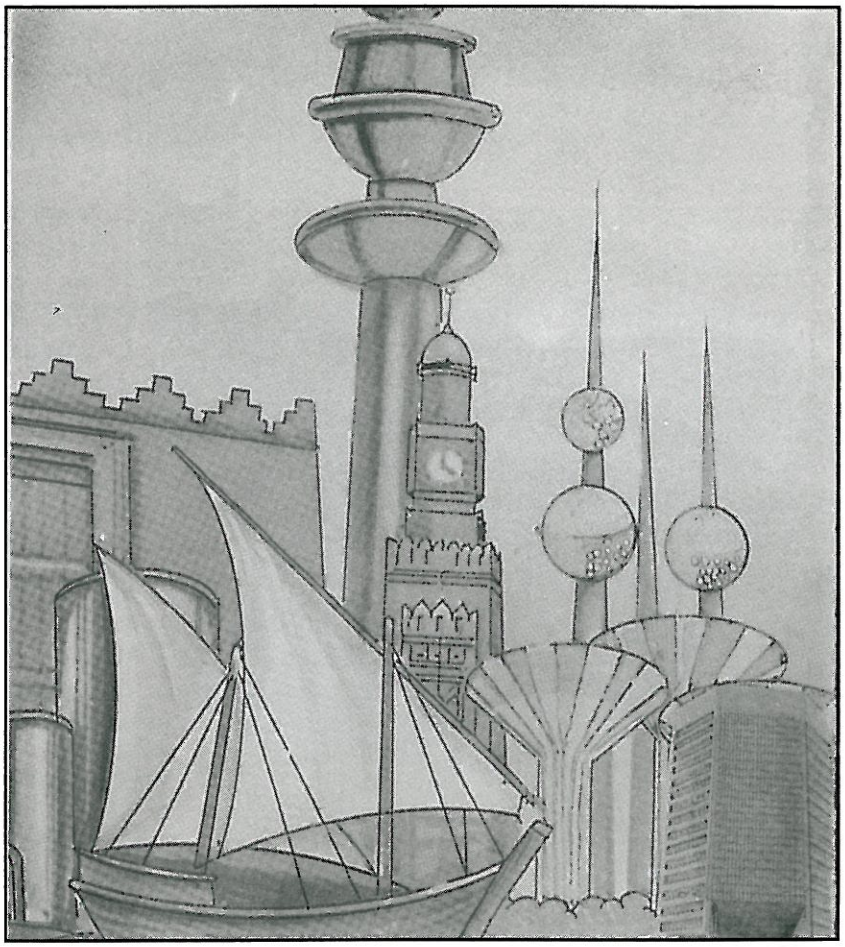
Volume 1/ No. 2
June 1998

CONCRETE NEWS

ACI-Kuwait Chapter



ACI - Kuwait Chapter
Room 25, Civil Eng. Dept. , Kuwait University
P.O. Box: 5969, Safat 13060, Kuwait
Tel.: 4811188 Ext. 7021 - Fax: 4817524
acikuwait@hotmail.com

*Calendar of Coming Events

October 5, 1998	Nomination committee Chapter to contact ACI international for a list of members residing in Kuwait (eligible for office nominations).
October 20, 1998 6:00 p.m	Technical committee Workshop: "Review of Concrete Guidelines" at Kuwait Engineering Society.
October 24, 1998	Nomination committee Deadline for receiving nominations for Board of Directors.
December 14, 1998	Nomination / Social committees Annual General Meeting and elections. Followed by Social gathering for members: Dinner Banquet.

* For further information on a specific event contact ACI Kuwait Chapter office or concerned committee. Specific announcements will be made for each event.

