September 2003, Volume 1, Issue 6

CCI SRI LANKA

Bulletin

THE NEWSPAPER OF THE CHAMBER OF CONSTRUCTION INDUSTRY SRI LANKA

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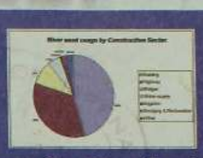


MINISTER MARAPANA - SUPPORTIVE OF THE SPECIALIZED BANK FOR CONSTRUCTION

At a recent meeting held at the Ministry of Highways, the Chamber of Construction Industry Sri Lanka delegation, led by the President Deshabandu Surath Wickramasinghe, proposed the establishment of a specialized bank for Construction to Honorable Tilak Marapana, and this proposal was positively discussed at length and the Minister agreed to take the initiative to realize this proposal. The CCI delegation also comprised, Vice President, Eng. D.D. Wijemanna, Eng. Rohan Tudawe, Mr. Jayasiri Samaratunge, Mr. M.G. Kularatne and Mr. Dayan Jayasuriya. Mr. Upasena Senanayake, Secretary to the Ministry of Highways, Dr. D.A.G. Goonewardena, Chairman RDA and Mr. P. Dayananda, General Manager, RDA, were also present at this meeting.

CCI has been lobbying for sometime, for the establishment of a specialized bank for the Construction Industry to facilitate the funding requirements of the Industry. The Bank as proposed will exclusively finance Infrastructure, Urban Regeneration, Housing and other construction related projects. The functions of this Bank will include providing Performance Bonds, Letters of Guarantee, Working Capital, Supplier Credit, Equipment Purchasing and Leasing.

The DFCC and the NDB are also Development Banks but their areas of interest are varied and numerous. Consequently, the specific needs of the Construction Industry are not adequately addressed. This has resulted in the Industry having to depend on the Commercial Banks for their financial requirements at the prevailing rates of interest. For e.g. if the financial value of a project exceeds Rs. 500 million the Performance Guarantee Bond required would be to the value of Rs. 50 million. A normal Commercial Bank would demand a collateral for the entire cover whereas a specialized Bank which understands the construction needs would evaluate the client with regard to the clients creditability, present performance, and the value of tangible assets, etc. The lending rates of the funds of the proposed bank are expected to range from 1 to 5% as in countries like Singapore, Malaysia, Japan and China. This has allowed those countries to boost their construction activities and if Sri Lanka is to emulate the developed countries, similar facilities should be provided to the local Construction Industry.

Of the required Capital the stakeholders in the Construction Industry have pledged to raise a sum of Rs. 300 million as equity and the Government facilitation remains vital in order to negotiate a bilateral loan with an International Funding Agency to establish this specialized Bank.

Bureaucratic apathy leaves Construction in Red.

The Government organizations, Provincial bodies and Statutory organizations have either delayed or defaulted a sum of Rs. 590 million to the Construction community on work completed according to specifications by them. Of this amount, the Bulletin reliably understands, a sum of Rs. 547million is due to the Construction contractors on work completed and certified by the clients consultants and Rs. 43 million is due to the Construction Consultants

The delays in payments generally range from three months to seven years and the major reason for this could be seen as beurocratic apathy and the communication snags that exist between the various ministries and the treasury. Although both the Consultants and Contractors have been appreciative of the co-operation extended in the past by the treasury under Dr. Jayawardene with periodic meeting between the Consultants,Contractors ,Heads of the Ministris and the Treasury Officials, the discontinuation of these meetings since Nov.2001,the Construction community feel, has exacerbated this problem. Sums of these proportions could create a considerable dent in the liquidity position of the Consultants and Contractors which will effect their ability to undertake future projects thereby adding to the problems of the Construction industry.

In response to the representations made by the President of the CCISL Deshabandu Surath Wickremasinghe the Treasury had responded very positively but the problem however appears to be beyond the Treasury since the relevant Ministries should take the initiatives to get the funds released.

Second Annual General Meeting of the Chamber.

The second Annual General meeting of the CCI is scheduled to be held on the 7th November2003 at the Colombo Plaza Hotel. The AGM will be followed by cocktails and Forum/ Dinner. Hon. Karu Jayasuriya, Minster of power and energy would be the Chief Guest at the proceedings and Hon. Thilak Marapana, Minister of Defence, Highways, Aviation and Transport will be the Guest of Honour. Government officials and other important personalities associated with the Construction Industry will also be invited. the key note speaker at the Dinner will be Mr.Peter Harold the Country Director, World Bank. Chamber members attending the Dinner are requested to contact Chitra or Mariya at the CCI office. Tel no. 2577812, 815, 816.

Theme of the September issue.

In order to promote specific areas of the Construction industry, the CCI would develop a theme in each issue of the bulletin to draw out specific sectors of the industry commencing from the September issue. The theme in the current issue therefore would be the "Property development" sector. 'Property development' is an area that has received tremendous recognition during the past decade, making a significant contribution to the country's economy and the consruction industry. As a precursor to this, the bulletin is featuring Mr. Crishantha Jayawardene, the current Executive Director of three Property Development companies; Ceylinco Housing and Real estate, Ceylinco Homes International Ltd., Ceylinco Homes International [Lotus Tower] Ltd. in a Question and Answer session with the CCI Editor Mr. Palitha Senanayake in page 16.

Editorial

The significance of the Construction industry and the voice of the Chamber

The importance of the Construction Industry to the National Economy of a country cannot be over emphasized. In the National accounts the place of Construction in the Economy is measured by two aggregates. The first is the contribution made by the construction industry to the Gross National Product (GNP), also called the value added. The second aggregate measures the contribution made by the Construction industry towards capital formation. Capital formation in a country is made of dwellings, non residential building, other construction and works, land development, transport equipment, plant and machinery and other capital goods of which only the first four would be accounted under the Construction.

In the International scene attempts have been made to estimate the world total capital formation and it has been observed that 88% of the world total capital formation is confined to the richer countries ofthe world which comprises only29% of the world population. The so called Developing countries account for only 8% of the total construction investment, although they account for 66% of the world population. International comparisons should, of course be treated with a margin for the accounting inaccuracies in the developing countries, but the fact is that the rich countries are becoming richer because of their ability to invest in Construction and the poor countries are becoming poorer due to their inability to invest in Construction.

Even from the most primitive standards, the man of the stone age first looked for a cave to give him shelter before he would started looking for his next basic need, food. A few weeks ago the honorable Mr.Thondaman, the Minister of Housing and Estate Infrastructure at the ceremony held to formally sign the MOU between the CCISL and INDST for the promotion of Trenchless Technolgy observed that **'Construction is the first step in any economic activity, people spend most of their time inside a building, whether it be for living ,working or relaxing'**. The Hon. Minister was only trying to feel the Construction than to calculate it. The beneficiaries of a Construction boom will not be only the contractors but there will be 'trickle down' effects right down to the smallest vendor in the wayside boutique.

Having realized the importance of the construction industry and therefore the need to organize the industry on a more cohesive and a coordinated footing 8 professional organizations allied to the construction industry formed themselves in to an apex body called the Chamber of Construction industry. This Chamber is meant to be the collective voice of the Construction Industry and act in Consultative capacity to the Government on matters of Construction and in general promote the construction industry on all fronts. During the one and a half years of its existence the Chamber has raised many a pertinent issue on the industry and endeavored to accomplish much but has been successful only in some.

