarioff and Christian Veder - and tonight there is but one, Dr. Christian Veder. (Could he rise and exhibit himself?) We are proud of his resiliance and we judge that he is good for another ten!

Our Society flourishes because we have an allegiance to it. Our President is taking decisions throughout the whole of his four years of office on your behalf and I want to testify to the way he does his work. This tradition was passed on from Terzaghi to Skempton to Casagrande to Bjerrum to Peck and although we are now very democratic and elect our Presidents I know that the same devotion exists in Kerisel and Fukuoka.

Our Secretariat has its office in London and Mrs. Webb is the hard working Secretary. Please visit us in London and you will be very welcome. Each week the work of the ISSMFE goes on. In two years we shall be meeting in our separate Regions - Asian, African, North and South American, Australasian and European - and two years after that we shall come together in Stockholm.

Those who have acted as hosts to the ISSMFE do a great service to us. We thank them all - most especially the Japanese at this moment. The best way we can say thank you to the Swedes and back up our Society is by turning up at Stockholm in 1981. To the Japanese I say thank you on behalf of all from abroad. We shall meet, I hope, in Sweden.

Professor S. Hansbo

Mr. President, Ladies and Gentlemen, I assure you that it is a far greater pleasure to take the stand after some encouraging cocktails or other drinks - after relaxing chatter with the guests who surround you or, as one might express it, who are sitting on your left and right hands - after having enjoyed the skill of the Japanese cuisine, than to take the stand for two minutes of meaningful discussion in Main Session No. 2. It is much easier now to say what you feel deep in your heart. However, my problem is that what I am now expressing had to be left with the Organizing Committee in written form this morning and mornings are not the best time for expressing your contained deep feelings.

We have experienced and enjoyed a conference of utmost importance for geotechnicians throughout the world. It has been extremely well organized - which we of course expected from our Japanese hosts - but it has also enriched us with new concepts of Japanese politeness and hospitality. I shall never forget my arrival in Tokyo, not announced in advance. The Secretary General of the Organising Committee, our new president Professor Fukuoka, was waiting in the arrival hall at the airport wishing me welcome and providing me with all assistance and help needed. This I would call hospitality in its true sense.

A second memory, unforgettable, was the number of Sakes I witnessed being consumed during the reception. I now know for sure that the Sakes are more dangerous than I first thought and that they are quite capable of getting us into a sort of floating-around condition where heavy tamping might follow or be required to speed up the dissipation of excess pore pressures, thereby putting us again in good shape and order. Otherwise one would have to say: Sayonara!

Next time we meet - I do hope all of us - will be in Stockholm in 1981, in early June when the whole of Scandinavia is in full blossom, when the nights are light and your body full of aching desires. Ships will take you over the waters of the Baltic Sea, over lakes and rivers; the midnight sun will throw its light upon you up in the North, fish is waiting for you to be caught and we, the hosts, to welcome you with open arms.

Thank you dear Japanese friends for everything you have done and be welcome all of you to

Stockholm.

On this grand occasion it is my pleasure to make an announcement to the delight of those who are monarchists and to the regret of those who are republicans or revolutionaries. Today a princess was born in Stockholm by the Queen of Sweden.

Once again, thank you for a most enjoyable evening.

Domo arigato! Sayonara.

Report from the Organizing Committee

Rapport du Comité d'Organisation

1. History and Organization of the Conference

The Executive Committee during its meeting at the time of the Moscow Conference voted for Japan as the site for the next International Conference. At the same time the Conference Advisory Committee for the Ninth Conference was appointed. The Conference Advisory Committee consisted of six members: President of the International Society (Professor J. Kerisel; Chairman), Vice-President for Asia (Dr. Z-C Moh), Secretary General of the Organizing Committee for the Moscow Conference (Dr. N.S. Chetyrkin), Secretary General of the International Society (Professor J.K.T.L. Nash) and two representatives from Japan.

The Japanese National Committee appointed the Preparatory Committee for the Ninth International Conference in August 1973, under the chairmanship of Professor M. Fukuoka. This Committee worked out an outline of the Conference and chose Tokyo as the location of the Conference. Results of this Committee's work were explained at the first meeting of the Conference Advisory Committee in Stockholm in June 1974. At this meeting, themes of the Main and Specialty Sessions and also names of key role persons such as General Reporters and Chairmen were almost decided.

The Organizing Committee for the Tokyo Conference was appointed by the Japanese National Committee in November 1974, under the chairmanship of Mr. G. Togashi and Professor M. Fukuoka as the Secretary General. The Organizing Committee set up the Task Committee for detailed planning for the Conference with Professor M. Fukuoka as the Chairman. The Task Committee carried out variety of works with a number of sub-committees under the guidance of the "Report of Conference Procedures Committee", which was published in February 1971 by the Conference Procedures Committee of the International Society.

The second meeting of the Conference Advisory Committee was held in Istanbul in April 1975. At this meeting detailed programs of the Conference were discussed based on the draft of Bulletin No. 1. The Executive Committee of the International Society also met in Istanbul at the same time. At this meeting, a motion which might cancel the Tokyo Conference was adopted. This was due to the fact that the

1. Historique et Organisation du Congrès

Le Comité Exécutif au cours de sa réunion lors du Congrès de Moscou a décidé par un vote de choisir le Japon comme lieu du prochain Congrès International. En même temps, le Comité Consultatif pour le neuvième Congrès était nommé. Le Comité Consultatif du Congrès comporte six personnes: le Président de la Société Internationale (Professeur J. Kérisel, Président), le Vice-Président pour l'Asie (Dr. Z-C Moh), le Secrétaire Général du Comité d'Organisation du Congrès de Moscou (Dr. N.S. Chetyrkin), le Secrétaire Général de la Société Internationale (Professeur J.K. T.L. Nash) et deux représentants du Japon.

Le Comité National Japonais a nommé le Comité Préparatoire pour le neuvième Congrès International, en août 1973, sous la présidence du Professeur M. Fukuoka. Ce comité a préparé une ébauche du Congrès et choisi Tokyo comme lieu du Congrès. Les résultats du travail de ce comité ont été présentés à la première réunion du Comité Consultatif du Congrès à Stockholm en juin 1974. A cette réunion les thèmes des Sessions Principales et des Sessions Spéciales ainsi que les noms des personnes ayant un rôle essentiel comme les Rapporteurs Généraux et les Présidents ont été presque tous décidés.

Le Comité d'Organisation du Congrès de Tokyo a été nommé par le Comité National Japonais en novembre 1974, avec comme Président M. G. Togashi et comme Secrétaire Général, le Professeur M. Fukuoka. Le Comité d'Organisation a mis en place un Comité des Tâches, présidé par le Professeur Fukuoka, pour l'organisation détaillée du Congrès.