ACI Kuwait Chapter Committees

Board Of Directors

President	Dr. Hussain Al-Khaiat	4811188 Ext. 5191
Vice President	Ms. Hayfaa Al-Mudhaf	4836100 EXt. 4522
Director	Mr. Ubaidur Arain	4843565
Director	Dr. Yousef Shuhaibar	2446585/9

Chair Persons:

Membership Committee	Ms. Suad Al-Bahar	4836100 Ext. 4520
Technical Committee	Dr. Ahmed Essawy	4811188 Ext. 5729
Publicity Committee	Dr. Mohamad Terro	4811188 Ext. 5753
Social Committee	Ms. Shaikhah Al-Arfaj	4820411/22

Editorial Board

Mohamad Terro (4811188 Ext. 5753)
Mohammad. Iqbal (4804693)
Hussain Al-Najadah (5523725)
Mohamed Harb Sayed (4812145)
Humayun Kabir (4811188 Ext. 5728)

email: acikuwait@hotmail.com
Fax: 4817524

Announcements by Membership Committee

1. The Status of the membership so far: Individual members=124, Organizational members =13

2. Membership cards to be collected by respective members are listed below: Majed Hamoud ME103, Mazen Hamwi ME104, AbdulahAl-Mezieni ME105, Sameir El-Mezieni ME106, Samy Taha ME107, Adnan Al-Enzi ME108, Tarun Mukherjee ME109, Khaled Alsharawy ME110, Moustafa Mousa ME111, Hisham Khalil ME112, Anas Al-Kassem ME113 Mohsen Ahmad ME114, Khalid Al-Rashidi ST004, Abdullah Al-Essa ST005

3. Reminder for all members to submit to the membership committee the information to produce the membership directory. Information can be submitted to Mr. Tareq AbdulJalil, Civil Engineering and Building Department, Kuwait Institute For Scientific Research, Rm. #1822.

The opinions expressed in Concrete News are those of the authors and do not necessarily reflect the official views of ACI-Kuwait Chapter.

Editorials

Dear Colleagues,

Here we are again, the publicity committee, welcoming you to our second issue of Concrete News. Thanks to the cooperation of various active members of ACI-Kuwai chapter, our first issue met with success. It contained an interesting blend of information related to technical, industrial and social issues. We are still hoping to improve on both the quality and the quantity of articles of interest to those in the business of improving the use of concrete to build a better environment. However, to achieve this end, we are in great need for your cooperation and active participation in our newsletter. Our publicity committee has always received your comments and suggestions with keen interest. Hopefully, we are going to succeed in distributing this issue before the summer break when a large number of people in Kuwait will be leaving for their vacation. We wish all of you a calm and trouble-free summer, and we hope that you are going to come back with some fresh ideas and news. We are surely going to expect from you some interesting social news, at least. Finally, we would like to re-encourage all our readers to join the chapter and benefit from the many privileges that are offered to its members.

Address by Dr. Hussain Al-Khaiat
President of ACI-Kuwait Chapter

Why concrete made of natural materials, such as sand and aggregates, deteriorates in a short period ?

Why, often, designers have flaws that only the factor of safety is holding the structure?

Sometimes, we attribute the first problem to severe local conditions. However, if the concrete quality is poor, then these conditions will degrade concrete in a short time. The other problem might be attributed to the lack of a unified design code. However, major design codes lead to a safe structure.

It is unfortunate that we see, even in major projects, poor quality concrete, bad workmanship and inadequate structural designs. This lead to losses in lives, as we had several structural failures. The repair and rebuilding costs are tremendous.

These problems are attributed to two things: lack of knowledge and lack of ethics. The first problem is solvable. ACI Kuwait Chapter formation is a start to the solution by having a forum where members meet, discuss problems, and educate one another. I hope that the last twelve months, as we are celebrating our first anniversary, contributed to the awareness of the problem in Kuwait. I hope we will be able to tackle the second problem, ethics. Can you help ?

Seminar on Microsilica for Durable Concrete

A seminar on Microsilica for Durable Concrete was held at the Kuwait Society of Engineers on May 25th 1998. Al-Ghanim Specialities Company sponsored this event. The technical committee of ACI-Kuwait Chapter was responsible for the administrative and various preparations of the event. Mr. Robert Lewis of Elkem Chemicals, Norway, and who's an expert in this field presented the seminar.

