EDITORIAL

Welcome to the 59th Issue of Almohandis, in which we are introducing an exciting new chapter about disputes and arbitration. We are looking forward for further contributions from the specialists in this field to bring their expertise through technical articles and case studies in the coming issues. The issue also includes an article about the land acquisition process which is very important area you need to be aware of.

This issue includes many other technical articles. It also covered all of BSE’s activities from June to November 2014. We would like to thank our volunteers and contributors for their efforts. We urge you all to provide your contribution, comments, ideas, and suggestion to assist us in producing a quality magazine that meets your expectations. We highly welcome your constructive feedback.

Best Regards
Abdul Nabi Al Sabah
From the Desk of the President
Profile: Engineer Abdulla Mattar
Knowledge Management & Innovation
Earthworks Current Practices
Arbitration and Engineering Disputes
Book Review: Beyond the Wall
The Role of Consulting Engineer in Disputes Settlement
Engineers, I would like to take this opportunity to thank all the members for their valuable confidence given to me and to my colleagues Board members, hoping to meet your expectations.

This Board will build on, and continue the efforts of previous boards throughout the past forty years. It will steadily continue the drive to achieve plans and goals aiming towards enhancement of engineering profession and community welfare while assuming the responsibilities as President of Bahrain Society of.

In this occasion we, BSE; would like to express our appreciation and thanks to all Ministries, Government Institutions, Industrial Companies and Private Sector that have sponsored and supported BSE and its activities over the past years. We are confident that such support will continue enabling us to exert our efforts and expertise for the benefit of our Country and Profession.

Dear Members, BSE Board has laid down challenging activities that can only be achieved through collective efforts and wide participation and supports of all members.

This is therefore an open call to all members to take part in various activities of BSE. We welcome any suggestions that contributes to enhance BSE programs.

Best Regards

Masoud Ebrahim Al Hermi
President
Coincidence played an important role in his life and changed it significantly. His interest in medical field changed to engineering passion and instead of studying at the University of Beirut he traveled to Britain with around 40 students who were sponsored by the Bahrain Petroleum Company (BAPCO) to study and specialize in engineering.

Engineer Abdulla Matter has various hobbies and abilities. He loves travelling and learning about civilizations in addition to playing sport. He engaged in political activities when he nominated himself first in the parliamentarian elections held in Bahrain. He is also the founding member of the Member National Islamic Society in 2002.

Birth & Upbringing

His real birthday was in 1950 although his official documents showing that he born in 1945. In fact, he increased his age since he was in need for a car when he joined Bahrain Petroleum Company (BAPCO), since driving license is only given to those whose age reach 18 years. He born in West Riffa on the Mother Day evening on 20th March 1950. He has many brothers and sisters.

Education

He started his primary and intermediary education at West Riffa School and his secondary education was at Manama Secondary School since it was the only secondary school on the island. He recalls that the secondary education was four years then one more year was added later so the total secondary years was five. He said that he has never enrolled to Mutawa education (where they used to study Quran) but directly joined formal education including primary and secondary.

He said that he completed Secondary School in 1964 and obtained the third position in the Kingdom of Bahrain while the first position was achieved by Mr. A. Rahman Fahroo, ex-GM of Al Ahli Bank, and Mr. Hasan A. Kareem attained the second position.

Useful Move

He did not select engineering discipline at his own discretion but because he studied in science section at the secondary school. His passion was to study medicine at the American University in Beirut rather than engineering. However, after he joined BAPCO they made him change his mind and he decided to study engineering as he said.

According to the education system at that time, it was supposed that the three of them will receive scholarships to study at the American University in Beirut but unfortunately during the said year the Ministry of Education selected 4 from Arts Division and offered Abdulla and his two colleagues to study in Egypt. Abdulla felt that he was not fairly treated and refused the scholarship in Egypt. The scholarship to Beirut was to specialize in some science sections. However, this was good for Abdulla who immediately joined BAPCO which was sponsoring outstanding students to study at their own schools to prepare them to study later in UK. After he passed IIS exams at BAPCO School, certified by the university in UK, he was accepted by the university. Among the students who started one year earlier than him was Mr. Abdulla Saif, ex-Minister of Finance, Mr. Nooruddin Abdulla Nooureldin, Mr. Abdulla Mansour, ex-Assistant Undersecretary of Ministry of Works, Mr. Hasan Juma and Mr. Murad Ali Murad, Chairman of Bank of Bahrain and Kuwait. Other students who studied with him included Mr. Karim Al Sayed, Mr. Mohamed Adibi and Mr. Abdulla Dawood. They were around 40 students sponsored by BAPCO in 1970. They were divided into two groups; the first 20 studied in Wales and Scotland and the other 20 in London. Abdulla was among those selected to study in Middlesex University located north of London. The university was located north of London while he was living south of London and he had to use underground daily and pass approximately 20 stations until he reaches to his university. He continued in this manner for four years. London was the ideal option at that time for those who seek knowledge since it houses major international universities and provide quality education. He recalls that the Bahraini students were more dedicated than other nationalities as acknowledged by the British teachers themselves who used to wonder “how students coming from an Arab country and are able to speak English fluently. The answer is BAPCO which was a school itself.

Returning Home and Working with BAPCO

Following his return from studying in UK, which continued from 1970 until 1974, Engineer Abdulla Mattar returned home holding Mechanical Engineering Degree from one of the most prestigious universities. At BAPCO his skills were enhanced and the company organized a programme so that the new graduates can work in all the departments. In BAPCO school there was a center called “Industrial Section” providing vocational training and allowing students to study for certain time in various sections including auto mechanic, welding, electricity and any other disciplines related to water, mechanical, designing or any other engineering aspects etc.
After working in various departments, he was assigned to work in the petroleum planning department at the Refinery. During his assignment, he covered all the tasks assigned to him in all company’s units.

Later, he moved to Engineering Department and started his career as engineer when he was subsequently promoted to Senior Project Engineer. In this department, Abdulla worked in various sections and units for almost 41 years.