The President of this Chamber, time and again over the columns of this bulletin and also over the National press reiterated the need to intervention by the Government to revitalize the Industry which experienced a period of depression during the last few years. We published incepts from the Central Bank annual report of 2002 which called the performance of the Construction industry 'dismal' with recommendations for transformation. Our position has always been that the 'impetus' alone is not sufficient and the need of the hour is 'infusion' by way of a major government construction projects to 'kick start' the Industry and the Economy. We highlighted the bureaucratic apathy and how it could delays the implementation and commissioning of the projects. Certain Government officials reacted with 'disbelief' to our claims that only 15% of the donor funds on infrastructure projects were hitherto utilized, but in no time no less a person than Mr. Choksy, the Governments Finnance Minister admitted in the National press that the aid utilization on infrastructure projects had been around 17%. Still after some time the Prime Minister in his address at the Tokyo aid meeting spelt out in very clear terms the need to improve the aid utilization percentage and acknowledged the need to overhaul the 'bureaucratic machinery'.

We championed the cause of a National Construction Policy for the Industry and emphasized the need for such a policy to encompass not only the regulation of construction but also the regulation of the use of raw material and the effect on environment. We voiced our concern on Trade certification and the need to privatize the Accreditation agencies if their performance records leaves things to be desired .We have consistently expressed our position on the area of skills development and have already taken certain meaningful steps in this direction. We have now introduced an Insurance scheme for the benefit of the construction workers.

Our position on the deployment of foreign consultants and contractors had been that they should be employed only as 'supplementary' and never as a 'substitute' for it is not only the construction of projects that matter but the total benefit to the Industry and the country at the end. In this regard we have always advocated the examples set by the newly industrialized countries as suitable for our country's Construction industry. We have established bilateral relations with international Construction organizations and have laid a foundation for Construction Consortia.

We have been consistently promoting new technology on construction and we have striven hard to promote alternative material in place of scarce and expensive raw materials such as river sand. The latest issue that the Chamber has to take up in earnest, is the issue of outstanding dues of the members of the Consulting and Contracting community. The Government, Provincial and Statutory organizations, have either not paid in time or defaultered to the Construction Consultants and contractors a sum of Rs.590 million during the past few years.

The Chamber has taken all this upon itself, for the professionals who are instrumental in forming this Chamber believe, that the Construction industry is an important, if not the most important force to revitalize the country's economy.

Chamber Of Construction Industry Sri Lanka

CCI SRI LANKA

we strive to

- *Be the voice of the Construction Industry*
- *Provide Management and skills education and training for the construction industry*
- *Be the promoter of services and business opportunaties for the Chamber Members*
- *Catalize the formation of construction consortia*
- *Disseminate information for the Chamber Member ship*
- *Facilitate market research and promote foreign collaboration*
- *Promote public / Private partnership for Infrastruc ture and related projects*
- *Initiate the pension, health and retirement benefit plan for the construction industry*

Diary of CCI Events August / September 2003.

27th August 2003 :
The 2nd Round Table Discussion on Mobilization of Local Private Sector participation in North East Reconstruction Programme at Kilinochchi. CCI was represented by Mr. Dakshitha Thalgodapitiya

2nd September 2003 :
Meeting with Mr. Amul Gogna, Executive Director of ICRA Limited, New Delhi, India at the Chamber Auditorium on Business Developments for Corporate Membership. CCI was represented by Mr.Dakshitha Thalgodapitiya, CEO.

2nd September 2003 :
Meeting with the Japanese Delegation of Sri Lanka Reconstruction and Development Assistant Forum at the Chamber Auditorium. CCI was represented by Mr. Dakshitha Thalgodapitiya.

4th September 2003 :
An Interactive Meeting with the visiting Indian delegation at the Sri Lanka Exhibition and Convention Centre. This meeting was held in connection with the 'Construction and Infrastructure Expo', a trade fair organised by the Indian Federation of Chambers of Commerce from 4th to 6th September 2003, which was supported by the Chamber of Construction Industry Sri Lanka. The meeting was attended by several Council Members and Corporate Members.

22nd September 2003 :
Meeting with Hon. Minister Thilak Marapana, Minister of Defence, Aviation, Transport and Highways at the Ministry of Highways, Sethsiripaya, Battaramulla. CCI was represented by Deshabandu Surath Wickramasinghe, Eng. D.D. Wijemanna, Eng. Rohan Tudawe, Mr. Jayasiri Samaratunge, Mr. Dayan Jayasuriya and Capt. M. Kularatne.

New Members for September

The following Organizations were enrolled as Corporate Members of the Chamber during the month of September 2003.

1. K.D.A. Weerasinghe & Co. Pvt Ltd.
8/16, Thalapathpitiya Road,
Nugegoda.
E-mail - kdaw@eureka.lk

2. Royal Ceramics Distributors (Pvt)Ltd.
No. 10, R.A. de Mel Mawatha,
Colombo 3
E-mail - tharana@rcl.lk

3. Sam Samarasekera & Co. Ltd.
240, Katugastota Road,
Kandy
E-mail - ssco@sltnet.lk

4. Lanka Tiles Ltd.
34/5, W.A.D. Ramanayake
Mawatha,
Colombo 2.
mahendra@lankatile.com

5. Wins Products Lanka (Pvt)Ltd.
621, Negombo Road,
Mabole, Wattala.
jayasath@dialogsl.net

6. R.E. Weerakoon Constructions
272, Galle Road,
Kalutara South
munasin@sltnet.lk

7. NEM Construction (Pvt)Ltd.
100/1, D.S.Senanayake
Mawatha,\
Colombo 8.
nem@itmin.com

8. GTB Colombo Corporation (Pvt)Ltd.
No. 15, Boteju Mawatha, off
Thimbirigasyaya Road,
Colombo 5.
gtbtor@sltnet.lk

The applications of the above members were ratified at the Council meeting held recently. The Chamber wishes the new members success in all their endeavors.

SMALL HYDRO,

The leader in small scale renewable elecrical energy generations

by: WDAS Wijayapala.
BSc Eng (Hons), MEng, MIE (SL), MIEE (UK), CEng, Manager – Hydro Power, Lanka Transformers Ltd)

Hydro power has a very long history. There have been major power plants in the world which have operated nearly a hundred years and still in good shape. The power plants in the Laxapana complex, nearly fifty years of age, continue to supply a fair portion of our annual electricity requirement. Thus, hydro power has been the major renewable supplier of electricity at economical price over the years.

The concept of **small hydro power** has also been as old as major hydro power plants in the world. There have been many mini and micro hydro power plants built in our tea and rubber plantations by the British in early part of last century at a time when grid electricity was not available. But as the national grid was expanded to these remote places over the years, these plants were neglected.

However the unprecedented increase of electricity prices, specially in the last ten years, have opened the eyes of many industrialists, investors as well as planters and consequently there is a huge boost in the sector of micro, mini and small hydro power development. To add zest to the situation Ceylon Electricity Board (CEB) started to purchase electricity produced from small hydro power plants in early nineties attracting a host of investors into the field of private electricity generation by small hydro Power Plants. This has been further strengthened by the continuous increase of tariff paid to suppliers over the last several years. Table 1 shows the tariff paid for electricity generated by small hydro power plants from 1996 to 2002. The tariff is revised every year based on the avoided cost of electricity generation by CEB. Naturally with the increased cost of fuels and a cheap coal power plant not within the sight of next five years, the likelihood is that the tariff paid for small hydro shall be on further increase.

	1996	1997	1998	1999	2000	2001	2002	2003
Dry Season	2.90	3.38	3.51	3.22	3.11	4.20	5.13	6.06
Wet Season	2.90	2.89	3.14	2.74	2.76	4.00	4.91	5.85

Table 1 - Tariff Paid in LKR for a kWh through the Standard Power Purchase Agreement (SPPA)

Traditionally the hydro power schemes are classified into Micro, Mini, Small or Large depending upon the capacity of the plant. Although there is no hard and fast rule the following sizes are generally accepted.