Ce comité a mené à bien ses différentes tâches avec l'aide de nombreux sous-comités et en suivant les instructions du "Rapport du Comité des Procédures du Congrès", publié en février 1971 par le Comité des Procédures du Congrès de la Société Internationale.

La seconde réunion du Comité Consultatif du Congrès s'est tenue à Istambul en avril 1975. A cette réunion les programmes détaillés du Congrès ont été discutés sur la base du projet du bulletin n° 1. Le Comité Exécutif de la Société Internationale se tenait également à Istambul à la même date. A cette réunion,

Japanese Government had employed a policy of partially restricting the entry of the South African national. This policy had been adopted after the time of the Moscow Conference, in accordance with the recommendation of the United Nations.
Decision of holding the International Conference in Japan was then left to the hand of the President of the International Society, with consideration of an improvement of attitude of the Japanese Government. Effort made by the Japanese members, in particular by Professor M. Fukuoka, and also by officers of the International Society, however, proved ineffective in trying to alter the policy of the Japanese Government. Finally, in the middle of July 1975, the President made the decision to hold the Tokyo Conference, based on results of the vote by letters. This was a great relief to all of the members concerned. The Japanese Government has altered its policy in July 1976 and removed all restrictions for the South Africans' entry into Japan.

Problem of how to raise necessary funds for the Conference has been one of the major points of discussion since the time of the Preparatory Committee. The world wide 'oil crisis' put an additional burden on the financing business. Through a series of consultation with influential persons of both government and industries, the Japanese National Committee appointed the Fund Raising Committee in June 1976 with the chairmanship of Mr. M. Maeda. The chairmanship of this committee was later succeeded by Mr. T. Atsumi.

In August 1976, the Japanese Government decided, at the request of the Japanese National Committee, that the Tokyo Conference be sponsored by the Science Council of Japan and the Japanese Society of Soil Mechanics and Foundation Engineering. Accordingly, the Organizing Committee for the Tokyo Conference was slightly altered in September 1976.

Through the course of preparational works for the Conference, members of the Conference Advisory Committee had continued to maintain its correspondences. In particular, the Secretary General of the International Society Professor J.K.T.L. Nash, visited Tokyo several times for close discussions with the Japanese members in January of 1974, June of 1975, July of 1976 and April of 1977.

2. Bulletins

Bulletin No. 1 containing the preliminary information for the Conference was published in May 1975. 10,000 copies were printed and despatched to the National Committees with the request that they be distributed to their members. A preliminary application form was attached to each copy of Bulletin No. 1.

Special Bulletin No. 1 was issued in September 1975, giving specific instructions regarding the submission of papers. Special Bulletin No. 2 was issued in February 1976 and gave the details of the twelve Specialty Sessions. 5,500 copies each of these Special Bulletins

une motion qui risquait d'annuler le Congrès de Tokyo fut adoptée. Cette motion était due au fait que le Gouvernement Japonais appliquait une politique restreignant l'entrée des ressortissants Sud-Africains. Cette politique avait été adoptée après le Congrès de Moscou, suivant les recommandations des Nations Unies.

La décision de tenir le Congrès International au Japon était alors laissée à l'initiative du Président de la Société Internationale en fonction de l'amélioration de l'attitude du Gouvernement Japonais. De grands efforts de membres Japonais, en particulier du Professeur M. Fukuoka, ainsi que des officiels de la Société Internationale n'ont cependant pas eu pour effet de modifier la politique du Gouvernement Japonais. Finalement, à la mi-juillet 1975, le Président, en fonction des résultats d'un vote par correspondance, prenait la décision de tenir le Congrès de Tokyo. Ce fut un grand soulagement pour tous les membres concernés. Le Gouvernement Japonais modifia sa politique en juillet 1976 et supprima toute restriction à l'entrée au Japon des ressortissants Sud-Africains.

Le moyen de rassembler les fonds nécessaires pour le Congrès a été l'un des points majeurs de la discussion dès les réunions du Comité Préparatoire. La crise mondiale du pétrole a ajouté un fardeau supplémentaire au problème du financement. A la suite d'une série de consultations avec les personnes influentes du gouvernement et de l'industrie, le Comité National Japonais a nommé en juin 1976 un Comité chargé du rassemblement des fonds sous la présidence de M. M. Maeda. La présidence de ce comité a été plus tard reprise par M. T. Atsumi.

En août 1976, le Gouvernement Japonais décida, à la demande du Comité National Japonais, que le Congrès de Tokyo serait parrainé par le Conseil Scientifique du Japon et par la Société Japonaise de Mécanique des Sols et des Travaux de Fondations. En conséquence, le Comité d'Organisation du Congrès de Tokyo fut légèrement modifié en septembre 1976.

Pendant tous les travaux préparatoires du Congrès, les membres du Comité Consultatif du Congrès ont échangé des correspondances. En particulier, le Secrétaire Général de la Société Internationale, le Professeur J.K.T.L. Nash, s'est rendu à Tokyo à plusieurs reprises, en janvier 1974, en juin 1975, en juillet 1976 et en avril 1977, pour des discussions approfondies avec des membres Japonais.

2. Bulletins

Le bulletin n° 1 contenant les renseignements préliminaires sur le Congrès a été publié en mai 1975. Dix mille exemplaires ont été imprimés et expédiés aux Comités Nationaux, à charge pour eux de les distribuer à leurs membres. Un formulaire d'inscription préliminaire était joint à chaque exemplaire du bulletin n° 1.

Le bulletin spécial n° 1 a été publié en sep-

were printed.

Bulletin No. 2 was published in November 1976. 7,000 copies were printed and despatched to the National Committees. This bulletin contained the detailed programs of the Conference, application forms for registration, accommodation and post-conference tours, and also a pre-registration form for technical visits.

To facilitate the final planning of the proposed tours, a separate detailed tour bulletin, "Bulletin for Post Conference Tours", was issued in January 1977 (5,500 copies printed) and airmailed to each pre-registered member of the Conference with additional copies to each National Committee.

There was also a brochure for Technical Exhibits, "Bulletin for Exhibition", published in May 1976 (100 copies printed), describing the necessary information and instruction for the participation in this program.

At the time of the registration in Tokyo, each registrant was provided with a Guide Book containing the general information and the detailed programs of the Conference together with maps of the Conference Hall and its vicinity (2,500 copies printed). Also, "Program for Ladies" (600 copies printed) and "A Guide to Exhibition" (5,000 copies printed) were prepared and distributed during the Conference.