Achievements in BAPCO

Mr. Abdulla was also founder of the BAPCO’S Labour Committee which was later changed to a trade union. He was the first chairman of the Labour Committee and he was the one who laid down its by-laws in collaboration with a member of management. He was active in this Committee for almost 4-5 consecutive years. He was responsible for illiteracy eradication. Abdulla feels proud while informing us that he had great honor to help many workers of this company to move from illiteracy to education and knowledge specially that some of them had continued their education until they reached to university education. He feels proud that most of those people were young Bahraini citizens.

He supervised a programme called “Good Idea” which supported the economy of BAPCO. This programme was the first of its kind on the island, designed by BAPCO. This concept was later followed by various other companies including ALBA, ASRY and Gulf Petrochemical. The idea of the project is to motivate employees to submit ideas or create means for example in the field of health and safety and to develop the company in general term. This project received an overwhelming response by the employees and many creative development ideas were submitted within each department. In order to motivate employees to continue with their creative ideas, BAPCO used to buy such ideas from the department. In order to motivate employees to continue with many creative development ideas were submitted within each department. This helped them to educate and familiarize himself well with the Islamic culture and he passed this to his children. He stated that he had the opportunity to go to Haj around 15 times and 10 times to Omrah particularly during the holy month of Ramadan. This helped him to educate and familiarize himself well with the Islamic culture and he passed this to his children. His eldest child was his daughter “Wala’” but she passed away in addition to Nouf and Yousif.

“Bubshait” Family are among the founders of Dammam city. His grandfathers used to work in courts and most of them were scholars. His great grandfather “Uncle Mohammed” was chief of matrimonial judges and was responsible for personal status.

Voluntary activities

He participated in many voluntary works and he is still an active member of Bahrain’s Alamal Charity Society, one of the major charity organizations in Bahrain. He was a member of the Public Relations Committee and represented the Society in a number of conferences and symposia.

Political Activities

He is a founding member of Member National Islamic Association, a major political party in Bahrain, established in 2002. He also took part in the first parliamentarian election in Bahrain, as a candidate of Member in the Southern Area.

Joining BSE

The first group who joined BSE included Dr. A. Latif Kanoo, Engineer Ebrahim Al Moayyed and other founding members while Abdullah Mattar was among the second group. While working with BAPCO, they heard about a new society, headquartered then in Muharraq, that is concerned with engineers and engineering disciplines and hence they decided to enroll.

Engineer Abdulla was active in the BSE’s board of directors during various terms. He took the position of Treasurer during the office of Dr. Hasan Falhro, currently Minister of Industry and Commerce. He was also deputy president two times during the office of the late Engineer Hesham Al Shehabi and Engineer Emad Al Moayyed.

During this period, Engineer Abdulla visited the American Society of Engineers for the purpose of promoting the Bahrain Society of Engineers and acted as a representative of BSE. "Later we established the Mechanical Engineers Division in Bahrain”, He said.

Regarding his perceptions about engineering profession in Bahrain, Engineer Abdulla said: "The development of this sector is a continuing process and is dependent on developing the engineering curricula in the universities and institutes. It also depends on the interest of students and their desire to study engineering. Engineering, like medicine, is continuously developing, and hence we need to keep pace with such developments and learn all the updates in this field otherwise we will find ourselves vastly behind”. Graduation is only the beginning of the engineering path rather than the end according to Engineer Mattar.
Knowledge Management & Innovation

Innovation is widely recognized as a source of a firm’s and indeed a nation’s wealth creation

The changing of our economy from an industrial economy to a knowledge-based economy has lead to an increased focus on innovation. According to Drucker, Innovation implies improving on existing products and processes, finding new ways and also abandoning the old, or reviewing every product, service, technology, market, and distribution channel on a regular basis. Creativity and innovation are at the cutting edge of knowledge management.

Organizations in today’s globalized world must innovate to keep their competitive edge. Many successful organizations have found that to constantly innovate they have to implement knowledge management strategies and practices.

Innovation is extremely dependent on the availability of knowledge and therefore the complexity created by the explosion of richness and reach of knowledge has to be identified and managed to ensure successful innovation.

Knowledge management (KM) is a planned, structured approach to manage the creation, sharing, harvesting and leveraging of knowledge as an organizational asset, to enhance a company’s ability, speed and effectiveness in delivering products or services for the benefit of clients, in line with its business strategy.

If KM is to have any real impact on the way we do business and not just a passing fad then it has got to be about making radical changes in the way that we perceive and utilize knowledge. It needs to be about creating new knowledge, applying knowledge and in the words of Peter Drucker “making it productive”. In other words knowledge management needs to fundamentally focus on creativity and innovation. It is a holistic solution incorporating a variety of perspectives, namely people, process, culture and technology perspectives, all of which carry equal weighting in managing knowledge.

Drivers of the application of KM in innovation:

- Create, build and maintain competitive advantage through utilization of knowledge and through collaboration practices.
- KM assists in managing new knowledge created through the innovation process, but also in managing existing knowledge as a resource used as input to the innovation process.
- The third driver is the integration of knowledge both internal and external to the organization, thus making it more available and accessible.

What is Knowledge Management?

What is Innovation?

Innovation is a process wherein knowledge is acquired, shared and assimilated with the aim to create new knowledge, which embodies products and services. Innovation is the adoption of an idea or behavior that is new to the organization. The innovation can be a new product, a new service or a new technology. Innovation is related to change, which can be radical or incremental.

Marjan Modara
PhD Candidate in Knowledge & Innovation Management
The nature of the role of KM in innovation:

- Enables the sharing and codification of tacit knowledge.
- Makes explicit knowledge available for recombination into new and innovative ideas.
- Enables collaboration through the ability of customers and employees to form knowledge sharing communities within and across boundaries that can work together to achieve a shared business objective benefits to all community members.
- Managing various activities in the knowledge management lifecycle, which consists of the phases of creation, gathering, sharing, leveraging of knowledge.

