

M R Selamat (Mohamad Razip Bin Selamat)  
Professor, P.E.,  
School of Civil Engineering  
Universiti Sains Malaysia,  
Engineering Campus  
14300 Nibong Tebal  
Pulau Pinang, Malaysia



### **Name**

The traditional name "Selamat" is patronymic, not family name, and the person is normally referred to by the given name, "Razip". 'Selamat' means 'Safe' or 'Peace' in the Malaysian language.

### **Qualifications**

Razip received BS (1985) and M Eng (1986) from University of Louisville, USA; and PhD (1995) from University of Queensland, Australia.

### **Service to the university**

At Universiti Sains Malaysia, Razip teaches, carries out researches and consultancies, publishes, and reviews in the area of Geotechnical Engineering. His service with the university commenced in 1986 when the School of Civil Engineering was still in the planning. The school finally founded in 1989 but Razip soon left for PhD studies in Australia. Since returning in 1994, Razip has been appointed three times as chairman of the Geotechnical Engineering program which he held for 6 years altogether. Razip was also Deputy Dean for another 3 years. He has given instructions in wide ranging subjects and supervised final year, MSc, and PhD researches.

### **Professional services**

Relationship with the industry is essential in the work of an academic. In this regard, Razip has had appointments in projects in the areas of Geotechnical Engineering, Rock Mechanics, Construction Vibrations, and Waste Management, either alone or as part of a technical team. These contacts with the industry culminated into a vast practical experience which he shares with students and colleagues. Tests carried out in the geotechnical engineering laboratory and in the field in the Northern states of Malaysia have enabled academics and others to have access to valuable data that were useful in the design and construction of facilities in the respective geographical region of the country. Razip treasures experience from a wide range of practical engagements involving Site Evaluation, Geotechnical Feasibility Study, Deep Foundation, Slope Stability, Slope Reinforcement, Ground Assessment and Improvement, Vibration Monitoring, Landfill Development, and Assessment of Ground Vibrations. No job is too small or too big as they say, he handles each for the pleasure of solving an engineering problem and serving the community in an area his specialization. He has served the region for more than 30 years now. Given next is a list of firms attended. These are the multinational, government, local government, private, and family owned entities. Razip's activities have been carried out with full knowledge of USAINS Holding Sdn. Bhd., the department running the businesses for the university, and its precursor, the Center for Consultancies and Innovations.

Southern Perak District Council

Madu Jaya Sdn. Bhd.

Cahaya Insan Sdn. Bhd.  
 Permata Services Sdn. Bhd.  
 Soils and Foundation Sdn. Bhd.  
 Sekata Drillers Sdn. Bhd.  
 Jurutera Konsultant (SEM) Sdn. Bhd.  
 Soil Drillers Sdn. Bhd.  
 Chenor Harapan Sdn. Bhd.  
 Pelangi Bumi Sdn. Bhd.  
 TATCOM Sdn. Bhd.  
 Jurutera Perunding Bersama Sdn. Bhd.  
 HLA Consultants Sdn. Bhd.  
 BTS Engineering Sdn. Bhd.  
 W S Atkins Sdn. Bhd.; KMZ Sdn. Bhd.  
 Rimba Raya Sdn. Bhd.  
 Air Kuning Mosque, Taiping, Perak  
 Universiti Teknologi Petronas  
 Binaan Desjaya Sdn. Bhd.  
 Wibawa Engineering Sdn. Bhd.  
 Johan Fibres Sdn. Bhd.  
 Soil Mechanics Sdn. Bhd.  
 Kuala Kedah Marina Harbor  
 Ballast Nedam Groep N. V. (M) Sdn. Bhd.  
 Sri Meraga Sdn. Bhd.  
 Public Works Department of Malaysia (JKR)  
 Bumi Teknik Laboratory Sdn Bhd  
 Jurutera Perunding Wibawa Sdn Bhd  
 VCS Interior Sdn Bhd  
 Oriental Utility Sdn Bhd  
 BBD Smart Enterprise  
 Ir Paksi Teguh Enterprise  
 Indah Bekalan Jaya Sdn Bhd  
 Shafina Construction Sdn Bhd  
 Reen Raz Sdn Bhd  
 Sarahon Construction Sdn Bhd  
 S U Citra Sdn Bhd  
 Sinaran Restu Sdn Bhd  
 Daya Iltizam Sdn Bhd  
 Panzana Enterprise  
 Smart Mega Construction Sdn Bhd  
 Asturi Metal Builders (M) Sdn Bhd  
 PLB Terang Sdn. Bhd.  
 MEGA SASA SDN. BHD  
 Maltecon Builders Sdn Bhd  
 Ilham Maya Sdn Bhd  
 Landasan Impian Sdn. Bhd.  
 KLG Enterprise Sdn Bhd  
 Geostrata Sdn Bhd  
 INFRA CONNECT SDN BHD  
 Karya Citarasa Sdn Bhd  
 The list is longer.