3. Proceedings

The Proceedings of the Tokyo Conference was prepared by a direct photo-off-set reproduction of the manuscripts as sent by the National Committees. Some of authors of the papers, however, were asked to improve their manuscripts because they had not been prepared in strict accordance with instructions in Special Bulletin No. 1.

Table 1 shows the numbers of papers and their total pages submitted by each National Committee and the number of discussions submitted and accepted. Vols. I and II of the Proceedings contained 239 papers and 4 State-of-the-Art Reports.

It was announced in Bulletin No. 1 and Special Bulletin No. 1 that the papers should be submitted to the Organizing Committee by the end of September 1976. It was, however, only at the end of November when all of 239 papers had arrived at the Organizing Committee.

Manuscripts of these 239 papers were brought to the printer at the end of December 1976, and the four State-of-the-Art Reports in the beginning of February 1977. Vols. I and II were ready for shipment in the middle of April 1977, which was about two weeks behind schedule. 3,100 sets were printed. In some cases, foreign exchange transaction delayed prompt deliveries of the Proceedings before the Conference to some of the registrants.

tembre 1975 et donnait des instructions spécifiques pour la soumission des communications. Le bulletin spécial n° 2 a été publié en février 1976 et donnait des détails sur les 12 Sessions Spéciales. Cinq mille cinq cent exemplaires de chacun de ces bulletins spéciaux ont été imprimés.

Le bulletin n° 2 a été publié en novembre 1976. Sept mille exemplaires ont été imprimés et expédiés aux Comités Nationaux. Ce bulletin contenait les programmes détaillés du Congrès et les formulaires pour l'inscription, l'hébergement et les voyages post-congrès, ainsi qu'un formulaire de pré-inscription pour les visites techniques. Pour faciliter l'organisation finale des voyages proposés, un bulletin détaillé séparé, pour les voyages post-congrès, a été publié en janvier 1977 (5 500 exemplaires imprimés) et expédié par avion à tous les membres pré-inscrits au Congrès, des exemplaires supplémentaires étant adressés à chaque Comité National.

Il y eut également une brochure pour les expositions techniques "Bulletin concernant les expositions" publiée en mai 1976 (100 exemplaires imprimés) décrivant les renseignements nécessaires et les instructions pour la participation à ce programme.

Au moment de l'inscription à Tokyo, chaque participant a reçu un livret guide contenant les renseignements généraux et les programmes détaillés du Congrès, ainsi que des plans du Palais des Congrès et de ses environs (2 500 exemplaires imprimés). Un "Programme pour les personnes accompagnantes" (600 exemplaires) et un "Guide pour l'exposition" (5 000 exemplaires) ont été préparés et distribués durant le Congrès.

3. Compte-Rendus

Les compte-rendus du Congrès de Tokyo ont été préparés par reproduction directe en photo-offset des manuscrits, envoyés par les Comités Nationaux. Les auteurs de certaines communications ont cependant été priés d'améliorer leur manuscrit qui n'avait pas été préparé dans le strict respect des instructions du bulletin spécial n° 1.

Le tableau 1 indique le nombre de communications, avec leur nombre total de pages, soumises par chaque Comité National et le nombre de discussions soumises et acceptées. Les volumes I et II des compte-rendus contiennent 239 communications et 4 rapports sur l'Etat des Connaissances.

Il fut annoncé dans le bulletin n° 1 et dans le bulletin spécial n° 1 que les communications devaient être soumises au Comité d'Organisation avant la fin septembre 1976. Ce n'est cependant que vers la fin novembre que le Comité d'Organisation fut en possession de l'ensemble de 239 communications.

Les manuscrits de ces 239 communications furent portés à l'imprimeur fin décembre 1976 et les 4 rapports sur l'Etat des Connaissances

Table 1 / Tableau 1

National Society/ Société nationale	Original allocation(pages)/ Allocation originale(pages)	Number of papers arrived/ Nombre des documents venus	Total number of pages/ Total nombre des pages	Number of discussions/ Nombre des discussions
Argentina/Argentine	18	-	-	-
Australia/Australie	50	7	42	2
Austria/Autriche	14	1	8	1
Belgium/Belgique	20	3	24	-
Brazil/Brésil	28	8	28	1
Bulgaria/Bulgarie	14	3	14	1
Canada/Canada	60	10	64	2
Chile/Chili	6	-	-	1
China/Chine	18	-	-	-
Colombia/Colombie	6	-	-	-
Czechoslovakia/Tchécoslovaquie	14	4	18	-
Denmark/Danemark	16	4	16	-
Ecuador/Équateur	6	-	-	-
Ethiopia/Ethiopie	-	-	-	-
Federal Republic of Germany/République Fédérale d'Allemagne	72	14	80	4
Finland/Finlande	18	3	16	-
France/France	68	18	72	-
German Democratic Republic/République Démocratique Allemande	12	3	12	-
Ghana/Ghana	8	-	-	-
Greece/Grece	12	3	12	-
Hungary/Hongrie	10	1	4	-
India/Inde	36	9	36	-
Indonesia/Indonésie	-	-	-	-
Iran/Iran	8	-	-	-
Iraq/Irak	-	-	-	-
Ireland/Irelande	6	1	6	-
Israel/Israël	16	3	14	-
Italy/Italie	50	5	44	1
Japan/Japon	56	24	96	4
Mexico/Mexique	28	6	32	-
Morocco/Maroc	12	-	-	-
Netherlands/Pays-Bas	24	6	24	2
New Zealand/Nouvelle Zélande	24	2	16	-
Nigeria/Nigéria	6	-	-	-
Norway/Norvège	26	3	22	-
Pakistan/Pakistan	8	1	8	-
Peru/Perou	8	3	8	-
Poland/Poland	28	7	30	-
Portugal/Portugal	18	3	18	-
Republic of South Africa/République Sud-Africaine	30	5	30	-
Rhodesia/Rhodésie	18	-	-	-
Romania/Roumanie	12	3	12	1
Southeast Asia/Asie du Sud-Est	24	5	24	2
Spain/Espagne	28	6	34	-
Sweden/Suède	34	6	38	-
Switzerland/Suisse	24	1	8	-
Syria/Syrie	6	-	-	-
Tunisia/Tunisie	6	-	-	-
Turkey/Turquie	12	3	12	-
United Kingdom/Royaume-Uni	84	16	90	1
United States of America/États-Unis d'Amérique	108	18	116	3
Union of Soviet Socialist Republic/Union des Républiques Socialistes Soviétiques	58	17	58	-
Venezuela/Vénézuela	18	1	10	-
Yugoslavia/Yougoslavie	20	3	12	-
	1306	239	1208	26