Micro Hydro - Plants less than 250kW

Mini Hydro - Plants from 250kW up to 2000kW

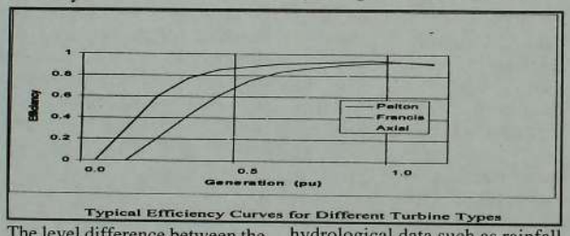
Small Hydro - Plants from 2000kW up to 10000kW

Large Hydro - Plants above 10000kW

Sometimes the word Mini Hydro is used for all plants up to 10000kW

Constructional features of a small hydro power scheme.

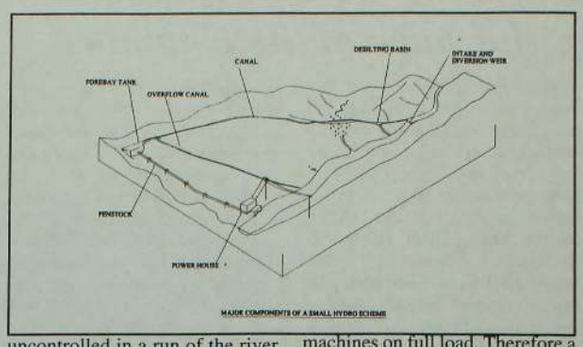
A hydro power scheme essentially consists of flow of water from a high altitude to a low altitude. Large hydropower projects (such as Victoria, Kotmale or Laxapana) usually comprises of a dam and a large reservoir which collects water from one or several rivers or streams. Water from the reservoir is controlled and issued to the power plants depending upon the electricity generation requirements as well as the down stream irrigation water requirements. On the other hand, a small hydro power project usually does not involve a reservoir. Water is tapped from a river or a stream by constructing a small weir and water is brought to a power house through a canal and a penstock. Then the water passes through a turbine imparting the energy to the turbine and flows back to the river. Figure 1 shows a typical layout of a small hydro power project. The turbine is coupled to a suitable generator which produces electricity to be either supplied to the national grid or to be used as a stand alone unit supplying a village or a factory.



Typical Efficiency Curves for Different Turbine Types

The level difference between the water tapping point and the turbines is termed as the "head". Of course there will be a head loss due to different structural components (such as canal and the penstock); and therefore the term net head (H_{net}). A canal is used to take the water from the weir upto a location closer to the power house on the same level so as to minimize the length of the penstock. The end of the canal usually ends with a large tank which is called as Forebay Tank. The penstock starts from the forebay tank. In between the weir and the forebay tank there may be one or several desilting basins and an overflow canal. The penstock, usually made of steel (there have been occasions where wooden penstock are used in other countries), must be robust enough to withstand the pressure of water and any dynamic loads during operation. The lower end of the penstock is connected to the turbine through a valve.

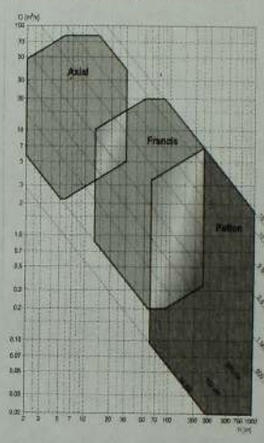
The amount of water available for power generation varies depending upon the rain and



MAJOR COMPONENTS OF A SMALL HYDRO SCHEME

uncontrolled in a run of the river scheme. Therefore a measure is introduced as Rated Flow (Q_r) which is an average indication of the flow of the stream. The determination of the rated flow is not very easy and involves some risk factors. The product of the rated flow and net head is directly proportional to the size of the plant in kW and will also determine the energy output of the plant. Therefore an over estimation of the flow will result in a bigger plant at a high cost but the energy output shall be less than the expected. Similarly an under estimation of the rated flow will result in a smaller plant at a lower cost but the plant may not be able to utilize most of the water during the year.

The hydrological analysis isusually carried out by a hydrologist based on various hydrological data such as rainfall measurements and flow measurements. It is very fortunate if stream flow measurements are available over several years. To have a rain gauge in the catchment area is also very useful. In case neither of these direct measurements is available there are techniques of using the data from the closest rain gauge to the catchment area and generating a prediction of rainfall pattern relevant to the catchment area under consideration. However all these deviations will introduce a new risk factor and may affect the accuracy of energy prediction. It is usual to have data for at least 30 years to obtain a reasonably accurate hydrological prediction. Once a hydrological study has been carried out, it is possible to prepare a Flow Duration Curve (FDC) which depicts the available flows and the period over which such flows are available during the year. Figure 4 shows a typical FDC. There we can see, for example that, over 35% of the period the flow has been above 1.0 m^3/s. Therefore if we select a turbine with rated flow of 1m^3/s then we shall not be able to use full water of the stream over a period of 35% of the year (i.e. about 128 days). On the other hand if we select a flow of about 2m^3/s as the rated flow, then only 10% of the year we can run the machines on full load. Therefore a compromise has to be made. Now a days, there are optimization techniques to decide upon these figures to obtain maximum plant output at optimum plant cost.



Selection of the type of turbine

Power output

Although it is not possible to address all the calculations of power and energy output from a small hydro power project, it may be to know how to determine the basic power out put for a typical case.

The power output (P_{net}) in kW can be calculated based on the following formula.

$$P_{net} = E_{net} * 9.81 * H_{net} * Q_r$$

Where E_{net} is the overall efficiency of the system. Which is calculated as;

$$E_{net} = E_t * E_g * E_{tf}$$

Where E_t is the turbine efficiency; E_g is the generator efficiency and E_{tf} is the transformer efficiency.

For a typical project of H_{net} = 170m ; $Q_r = 2\ m^3/s$, $E_t = 88\%$, $E_g = 96\%$, and $E_{tf} = 98\%$ the expected rated power output will be:

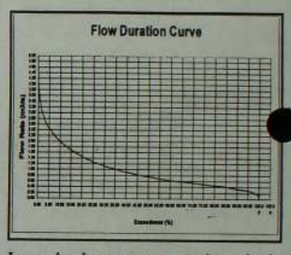
$$P_{net} = (0.88 * 0.96 * 0.98) * 9.81 * 170 * 2\ kW = 2760kW$$

Based on this power output and availability of water the annual energy shall be calculated.

Turbine types & efficiencies

There are various types of turbines used in hydro power projects. The type of turbines depends on the rated head and the rated flow of the project. The figure 5 shows the selection of turbine types for a hydro power scheme depending upon the head and flow.

Turbine efficiency is also dependent upon the type of turbine as well as the rate of water flow. Figure 6 shows some typical curves depicting the turbine efficiencies for various types of turbines. These curves are very useful in determining the individual machine capacities in a plant. For example, a Pelton turbine has better part load efficiencies compared to Francis turbines. So if the curves in figure 5 permits, it may be useful to have Pelton turbines for a scheme having a wide variation in water flow. Similarly it may be useful to have a one large Francis turbine and about half size Francis turbine together in order to maximize the water usage. Then the small unit can operate at a higher load with higher efficiency when the river flow is low. This kind of optimization in plant selection is very important in order to make the maximum use of the available site.



In a hydro power project it is extremely difficult to carry out an accurate efficiency measurement at site. It is also not possible to test the equipment at the manufactures facility. Only possible way is to make a model turbine and to test it under simulated conditions. This also is a very expensive exercise. Typically the turbine manufactures go by their experience and several model tests they may have carried out.