ABSTRACT

This paper is aimed to discuss the earthworks specifications issued by the government authorities such as the Ministry of Housing and the Ministry of Works, Kingdom of Bahrain, compared to the Standard (BS 1377-1990 Part 2, 3, 4 and 9) and current practices that adopted by the independent testing laboratories and practicing site engineers at the construction sites. It was observed that there are few issues where the issued specifications required to be amended in order for them to be applicable on sites. The desert fill is described as Class 3 Fill in the Ministry of Housing specification. Based on its grading curve, this material will fall in the “gravel” description according to BS 5930-1999. In many cases, its gradation has prevented it to be tested by standard Laboratory Compaction Test (Proctor Test) as specified in BS 1377-1990 Part 4 Clause 3, due to its gradation which is too coarse to be tested. It was observed in the field/test report that there was an alteration in the gradation of the tested materials in order for them to be eligible for laboratory compaction tests which was done by the testing firms.

This condition has a consequence that the actual field behavior of the compacted soil will no longer be simulated in the laboratory compaction tests. Consequently, the Contractor will be easy to achieve a good field density which is above 95% of the dry density obtained in the laboratory compaction test. This is the implication of the condition where the actual strength of the tested soil at the site will be much stronger than what is measured in the laboratory. Very same problem also was also encountered for the case of free draining materials such as clean dredged sand (Class 4) with small amount of silt/clay in it. It is suggested that the proper quality control on field compaction needs to be improved/rectified in order to achieve good quality of the earthworks.

Keywords: earthworks, laboratory compaction test, field compaction, Class 3 Fill, Sand Fill

References:


The images are from images for Knowledge Management and Innovation search on line.
1. INTRODUCTION

Undoubtedly, the earthworks have been fundamental component in construction works. Grading works, reclamation works, road works are the examples where the earthworks are showing their important roles in supporting the success of the construction projects.

However, when it comes to the implementation of the specifications on site, careful thought should be taken as the specifications will sometimes do not work well with the available standard. Therefore, the supervising authorities are requested to check carefully the applicability of the issued specifications in comparison with the standard available in the market.

This paper is aimed to revisit the earthworks-related issues (making of structural fills) using desert fill (Class 3) and Dredged Sand (Class 4), which will compare current specifications issued by the Ministry of Housing and the Ministry of Works, Kingdom of Bahrain and the current site earthwork practices and the available standards, in this case the British Standards.

2. LITERATURE REVIEW

2.1. Earthworks Specification of the Ministry of Housing – Kingdom of Bahrain

The specification says that there are 9 groups of fill materials which can be used for earthworks job (Ministry of Housing - Kingdom of Bahrain, 2010). The desert fill has been one of the most widely used materials in many construction sites in the Kingdom of Bahrain. This material is used mainly for the purpose of mass grading works. The following Table 1 depicts the grading envelope of Class 3 Fill.

<table>
<thead>
<tr>
<th>Sieve size (mm)</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>0 – 50</td>
</tr>
<tr>
<td>0.075</td>
<td>0 – 20</td>
</tr>
</tbody>
</table>

The specification (Ministry of Housing - Kingdom of Bahrain, 2010) says on page 4, that “….the desert fill (Class 3 Material) shall be a selected, graded, hard granular material free from clay and deleterious substances. The total sulfate content as SO3 of the material shall not exceed 1% and the total soluble salts shall not exceed 2%. The grading of the fill shall lie within the range as tested in accordance with BS 1377 Test 7. Where the percentage passing 0.075mm sieve is greater than 8%, the plasticity index shall not exceed 20% when tested in accordance with BS 1377.”

Table 2 depicts the typical grading envelop of dredged sand (Class 4 fill) based on the specification of the Ministry of Housing. It says “…a dredged sand type material normally employed as common fill. The material shall be evenly graded and shall lie within the grading envelope given below when tested in accordance with BS 1377 Test 7. The material shall be non-plastic when tested in accordance with BS 1377. The total sulfate content as SO3 of the material shall not exceed 1% and the total soluble salts shall not exceed 2%.”

Table 2. Typical grading envelope of Dredged Sand (Class 4 fill)

<table>
<thead>
<tr>
<th>Sieve size (mm)</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>95 - 100</td>
</tr>
<tr>
<td>0.075</td>
<td>0 – 8</td>
</tr>
</tbody>
</table>
2.2. Earthworks Specification of the Ministry of Works – Kingdom of Bahrain

The following Table 3 depicts the classes of materials for earthworks, issued by the Ministry of Works, Kingdom of Bahrain (Ministry of Works - Kingdom of Bahrain, 2009).

### Table 3. Grading Requirements for Acceptable Earthworks Materials (Ministry of Works - Kingdom of Bahrain, 2009)

<table>
<thead>
<tr>
<th>Class</th>
<th>Grading zone</th>
<th>Percentage by Mass Passing the size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grading curve</td>
<td>20 mm</td>
</tr>
<tr>
<td></td>
<td>Grading curve</td>
<td>500</td>
</tr>
<tr>
<td>1A</td>
<td>100</td>
<td>90-100</td>
</tr>
<tr>
<td>1B</td>
<td>100</td>
<td>90-100</td>
</tr>
<tr>
<td>1C</td>
<td>100</td>
<td>37.5-52</td>
</tr>
<tr>
<td>2A</td>
<td>100</td>
<td>37.5-52</td>
</tr>
<tr>
<td>2B</td>
<td>100</td>
<td>37.5-52</td>
</tr>
<tr>
<td>2C</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>2D</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3A</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3B</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3C</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3D</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3E</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3F</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3G</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3H</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3I</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3J</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3K</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3L</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3M</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3N</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3O</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3P</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3Q</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3R</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3S</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3T</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3U</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3V</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3W</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3X</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3Y</td>
<td>100</td>
<td>15-50</td>
</tr>
<tr>
<td>3Z</td>
<td>100</td>
<td>15-50</td>
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<tr>
<td>0PA</td>
<td>100</td>
<td>15-50</td>
</tr>
</tbody>
</table>

2.3. Earthworks Quality Control

Once the fill material has been laid and compacted, it is a general practice to control its quality so that it will meet the required standard specified by the specification. Regarding this issue, the Ministry of Housing's specification has stated in general on page 12: “…filling generally under slabs shall consist of Class 3 fill or other approved fill laid in layers not exceeding 150 mm compacted thickness, each layer being well watered and compacted to 95% of maximum dry density as determined in accordance with BS 1377, Test 13”.