Sazali Development Sdn. Bhd.  
 Deep Rocks Sdn. Bhd.  
 Lembaran Setia Sdn. Bhd.  
 MZErat Services Sdn. Bhd.  
 Penang Port Sdn. Bhd.  
 Kristalcojaya Sdn. Bhd.  
 Lereng Wira Sdn. Bhd.  
 Polis Di Raja Malaysia  
 K L Chan and Associates  
 Island Living Sdn. Bhd.  
 City of Makkah, Saudi Arabia  
 Timeless Construction Sdn. Bhd.  
 Maju Jaya Development Sdn. Bhd.  
 Lembaran setia Sdn Bhd  
 Kejuruteraan Makmur Jaya Ent. Sdn. Bhd  
 Indah bekalan jaya Sdn Bhd  
 Lembaran Setia Sdn Bhd  
 Indah Serumpun Sdn Bhd  
 Mindsway Sdn Bhd  
 Sanjung Murni Sdn Bhd  
 Dataran Mahir Sdn bhd  
 Para Development Sdn Bhd  
 Jurutera Perunding SAS  
 JPS Training, Ipoh  
 Geolab (North) Sdn Bhd  
 Geolab (Malaysia) Sdn Bhd  
 Jurutera perunding Cahaya Sdn Bhd  
 Glamour Strategy Sdn Bhd  
 Belati Wangsa Sdn Bhd  
 Specific Res. Sdn Bhd & Punjom Gold Mine  
 JNH Bina Sdn Bhd  
 Blackfox Engineering Sdn Bhd  
 Gabungan Pemborong Bumiputra Berhad  
 Gemilang Jaya Impian Enterprise  
 Warisan Sepakat Sdn Bhd  
 Fadzil Construction Sdn Bhd  
 Geolab Malaysia Sdn Bhd  
 North Lab Sdn Bhd  
 Indah Bekalan Jaya Sdn Bhd  
 Global Terbilang Sdn Bhd  
 Tetuan Perusahaan Tabah  
 Maycon Sdn Bhd  
 Gerak Restu Enterprise  
 Asakher Enterprise  
 Lion Tin Sdn Bhd  
 Izinria Sdn Bhd  
 MDC Sdn Bhd  
 Lion Tin Sdn Bhd  
 Pria Pantai Sdn Bhd



The Geotechnical team at work in the field

### **Roles with Board of Engineers (BEM) and Institution of Engineers (IEM)**

Razip has reviewed, validated, sealed, and signed documents for the following candidates seeking registration with the Board of Engineers Malaysia (BEM) and the Institution of Engineers Malaysia (IEM). Name mentioned more than once indicates either consecutive registrations as graduate and professional engineer, listing with both professional bodies, or matters requiring repeat submissions.