Cost aspects of small hydro plants

Cost of any hydro power plant is specific for the site. However it may be useful to know the range of costs for average site conditions. For a typical small hydro project the project costs shall be in the ranges shown in the Figure 7. Again the costs will greatly depend upon the quality of work, type of turbines, supplier of turbines etc. For example, European machinery will be double the cost of machinery from East Asia. Generally the cheap equipment has poor efficiencies as well as poor performance. Therefore the project may have to suffer from the loss of production of anticipated electrical energy amount. Similarly the cost of civil work will depend upon the quality of work and quality of material used. The total costs of a small hydro power project is in the range of 70MLKR to 100MLKR per 1000kW depending upon the site conditions as well as the quality of equipment. When compared to wind power as well as to other forms of renewable power, small hydro power stands above all, especially in regard to cost competitiveness and reliability of equipment which ensures several decades of trouble free operation.

Concrete pavements highly recomended for our road conditions

By: T.I.R. Thilak Silva.
Bsc., Eng(Hons)., M.Eng., MIE(SL)., CENG

Present Condition of our Roads :
One of the major obstacles that our country faces today is the deteriorating condition of our major intercity highways, which makes traveling on these roads risky, unpleasant and frustrating. Every one can witness the condition of bituminous roads that were overlain about 10 years back, such as the Colombo-Negambo road. Extent of rutting, fatigue cracks and pot holes is so much beyond the tolerable limits. This is the first impression any tourist or an investor arriving from the airport gets before he enters the Colombo city.

Mumbai Experience :
Residents of Mumbai city also had the same feelings before late 80s, when they had such a horrible black pavements covered with a series of rutting, pot holes with ditches dug by the utility providers running across the entire width every 100 meters or so. They did not want to continue with this embarrassing situation forever; that is why they insisted that the Brihan Mumbai Municipal Corporation should find an alternative solution to this persistent problem of poor roads that made their city looked so untidy.

In spite of the resistance and the much reluctance of the supporters of bituminous bound pavements, Brihan Mumbai Municipal Corporation took the bold step of introducing concrete pavements as the ideal long-lasting solution to this problem.

Mumbai- Pune Expressway :
A futher step taken in this right direction by India was the construction of concrete paved Mumbai- Pune Expressway, a highly ambitious project undertaken by the Government of Maharashtra. They entrusted the construction work of this project to the Maharashtra State Road Development Corporation Ltd.,(MSRDC) in March 1997 on a BOT basis, with permission to collect toll for 30 years. It was first open to traffic on the 5th April 2000.

India's experience with concrete roads dates back more than 50 years. The Marine Drive in Bombay which was built 50 years ago, is still in a good condition and has required very little maintenance during the half-a-century of its existence. Other concrete roads in Delhi, Madras, Hydrabad and other metropolitan cities have also stood the test of time.

First Concrete Pavement :
As per historical records first concrete pavement was built in 1891 in Bellefontaine, Ohio. That pavement is still in use, and the American Concrete Pavement Association recently commemorated its builder, George Bartholomew, on the pavement's centennial.

US Experience on Concrete Roads :The first concrete highway was constructed in the United States was a 24-mile long, nine-foot-wide, 5" thick concrete pavement built near Pine Bluff, A.K., in 1913. By 1914, Portland Cement Concrete had been used to pave 2,345 miles of roadway in the U.S. highways.

Significant technical and design developments during the 1930s and 1940s made concrete paving faster, less expensive and durable. During this period contractor's developed a better method of forming contraction joints by sawing the concrete once it was partially hardened to create a smoother joint and better even highway surface.

The slip-form pavers were invented in 1949, and it became another milestone in the development of concrete paving technology.

1960s and 70s were the heydays for the concrete roads in the US. As at today, 60% of the 47,744 miles US interstate highway system is built of concrete, especially in the urban areas where heavy traffic volumes are experienced.

Concrete streets in Sioux City survived an average of 58 years before replacement or resurfacing. Denver, Colorado invested in concrete streets in the early 1950s. Fifty years later with much heavy use and extreme temperatures, these pavements are still in good shape.

Australian Experience:
In Australia, 1970s saw the commencement of the modern era of rigid pavements. Improved design procedures, the advent of high volume slip-form pavers and the acceptance of life cycle costing allowed the cost effective construction of long lengths of concrete pavements for conditions of heavy traffic and poor sub grade, particularly in New South Wales. The adaptation of the best overseas design technology, from both USA and Europe, by the use of bound sub-bases, tied shoulders and checks for erosion at joints has meant, Australian Pavements Concrete Technology, now world class.

Reasons Why Concrete Pavements can be considered as the Ideal Solution to our Road Problem: -
Concrete can naturally support the heaviest loads, such as heavy truck traffic. Deforms less than asphalt under load.

Although the initial cost of concrete can be higher than asphalt, concrete usually has a useful life twice that of asphalt. On average 40 years would be the useful life of a properly constructed concrete road. Concrete pavements consistently serve 20-30 years without

needing major repair, while asphalt lasts only 8-12 years

before resurfacing, or significant repairs are required.

With concrete roads, ruts, shoving and washboard effects would not be the failure criteria as common with asphalt roads.

Concrete pavements are easily textured during construction to create a surface that provides traction and quite riding.

The durability of concrete minimizes the need for extensive repairs and annual maintenance. When repairs are necessary, they are typically smaller in extent than with asphalt pavements.

Cost Benefits:
Maintenance cost typically less than asphalt by 25-50% Better reflectivity during night saves costs of installation and maintaining street lighting Lower maintenance cost for vehicle owners Saving on lost money due to traffic jams, accidents, heavy vehicle maintenance due to bad road conditions that arise with under-maintained asphalt roads 20% cost saving on fuel for heavy trucks Life cycle cost benefits

White topping:
placing a layer of concrete over existing asphalt surface or Ultra thin topping (in which a thin layer of fiber reinforced concrete is placed over prepared asphalt surface) is a fast and cost effective method of rehabilitating distressed asphalt pavements.

When the concrete pavements need replacement after its design life about 40 years, the old surface can be crushed and used in the new road surface or for the base.

Things to Observe when new Concrete Roads are designed and constructed: -

To overcome problems with ground subsidence:
Carry out proper soil investigation to find out details about underlain soil, especially problematic soils such as compressible peats and poor bearing soils.

Evaluate the sub grade CBR and settlement characteristics of soils in the zone of influence.

Determine suitable soil replacement or stabilization methods in case of weak, compressible or expansive soils. Sub base preparation should be given careful consideration (correct material selection and adequate compaction).

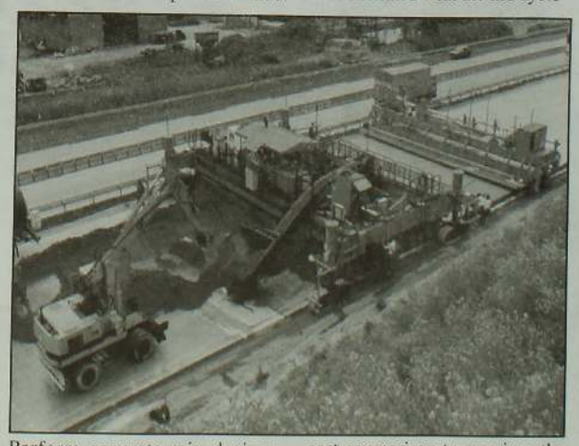
To overcome problems with utilities:
Pre-plan the location of utilities across the roads before concreting.

Provide underground ducting for future expansion of services As an alternative, shoulders can be paved with pre-cast concrete blocks or paved with a strip of flexible base material to facilitate future digging for utilities. Modern tunneling techniques such as horizontal drilling also make possible the laying of new utilities under existing concrete pavements without disturbing the pavement.

To avoid problems with respect to preservation of sub base and subgrade :
Proper drainage system to avoid rainwater percolating to the subgrade. Provide subsoil drains in cut sections. Maintain correct camber to avoid collection of water on the pavement.

Provide a permeable drainage layer beneath the concrete pavement across the full carriage width. A granular sub base can act as a drainage layer.