During the seminar several intriguing questions were posed and a healthy technical discussion about the subject was held. However, the organizers of the events noticed that the number of ACI members who were present was as low as 15 compared to the total 40 attendees. We therefore, urge members of our chapter to take advantage of such valuable technical and scientiftc events that will be coming in the future.

Glimpse on the Construction Business in Kuwait

Tender documents for renovation of the north and south piers at Mina-Al-Ahmadi refinery could be issued by late May, industry sources say. The renovation work is expected to cost about $60 million. The Netherlands Frederic R. Harris is understood to be close to completing detailed designs on the scheme for Kuwait National Petroleum (KNPC). The project involves making short-term repairs to the south pier to keep it operational for another five years and long-term repairs to the north pier to keep it in working order for 15 years. The construction package will include piling and structural steel work. KNPC wants to keep the south oil pier operational until a new pier is constructed. The UK's Mouchel & Partners was awarded the front end engineering and design contract for the new pier last summer. The pier will be about two kilometers long and will handle a variety of products including gas-oil, crude, naphtha, kerosene, butane and propane. It will be capable of handling vessels of 60,000 - 300,000 dart.

Corrosion in Concrete Structures

Prepared by: Eng. Moh'd Harb Sayed
(Al-Ghanim Specialities)

The major causes of corrosion in concrete

Concrete is a highly alkaline material with a PH ranging from 12 to13. The embedded steel is protected by a passive oxide layer, which is maintained by high alkalinity at the surface of the steel.

Under certain exposures and conditions, the natural passivating protection of the steel breaks down in the presence of moisture and oxygen, resulting in a corrosion process.

High chloride levels

Chlorides from aggregates water, or chemicals used in the curing process, may cause corrosion of the reinforcing steel. As corrosion progresses in reinforcements, oxides build up, and cause an expansion resulting in debonding of the reinforcement from the surrounding concrete. Eventually, the concrete cracks, and the structure suffers damage.

Carbonation of concrete

The most common cause of loss of passivating alkalinity is the carbonation process where atmospheric carbon dioxide reacts with the soluble alkaline calcium hydroxide and other cement hydrates in concrete. These are then converted into insoluble calcium carbonate

$$Ca(OH)_2 + CO_2 \rightarrow Ca\,CO_3\downarrow + H_2O$$

(soluble) high alkalinity (insoluble) lower alkalinity

The alkalinity of the cement matrix gets reduced, resulting in loss of passivity.

Once a concrete in contact with the reinforced steel has carbonated, the steel loses its protection. In the presence of moisture and oxygen, corrosion damage is inevitable.

The electro chemical process of corrosion

The corrosion products of steel (iron oxides or hydroxides), occupy a much greater volume than the steel (4-12 times the volume). This increase in volume exerts an expansive pressure within the concrete, leading to cracking, and aplling of concrete. Being an electrochemical process, corrosion of steel in concrete requires an electrolyte. Concrete is full of small pores containing moisture, which is an effective electrolyte. A small electrical current flows between the anode and the cathode with corrosion activity (rust formation) taking place at the anode. The anode being the surface of the steel bar and the cathode its center.

Durability of an Epoxy Mortar System

MOETAZ M. EL-HAWARY
Civil Enginecring Department,
Kuwait University

Epoxy mortar systems are becoming a more widely used method of repair for reinforced concrete structures due to their high strength, rapid hardening and ease of application. The durability of some of these systems, however, is still in some doubt.

In this article the engineering properties and durability of a particular type of repair mortar consisting of a two component epoxy mortar system, available in the market and meeting ASTM C881 specifications for epoxy resins, was investigated. The effect of sulphuric acid sodium hydroxide and sodium chloride solutions at 40°C and 70°C on compressive strength and weight of the epoxy mortar was investigated for time durations up to 100 days. The compressive strength, tensile strength, flexural strength, bond strength and modulus of elasticity were also determined at 23°C and 40°C along with the water absorption for this type of epoxy mortar.