Table 2 / Tableau 2

National Society/ Société nationale	Attending/ Participant	Accompanying Person/ Personne acompagnante	Total/ Total
Argentina/Argentine	2	2	4
Australia/Australie	15	4	19
Austria/Autriche	13	2	15
Belgium/Belgique	6	4	10
Brazil/Brésil	29	15	44
Bulgaria/Bulgarie	2	-	2
Canada/Canada	21	12	33
Chile/Chili	3	1	4
China/Chine	-	-	-
Colombia/Colombie	3	2	5
Czechoslovakia/Tchécoslovaquie	1	-	1
Denmark/Danemark	9	3	12
Ecuador/Équateur	4	2	6
Ethiopia/Ethiopie*	1	-	1
Federal Republic of Germany/République Fédérale d'Allemagne	44	24	68
Finland/Finlande	3	1	4
France/France	50	19	69
German Democratic Republic/République Démocratique Allemande	2	-	2
Ghana/Ghana	-	-	-
Greece/Grece	-	-	-
Hungary/Hongrie	4	-	4
India/Inde	5	-	5
Indonesia/Indonésie	23	8	31
Iran/Iran	2	-	2
Iraq/Irak*	6	-	6
Ireland/Irelande	-	-	-
Israel/Israël	9	5	14
Italy/Italie	32	18	50
Japan/Japon	874	71	945
Mexico/Mexique	24	27	51
Morocco/Maroc	2	-	2
Netherlands/Pays-Bas	22	7	29
New Zealand/Nouvelle Zélande	3	-	3
Nigeria/Nigéria	6	1	7
Norway/Norvège	21	14	35
Pakistan/Pakistan	-	-	-
Peru/Perou	4	-	4
Poland/Poland	6	-	6
Portugal/Portugal	5	1	6
Republic of South Africa/République Sud-Africaine	8	2	10
Rhodesia/Rhodésie	-	-	-
Romania/Roumanie	2	1	3
Southeast Asia/Asie du Sud-Est	61	8	69
Spain/Espagne	19	13	32
Sweden/Suède	23	9	32
Switzerland/Suisse	5	2	7
Syria/Syrie	3	2	5
Tunisia/Tunisie	-	-	-
Turkey/Turquie	5	-	5
United Kingdom/Royaume-Uni	57	13	70
United States of America/États-Unis d'Amérique	112	65	177
Union of Soviet Socialist Republic/Union des Républiques Socialistes Soviétiques	28	-	28
Venezuela/Vénézuela	25	5	30
Yugoslavia/Yougoslavie	38	2	40
*Non-member / Non-membre	1642	365	2007

4. Conference Participants

Table 2 gives the detailed distribution of participants in the Conference.

5. Languages and Interpretation

The official languages of the Conference were English and French, according to the Statute of the International Society. During the Conference and in correspondence with Japanese-speaking members, however, the Japanese language was also used as the language of the host country.

Bulletins Nos. 1 and 2 as well as Special Bulletins Nos. 1 and 2 were prepared in English and French, while Bulletins for Post Conference Tours and Exhibition, and Programs for Ladies were prepared only in English. The Guide Book distributed during registration in Tokyo was prepared in English, French and Japanese.

The Organizing Committee provided simultaneous interpretation among the three languages for all the speeches, lectures and discussions during the Main Sessions, the Specialty Sessions, the Special Lectures and the Opening and Closing Sessions.

Simultaneous interpreters were engaged; ten from Lateiner International, New Jersey, U.S.A. for the English/French interpretation and nine from Simul International, Tokyo, Japan for the English/Japanese interpretation. The Organizing Committee provided the latter group with some advance training in soil mechanics and foundation engineering terminology through several briefing sessions.

6. Executive Committee

The Executive Committee of the International Society met on the 8th and 9th of July 1977 in the "Sakura Room" of the Imperial Hotel, under the chairmanship of the President Professor J. Kerisel. Each National Committee was represented by one voting delegate and another non-voting delegate. The list of the delegates and the minutes of the meeting will be found in this volume on pages 71 to 203. Simultaneous interpretation and secretarial services were provided by the Organizing Committee. On the 10th of July, a sightseeing tour by bus was provided for the delegates who had attended the Executive Committee meeting and their wives. The draft of the minutes of the meeting was distributed to the delegates on the following day, and the final version, in English and French, was ready before the end of the Conference.

7. Main Sessions

The framework of the Main Sessions was discussed at the time of first meeting of the Conference Advisory Committee in Stockholm in June 1974. It was agreed then that for the Main Sessions there would be General Reporters

au début de février 1977. Les volumes I et II furent prêts pour l'expédition à la mi-avril 1977, soit environ 2 semaines avant la date prévue. Un retard dû au change des monnaies étrangères a cependant empêché certains participants de recevoir leurs compte-rendus avant le Congrès. Trois mille cent exemplaires des volumes I et II ont été imprimés.

4. Participants au Congrès

Le tableau 2 donne la répartition détaillée des participants au Congrès.

5. Langues et Traduction

Conformément aux statuts de la Société Internationale, les langues officielles du Congrès sont l'Anglais et le Français. Cependant, durant le Congrès, et dans la correspondance avec les membres parlant Japonais, la langue du pays hôte a également été utilisée.

Les bulletins n° 1 et 2, ainsi que les bulletins spéciaux n° 1 et 2 ont été préparés en Anglais et en Français, alors que les bulletins pour les voyages post-congrès, les expositions et le programme pour les personnes accompagnantes ont été préparés en Anglais seulement. Le guide distribué lors de l'inscription à Tokyo a été préparé en Anglais, Français et Japonais.

Le Comité d'Organisation a assuré la traduction simultanée dans ces trois langues de tous les discours, conférences et discussions au cours des Sessions Principales, des Sessions Spéciales, des Conférences Spéciales et des Séances d'Ouverture et de Clôture.

Des interprètes simultanés ont été engagés: 10 de Lateiner International, New Jersey, Etats-Unis pour la traduction Anglais/Français, et 9 de Simul International, Tokyo, Japon pour la traduction Anglais/Japonais. Le Comité d'Organisation avait fourni par avance à ces interprètes, à l'occasion de plusieurs séances de travail, la terminologie dans le domaine de la Mécanique des Sols et des Travaux de Fondations.