To avoid problems with respect to design:
Accurate estimation of design wheel loads. Select the base thickness based on CBR value of sub grade and sub base material, thickness of the sub base and the design axle loading using a theoretical or an empirical method.



Perform concrete mix designs toachieve required flexural strength in concrete.

To avoid problems due to thermal and shrinkage cracks:
Contraction joints are placed 4 to 6 meter intervals in un-reinforced concrete. Depth of saw cut to induce crack should be about 1/3 depth of the slab. Dowels are provided across the contraction joints and one end would be coated with either plastic or bitumen to give free lateral movement. Longitudinal joint spacing is between 3 to 5 meters. The saw cut to induce this joint extend up to half the depth of the slab. Tor steel tie bars are provided across the longitudinal joints to prevent the adjacent slabs from separating or curling up.

All joints should be sealed with flexible and long lasting sealing compound to prevent ingress of water and dirt.

To ensure smother riding surface:
If concrete pavers are not used, use porker vibrators to compact the concrete and screed vibrators to level the concrete and finally to finish the surface.

After the concrete has been leveled smooth, it is required to texture the surface. Excess slurry on the surface should be removed with bull floating. Surface should then be brushed to get the texture with a coir brush with hard long bristles. Concrete slab should be cured by spraying a curing compound or by laying wet hessians.

How to popularize concrete roads in Sri Lanka:
There not been much thought given by the local road engineers to yield the benefits of concrete roads for the local applications. On one side, funding limitations force Engineers to opt for the bituminous roads. On the other side reluctance to change and the concern about redundancy of acquired expertise on bituminous roads make our engineers driven further away from concrete pavement technology.

General public, road users, foreign tourists and foreign investors need better roads. We should look forward to accept the reality and change for the betterment of everybody. It should also be clearly demonstrated with the life cycle cost comparison to convince the politicians and the bureaucrats to adopt concrete pavements for the proposed new expressways and future major rehabilitation works.

Construction chemicals

the admixtures in concrete.

By: Anura Weerasinghe.
Bsc. Eng.(Hons), C.Eng., MIE (SL), MIE Aust

Introduction.

Concrete was accepted as a good building material since the time of the Roman civilization and still continues to contribute towards many advantages in making various structures. Researchers started their work on improving quality of concrete as soon as concrete was introduced as a building material and found that the addition of certain amounts of materials, admixtures, promote desirable properties to a great extent. When turning the pages of history in human civilization, one can easily see how Romans improved the Pozzolonic cements, improved workability and durability, by adding blood, pig's fat, and milk to cement. This simply shows how in the medieval days people were trying to improve the properties of concrete by adding some materials.

Admixtures have become an important part of concrete technology and they are indispensable to the engineer and architect. There are several hundred admixtures on the market and their intended uses vary very widely indeed. Generalizations are therefore difficult to make. The scope can perhaps be illustrated by saying that they range from those that are absolutely essential in some applications of concrete to those which are sometimes used with little more than wishful thinking as to their benefits.

The name admixture is itself subject to various interpretations but is currently accepted as meaning an integral addition to concrete at the stage of batching and mixing. The term 'additive' should be noted as meaning an addition to cement during its production.

Basis for the ues of admixtures.

The positive use of admixtures in concrete construction shall always be based on a positive reason and sound knowledge and never indiscriminately on vague impressions that it may do some good and will not do any harm; nor can admixtures remedy poor site control over concrete production. The positive reasons fall in to three groups:

(1)To give the concrete a particular property it does not otherwise possess (e.g. particular color)

(2)To modify some property which might otherwise hinder good concreting practice (e.g. to reduce excessive bleeding), or

(3)To reduce costs.

The difficulties which might arise following the use of an admixture shall always be considered prior to their use.

Heat of reaction, rate of reaction, volume of pores, and the formation of gel are the basic criteria considered in the development of admixtures. It has to be admitted that none of these features of interest can be controlled completely. It is however possible to influence some of them if these aids to concrete technology are applied properly.

Classification.

Many attempts have been made to classify admixtures both by chemical constituent of the material and by the effect on the properties of concrete in the fresh state, early age, and hardened state. Generally these attempts have been only moderately successful because of the great variety of materials and effects and the fact that a high proportion of proprietary admixtures are a mix of several groups of chemicals aiming to modify several properties of concrete at the same time. This complexity leaves the user in a position of being largely dependent on the admixture supplier for details of the admixture and how best to use it. The advice of the supplier shall therefore be sought before an unknown admixture is used and the appropriate trials undertaken. Some broad group names used are as follows.

Chemical admixtures, Miscellaneous admixtures, Plasticisers (chemical), Superplasticisers (chemical), Hyperplasticisers (chemical), Multi-function admixtures (e.g. combination of plasticizer and air entrainer), Special purpose admixtures (e.g. under water concrete, shotcrete)

Some typical applications of Admixtures

Property	Admixture	Remedy for
FRESH CONCRETE		
Workability	Water reducing admixtures	Bleeding
Workability	Air entraining admixtures	Non-homogeneity
Workability	Finely divided powders	Segregation
Workability	Retarders	High-year duration
Workability	Pumping aids	Pump clogging
EARLY AGE CONCRETE		
Property	Admixture	Application
Rapid setting	Set Accelerators	Screed to wet foundation
Rapid Setting & Hardening	Setting & Hardening Accelerators	Wet foundation
Plastic Cracking	Air entraining	Concreting in hot weather
Heat of hydration	Water reducing retarder	Mass concrete
HARDENED CONCRETE		
Property	Admixture	Application
Ultimate strength	Water reducing admixtures	Normal concrete
Ultimate strength	Pozzolanic materials	High grade concrete
Ultimate strength	Super plasticisers	High grade concrete
Density	Air entraining agents	Light weight concrete
Color	Pigments	Architectural
Volume change	Retarders	Mass concrete
Permeability	Pore blockers	Corrosion inhibitors
Permeability	Densifiers	Corrosion inhibitors

What are Plasticisers

It is a chemical admixture which causes dispersion of cement grains. This effect is caused by the absorption of plasticizers onto the cement grains. Dispersion of cement grains frees water previously trapped in cement flocs, releasing it to contribute to workability of concrete, leading to a more fluid mix. This freed water can be removed, returning the mix to its original workability but with a lower water cement ratio. Compressive strength is therefore increased. Cement can also be removed, maintaining the water: cement ratio at its original value. Workability and strength remain as before the admixture was used. As a rule of thumb, plasticizers give up to 15% water reduction at normal dosage. To obtain results higher than this either over dosage or super plasticizers must be used.

Benefits of plasticisers

A general point is that the use of plasticizers will, because of better and more even dispersion, give a generally improved concrete.

Increased setting time --}Large pours with less joints.
Increased workability --}Improved placement.
Increased strength --}Early strength gain for fast de-moulding & Long term strength improvement for specification purposes.
Cement saving --}Reduced cost, Reduced temperature rise & Reduced Alkali levels.
Durability --}Lower permeability, Reduced Alkalis & Improved dispersion.

Associated with these factors is the need to consider and allow for any secondary effects of individual admixtures

Superplasticisers

Super plasticizers de-flocculate cement particles in a similar manner to that of a normal plasticizer, but have a much more powerful action, albeit at a much higher dosage. The typical dosage of superplasticiser is up to six times that of a normal plasticizer, but even at these dosages, unwanted secondary effects such as retardation and air entrainment are not present at excessive levels. In studying the effect of cement paste, it will be found that normal plasticizers give increasing fluidity with increasing dosage up to a certain level, above which the effect tails off rapidly. Conversely superplasticisers show relatively little effect at low dosage, but their effect then increases very rapidly to give fluidities of double that which can be achieved with normal plasticizers. They are usually based on synthetic organic polymers.