#### **A. Verification, validation, sealing, and signing of documents to be submitted to the Board of Engineers (BOE) and supervision of candidate seeking the award of Professional Engineer (PE) qualification**

1. Lariyah binti Sidek, lecturer, School of Civil Engineering, USM, 2003.
2. Zaid bin Yusof, lecturer, School of Civil Engineering, USM, 2003.
3. Salahuddin, lecturer, School of Mechanical Engineering, 2011.
4. Leong Lee Vien, lecturer, School of Civil Engineering, USM, 27/6/2011.
5. Abdul Halim Kadarman, School of Aerospace Eng., USM, 2013 (with the State of California).
6. Choong Kok Keong, School of Civil Engineering, USM, 11/12/2014.
7. Shaharuddin Shah bin Zaini, Lecturer, School of Civil Engineering, USM, as proposer, 2008

#### **B. Verification, validation, sealing, and signing of documents to be submitted to the Institution of Engineers (BOE) and supervision of candidate seeking the award of Corporate Member (MIEM) qualification which would lead to award of Professional Engineer (PE) qualification with the BOE**

1. Leong Lee Vien, lecturer, School of Civil Engineering, USM, a transfer from BEM's PE, 2013.
2. Abdussamad bin Mahmud, School of Mechanical Engineering, USM, 8/5/ 2014.
3. Mohd Zulkifli Abdullah, School of Mechanical Engineering, USM, 8/5/2014.
4. Ahmad Baharuddin bin Abdullah, School of Mechanical Engineering, USM, 8/5/2014.
5. Chin Jeng Feng, School of Mechanical Engineering, 8/5/2014
6. Khairudin bin Mohamed, School of Mechanical Engineering, USM, 8/5/2014
7. Ahmad Zulfaa bin Mohamed Kassim, School of Mechanical Engineering, USM, 8/5/2014
8. Norilmi Amilia binti Ismail, School of Mechanical Engineering, USM, 8/5/2014
9. NORAZURA BINTI MUHAMMAD BUNNORI, Associate Professor, School of Civil Engineering, USM, as seconder, 2017
10. Irvan Dahlan, Indonesian, BEM, Associate Engineer, Oct 2017
11. Mastura binti Azmi, School of Civil Engineering, USM, as proposer, Dec 2017
12. Muhd Harris bin Ramli, School of Civil Engineering, USM, as proposer, Dec 2017
13. Mohd Ashraf bin Mohamad Ismail, School of Civil Eng, USM, as proposer, Dec 22, 2017
14. Norazura binti Bunnori, MIEM Interview, 10/8/2017
15. Motasem Alazaiza, Palestinian, BEM, Associate Engineer, 2018
16. Mohd Ashraf bin Mohamad Ismail, IEM Professional Interview, 2018
17. Dr Harris Ramli, IEM Professional Interview, May, 2018
18. Dr Mohd Ashraf bin Mohamad Ismail, IEM Professional Interview, July, 2008
19. Prof Badorul Hisham bin Abu Bakar, IEM Professional Interview, July, 2018
20. Dr Mastura Azmi, IEM Professional Interview, Sept, 2018

**C. Verification, validation, sealing, and signing of documents submitted to the Board of Engineers (BEM) or Institution of Engineers (IEM) and advice of candidates seeking to register as graduate engineer with BEM or IEM, for USM lecturers, students, and former students; and applicants from the general public:**

8. Dr. Badorul Hisham Abu Bakar (IEM), USM lecturer, 2003.
9. Leong Lee Vien, (IEM), USM lecturer, 22/8/2003.
10. Norrol Asima Abu Nawas (BEM), 22/8/2003
11. Khor Chun Hung, (IEM); 4/9/03
12. Lee Pen In, jurutera siswazah (IEM); 4/9/03
13. Zulkifli bin Mohamad (BEM), 1/12/03
14. Dr Solehuddin Shuib (BEM), lecturer in the School of Mech Eng, USM (2004).
15. Dr Zulkifli Abdullah (BEM), lecturer in the School of Mech Eng, USM (2004).
16. Mohamad Alif bin Abd Halim, (IEM); 1/19/04
17. Yahyatu Nizam bin Yahya, BEM; 6/3/04
18. Abdul Salam bin Abustan, BEM; 6/8/04
19. Muhammad Adzha bin Ibrahim, BEM; 11/4/2004
20. Harikkrishnan, IEM; 5/5/05
21. Harikkrishnan, BEM; 5/5/05
22. Rosmaliza binti Ramli, BEM; 11/8/05
23. Fadzli bin Mohd Nazri, BEM; 1/12/05
24. Mohd Rashwan Arshad, BEM; 20/12/2005
25. Mariati bt Alang, BEM; 20/12/2005
26. Fahmi Reza Abdul Patah, BEM; 20/12/2005
27. Farah al Wani bt Wan Chik, BEM; 20/12/2005
28. Khairul Amilin, IEM, 5/1/2006
29. Nor Adrin bin Mat Nayan, BEM, 5/1/2006
30. Aizam Yusof (Lecturer, USM), BEM; 5/5/06