6. Comité Exécutif

Le Comité Exécutif de Société Internationale s'est tenu les 8 et 9 juillet 1977, dans la salle "Sakura" de l'hôtel Impérial, sous la présidence du Professeur J. Kérisel. Chaque Comité National était représenté par un membre votant et un autre membre non-votant. La liste des membres et les minutes de la réunion se trouvent dans ce volume, pages 71 à 203. La traduction simultanée et les services de secrétariat ont été fournis par le Comité d'Organisation. Le 10 juillet, une visite touristique en car a été offerte aux délégués qui avaient assisté à la réunion du Comité Exécutif. Le projet, en Anglais, des minutes de la réunion fut distribué aux délégués le jour suivant et la version finale en Anglais et en Français fut prête avant la fin du Con-

to review the papers submitted to the Conference. With assistance of three Co-Reporters from different parts of the world, the General Reporters endeavour to produce a State-of-the-Art Report on the general theme of the Session. In addition, it was agreed at the first meeting that a Chairman would preside at the Session. Based on the paper submitted, the General Reporter would select three Penelists to open the discussions.

Names of the key role persons were also suggested at the Stockholm meeting of the Conference Advisory Committee, and the Organizing Committee was authorized to approach the key role persons. In July 1974 letters of inquiries were sent out to the Chairmen, General Reporters and Co-Reporters as to whether they were prepared to accept the suggested assignments. In the letter of December 1974, the Organizing Committee proposed tentative guidelines concerning the work sharing plan which the General Reporters might observe with the Co-Reporters in preparing the State-of-the-Art Report.

Names of the Panelists were suggested at the time of the second meeting of the Conference Advisory Committee in Istanbul in April 1975. Final appointment of the Panelists was made after confirming that they would be attending the Conference. Because of this, some of Panelists were nominated only few weeks before the Conference.

In the letter of December 1975, the Organizing Committee suggested a tentative plan for the conduct of the Main Sessions with particular emphasis on the respective role of the Chairman, General Reporter, Co-Reporter and Panelists. A novel feature of the suggested plan was the role of the Chairman in conducting floor discussions. In response to the criticism voiced after the 7th International Conference in Mexico, the Conference Procedures Committee was set up to evaluate the 7th Conference and make proposals for the guidelines for the 8th Conference. According to the Committee's report, it was becoming increasingly obvious that the size of the audience now attending main sessions was too large to permit real audience participation. In view of this, it was suggested that the Chairman be authorized to nominate suitable discussers during floor discussion based on the written discussions submitted to him until the intermission just before the floor discussion time.

There were a good deal of correspondence between the key role persons and the Organizing Committee prior to the Conference to make necessary arrangements for the publication of the State-of-the-Art Report and also for the conduct of the Main Sessions. The Chairman, General Reporter, Co-Reporter and Panelists of each Main Session met in the preceding day to lay out the necessary final details.

There were four Main Sessions. One session took place each day from Tuesday to Friday.

grès.

7. Sessions Principales

Le cadre des Sessions Principales a été discuté lors de la première réunion du Comité Consultatif du Congrès à Stockholm en juin 1974. Il fut convenu pour les Sessions Principales de nommer des Rapporteurs Généraux qui passeraient en revue les communications soumises à l'occasion du Congrès. Avec l'aide de trois Co-Rapporteurs de différentes parties du monde, le Rapporteur Général s'efforcerait d'établir un rapport sur l'Etat des Connaissances sur le thème général de la Session. De plus, un Président de Session serait nommé. Sur la base des communications soumises, le Rapporteur Général choisirait trois membres du Panel pour ouvrir la discussion.

Les noms des personnes ayant un rôle essentiel ont été également proposés à la réunion de Stockholm du Comité Consultatif du Congrès, et le Comité d'Organisation fut autorisé à prendre les contacts nécessaires. En juillet 1974, des lettres furent envoyées aux Présidents, Rapporteurs Généraux, et Co-Rapporteurs, pour leur demander s'ils étaient prêts à accepter les fonctions proposées. Par lettre de décembre 1974, le Comité d'Organisation a proposé des recommandations, concernant le plan de répartition des tâches, que les Rapporteurs Généraux devraient observer avec les Co-Rapporteurs dans la préparation du rapport détaillée sur l'Etat des Connaissances.

Les noms des membres du Panel furent proposés lors de la seconde réunion du Comité Consultatif du Congrès à Istambul en avril 1975. Leur désignation finale a été faite après confirmation de leur participation au Congrès. De ce fait, certains membres du Panel ont été nommés ultérieurement, quelques semaines avant le Congrès.

Par lettre de décembre 1975, le Comité d'Organisation a proposé un plan pour la conduite des Sessions Principales avec une mention particulière sur les rôles respectifs du Président, du Rapporteur Général, des Co-Rapporteurs et des autres membres du Panel. Le point nouveau du plan proposé était le rôle du Président dans la conduite des discussions à partir de la salle. En réponse aux critiques faites après le 7ème Congrès International de Mexico, le Comité des Procédures du Congrès fut instauré pour faire le point du 7ème Congrès, et faire des recommandations pour le 8ème Congrès. Selon le rapport de ce Comité, il devenait de plus en plus évident que la taille de l'audience qui assiste aux Sessions Principales est trop grande pour permettre une réelle participation du public. En conséquence, il fut suggéré que le Président soit autorisé à nommer les orateurs appropriés pour participer à la discussion à partir de la salle, sur la base des discussions écrites, soumises au Président avant l'interruption de séance précédant la période des discussions.

Il y eut avant le Congrès une nombreuse cor-

All Main Sessions were held in the "Peacock Room" of the Imperial Hotel. Each Main Session was opened with a brief introduction from the Chairman at 10:30 a.m., followed by a 30-minute State-of-the-Art lecture by the General Reporter. The General Reporter introduced several points worthy of further discussions. Discussions at each session were started by each member on the panel consisting of the General Reporter, three to four Co-Reporters, and three to four Panelists. After a panel discussion of about 40-minute, the participants recessed for a 20-minute intermission. The general participants had been requested to submit written questions, if any, to the Chairman by the end of the panel discussion. The Chairman, assisted by the General Reporter, sorted out the written discussions during the intermission and chose five to seven questions from the floor. The Chairman opened the floor discussion with introduction of the pre-selected discussers. They presented their comments and discussions in 5 to 10 minutes each. After an approximately 40-minute floor discussion, closing remarks were presented by the Chairman. The Main Session lasted two and half hours and closed at 1:00 p.m. There were always more than 1,500 persons attending at these sessions.

8. Specialty Sessions

Themes and names of the Organizer and Co-Organizer of the Specialty Sessions were suggested at the first meeting of the Conference Advisory Committee in Stockholm in June 1974. After each key role person was approached by the Organizing Committee, they were authorized at the Executive Committee meeting held in Istanbul in Apri1 1975. The arrangements for the Specialty Sessions were left to the disposal of the Organizer of each session. The outlines of the program were set forth in time by the Organizer of each session early enough to be publisized through Special Bulletin No. 2, issued in February 1976.