Benefits of Superplasticisers

If the super plasticizer is added to normal concrete mix without any reduction in water, a large increase in workability is obtained. For normal mix with a slump of 60 to 80 mm, the concrete will become flowing and will self level with a minimum amount of external help. The period for which the concrete maintains this high workability is important and varies for different types of superplasticiser.
If a super plasticizer is added to a normal concrete mix, then water can be reduced by between 16 and 25% without lowering the workability. The most important benefits are very high early strength, often better than that can be obtained from using accelerating admixtures. Also very significant reductions in permeability to water and chloride ion diffusion which can lead to a more durable structure

Integral Waterproofers

This category of admixture is something of a misnomer. There is no chemical admixture which can be added to an unsatisfactory concrete and make it water proof. If the type of concrete chosen is appropriate, is properly designed, compacted, and cured, then chemical admixture can be used to improve the impermeability and /or the weathering of such concrete. There are three types of admixture in this category, namely pore blockers, concrete densifiers, and combination admixtures which do both.

Pumping Aids

Admixtures can improve pumped concrete by reducing pump pressure and by reducing the risk of blocked pipes. The choice of an admixture as a pumping aid should be made with a clear idea of its purpose, or problems could result. For example, putting an admixture labeled 'pumping aid' which contains a thickening agent in to a cohesive mix would simply decrease pumping efficiency. Correctly chosen, admixtures give economic benefits to pumped concrete, and are widely used for that purpose. The biggest category is plasticizers, usually chosen for other benefits besides pumping.

Superplasticisers in flowing concrete are increasingly being used in this way. Air-entraining agents and combination air-entraining/plasticizing admixtures are also used. Special admixtures are available for solving specific pumping problems, for example lightweight concrete mixes. Retarding plasticizers may be used when extended workability may be required, for example for bored piles.

Underwater Concrete Admixtures

Admixtures for concrete placed underwater have now been developed to the stage that they are now widely used. The use of this type of product allows concrete to be placed underwater with far less risk than was previously possible. Concrete can easily be placed underwater using pumps. Under some circumstances, concrete is allowed to freefall through water and still give satisfactory results.

Washout of the sand cement mix is minimized by the inclusion of thickening agents. However, underwater concrete must have the ability to be self placing and, therefore, plasticizers are added to improve the flow characteristics of the mix. Some strength loss is apparent when using this type of admixtures. This is due to air entrainment by thickening agent. This is controlled to around 2-3% by the use of air detraining agents.

Quality control.

The quality control of concrete is made more complex by the inclusion of an admixture, though the extent of the problem depends upon the type of admixture involved. The main points requiring consideration are as follows.

1)Trial mixes are essential for majority of admixtures, calcium chloride being a main exception. Since trial mixes are in any case made for work of major importance this is not a difficult requirement. An additional trial mix with a deliberate over dosage can be useful in helping to judge the effect of a possible over dosage on site.

2)The admixture has to be accurately dispensed in to each batch of concrete. This include making provision for storage of the admixture, possibly preceded by its dilution or dissolving in water, the provision of an accurate means of dispensing and extra mechanical operation generally involved in dispensing for each batch of concrete.

3)Care must be taken to see that the admixture is efficiently distributed throughout each batch of concrete and the full mixing time given after addition of all ingredients to the mixer.

4)The use of an extra ingredient may necessitate the use of a further control test to ensure uniformity of quality. This situation occurs with air entrained concrete where the conventional control by quality of ingredients, accuracy of batching, and uniformity of workability, followed by strength test as a check does not provide full control. Variations in the quantity of admixture, leading to variations in air content and strength would not be detected, and a further control test to measure the air content of the fresh concrete become necessary.

Classification of Admixtures

Water Reducing	Air Entraining	Pozzolanic (Fly ash, Silica fume)
Retarding	Corrosion Inhibitors Pumping aids	
Accelerating	Waterproofing	Cementitious (Hydraulic lime, ground slag)
Water Reducing and Retarding	Grouting Materials	
Water Reducing	Gas Forming	Inert (Talc, Quartz, Ground Limestone, Bentonite)
	Expansion producing	
Superplasticisers	Bonding Aids, Alkali-aggregates reducing, Fungicides, Air detraining, Flocculating, Pigments	

Costs.

A major consideration before deciding on the use of an admixture in concrete construction is the cost. In some instances there is no option, for example in pumping. In other instances however the decision to use an admixture is an economic one taken for example to improve the workability and handling characteristics of the concrete, or to permit working in hot weather, or to facilitate a quicker turn around of forms. In these instances a careful study of all the factors involved shall be made, including the cost of the admixture and its control.

Conclusion.

Admixtures can be a useful aid to concrete construction in that some properties of the final concrete can be improved and construction work can often be eased by carefully selecting admixtures. Admixtures can not however be used to the best advantage without knowledge of their basic constituents and a good appreciation of their effects on the properties of concrete, followed by close control over their use on site.

The present President of the Sri Lanka Institute of Quantity Surveyors

is determined to establish the profession at the highest level in Sri Lanka.

The Sept. issue of the CCI Bulletin is featuring Prof. Chitra Wedikkara the present President of the Institute of quantity surveyors of Sri lanka in the series of 'Personalities that matter in the construction Industry'.

Mrs. Weddikkara was educated in Good shepherd Convent kotahena and in the University of Colombo then at Curtin University and the Murdoch University Perth Western Australia. She is also a Chartered architect and a Quantity surveyor, and also practices as a project manager and occasionally works as an arbitrator and also as a mediator. She was the former Head of the Department of Building Economics at the University of Moratuwa that conducts the only training course for the graduates in Quantity surveying. She is also the Chairman of the Professional affairs Board of the Sri-lanka Institute of Architects.

Those are the well known facts about Mrs Wedikkara but the lesser known facts are that, she is married also to a Chartered Architect and an Urban Planner who conducts his own practice, and the devoted mother of two children studying and working abroad. Her daughter who is a Project Officer in the Legal Department in New South Wales is yearning to come and work here making her family all the more construction oriented. Prof. Wedikkara is also a champion of gender equality in her own way.

In a **'Question and Answer session'** with the CCI Editor Palitha Senanayake Mrs. Wedikkara expresses her views on important matters concerning the Profession of Quantity Surveying in SriLanka in her capacity as the current President of the Institute of Quantity Surveyors in Sri Lanka.

Q. Mrs. Wedikkara, first of all I would wish to ask you about the reasons that propelled you to take to Quantity Surveying as a career for I don't consider it to be a profession that attracts very many ladies?

A.I graduated as an Architect and worked in Western Australia for a number of well established Architectural firms. I found that in a project while aesthetics and other Architectural qualities were important, the cost too, was a major factor in any project. As an Architect I knew the importance of design too, and I felt that the understanding of the cost aspects of a project, will make me a better Architect in delivering value for money to a client. This concept, which is the concept of Quantity Surveying, interested me and also my mother in-law was also instrumental in my decision since she was a Quantity Surveyor. My father in law who was also an Architect then practiced in kandy. These influences together with the interest in the concept of managing cost and giving good value for money made me do Quantity surveying. I was the only lady Quantity Surveyor to graduate in the early eighties from the Perth University in Western Australia. In fact my Head of the department was also quite curious as to my decision to do Quantity surveying and to enter into a then very male dominated construction industry. I love challenges and had a burning desire to be one of the best Quantity Surveyors in the construction industry and my husband gave me all the encouragement to do so.

Q. With so much exposure in the international scene I am sure our readers would be interested to know how you compare the profession of Quantity Surveying in the international scene vis a vis the local situation?