31. Mohd Fadzli bin Darus, BEM; 13/7/06
32. Shafida Adzwina (Lecturer, USM) BEM; 28/9/06
33. Fauzi Baharudin, BEM, 15/5/07
34. Leow Cheng Siang, BEM, 29/1/07
35. Wan Nor Aishah bt. Meor Husain, 30/5/2008
36. Thoon Khin Khuan, BEM, 12/8/2008
37. Thoon Khin Khuan, IEM, 12/8/2008
38. Mohd Hanif Ismail, BEM, 25/8/2008
39. Mohd Aminurrashid bin Mohd Amiruddin, 25/8/2008
40. Khoe Wei Joon, 3/9/2008
41. Zaid bin Abdul Hamid Fahmi, 22/9/2008
42. Tuan Ahmad Fadhil Tuan Rosidi, BEM, 9/2008
43. Noor Sheena Nerayani bt. Harith, BEM, 13/10/2008
44. Siti Fatimah binti Abdul Halim, BEM, 29/10/2008
45. Ali bin Jamaludin, BEM, 12/12/08
46. Ahmad Syazlin Khalil, 12/12/08
47. Hairul Akmal Shaharudin, BEM, 17/4/2009
48. M Sheikh Firdaus bin Sheikh Abdul Kadir, BEM, 13/7/2009
49. Asrul Nizam bin Abdul Manaf, BEM, 6/8/2009
50. Mohd Nor Azahari bin Azman, BEM, 20/8/2009
51. Inzarul Faisham bin A Rahim, BEM, 4/9/2009
52. Choong Wee Kang, IEM examination, 10/9/2009
53. Ramziah Md Nasir (USM academics), BEM, 20/10/09
54. Chin jeng Feng (USM academics), BEM, 20/10/09
55. M Najhan bin Awang (USM academics), BEM, 20/10/09
56. Mokhzani bin Mokhtar (USM academics), BEM, 20/10/09
57. M Razi bin A Rahman (USM academics), BEM, 20/10/09
58. Farzad bin ismail (USM academics), BEM, 20/10/09
59. Khairil Faizi b Mustafa (USM academics), BEM, 20/10/09
60. Ahmad Faizul Hawari (USM academics), BEM, 20/10/09
61. Zaidi b Ripin (USM academics), BEM, 5/11/09
62. Wan Amri b Wan Ali (USM eng.), BEM, 5/11/09
63. Zaiton bt Derani, IEM, Nov, 2009
64. Nurul Izma bt Mohammed, BEM, 3/12/09
65. Azamuddin bin Arsad, BEM, 3/12/09
66. Choo Kean Khoon, BEM, 10/2/10
67. Tan Chee Ghuan, BEM, 27/5/10
68. Jeng Feng Chin, BEM, 23/6/10
69. Wyon Ren Yoong, BEM, 23/6/10
70. Low Wai Chong, BEM, 13/8/10
71. Ng Wai Keun, BEM, 4/10/10
72. M Nizam bin Ahmad, IEM, 13/10/10
73. Khairul fadhilah bin M Sabri, BEM 9/11/10
74. Leong Chung Sum, BEM, 14/12/10
75. Clara Wong Xiang Xiang, 30/12/10
76. Gobi a/l Kanadasan, BEM, 21/1/11
77. Prabu a/l Murugiah, BEM, 21/1/11
78. Bryan Rudy Dominic Neng, BEM, 28/3/11
79. Wan M Sarbini bin Wan M Ali, BEM, 16/5/11
80. Ng Soon Min, BEM, 14/6/11