Topics for discussions and the session procedure were published, together with request that papers be submitted to each session. At the same time, the Organizer's intention of whether or not a separate Proceedings would be published was announced. Out of twelve Specialty Sessions, seven Sessions indicated the plan for publishing separate Proceedings at their own expenses. By the time of the Conference, three Sessions had published their own Proceedings.

Twelve Specialty Sessions were held in the afternoons from Monday to Thursday, three sessions taking place each day simultaneously from 3:00 p.m. to 5:30 p.m. East Wing and West Wing of the "Peacock Room" and the "Fuji Room" were used for the Specialty Sessions. Each session was attended by approximately 300 to 800 persons. Although the Specialty Session was designed to provide informal atmosphere conducive to exchanging views and experiences among the participants of the Conference, the size of the audience appeared a little too large for achieving this purpose.

respondance entre les personnes ayant un rôle essentiel dans les Sessions et le Comité d'Organisation, afin de prendre les dispositions nécessaires pour la publication des rapports sur l'Etat des Connaissances, ainsi que pour la conduite des Sessions Principales. Le Président, le Rapporteur Général, les Co-Rapporteurs et les autres membres du Panel de chaque Session Principale se rencontrèrent la veille du jour de la session pour mettre au point les dernières dispositions.

Il y eut 4 Sessions Principales, une chaque jour, du mardi au vendredi. Toutes les Sessions Principales se sont tenues dans la salle "Peacock" de l'hôtel Impérial. Chacune des Sessions Principales fut ouverte par une brève introduction du Président, à 10h30, suivie d'une conférence de 30 mn sur l'Etat des Connaissances par le Rapporteur Général.

Le Rapporteur Général a présenté les différents points proposés pour une discussion ultérieure. A chacune des sessions, les discussions ont été ouvertes par l'intervention de chacun des membres du Panel, formé du Rapporteur Général de 3 à 4 Co-Rapporteurs et de 3 à 4 autres membres. Après environ 40 mn de discussion entre les membres du Panel, il y eut une interruption de séance d'une vingtaine de minutes. Les participants dans la salle furent priés de soumettre leurs questions écrites éventuelles au Président avant la fin de la période de discussion du Panel. Le Président, assisté du Rapporteur Général, tria les questions écrites au cours de l'interruption de séance et sélectionna environ 5 à 7 interventions de la salle. Le Président ouvrit cette période de discussion à partir de la salle en présentant les orateurs choisis, qui eurent de 5 à 10 mn pour leurs commentaires et leur discussion. Après environ 40 mn de discussion à partir de la salle, le Président fit quelques remarques de synthèse. Les Sessions Principales, d'une durée d'environ 2h30 se terminèrent vers 13 h. L'audience dépassa toujours 1500 personnes.

8. Sessions Spéciales

Les thèmes des Sessions Spéciales ainsi que les noms de l'Organisateur et du Co-Organisateur furent proposés lors de la première réunion du Comité Consultatif du Congrès à Stockholm en juin 1974. Après la prise des contacts nécessaires par le Comité d'Organisation, les Organisateurs ont été nommés lors de la réunion du Comité Exécutif tenue à Istambul en avril 1975. Les dispositions pour les Sessions Spéciales ont été laissées à l'initiative de l'Organisateur de chaque session. Les grandes lignes du programme ont été exposées assez tôt par l'Organisateur de chaque session pour être publiées dans le bulletin spécial n° 2 paru en février 1976.

Les sujets choisis pour la discussion et l'organisation de la session ont été publiés ainsi que le thème des communications à soumettre à chaque session. En même temps, l'Organisateur a fait savoir son intention de publier ou non des compte-rendus séparés. Des projets

9. Opening and Closing Sessions

The Opening Session took place on Monday, July 11, in the "Peacock Room" of the Imperial Hotel. The Session commensed with Koto (Japanese harp) music, and the Conference was declared open by Mr. G. Togashi, Chairman of the Organizing Committee. Professor Y. Ochi, Chairman of the Science Council of Japan, and Professor J. Kerisel, President of the International Society, welcomed all the participants to the Conference. Mr. S. Hasegawa, Minister of Construction, gave a congratulatory address, and was followed by an address from Mr. Y. Onouchi, Vice Chairman of the Organizing Committee.

The Honorary Membership of the Japanese Society of Soil Mechanics and Foundation Engineering was presented to five well-known personalities: Professor A.W. Skempton, Professor A. Casagrande, Dr. R.B. Peck, Professor J. Kerisel, and Professor J.K.T.L. Nash.

Unfortunately, Professor Casagrande was not able to be present at the Conference due to illness. Dr. Peck represented the recipients and gave an address in reply.

Finally, Professor M. Fukuoka, President of the Japanese Society, presented a one-hour lecture "State of Geotechnical Engineering in Japan", accompanied with many slides.

In the Closing Session on Friday, July 15, Professor J. Kerisel gave a presidential address, in which he expressed his thanks to the participants and also presented the new President of the International Society, Professor M. Fukuoka. Then three addresses were given by Professor M. Fukuoka as the new President, Mrs. J. Kerisel on behalf of ladies, and Professor S. Hansbo as the representative of the next host Society. The Conference was declared closed by Mr. G. Togashi. After the Closing Session, the participants were entertained by the Nikikai Chorus Group who presented a variety of Japanese traditional folk songs; the film "Four Seasons of Japan" was also presented.

A full record of the proceedings of the Opening and Closing Sessions will be found in this volume on pages 205 to 233.

10. Technical Films

During the Conference from Monday through Friday, 47 films were shown in the "Kotobuki Room" of the Imperial Hotel. These films were grouped into two themes, one for technical interest, and the other for general introduction of the host country. These films proved to be of much interests to the audiences.

11. Technical Visits

Thirteen different courses had been prepared for technical visits during the Conference. These courses included construction sites of geotechnical interest and geotechnical engi-

de publication séparée des compte-rendus, à leurs propres frais, furent indiqués pour 7 des 12 Sessions Spéciales. A la date du Congrès, les compte-rendus de 3 des Sessions avaient été publiés.

Douze Sessions Spéciales ont eu lieu les après-midi du lundi au jeudi, trois sessions se tenant chaque jour simultanément de 15 h à 17h30, dans les parties Est et Ouest de la salle "Peacock" et dans la salle "Fuji". Chaque session a été suivie par environ 300 à 800 personnes. Bien que les Sessions Spéciales aient été conçues pour offrir un climat informel permettant l'échange de vues et d'expérience entre les participants au Congrès, le nombre d'auditeurs a paru trop grand pour atteindre ce but.