A. In the international scene the profession of quantity surveying is so called in the Common wealth countries and called Cost engineering in USA and EU countries, is well recognized for its important place in cost management of a project in the construction industry. The Quantity surveyors in the developed countries are well established and work as separate professionals having separate firms and is one of the important team players in the project. There are two major bodies in the world that regulates and foster the profession of Quantity Surveying and one of these is in the Asia pacific region. That is called the Pacific Association of Quantity surveyors (PAQS). They have all the Asia pacific countries as members of the Association and they sponsor the education of Quantity Surveyors with the Australian Institute of Quantity surveyors which plays an important role in this region. Royal Institution of Chartered surveyors (RICS) is the other major body having its origins in the UK and is one of the Key players in both the Asia Pacific region as well as the Commonwealth of Nations also overseeing the education and practices of Quantity surveyors in the regions. I am a fellow member of the RICS and Associate of the AIQS.

The Institute of Quantity surveyor in sri-lanka is a member of the PAQS as well as the Institute of Cost Engineers (ICEC) the world body for Cost engineers, therefore in the international context it is very well recognized profession and we in Srilanka are trying to make the best of what is available to us in the International scene.

In the local scene the profession of Quantity Surveying is slowly gaining recognition in the Sri-Lanka Construction Industry. It has come a long way from the formative years for this level of recognition. However still both the Government and also the private clients are not totally aware of the value of an independent Quantity surveyors in the project team. There is a only a hand full of quantity surveying firms and most Quantity surveyors work in a Architectural or Civil Engineering firms as employees rather than independent Quantity surveyors. This is due to the government and the private sector **not requesting** Quantity surveying firms to bid for work under an independent banner. Quantity surveying service is requested often as a part of Architectural consultancy or a Civil engineering consultancy. This has led to the profession not growing the way it should and acting as an independent Cost advisor to the client organization. Therefore it is important that legislation be brought by relevant authorities to recognize the Quantity surveyor as an independent professional in the construction industry and grant its due status. One example is that there is a Public service commission for architects and Engineers to look into the problems of the profession under the Ministry of Public administration where the President of the respective Institute is the representative in this commission but there is no such thing for Quantity surveyors and this is where the Chamber could help in the establishment of such a service for Quantity surveyors so that the aspects of advancement could be looked into in terms of salary structure etc. The industry as a whole, both private and public must be made aware of the important role played by quantity Surveyors in the management of scarce resources, "Money" especially now in Sri-lanka, is a scarce resource and it is important to manage it efficiently for the regaining of Sri-lanka.

Q. And now about the Institute where you are the current President, The Institute of Quantity surveyors in Sri-Lanka, could you give us a brief account of the history of this profession and the history of the Institute, its formation and the legislation relating to its formation?

A.The institute of Quantity surveyors has had small beginnings with handful of quantity surveyors. Most were qualified from abroad and sent for training by the Public works department. Initially there had been only four Quantity Surveyors in the 60's and the Quantity Surveyor meetings were held in private house , anyway those days it must have been a very personalized association. Presently we are housed at no.185/2, Model Farm Road, Colombo 8. We are registered as a Profession in Sri Lanka and the status of the Institute is that we have been registered under the companies Act. in 1982 as an Association. The Government has recognized the importance of our Profession and steps have already being taken to draft a Parliamentary bill to create the Sri Lanka Institute of Quantity Surveyors. This I believe was gusseted on 14/6/2002. In the mean time The Institute of Quantity surveyors as it is registered as a Professional institute is carrying out functions and promotion related to the quantity surveying profession in the sri lankan construction industry. Professor Caldera was the first president of the Institute and later became the professor of building economics at the Department of Building Economics at the university of Moratuwa, where the first and the only undergraduate course in Quantity Surveying was established after the needs and assessment survey carried out by CASLE, the Commonwealth Association of Surveyors and Land Economist. British council sponsored this visit. With the help of British council necessary staff resources to draft the first Quantity Surveying degree course was established.

Q. Could you be more specific as to the functions carried out by your institute at present?

A. The present functions of the Institute are to develop the profession and lobby for it at various forums to introduce and establish the profession with public awareness and government awareness of the importance of having a Quantity Surveyor in any project relating to civil and building work. Further ICTAD has given due recognition to the profession by recognizing in their consultancy document as a separate profession. We also conduct seminars, workshops for the members and all what is necessary to keep our members abreast and develop and upgrade their knowledge base with the new developments in the profession. Also the Institute conducts qualifying exams such as Part 1 to Part 3 for those members who wish to come through the practice rather than through the University.

Q. Could you tell us about your membership strength at the moment and the administrative structure your Council etc.?

A. Today the institute enjoys a membership of nearly 350 members varying from Fellow members to Associate members, Student members, Registered members, Graduate members, Probationary members and Student members both in sri-lanka abroad. We have a Council elected from among the membership and that is the executive body of the Institute. There are 15 members of this council and I am the current President of this Council. The term of office of the Council members is 2 years. **The governing body** is the council and it has its own memoranda of understanding its code of ethics and code of conduct and as recommended fee scale for its members. The Council is also responsible for any major changes to the profession. The institute is also a member of the OPA and actively takes part in its activities and also a founder member of the Chamber of Construction Industry (CCI).

Q. What do you consider to be the challenges of the Profession if any that you currently face?

A. That is a very pertinent question and I would request you to list down the challenges in point form for we have too many of those;

Lack of recognition by the private and public **sector**

- The necessity for recognition by an Act of Parliament which is now at the stage of being presented to the parliament
- A land from the government for construction of a building to house the institute to conduct its activities.
- Due recognition as an independent profession in the construction sphere.
- The development of the technical grades of Quantity surveyors and to have a cohesive structure for advancement for the members of the institute.
- To enhance the training needs and educational needs of the technical grades of quantity surveyors and to give them self improvement.
- To introduce best practice of quantity surveying

Q. You consider those to be your challenges, I would have thought that they were your functions?

A. That exactly is the situation I would like to impress upon, our profession is in such a position when you compare it with other established professions, all our functions have to be treated as challenges.

Q. Finally I would like to ask you for the benefit of our readers, as the President of the Srilanka Institute of Quantity Surveyors what is your vision for the profession of Quantity Surveyors?