81. M Ashraf bin M Ismail, BEM, 16/6/11
82. Hajar binti Abu Bakar, BEM, 16/6/11
83. Azamudin Arsad, IEM, 27/6/11
84. Koay Loke Kean, BEM, 27/6/11
85. Fazilah Hasbi, BEM, 20/12/11
86. Muhammad Zaki bin Mohd Kasim, BEM, 4/4/2012
87. Norfaizah binti Fitri, BEM, 17/5/2012
88. Hafizi bin Abu Samah, BEM, 20/7/2012
89. Rojali bin Othman, BEM, 25/10/2012
90. Nastaein binti Qamaruzzaman, BEM, 25/10/2012
91. Eng Swee Kheng, BEM, 12/12/2012
92. Remy Rozaini, BEM, 18/12/2012
93. Lau Jun Giap, BEM, 19/12/2012
94. Teo Hui Ting, MBEM, 19/12/2012
95. Mohamad Anuar bin Kamaruddin, BEM, 16/4/2013
96. Nurul Nadiah Ahmad, BEM, 26/4/2013
97. Muhammad Nurfasha Alias, BEM, 29/4/2013
98. Pervathy Rajendran, IEM, 21/5/2013
99. Muhammad Irshad A Mokti, BEM, 12/7/2013
100. Tuti Azmalia Azni, BEM, 29/7/2013
101. Sakhiah Abdul Kudus, BEM, 28/8/13
102. Siti Ramziah Basri, BEM, 28/8/13
103. Zul Azmi bin Mokhtar, BEM, 23/12/13
104. Wan M Badrul bin W Mustafa, BEM, 8/1/14
105. Hazwaruaida Muhammad, BEM, 27/1/14
106. Kuon Kok Huat, BEM, 7/2/2014
107. Lim Siao Phin, BEM, 7/2/2014
108. Tan Zhong Heh, BEM, 7/2/2014
109. Goh Chin Ong, BEM, 7/2/2014
110. Teh Dick Way, BEM, 7/2/2014
111. Siti Noratikah binti Che Deraman, BEM, 12/3/2014
112. M Khairul Azuan bin Muhammad, BEM, 31/3/2014
113. Ooi Su Goon, BEM, 7/4/14
114. Khoo Choon Gek, BEM, 7/4/14
115. Muhammad Iftishah Ramdan, 9/5/14
116. Dr. Abdussamad bin Mahmud, IEM (corporate), 8/5/2014
117. Dr. (Prof) Mohd Zulkifli Abdullah, IEM (corporate), 8/5/2014
118. Dr. Ahmad Baharuddin bin Abdullah, IEM (corporate), 8/5/2014
119. Dr. Chin Jeng Feng, IEM (corporate), 8/5/2014
120. Dr. Khairudin bin Mohamed, IEM (corporate), 8/5/2014
121. Dr. Ahmad Zulfaa bin Mohamed Kassim, IEM (corporate), 8/5/2014
122. Dr. Norilmi Amilia binti Ismail, IEM (corporate), 8/5/2014
123. Mohd Azhar bin Ahmad, BEM, 23/7/2014
124. Harlene Ooi Hui Lee, BEM, 18/9/2014
125. Dr. Khairudin bin Mohamed, IEM (corporate-as sponsor), 13/11/2014
126. Dr. Choong kok Keong, BEM (Professional), 11/12/2014
127. Sit Nur Akilah binti Sarudin, BEM 22/2/2015
128. Azura binti Abdul Rahman, BEM 22/2/2015
129. Nurhafizah binti Zakaria, BEM 22/2/2015
130. Che Muhammad Amirus Syafiq bin Che Ismail, BEM 26/2/2015