9. Séances d'Ouverture et de Clôture

La Séance d'Ouverture a eu lieu le lundi 11 juillet, dans la salle "Peacock" de l'hôtel Impérial. La séance a commencé par un concert de Koto (harpe japonaise) puis le Congrès a été déclaré ouvert par M. G. Togashi, Président du Comité d'Organisation. Le Professeur Ochi, Président du Conseil Scientifique du Japon, et le Professeur J. Kérisel, Président de la Société Internationale, ont souhaité la bienvenue à tous les participants au Congrès. Ensuite, M. Hasegawa, Ministre de la Construction, a adressé un message de félicitation, auquel a succédé un discours de M. Y. Onouchi, Vice-Président du Comité d'Organisation.

La distinction de Membre Honoraire de la Société Japonaise de Mécanique des Sols et des Travaux de Fondations a ensuite été remise à cinq personnalités bien connues: le Professeur A.W. Skempton, le Professeur Arthur Casagrande, le Docteur R.B. Peck, le Professeur J. Kérisel et le Professeur J.K.T.L. Nash. Pour des raisons de santé, le Professeur Casagrande n'a malheureusement pas pu assister à ce Congrès. Le Docteur Peck a adressé un message de remerciement.
Enfin, le Professeur M. Fukuoka, Président de la Société Japonaise, a fait le point sur la Géotechnique au Japon, dans une conférence d'une heure illustrée de nombreuses diapositives.

Au cours de la Séance de Clôture, le vendredi 15 juillet, le Professeur J. Kérisel a, dans son discours de Président sortant, exprimé ses remerciements aux participants et également présenté le nouveau Président de la Société Internationale, le Professeur M. Fukuoka. Trois discours ont suivi, celui du nouveau Président, le Professeur M. Fukuoka, celui de Madame J. Kérisel, au nom des personnes accompagnantes, et celui du Professeur S. Hansbo, en tant que représentant de la Société invitante pour le prochain Congrès. Le Congrès a été déclaré clos par M. G. Togashi. La Séance de Clôture fut suivie de chansons Japonaises chantées par le groupe choral de Nikikai et de la projection d'un film intitulé "Quatre saisons au Japon".

Un compte-rendu complet des Séances d'Ouver-

Table 3 / Tableau 3

Visit/ Visite	July 12th/ 12 Juillet	July 13th/ 13 Juillet	July 14th/ 14 Juillet	
Subway A Chemin de fer souterrain A	43	34	--	77
Subway B Chemin de fer souterrain B	--	52	37	89
Subway C Chemin de fer souterrain C	6	--	7	13
Bridge Piers Piles de pont	29	30	--	59
Port and Harbour Research Institute Laboratorie de géotechnique A	19	--	28	47
Public Works Research Institute Laboratorie de géotechnique B	40	40	--	80
Building Research Institute Laboratorie de géotechnique C	--	34	33	67
Land Subsidence Affaissement de terrains	33	--	24	57
Steel Plant on Man-made Island Aciérie sur une île artficielle	46	67	80	193
Underground Substation Sous-station souterraine	--	35	17	52
Tama New Town Scheme Projet de la ville nouvelle de Tama	24	--	51	75
Submerged Tunnel Tunnel immergé	--	35	45	80
Musashino Railway Yard Dépôt ferroviaire de Musashino	17	25	--	42
	257	352	322	931

neering laboratories. All visits were limited to Tokyo and its vicinity, and took place in the afternoon from Tuesday through Thursday. The number of attendants to the technical visits are listed in Table 3.

12. Exhibits

In the "Botan Room", "Kiku Room" and "Ran Room" of the Imperial Hotel, technical exhibits were arranged during the Conference. 39 firms from all over the world had participated and demonstrated their know-how and soil mechanics equipment. In particular, testing machines with data processing and the construction method with slurry shield tunneling system attracted much interest among the attendants.

The Japanese Society of Soil Mechanics and Foundation Engineering maintained a section where several books on soil mechanics were on sale. There was another section for the sales of the Proceedings of the Specialty Sessions.

ture et de Clôture figure dans ce volume, pages 205 à 233.

10. Films Techniques

Pendant la durée du Congrès, du lundi après-midi au vendredi après-midi, 47 films furent projetés dans la salle "Kotobuki" de l'hôtel Impérial. Ils peuvent être répartis en deux groupes, les uns d'intérêt géotechnique, les autres servant d'introduction au Japon. Toutes ces projections de film ont suscité u vif intérêt de la part du public.

11. Visites Techniques

Treize circuits différents ont été organisés pour des visites techniques pendant la durée du Congrès, comprenant des chantiers d'intérêt géotechniques, et des laboratoires de géotechnique. Toutes ces visites ont été limitées à Tokyo et à ses alentours, et eurent lieu les après-midi du mardi au jeudi.

13. Social Activities

All the participants of the Conference and persons accompanying them were invited to the Reception and a stage show "Summer Festival in Japan" held at the Imperial Hotel in the evening of July 11.

In the evening of July 15, at Tokyo Kaikan, some 850 registrants attended the Banquet and a cocktail party which preceded it.

The Ladies' Programs during the Conference are briefly summarized in the programs of the Conference given in this volume on pages 45 to 50.

14. Post Conference Tours

As announced in Bulletin No. 1 and also in Bulletin for Post Conference Tours, twelve courses had been prepared for the Post Conference Tours by the Organizing Committee for visiting sites of geotechnical interest and for touring historic sites and places of natural beauties in Japan. Some of the courses were cancelled because of insufficient number of applicants, and six courses of the Post Conference Tours took place. All tours were carried out successfully. The number of attendants to the Post Conference Tours are listed in Table 4.

Table 4

Seikan Undersea Tunnel	(17-21 July)	28
Landslide	(16-21 July)	59
Rockfill Dams	(16-21 July)	26
Kyoto and Nara	(16-20 July)	68
Hakone	(16-17 July)	13
Nikko	(16-17 July)	7
		201

15. Finances

In addition to the registration fees and the earnings from the sales of the sets of the Proceedings, the Conference was financed by a grant from the Japanese Government through the Science Council of Japan; a grant from the Japanese Society of Soil Mechanics and Foundation Engineering; and grants from contractors, consulting engineers, industries and others throughout Japan, as listed in this volume on pages 11 to 13 ; where the Organizing Committee records its thanks. Several government agencies and related agencies generously provided personnel, equipment and other services.

16. Secretariat

The Organizing Committee was served by Professor A. Nakase, as secretary from August 1973 onwards; he was assisted by full time services of three members of the secretarial staff of the Japanese Society of Soil Mechanics and Foundation Engineering, and also by his secretary from the Department of Civil Engineering, Tokyo Institute of Technology. Ten more mem-

Le nombre des participants à ces visites techniques est indiqué dans le tableau 3.