An increase in weight was observed for all specimens at all ages and exposure conditions. The critical exposure conditions were found to be the sulphuric acid and sodium hydroxide solutions at 70°C, where a reduction in compressive strength of about 40% was observed. At 40°C a maximum reduction of about 3% in compressive strength was observed for sulphuric acid exposure while an increase was observed at all ages for sodium hydroxide. An increase in compressive strength was also observed at all ages, and both temperatures, for specimens immersed in sodium chloride solution. The large difference in reduction in compressive strength due to temperature variation (39.37% to 3.12% for sulphuric acid and 37.93% to -1.52% for sodium hydroxide) emphasizes the sensitivity of the durability of epoxy mortars to variation in temperature. This fact should be considered for epoxy mortar systems exposed to chemicals at higher temperatures. The compressive strength was found to be higher for specimens cured at higher temperature. The effect of temperature on tensile and flexural strengths and the modulus of elasticity was found to be insignificant and may be ignored in design. The bond strength was found to be higher than the compressive strength due to failure not being along the bond line. The average water absorption at 7 days was found to be 0.07%.

In general, the type of epoxy mortar investigated was found to be durable and may be used in conditions comparable to those used in this investigation, except at temperatures close to 70°C, in which case an almost 40% reduction in the mortar compressive strength may occur.

Dinner Banquet at Radisson SAS Hotel

Our first annual dinner banquet, organized by the social committee, was held at the Raddisson Sas Hotel on April 28, 1998.

Around 60 members of the chapters participated in this dinner together with their accompanying spouses or guests. The total number of attendance reached 120.

The Chapter President, Dr. Hussain Al-Khaiat, started the program with an opening talk briefly describing the purpose of our chapter and encouraging all members to actively participate in all activities. This was followed by a presentation on GGBS (ground granulated blast slag) by Mr. Christopher Bibby, who is the technical marketing manager of Appleby company. Appleby partly sponsored the dinner banquet. The program of this gathering also included two quizzes to test the technical and social knowledge of the attendants. A raffle draw was performed to determine the six winners amongst the correctly answered quizzes. The prizes were:

1. Round trip ticket to Dubai by Qatar Airways.

2. Electrical appliances including a TV, video, and toaster by Hussain Al-Yousufi.

3. Dinner coupons at "Al-Boom" restaurant by SAS Hotel.

Bulletin

This space is reserved for bulletins by members.

Please contact Dr. Mohamad Terro at 4811188 Ext. 5753 for further information.

Announcements

The ACI, Kuwait chapter will be publishing a directory for its members. All members are requested to supply the following:
a) One passport size photograph, b) Address, telphone & fax numbers, c) Educational background information, and d) Job description in ten keywords.
Please contact:
Dr. Humayun Kabir (4811188 Ext. 5728)

Social News / Fun

Announcements

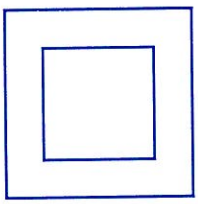
* Congratulations go to Eng. Tareq Al-Sayed who got engaged recently. We wish him success in his interesting adventure.
* We would like to congratulate Eng. Zafer Sakka and his wife for their new-born baby boy Ibrahim.
* ACI Kuwait is preparing for an exhibition on Concrete. Any members who are interested in assisting please contact Dr. Hussain Al-Khaiat at 4811188 Ext. 5191.

Ibrahim Sakka

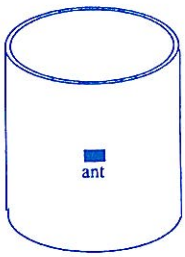
Puzzles

The front and the top view of an object are identical (shown).

Draw this object.