The Ministry of Works' specification says that the field compaction quality controls are mainly required to achieve 95% of the maximum dry density of BS 1377. Part 4 (using 4.5kg rammer), except for Class 6A, 6B and 6D where the compaction method has to be approved by the Engineer.

2.4. Available standard to deal with earthworks quality control

### 2.4.1. Standard and Modified Proctor Compaction Tests

One of the widely used engineering standards is British Standard, which is published by British Standard Institution (BSI). The one which is mainly used for soil testing related to civil engineering purposes is BS 1377-1990. BS 1377-1990: Part 4, it deals with the laboratory compaction tests and the determination of maximum and minimum dry density of soils. In Clause 3 of this BS 1377-1990 Part 4, it highlights the detail of the laboratory compaction test. The standard laboratory compaction tests are standard and modified Proctor tests.

Table 4 depicts the summary of sample preparation methods for different soil gradation to establish the relationship between the soil dry density and moisture content (British Standard Institution, 1990). In general there are 5 soil grading zones that can be tested using this standard test procedure. When the soils gradation fall into grading zone X, then the test procedure is no longer applicable. This grading zone X is described where the composition of particles passing 20mm and 37.5mm sieves are less than 70% and 90% respectively.

Therefore, any material falls in this grading zone will not be possible to be tested using this procedure. The reason behind this is that the material is too coarse to be tested.

### Table 4. Summary of sample preparation methods

<table>
<thead>
<tr>
<th>Grading zone</th>
<th>Minimum percentage passing test sieves</th>
<th>Preparation procedure</th>
<th>Labelling code</th>
<th>Minimum mass of prepared soil required</th>
<th>Type of mould used</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mm</td>
<td>100%</td>
<td>(a)</td>
<td></td>
<td>15</td>
<td>1L</td>
</tr>
<tr>
<td>37.5 mm</td>
<td>100%</td>
<td>(b)</td>
<td></td>
<td>15</td>
<td>1L</td>
</tr>
<tr>
<td>(a) Soil particles not susceptible to crushing during compaction.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Soil particles susceptible to crushing during compaction.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1L – One litre compaction mould.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRR = CBR mould.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

2.4.2. Determination of maximum and minimum densities for granular soils (sand)

BS 1377-1990: Part 4, Clause 4, explains on how to determine the maximum and minimum dry densities of granular soils such as sands and gravels with fines content less than 10%.

The method is suitable for sands containing small amount of material passing 63 μm (usually not exceeding 10%) and up to 10% of fine gravel passing 6.3 mm test sieve. As for gravel soils, the method is suitable for gravels passing 37.5 mm test sieve and containing small amount of particles passing 63 μm (normally not exceeding 10%).

### 3. Findings based on the Laboratory test results

#### 3.1. Grading curve of Desert Fill and Dredged Sand

Figure 2 depicts the typical grading curves of Class 3 Material which were supplied by one of the grading contractors in Bahrain. These test results were derived from the sieve analyses conducted against Class 3 at the local independent laboratories.

### Figure 2. Typical Grading Curves of Class 3 Material in Bahrain
It can be seen from Figure 2 that Class 3 Fill material can be classified based on BS 5930-1999 (British Standard, 1999) and falls into sandy, silty GRAVEL. Where the composition of sand is around 10-20%, silt/clay of around 15-17% and followed by the dominant gravel-sized particles of around 65%. Based on the particle size distribution, this material can be classified as Class 6A according to BS 1377-1990: Part 4 Clause 3. Due to this issue, it is recommended to amend the specification in order to have clear procedure to tackle the problem which may be encountered at the sites.

Figure 3 shows the typical grading curve of Sand Fill encountered at the reclaimed sites in Bahrain. Based on BS 5930-1999, this material can be classified as very gravelly, silty SAND. The proportion of gravel is around 26%, followed by small amount of silt/clay of around 5-10%. The sand-sized particles are dominant which occupied the portion of around 68-70%. This material can be classified as Class 6A according to the Ministry of Works specification.

<table>
<thead>
<tr>
<th>Source</th>
<th>100</th>
<th>75</th>
<th>37.5</th>
<th>20</th>
<th>10</th>
<th>6.3</th>
<th>5</th>
<th>2</th>
<th>0.6</th>
<th>0.063</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alhoty</td>
<td>100</td>
<td>63.5</td>
<td>48.8</td>
<td>38.1</td>
<td>34.4</td>
<td>32</td>
<td>27.2</td>
<td>23</td>
<td>17.4</td>
<td></td>
</tr>
<tr>
<td>Zoo</td>
<td>100</td>
<td>70.2</td>
<td>55</td>
<td>46</td>
<td>41.9</td>
<td>40</td>
<td>34.9</td>
<td>30.2</td>
<td>15.5</td>
<td></td>
</tr>
<tr>
<td>Interlab</td>
<td>100</td>
<td>75</td>
<td>40</td>
<td>37</td>
<td>34</td>
<td>30</td>
<td>24</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MoW</td>
<td>100</td>
<td>87</td>
<td>75</td>
<td>60</td>
<td>55</td>
<td>50</td>
<td>45</td>
<td>40</td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Typical grading composition of Class 3 Material

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage by Mass Passing the size Sieve(mm)</th>
<th>O/D/D/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Busaytin</td>
<td>100 75 37.5 20 10 6.3 5 2 0.6 0.063</td>
<td>120.07%</td>
</tr>
<tr>
<td>North East Muharraq</td>
<td>100 91 84 73 54 6 0.80 0.1 8</td>
<td>120.07%</td>
</tr>
</tbody>
</table>

Table 6. Typical grading composition of Dredged Sand

4. DISCUSSION

4.1. Comments on the Ministries Specification

In the Ministry of Housing’s specification, there are few wordings that could trigger the confusion amongst the people who use this specification as the basis to execute the construction at the sites. For example, “…the grading of the fill shall lie within the range as tested in accordance with BS 1377 Test 7.” This has caused confusion as there is no explanation in the specification on which one is the BS 1377 Test 7. According to the standard publisher, this BS 1377 Test 7, was part of BS 1377-1975. This standard has been revised, withdrawn and replaced by BS 1377-1990. The correct reference might be the test that explained in BS 1377-1990: Part 2, Classification Test, Clause 9 (Determination of Particle Size Distribution).