12. Exposition

Pendant la durée du Congrès, une exposition technique a été organisée dans les salles "Botan", "Kiku" et "Ran" de l'hôtel Impérial; 39 sociétés du monde entier y participèrent. Elles purent faire la démonstration du développement de leurs techniques et de leurs équipements en Mécanique des Sols. Les machines d'essai avec traitement des données et la méthode de construction des tunnels à l'abri d'un bouclier à la boue ont attiré plus particulièrement l'attention des visiteurs.

La Société Japonaise de Mécanique des Sols et des Travaux de Fondations a tenu un stand où différents livres traitant de la Mécanique des Sols étaient en vente. Un autre stand était réservé aux compte-rendus des Sessions Spéciales.

13. Réception, Banquet et Programme des Personnes Accompagnantes

Les participants au Congrès et les personnes accompagnantes furent invités à la réception et au spectacle "Festival d'été au Japon" donnés à l'hôtel Impérial dans la soirée du 11 juillet.

Dans la soirée du 15 juillet, environ 850 participants assistèrent au cocktail suivi du banquet qui fut donné dans la tour Kaikan de Tokyo.

Le programme suivi par les personnes accompagnantes pendant la durée du Congrès est brièvement résumé dans les programmes du Congrès qui figurent dans ce volume, pages 45 à 50.

14. Voyages Post-Congrès

Comme annoncé dans le bulletin n° 1 ainsi que dans le bulletin pour les voyages post-congrès, douze circuits furent préparés par le Comité d'Organisation, pour les voyages post-congrès, afin de permettre aux participants de visiter des sites intéressants sur le plan géotechnique et d'admirer des beautés naturelles du paysage et des lieux historiques du Japon. Certains de ces circuits durent être annulés par manque d'inscription, et six voyages post-congrès furent maintenus et se déroulèrent de manière satisfaisante. Le nombre des participants aux voyages post-congrès est indiqué dans le tableau 4.

Tableau 4

Tunnel sous marin de Seikan	(17-21 juillet)	28
Glissements de terrains	(16-21 juillet)	59
Barrages en enrochements	(16-21 juillet)	26
Kyoto et Nara	(16-20 juillet)	68
Hakone	(16-17 juillet)	13
Nikko	(16-17 juillet)	7
		201

bers of the secretarial staff of the Japanese Society joined in to assist Professor Nakase from April to July of 1977.

Much time and services were given by geotechnical engineers throughout Japan, and in particular by the members of the sub-committees whose names are listed on pages 5 to 6 of this volume. Throughout the weeks of the Conference, some 200 persons were engaged everyday in various services for technical sessions, technical visits, social events and so on.

15. Financement

En plus des droits d'inscription et de la vente des compte-rendus, le Congrès a été financé par un don du Gouvernement Japonais, par l'intermédiaire du Conseil Scientifique du Japon, et un don de la Société Japonaise de Mécanique des Sols et des Travaux de Fondations, ainsi que par des dons d'entrepreneurs, d'ingénieurs-conseils et d'industries et d'autres organismes à travers le Japon. La liste en est indiquée dans ce volume, pages 11 à 13. Le Comité d'Organisation leur adresse ses remerciements. Plusieurs Administrations Gouvernementales et apparentées ont généreusement fourni du personnel, de l'équipement et d'autres services.

16. Secrétariat

Le secrétariat du Comité d'Organisation a été assuré à partir d'août 1973, par le Professeur A. Nakase. Il fut assisté par les services à plein temps de trois membres du secrétariat de la Société Japonaise de Mécanique des Sols et des Travaux de Fondations, ainsi que par les services à plein temps d'une de ses secrétaires au département de Génie Civil de l'Institut Technologique de Tokyo. Dix autres membres du secrétariat de la Société Japonaise ont été employés à plein temps d'avril à juillet 1977.

Une contribution considérable en temps et en services a été apportée par des géotechniciens à travers tout le Japon, et en particulier, par les membres des sous-comités, dont les noms figurent, pages 5 à 6 de ce volume. Pendant la semaine du Congrès, 200 personnes ont été employées chaque jour dans différents services pour les sessions techniques, les visites techniques et les diverses activités.

Registration

Ladies' Program—Kimono Show

Reception

Executive Committee Meeting

Prof. Kerisel, President of the ISSMFE, and
Prof. Nash, Secretary General of the ISSMFE

Opening Session

Opening Address by Mr. Togashi,
Chairman of the Organizing Committee

Address by Prof. Kerisel,
President of the ISSMFE

Lecture by Prof. Fukuoka,
President of the JSSMFE

Closing Session

Main Sessions

Main Session No. 1

Main Session No. 2

Main Session No. 3

Main Session No. 4


K.HOSHINO
CHAIRMAN
A.J. SALAS
ORGANIZER
CO-ORGANIZER

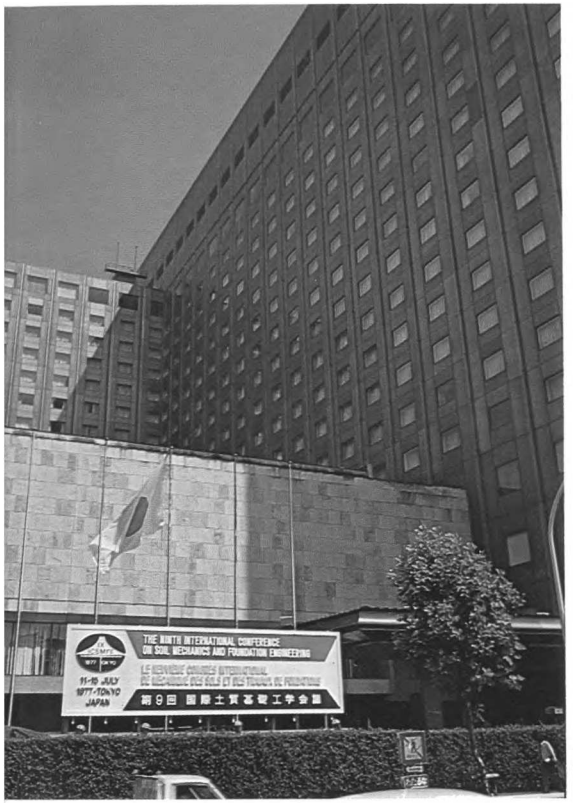
Technical Exhibits

Submerged Tunnel (Technical Visit)

Tedorigawa Dam (Post Conference Tour)

Bulletins

Opening Session Ceremonies



Exterior View of the Imperial Hotel
Site of the 9th International Conference

Visit to Meiji Shrine – Ladies' Program