Top & Front view



An ant is located at the outside of an empty open can of honey, midway along the height. Diametrically opposite, on the inside of the can, there is a drop of honey. The circumference of the can is 240mm, and its height is 100mm. **Calculate the shortest distance for the ant to reach the drop of honey.**

Please fax you answers in writing to M. Terro at 4817524.
Prizes will be given by draw for correct answers (courtesy of Al-Ghanim Specialties)

Jokes

Four surgeons were taking a coffee break and were discussing their work.

The first said, "I think accountants are the easiest to operate on. You open them up and everything inside is numbered."

The second said, "I think librarians are the easiest to operate on. You open them up and everything inside is in alphabetical order."

The third said, "I like to operate on electricians. You open them up and everything inside is color-coded."

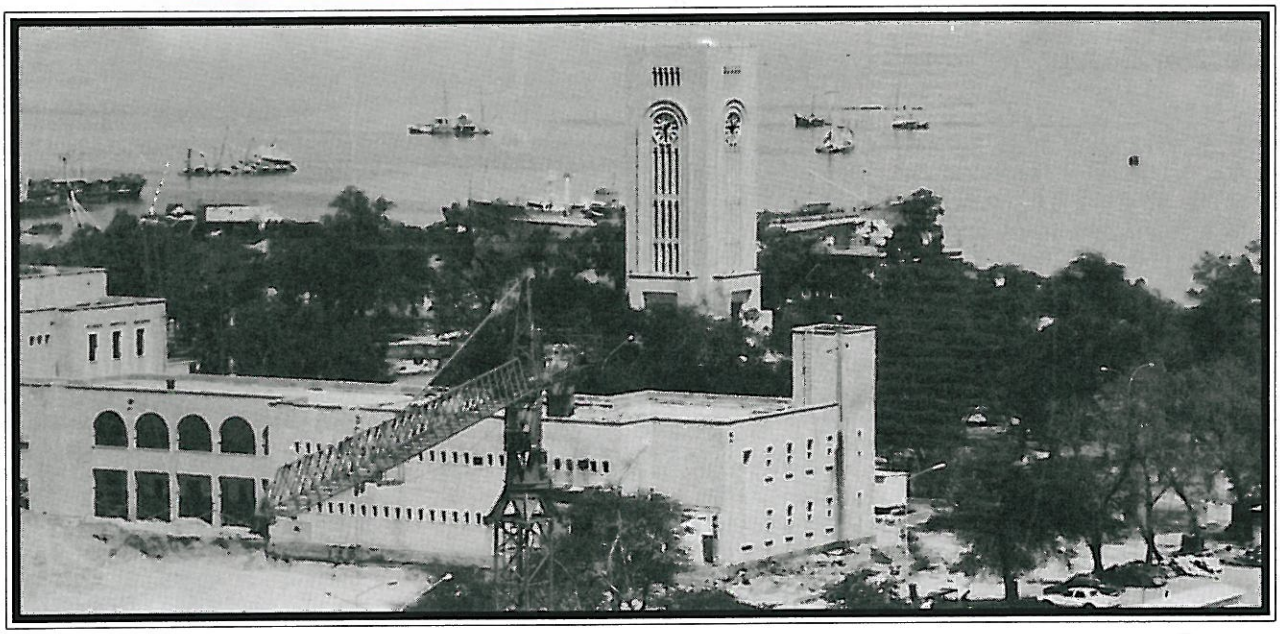
Fourth surgeon said, "I like Engineers...they always understand when you have a few parts left over at the end..."

Four engineers are traveling in a car...

Four engineers traveling in a car; a mechanical engineer, a chemical engineer, an electrical engineer and a computer engineer. The car breaks down. "Sounds to me as if the pistons have seized. We'll have to strip down the engine before we can get the car working again", says the mechanical engineer. "Well", says the chemical engineer, "it sounded to me as if the fuel might be contaminated. I think we should clear out the fuel system." "I thought it might be a grounding problem", says the electrical engineer, "or maybe a faulty plug lead." They all turn to the computer engineer who has said nothing and say: "Well, what do you think?" "Ummm perhaps if we all get out of the car and get back in again?"