Similar case also happened in other place; this is one of the examples, “…filling generally under slabs shall consist of Class 3 fill or other approved fill laid in layers not exceeding 150 mm compacted thickness, each layer being well watered and compacted to 95% of maximum dry density as determined in accordance with BS 1377, Test 13.” The BS Standard which was meant in this specification might be BS 1377-1990-Part 4, Clause 3. It has also to be stated the alternative test that could be used when the material gradation does not meet the requirement to be tested according to BS 1377-1990: Part 4 Clause 3. Due to this issue, it is recommended to amend the specification in order to have clear procedure to tackle the problem which may be encountered at the sites.

Based on the specification of the Ministry of Works, the Class 3 material in the specification of the Ministry of Housing is close to be classified as 1A (well graded granular material), 1C (coarse granular material) or Class 6A (Selected well graded granular material). In the Ministry of Works specification, for this type of material 1A and 1C, the quality control for the compaction at the site will be controlled by the laboratory compaction which is governed by method in BS 1377: Part 4 with 4.5kg rammer. In this case, the desert fill will fail to meet the grading curve for these tests for most cases. The only class for desert fill which is matching with the grading curve of desert fill is Class 6A. In the specification of the Ministry of Works, it says that the field compaction for this type of material should be compared by the results derived from the method which will be approved by the Engineer. In this case, the Engineer should find a way to control the field density at the site. This cannot be left like this, which will trigger the dispute amongst the parties involved in the projects. There should be a clear defined alternative solution which is sound and achievable.

4.2. The use of Clause 3 of BS 1377-1990 Part 4 for Class 3 and Sand Fills

In many construction sites where the earthworks were done, Class 3 and Sand Fills whose grading curves like the ones depicted in Figure 2 and 3 were tested using Standard and Modified Proctor Compaction Tests which were explained in BS 1377-1990 Part 4. It is clearly seen that according to Figure 2, the grading curve of the tested material had revealed the information that the amount of particles passing from 20mm and 37.5mm test sieves were around 48.8% and 63.3% respectively. This is a clear indication that this Class 3 Fill grading curve has fallen into Grading Zone X, which is indicated by Table 2 in Clause 3 of BS 1377-1990 Part 4, which says that the material is too coarse and cannot be tested using either with Standard or Modified Proctor Compaction Test Methods. In fact, the testing firm managed to submit the test results even though the material was not suitable for this test. It can be seen in Figure 4 that the gradation of the material has been altered which resulted the passing percentage from 20mm and 37.5mm sieves has become 82.75% and 89.33% respectively. Therefore, it is clear that actually, the tested material has different grading curve compared to the original material.
There is a tendency based on the reported results that the gradation of the material has been altered, where the testing firm most likely did the laboratory compaction test against the samples that passed 20mm test sieve plus small amount of material that passed 37.5mm test sieve and retained on 20mm test sieve. By doing this, the actual behavior of the material will be no longer closely simulated. The consequence would be, with the minimum compactive effort, the contractor at the site will be able to achieve the field relative compaction which is equal or more than 95% of laboratory dry density.

Similar situation happened for the case of Sand Fill where, based on author’s experiences, many sites that used Sand as fill material was cross-verified using the MDD curve derived from laboratory compaction test (Proctor or Modified).

4.3. Solutions offered to re-dress the problems

The specification issued by both Ministry of Housing and Ministry of Works related to earthworks should be amended to fit with the current engineering practices and available standards.

Based on the current specification, most of the Class 3 Fill grading curves fit with the specification’s requirement, but in many cases the grading curve of the Class 3 Fill has fallen into the group of Grading Zone X, which is the indication that this material contains too much coarse particles that makes it impossible to be tested using Clause 3 of BS 1377-1990 Part 4. To overcome this problem, the alternative test should be proposed to allow the quality control of field compaction at the sites. When the Class 3 Fill grading curve falls into Grading Zone X, then it is recommended to test the field compaction quality using plate load test (PLT). A soil elasticity modulus of 40MPa is expected that the desert fill will sustain the actual load of a house with raft foundation with structural load of around 60kPa with a small corresponding elastic deformation, which is far below the tolerable settlement for raft foundation.

Therefore, it is not a surprise to find a condition where the field dry density of the Sand Fill is higher than laboratory dry density. In other words, the relative compaction is above 100%. This is an indication that the use of Clause 3 of BS 1377-1990 Part 4 for conducting laboratory compaction test against the Sand Fill will give poor reference for field density quality control.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. CONCLUSIONS

(a) The available earthworks specifications issued by both the Ministry of Housing and the Ministry of Works needs to be slightly amended.
(b) The clear test method to control the field compaction for desert fill (Class 3 Fill/Class 6A) whose grading curve falls in Grading X is not appropriate and needs to find other method to control the compaction at the site.
(c) The use of laboratory compaction test method described in Clause 3 of BS 1377-1990 Part 4 for Sand Fill quality control is not appropriate. This practice will give only poor reference for field compaction control.

5.2. RECOMMENDATIONS

(a) The workings used in the specification of the Ministry of Housing needs to be revised, particularly for referring to any particular standard. The most current British Standard to deal with earthworks are BS 1377-1990 Part 2, 3, 4 and 9.
(b) The clear test method to control the field compaction for desert fill in the Ministry of Housing and the Ministry of Works specifications need to be stated. For desert fill whose grading curve falls into Grading Zone X of BS 1377-1990: Part 4, the quality control of the field compaction is recommended to use plate load test (PLT), to achieve the soil elasticity modulus of 40MPa.
(c) For free draining material like dredged sands, the most appropriate method to find its laboratory maximum dry density is by using the method described in Clause 4 of BS 1377-1990 Part 4.