131. Mohd Hazwan bin Zakaria, BEM 26/2/2015
132. Nurfarhah binti Naaim, BEM 2/3/2015
133. Sharul Nizam bin Hussin, BEM 11/3/2015
134. Tan Chee Guan, BEM 10/4/2015
135. Mohd Fakhrul Hilmi bin Mohd Saad, BEM 27/4/2015
136. Moon Wei Chek, BEM 11/5/2015
137. Lee Chee Mei, 11/5/2015
138. Halimatun Saadiah Ahmad, BEM 24/7/2015
139. Munirah binti Musa, BEM 25/11/2015
140. Najwaatiqah binti Zulkifli, BEM 25/11/2015
141. Mohamad Fikri bin Mohd Najib, BEM 2/2/2016
142. Radziati binti Ramlee, BEM 2/2/2016
143. Muhammad Zainuddin bin Noordin, BEM 31/5/2016
144. Nor Adilah bt Mohamed Daud, BEM 5/8/2016
145. Kee Li En, BEM 8/8/2016
146. Mohamad Zuhairi bin Ramli, BEM 2/9/2016
147. Nurul Atiqah binti Radzuan, BEM 6/10/2016
148. Nur Amni binti Bakar, BEM 6/10/2016
149. Herni binti Halim, BEM 13/10/2016
150. Mohamad Firdaus bin Mahamad Yusob, BEM 13/10/2016
151. Muhammad Kashfi bin Zainalfikri, BEM 1/11/2016
152. Irwina binti Ismail, BEM, 23/11/2016
153. Mastura binti Ghani, BEM, 23/11/2016
154. Nor Aida binti Saad, BEM, 25/11/2016
155. Muhammad Alif Fitri Hanipa, BEM, 22/12/2016
156. Gunasegaran a/l Ramachandran, BEM, 12/1/2017
157. Norazrin binti Ramli, BEM, 9/3/2017
158. Abdurrahman bin Mohamad Razip, BEM, 29/5/2017
- 159. Muhammad Jafni bin Jaafar, BEM, 2/8/2017**
160. Wan Nurfariza binti Wan Yahya, BEM Graduate Eng, 17 Nov, 2017
161. Fatehah binti Mohd Omar, BEM, Engineering Technologist, 13 Mar, 2018
162. Siti Multazimah Mohamad Fauzi, BEM Graduate, Apr 4, 2018
163. Nur Hafizah Abdul Jalil, BEM Graduate, Apr 4, 2018
164. Noor Halizah bt Abdullah, BEM Graduate, Apr 30, 2018
165. Ooi Chin Boon, BEM Graduate, Oct 1, 2018
166. Haarvin Narth A/L Kannathasan, Jan 18th, 2019

## **Travel**

Razip visited Australia, Botswana, Saudi Arabia, and USA, for study and work. In shorter trips, he has been to Brunei, Germany, Hong Kong, Indonesia, Japan, Kuwait, Philippine, South Africa, Thailand, and UK.

## **USAINS Holding Sdn. Bhd.**

'Usains Holding Sdn. Bhd.' is the commercial arm of Universiti Sains Malaysia that administers funding from the private sector and carries out commercial services on behalf of the university. Razip's activities have been carried with full authorization of USAINS' management and by following the stipulated rules and regulation. His earlier works were administered by the Center for Consultancies and Innovations, the precursor of USAINS Holding Sdn. Bhd.



## **Universiti Sains Malaysia (USM)**

The name 'Universiti Sains Malaysia' has been incorrectly called 'Science University of Malaysia' or 'University of Science, Malaysia' as these other names are unrecognized locally. This state university is increasingly autonomous in its pursuit and funding or at least that is what is expected of it in order to thrive in the present environment. Placement has been very competitive and meritocratic. A third of the students in the School of Civil Engineering are postgraduates. The greatest challenge facing the university currently is to get ahead among the competitors in key areas of the performance indicators and win financial funding.

### **School of Civil Engineering**

The School of Civil Engineering is located in the Engineering Campus in Nibong Tebal, about 50 km from the main campus in Pulau Pinang. Two thirds of its 500 students are undergraduates while another third are postgraduates pursuing Master and PhD degrees. The school is renowned for its environmental studies, active engagements of the industrial and community entities, and graduates who are highly sought after, by the local and international employers.