KUWAIT UNIVERSITY CAMPUS PROJECT

College of Social Science and College of Legislative Sciences: Kuwait University



Introduction

Client: Ministry of Public Works, Special Projects Administration

Consultant: Kuwait Engineers Office (KEO)

Contractor: Al Khalid Eng. & Contracting Co. W.L.L.

Value: 118,600,000 KD

Duration: 8 years

Completion Date: 2002 / 3

SCHEME

The proposed new building for Colleges of Legislative Sciences and Social Scicnces is a diamond shaped complex constructed inside the existing complex. The college of legislative sciences which is proposed to be located at the North portion of the complex is spread into two wings and each wing in turn is three storeys high with ground, first and second floors. In one of the two wings is a new big theatre projecting out in plan. In addition to the big theatre there are two small theatres per wing.

All the buildings are low rise. The structural material chosen is primarily cast in place concrete. Structural steel has been used to the minimum where required and where dictated by the architectural requirements.

HISTORICAL SIGNIFICANCE

As the oldest prestigious building on the campus, symmetrically positioned in relation to the main campus entry, this facility is the pivotal building within the overall Kuwait University Shuwaikh campus. Its importance suggests treatments that respect and dignify its location and historical signiticance.

OBJECTIVES

The Preliminary Design is based on the approved Selected Concept Design in accordance with the directives from the Kuwait University and MPW-SPA.

The design successtully integrates a very large building program of spaces within the existing courtyards of the College of Arts Complex.

The overall expression is to establish a cohesive balance of Modern Architecture of the new and old Kuwaiti Heritage of the existing buildings using motifs, torm, scale, colour materials and textures along with a sensitivity towards the regional climatic conditions.

STRUCTURAL SYSTEM

The structural system proposed for the buildings is one way ribbed slabs supported on beams. Typically the ribs and the beams are 600mm deep, except at some localised areas where beam depth is limited to 1350mm. The ribs are spaced 900mm on centers with a 75mm thick topping slab. Typical column sizes are 500 x 500mm for basement and ground floor whereas they are 400x500mm for upper floors.

Structural steel is used in certain areas of the ground floor in the college of social sciences in order to fulfil structural and architectural requirements. The bridges connecting upper floors of various buildings is to be in structural steel.

There are five theatres in the college of legislative sciences. Each wing of the structure houses two small theatres which are integrated into the concrete one-way rib slab system proposed elsewhere. There is one more theatre which is big and projecting out of one of the wings. The big theatre has concrete columns and the roof is sloped. Due to the long span, structural steel roof trusses and metal deck roof is proposed to be used.

All the core walls used are 300mm thick reinforced concrete.

SUBSTRUCTURE

Isolated footings will be used for all columns except in areas where there is a basement. Raft foundation will be used in areas with basements. The ground floor slab in areas without basement will be 150mm thick slab on grade surrounded with tie beams on the perimeter of each building.

In areas where columns are located very close to the existing building, footings will be set back using stub columns and deep girders.

The substation building will be completed below the grade and shall have a raft foundation.

KUWAITI BRITISH READYMIX COMPANY

HISTORY

Kuwaiti British Readymix Company (KBRC) was formed in 1980 as a joint venture company owned by M.A. Kharafi & Sons (MAK) of Kuwait and by Redland Ltd. of Britain. The company continued to operate under this arrangement until the invasion of Kuwait by Iraq. During the invasion a large percentage of the company's assets were destroyed or damaged requiring major investment to re-establish it. At that point Redland decided to withdraw from Kuwait leaving M.A. Kharafi as 100% shareholder of KBRC with MAK retaining the British management which continues to exist today.