Works Cited


Arbitration and Engineering Disputes

Arbitration represents one of the advanced solutions for the resolution of disputes for institutions and companies in a quick, inexpensive and strictly confidential way. Arbitration, as one of the alternative options for the settlement of disputes, makes the resort to the judiciary no longer the only option. Arbitration is particularly important for the growth of industrial and commercial projects, contracts and what arises of domestic and international disputes.

In this regard, on 12/08/2014, the Bahrain Society of Engineers held a seminar under the title "Origins of Arbitration in Engineering Disputes" aiming at the presentation of arbitration to solve the dispute outside the general judicial framework.

• From this perspective, Arbitration focuses on two key elements:
  - The agreement between the parties to resort to arbitration to settle the dispute between them.
  - The task of considering the conflict and sentencing in a way that ends and solves the conflict.

3. Advantages of Arbitration:

- Fast settlement of disputes, flexibility and cost saving.
- Non-compliance with the application of a particular law or specific proceedings, as it is possible to agree upon the applicable law upon which the dispute will be settled, and this solves problem in case the dispute involving parties from different countries; or involving foreign countries and organizations, in such cases they will agree upon the applicable law and will not be imposed the law of a particular country to settle the conflict.

4. Arbitration Agreement Forms:

- Arbitration clause:
  - Parties agree to resolve any conflicts that might take place in the future by arbitration in an agreement separate from the commercial agreement to be attached thereto and deemed an article of the agreement or the legal relationship between them.
- Arbitration stipulation:
  - Arbitration is agreed upon following the arising of dispute between the two parties where they agree on the settlement thereof, in a separate agreement, by arbitration away from judiciary.

5. Types of Arbitration:

- Optional Arbitration:
  - Arbitration is an optional method subject to the absolute will of the parties; this is the general applicable rule according to the regulations of arbitration of the Gulf Cooperation Council (GCC) for the year 1993; and the Arbitration Model Law for the year 1985; as well as the parent in Comparative French and British law.
- Obligatory Arbitration:
  - Some laws oblige disputing parties to refer their dispute to a particular arbitral tribunal, as stipulated by the Labor and Social Insurance Law for the year 2012, that collective labor disputes shall be solved by arbitration.
- Free Arbitration:
  - Special cases arbitration is the ordinary traditional type of arbitration, in which the parties delegate, to the extent permitted by law, a third party to solve any dispute arising between them. In this type of arbitration, it shall be determined the procedures and rules applicable to the conflict.
- Institutional Arbitration:
  - In which the Parties delegate an entity, organization, or a permanent arbitration center to oversee the arbitration in accordance with a pre-set rules and procedures by such permanent entities.

6. Advantages of Arbitration over Engineering Expertise?

- The judgment is issued by experts in specific areas, as arbitration does not require the arbitrator to be the holder of a certificate in law as is the case in the judiciary. And some differences require experts in specific areas to solve them.
- Greater chances to resolve differences amicably. As arbitral tribunal members are chosen by the parties to the conflict, they are often trying to bridge the gap in views between the parties to settle the conflict amicably.
- Dealing with the conflict in a manner that ensures the confidentiality, protecting the parties from the results of disclosure of conflict, especially in commercial transactions where publicity is not required in the hearings.
- Saving costs of judiciary by not referring thereto in all disputes that may arise.
- Open the way for the parties to choose the persons who will settle the dispute, which will lead to the acceptance of their sentences.
conflict, as deputy for said parties, whose goal is not to resolve a particular dispute, but his goal is to provide the opinion of a specialist in a particular issue. The opinion of the expert has no binding force. The opinion of the Arbitrator is binding while the opinion of the expert is advisory.

7. Arbitration Proceedings:

- Commencement of arbitration proceedings:
  - The place of arbitration, language, statement of claim, terms, experts, default.
  - Arbitration application, preparation and drafting of the application, submittal of application, respond to the application, counterclaim.

- The Formation of the Arbitral Tribunal:
  - The case of a sole arbitrator, the case of multiple arbitrators, the conditions to be met by the arbitrator, taking the job and decide impartiality and independently with the necessity of disclosure, completing the arbitration task (step-down, insulation, dismissal and reply), appoint the secretariat.

- Terms of Reference Document for Arbitration:
  - The document (origination, legal basis, core data), the difference thereof from the arbitration agreement in its three forms (condition, stipulation and referral), cases of refusal to sign the document (problems and solutions).

8. Issuance and Implementation of the Arbitration Award:

- Award - in general - the decision issued by a competent court duly formed in a dispute referred thereto according to the rules of pleadings.

- An Award has fundamental pillars:
  - To be issued by any Judicial Court.
  - To be issue in a dispute.
  - To be written in the instrument.

- Arbitration Award is like court judgments - the decision that resolves the conflict between adversaries. It is the result of their agreement on referral to arbitration and follows its procedures. Therefore, it must include the core elements of the judgments in general. It includes the resolve of a specific conflict, and permanently settles the conflict and shall be directly enforceable following its inclusion of the executive form, as well as, it enjoys the opposability of court judgments.

- In addition to the arbitration award, terminating conflict as a whole, the arbitrators may issue other awards, either before or after this Award, such as preliminary rulings issued to delegate an expert, for example / and temporary provisions that determine temporary or conservative measures such as the order of the deposit of goods, for example. Partial sentences that settles only part of the conflict such as the judgment issued to decide on the principle of responsibility and defer the resolution of the estimate of the value of the compensation resulting from such responsibility, or which determines the value of the damage or loss.

- The arbitral tribunal may issue an award to determine the party responsible for arbitration expenses.

- Issuance of arbitration award settling the whole conflict in terms of procedures of its issuance of deliberation, drafting, causing, substantial data that must be included therein, the date of its issuance and procedures of pronouncement and notification of opponents thereof.