The main school building

The school was founded in 1989 as one of the earliest engineering schools established for the Northern region. With 11 students registered, classes began in July 1989 in the Engineering Campus, which was then located in Tronoh, Perak. By the 2000s, the school achieved its maximum undergraduate enrollments and hosted international postgraduate students from over 12 countries. In 2016, the school began taking in international students for the undergraduate program as well.

### **Development in the Northern States of Peninsular Malaysia**

The Northern states of Perlis, Kedah, Pulau Pinang, and Perak have seen many development projects completed over the past few years. In fact, infrastructure developments have taken place continuously since the post independent era of the 60's. Major cities are George Town, Butterworth, Ipoh, Taiping, Alor Setar, and Kangar. The two major projects that have just been concluded are the Second Bridge to Penang Island totaling 25km in length and the Northern Extension of Double Railway Tracks from Ipoh to Thai Border covering some 329 km in distance and 21 stations. The northern states also have a fair share of the natural and industrial heritages of the country. Tourists from many places have made this part of the country their destinations mainly due to pristine



beaches and lush tropical jungles. International students have in recent years seek admission onto other local institutions beyond Universiti Sains Malaysia such as the Universiti Teknologi Petronas, Universiti Malaysia Perlis, Universiti Tunku Abdul Rahman, Universiti Utara Malaysia, and branch campuses of Universiti Teknologi Mara and Universiti Kuala Lumpur.

### **Geotechnics of the Northern States**

Regional developments in Northern Peninsular Malaysia which covers the states of Perlis, Kedah, Pulau Pinang, and Perak have been going over both, the coastal plains and the inlands. However, the coastal plains which occupy a third of the 32000km<sup>2</sup> total area are the more developed and crowded portion with the bigger cities of Penang, Butterworth, Alor Setar, Kangar, and Manjung located within. The inlands are relatively less developed but also consist of medium sized cities such as Sungai Petani and Ipoh. Development projects in the area have resulted in countless site investigation (SI) penetrations carried out either by the cone penetration with pore water pressure acquisition (CPTU) technology or the more traditional wash boring method.

The 10000 square kilometers coastal plains, flanked by the Straits of Malacca on one side and the slightly elevated inlands on the other, are underlain by various quaternary deposits which were formed under marine environments within the last 2.6 million years and unaffected by the plate tectonic movement. The Gula formation which covers most of the plains consists mainly of the soft clays while the lesser Beruas and Simpang formations are made up mostly of peats, silts, sands, and gravels. Tests carried out on soils on the ground of Engineering Campus, Universiti Sains Malaysia gave the general results of LL>50% and PL<50% which conform to results obtained by others such as Al-Bared and Marto (2017). These high plasticity clays (CH) are comparatively very soft and are well known for being problematic as a foundation material. The various subsurface materials of the coastal plains are alternatively called the marine clays. The engineering campus was in the year 2000 built over 2m thick of residual soil fill, over a marine clay deposit, resulting in a long term ground settlement that is still damaging structures and worrying residents. The original ground level was only 0.5m above mean sea level.

The plains rise into the rainforest-clad hills as one travels the interior. The residual soils, formed by various weathering processes, are abundantly available in the higher grounds and have become a steady source of fill material for projects on the coastal plains, while the excavations and transportations have led to environmental problems requiring immediate address.

The clays of the plains have the following behaviour identifications as given by the piezocone (CPTU) site investigation system: clayey silt to silty clay, clay, sensitive fine grain, and silty clay to clay. The stratum underlying the clays is mostly composed of sand to silty sand. On the other hand, the inlands' residual soils have the following identifications, among others: silty clay to clay, clay, clayey silt to silty clay, silty sand to sandy silt, and sand to silty sand. The residual soils are generally favorable in terms of their engineering properties. Due to the nature of their formation, the residual soils are also called the laterite soils.

Al-Bared M. A. M., and Marto A. (2017). A review on the geotechnical and engineering characteristics of marine clay and the modern methods of improvements. *Malaysian J. of Fundamental and Applied Sciences*, 3(4), 826-932.