Since that time the company has reformed, following the necessary investment, and has been established as Kuwait's premier ready mixed concrete supplier.

SUPPLY CAPACITY

Currently KBRC operates from 3 computerised plants at Sulaibiya, Mina Abdulla and Riggae enabling it to provide excellent service to its customers throughout Kuwait. Each operation has its own laboratory which is well equipped and manned by experienced and trained staff. Emphasis on training is a high priority and a facility to provide suitable accomodation for staff training is an integral part of plant operations at Sulaibiya. With its large modern fleet of truck mixers and concrete pumps KBRC is a formidable force in Kuwait's ready mixed concrete market. In a working day the plants have an overall capacity of over 1500 cubic meters and can cope with major pours. The largest single continous pour to date being in excess of 3000 cubic meters.

QUALITY & SERVICE

There is a heavy emphasis on concrete quality which is recognised by those members of Kuwait's construction and consulting community who are aware of the need for quality concrete, supplied to specification requirements. Particular reference to maintaining the essential elements of concrete quality and timely service is paramount in KBRC's Policy Statement. It is also clearly evident in the way business is conducted on a day to day basis.

EXPERIENCE

High specification contracts supplied by KBRC include 225,000 cubic metres to Amiri Diwan and 109,000 cubic metres to MPW/MEW project at Surra. Concrete has been supplied by KBRC to a variety of different structures including palaces, high rise buildings, bridges, roads,

marine works, airport landing strips, power stations and domestic villas. Each category has its own particular requirement and experience of these projects has enriched KBRC and its management.

The KFAS project, Scientific Centre at Salmiya is currently being supplied by KBRC and has included concrete with requirements not previously experienced in Kuwait. For particular sections of the project, Ground Granulated Blast Furnace Slag and/or corrosion inhibitors have been used. Other special types of concrete supplied to projects include the following:

- High performance concrete
- Mass concrete for a bomb shelter
- Tremie concrete (under water concrete)
- Shotcrete
- Lightweight concrete
- Air entrained (first to produce this for American Embassy)
- Slip form concrete
- Coloured concrete
- Fibre reinforced concrete
- Concrete with microsilica
- Concrete with GGBS
- Concrete with DCI
- Low temperature concrete in summer
- Concrete designed for flexural strength
- Pump concrete for high rise building using static pipeline
- Concrete delivered to Failaka Island from the mainland.
- Readymixed concrete to a precast yard 2 hours away from the plant for precast units to achieve 40 N/mm² in 10 - 12 hours by steam curing. (This was pioneered and successfullv completed by KBRC).

NEW PRODUCTS TO KUWAIT

In terms of new products to the Kuwait market, KBRC has pioneered the use of slag cement, from U.K. producer Appleby Group. It has successfully produced the first concrete to contain corrosion inhibitor - calcium nitrite, and carried out further tests on polypropylene fibres, coloured concrete, air entrained concrete and concrete with Type II cement.

QUALIFIED SUCCESS

In pursuance of its aim for constant improvement, KBRC introduced a quality management system, I50-9002, in 1995. In 1997 it was decided to extend the company's pedigree and certification under the American based National Ready Mixed Concrete Association (NRMCA) Conformance for Concrete Production Facilities was sought and achieved in December of that year.

The organisation is a member of American Concrete Institute Kuwait Chapter and actively participates in the functioning of the chapter.

KBRC is approved and under supervision of MPW Quality Control Department as a supplier to all MPW projects.

KBRC is also on the list of approved suppliers for KOC, KNPC and MOD.

CONTROL

The basis of KBRC's ability to successfully control the quality of its concrete is the policy of "wet mix" which means that all materials together with water and plasticiser/retarder are mixed in the plant mixer by trained qualified personnel then delivered to the site in a transit mixer.

On the other hand with "dry mix" all materials including wet washed sand, but excluding mixing water, is loaded in a transit mixer and delivered to the site where water is added, mixing is completed and slump is assessed by the driver before discharge.