- Deposition of the arbitration award by handing over to each party one copy of the award settling the conflict bearing the signatures of all or the majority of the arbitrators. And awards shall be implemented as follows:
  - Optional implementation
  - Obligatory implementation
  - Invalidity of the arbitration award
Book Review: Beyond The Wall

Reviewed by: S. Ali Hashim

Stephen Shore is the author of the book that narrates a personal biography explaining his story with autism in a simple but also accurate and frank manner. Parents with an autistic child will need to go through this book to avoid going through sophisticated medical material that will only create confusion on how to ideally deal with an autistic child or even a grown up.

The book starts with some flash backs of Stephen’s school days and his existing situation as a teacher of music in a university:

“...I have strong sensitivities to sounds. When I was in grade school, my classmates used to call my name as softly as they could to see if I could still hear them – I could hear them across the room and often even into an adjacent class room. One time a teacher did something similar. He stood behind me and barely whispered my name. I still sensed his presence and look around. The whole class, teacher included, had a good laugh...”

Another sort of special sensitivities an autistic person might have is explained further in this paragraph:

“It is now time to get up. My wife and I arise and do the usual morning activities of preparing for the day and eating breakfast. Time to shave. No, I don’t shave. Shaving feels like a powder sander scraping my skin. As a result, I’ve had a beard almost from the first time I first needed to shave my face, explaining to me that it was a male-type ritual. I told them it hurt. “Don’t be ridiculous” was their response. An electric shave is tolerable if I don’t use it often and on only the small portions of my face that I don’t want the beard to cover.”

These two paragraphs reveals a small portion of difficulties that might face an autistic person. We attach this table 1 which represents some of the allergies and sensitivities that autistic people suffer from and might cause ambiguous reactions.

The author starts to unfold his story from the very beginning of his first day in life and social status within his family. It takes into account the social, economical status of the family and responses towards his disorder throughout the different stages of school until university, marriage and work.

An interesting point about the biography structure is that the writer has compiled his book from 3 different perspectives. The first is a personal view from a person with an autism disorder, the second is views from common and specialists who have dealt with him and third perspective are the scientific medical facts about autism. This blend has given the book’s content an added strength and reliability of information.

The ups and downs of life are a normal trend for everyone, but for an autistic person it’s even with extra complexity that needs to be dealt with starting from allergies, communication difficulties, disabilities, confidence and self awareness. The author shares a lot of insights with pain at occasions when he loses his accounting job and his girlfriend but again with joy when he accomplishes his Master degree and Doctoral degree in music education after several failures.

This steep journey cannot be safely achieved unless the patient finds a highly supporting family, school and community where he can integrate with his special way and was expressed in the book by the author:

“...It appears that there are two major kinds of people who make a difference to my success and general well-being. The first includes those who like me and appreciate me for who I am despite any differences I may have. These people are helpful and try to protect me from bullies with whom I come in contact. The second group are those who seem to need a bully me in some way...”

Finally, I would advice every person to read this book to get enrolled as a supporter to the autism community that’s unfortunately seeing an increasing rate globally.

### AUTISM by the numbers

<table>
<thead>
<tr>
<th>Year</th>
<th>Rate</th>
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<tbody>
<tr>
<td>1970</td>
<td>1 in 10,000</td>
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<tr>
<td>1975</td>
<td>1 in 5,000</td>
</tr>
<tr>
<td>1985</td>
<td>1 in 2,500</td>
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<tr>
<td>1995</td>
<td>1 in 500</td>
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<td>2001</td>
<td>1 in 250</td>
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<td>2004</td>
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<td>2007</td>
<td>1 in 150</td>
</tr>
<tr>
<td>2009</td>
<td>1 in 110</td>
</tr>
<tr>
<td>2013</td>
<td>1 in 88</td>
</tr>
<tr>
<td>2014</td>
<td>?</td>
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### COMMON SENSORY REACTIONS

<table>
<thead>
<tr>
<th>Sense</th>
<th>Possible Sensitivity</th>
<th>What it feels like</th>
<th>Common Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sight</td>
<td>Fluorescent lights</td>
<td>The 60 HZ cycling of the lights is visible. Feels like sitting in a room with a strobe light.</td>
<td>Child may try to escape or have a tantrum</td>
</tr>
<tr>
<td>Sound</td>
<td>Birds tweeting</td>
<td>Feels like birds beaks scraping the ear drum.</td>
<td>Child may cover his ears</td>
</tr>
<tr>
<td>Taste</td>
<td>Avoidance of strong tasting food</td>
<td>Tasting like acid or some other extremely strong taste</td>
<td>Child may spit food out</td>
</tr>
<tr>
<td>Smell</td>
<td>Perfume</td>
<td>Feels like taking a deep breath from a Chase bottle</td>
<td>Sneezing, burning eyes, other allergic-like reactions. Child may try to escape.</td>
</tr>
<tr>
<td>Touch</td>
<td>Light touch</td>
<td>May feel like touching an open wound or getting an electric shock. May be overalerting.</td>
<td>Sensory defensiveness brushing away light touch, jumping excessively a unexpected touch seeking deep pressure.</td>
</tr>
</tbody>
</table>

Picture1: Rates of autism growth in US.
The role of the consulting engineer in the settlement of disputes in accordance with the FIDIC contracts.

The dispute settlement system of construction contracts is a central element in providing security to the parties to the contract. Construction industry needs alternative dispute settlement mechanisms which are able to solve rapidly the disputes relating to construction projects, even in the construction site, as far as they emerge in order to save money and time.

This study will focus on the role of the engineer in the settlement of disputes in accordance with the FIDIC model contracts. This Subject is divided into three sections as follows:

Introduction section:
Outline of the FIDIC model contracts

FIDIC is the International Federation of Consulting Engineers (Fédération Internationale des Ingénieurs-Conseils). It was founded in Belgium in 1913 by associations of consulting engineers in France, Belgium and Switzerland. It is known for short as FIDIC, which represents the first letter of each word of the five words that make up the federation’s name in French.

FIDIC is interested in issuing and developing a set of the most important model contracts at the international level in the field of construction works. It has over the years produced standard forms of contracts for the international procurement of projects.

FIDIC issued the first model contract in 1957, the Conditions of Contract for Works of Civil Engineering Construction, it was known as the Red Book because of the color of its cover. The form of the early FIDIC contracts followed closely the fourth edition of the ICE conditions of contract.


It is worthy to note that the terms of the fourth edition of The Red Book are recommended for general use for the purpose of construction such works where tenders are invited on an international basis. In addition, these conditions, subject to minor modifications, are also suitable for use on domestic contracts.

In 1999, FIDIC issued a new set of model contracts for the construction which contains the following:

2. The Conditions of Contract for Plant and Design-Build for Electrical and Mechanical Plant, and for Building and Engineering Works, Designed by the Contractor. (The New Yellow Book).
3. The Conditions of Contract for EPC/Turnkey Contracts. EPC stands for Engineering, Procurement and Construction, where the entire project is created by the Contractor as a turnkey project. (The Silver Book).
4. The Short Form of Contract, essentially for minor works where the full detail of the major forms would be inappropriate. (The Green Book).

It is clear that the FIDIC model contracts believe in that quick and professional settlement of any dispute will ensure successful implementation of works. Accordingly, the terms of these model contracts allow to the engineer to be one of alternative dispute settlement mechanisms.

Section I
The role of the consulting engineer in the settlement of disputes in accordance with the fourth edition of The Red Book.

According to Clause 67 of the general conditions of The Red Book (1987 edition), a dispute arises between the employer and the contractor, whether related to the technical or legal matters, shall be referred in writing to the engineer prior to the arbitration procedure.

No arbitration, other than one under Sub-Clause 67.4, may start without referring the dispute to the engineer in advance.

In case any dispute arising from a construction contract, related to the opinion, instruction, determination, document and evaluation of the engineer, the engineer shall be requested to make a decision on this dispute. The requesting party has to acknowledge that this application is done in accordance with Sub-Clause 67.1. The engineer shall indicate in the requested decision that he made a decision in accordance with the same Sub-Clause.

There is no express time limit for a reference to the Engineer. The Clause 67 envisages such references after the completion of the works.

The engineer shall give his decision in writing within 84 days as of the receiving date of the application. The party, that is not satisfied with the decision, shall announce to the other party and the Engineer his/her intention to initiate an arbitration procedure which is related to dispute issues, within 70 days from receiving the date of the decision.

If the engineer does not give the requested decision within 84 days, 70-day period shall begin the day after the last day of the 84-day period. Within this further period of 70 days, either party may notify his/her intention to commence arbitration as to the matter in dispute.

It is clear that the periods, which are provided for in Sub-Clausess 67.1 and 67.2, facilitate to estimate the minimum period of a dispute which is aimed to be resolved quickly.

The engineer shall show the required effort to overcome differences of opinion and disputes between the parties, and shall try to settle disputes with his vocational knowledge, experience and impartial attitude. He shall forget that he is a representative of the employer in order to decide the dispute in a neutral manner.

There is no obligation on the engineer to give reasons for his decision issued in the dispute. However, it is recommended to write the reasons of his decision because this decision may be challenged in front of arbitration later.

Unless the contract has come to an end, the contractor shall continue to execute the works and both parties must give effect to the Engineer’s decision.

If either party had given a notice of dissatisfaction with the decision of the engineer within 70 days, such decision becomes final and binding on both parties who are required to comply with it forthwith as stated in the second paragraph of Sub-Clause 67.1 which provides that “[…] the Contractor and the Employer shall give effect forthwith to every such decision of the Engineer unless and until the same shall be revised, as hereinafter provided, in an amicable settlement or an arbitral award.”

Where an Engineer’s decision has become final and binding, a party may refer any failure by the other party to comply with that decision directly to arbitration without the need for a further Engineer’s decision or any attempt at amicable settlement.
In practice, the engineer is required to act impartially in the circumstances of being employed and paid by the Employer. So, his role in the settlement of disputes between the employer and the contractor exposed to severe criticism.

This criticism concerns the duality in the traditional role of the engineer as the employer’s agent and as an independent third party holding the balance fairly between the employer and the contractor.

It was said that the engineer cannot be impartial because he receives all his fees from one party, the employer. In addition, this role wastes time since the dispute may be referred to arbitration later, as well as the engineer is not eligible legally to examine the legal issues properly.

In response to this and other criticisms FIDIC modified the Clause 67 and produced a replacement for the engineer in 1996. In accordance to this modification, the parties may submit the dispute to a Dispute Adjudication Board (D.A.B) instead of the engineer.

**Section II**
**The role of the consulting engineer in the settlement of disputes in accordance with The New Red Book.**

The Clause 20 of the general conditions of The New Red Book sets out the regime for claims, disputes and arbitration. The process includes the use of a Dispute Adjudication Board (D.A.B) and the consequences of its decisions.

Under the general conditions of The New Red Book, the engineer has no longer any arbitral or semi-arbitral role in the settlement of disputes which may arise between the parties to the contract.

However, the engineer retains his important role in receiving, inspecting and deciding the contractor’s claims during the implementation of the contract after proper consultation with the parties.

The engineer plays this role in accordance with Sub-Clause 20.1 which states that if the contractor considers himself to be entitled to any extension to the time for completion and/or any additional payment, under any clause of these conditions or otherwise in connection with the contract, the contractor shall give notice to the engineer, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 days after the contractor became aware, or should have become aware, of the event or circumstance. If the contractor fails to give notice of a claim within such period of 28 days, the time for completion shall not be extended, the contractor shall not be entitled to additional payment, and the employer shall be discharged from all liability in connection with the claim.

In fact, the role of the engineer under The New Red Book is critically examined in the light of relevant case law and expert commentaries. The examination identified three major changes:

1. a duty to act impartially has been replaced by a duty to make fair determination of certain matters;
2. it is open to parties to allow greater control of the engineer by the employer by stating in the appropriate part of the contract powers the engineer must not exercise without the employer’s approval;
3. there is provision for a Dispute Adjudication Board (D.A.B) to which disputes may be referred.

Although the duality has not been eliminated completely, the contract is structured flexibly enough to support those who wish to contract on the basis of the engineer acting solely as the agent of the employer.