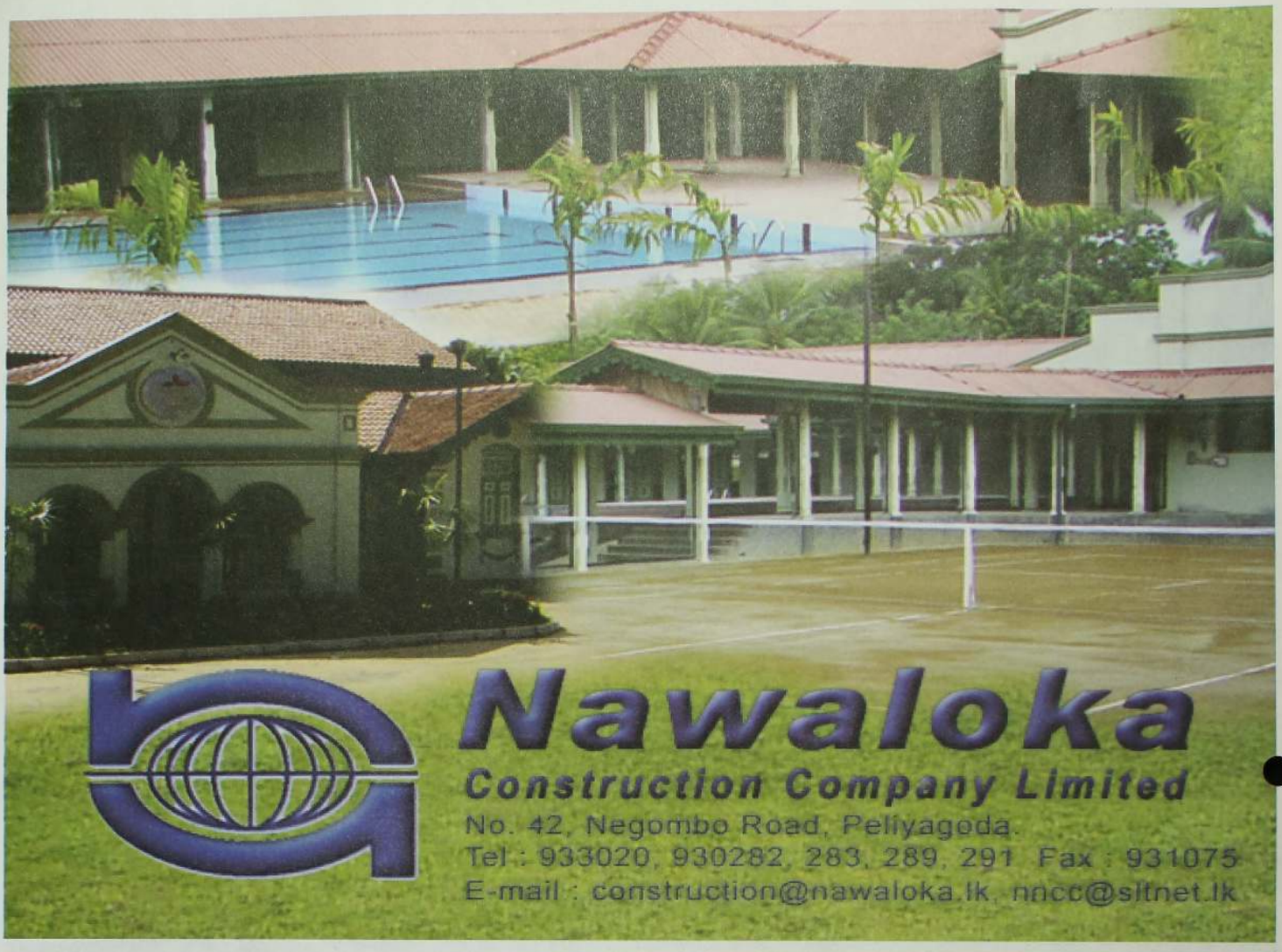
A. In view of the importance of that question I woud like you to mention this too in point form.

a)To make the Institute and it's members be proud to be Quantity Surveyors having integrity, honesty in the activities of their services and help them conduct business so as to give the client good value for money.

b)Make the institute an important lobbying group in the conduct of the activities pertaining to the construction industry.

c)To the best my ability to make the public and private aware of the importance of the quantity surveyor in the management of cost.

d)To promote gender equality in the construction industry.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The River Sand Crisis

Offshore Sand as an alternative

By: **Palitha Senanayake.**
(CCI speciael correspondent)

This bulletin, being the bulletin of the construction industry wishes to impress upon the industry the need to find a suitable material or materials as substitutes for river sand and cause such material to be produced at a commercial level. We have discussed at length the ' river sand crisis' in the previous issues of this bulletin and the economic, ecological, environmental, social and health implications of continuing to depend on river sand as one of the major raw materials of the industry. In view of the ambitious projects this Government and the future Government's may have, considering the country's current state of the development and the potentiality for development, it needs no prophetic genius to predict that sand, with the sources of supply as they are, would be the constraining raw material of the industry.

Also the authorities may have to use more stringent measures to conserve the river banks in the future, in view of the fact that we have now exhausted the stocks at this stage by using over the last few decades, the sand stocks that probably took a century to pile at the normal rate. Therefore, the actual time taken for replenishment of the natural river sand reserves would be felt by all concerned parties more in the immediate future than just now. In the last issue of the bulletin, we presented graphically the price increase of the major raw materials of the industry and sand recorded the highest increase. Even the declining demand for metal was reasoned out to be due to the non-availability of sand as these two products are used in unison for most construction purposes.

With the commencement of issuing permits only for a selected few for sand mining by the respective Government mechanisms we could well foresee a situation of partisan politics and thereby corruption creeping in to the sand supply situation and sending the prices further higher. Thus, it is imperative that all the stake holders of the industry focus their attention and pool in available resources to promote an equally acceptable substitutes for river sand. This article proposes to discuss the steps already taken by professional research teams in finding and evaluating suitable substitute material and the feasibility studies carried out by the construction entrepreneurs in the commercial adaptation of such material in the construction industry.

Processed sand as an alternative

In the May 2003 issue of this bulletin the CCI presented ' manufactured sand' as an alternative and featured a project called ' Miracle Sand' to be sited close to Kandy. Manufactured sand or processed sand is nothing but crushed rock sand and experiments have shown that this form of sand could be used as a replacement to an extend in some construction applications such as concreting, manufacture of pre-cast concrete elements, cement sand blocks, etc. Crushed rock sand is obtained even now as a by product of metal production and is currently used as a substitute for river sand in road works, concrete, cement blocks and also as a filler material. The ' quarry dust' that is a by product of metal crushers is extensively used now in cement block making and plaster but found to ' too finer' to be used in applications such as concrete. Piles of dust that was a familiar site in quarries a few years ago, and offered free to anyone who removes those from the site, are non-existent today and are now offered at a price. However, that 'miracle sand' project which was to be commissioned in September seem to take more time now to organize it's initial formative, logistical and funding problems. The cost of producing such sand is also attracting the attention of some experts now since our report, but however, the project co-ordinators of ' Miracle Sand ' provided for mobile machinery, meaning the transport of machinery to a location close to the construction site (since suitable rock material is available in any part of the Island) thereby reducing the transport cost of manufactured sand. The Chamber of Construction Industry, however with the interest of the industry paramount, would wish to promote more alternatives for the appropriate uses in the Construction Industry.

The use of Offshore Sand as an alternative

Offshore sand is one of the cheapest forms of substitutable material for river sand considered suitable to be used in the Construction Industry. Sri Lanka being the Island has access to considerable amounts of offshore sand deposits around the country. Nevertheless, retrieval of sand in large quantities regularly, to be used in the construction industry requires large capital investment, and therefore before we embark on the feasibility aspect of deploying river sand we may need to consider the suitability aspect in the long run, very scientifically, of offshore sand.

Prof. W.P.S. Dias of the department of Civil Engineering in the University of Moratuwa has been concerned for sometimes as to the impending shortage of river sand and as a result of initiatives taken by him a comprehensive study was carried out by a team of experts namely Prof. W.P.S. Dias, Dr. S.M.A. Nanayakkara, G.A.P.S.N. Senevitatne and T. Nanthanan of the Civil Engineering dept of the University of Moratuwa. The objectives of this study were in broader terms.

a). To study worldwide experience of using offshore sand in construction.

b). To test the relevant properties of the aggregate.

c). To design/develop and test mixes for concretes, mortars and plasters.

d). To ascertain practitioner acceptability in mortars and plasters.

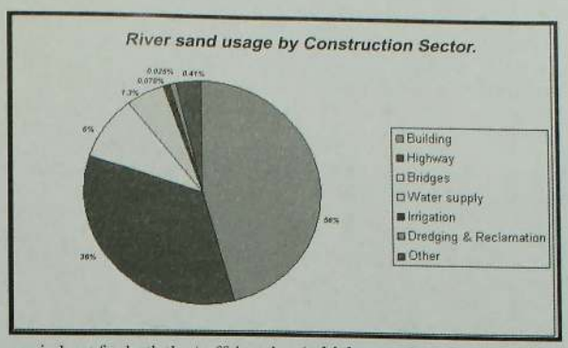
e). To study the performance properties of efflorescence and corrosion in concrete.

The literature review of this study is also quoted here for it's relevance.

Use of Sea Sand in Concrete

This literature review will focus on the use of offshore sand in concrete, since offshore sand is arguably the most promising alternative to river sand, as stated before. It is also the alternative that poses the greatest concerns, primarily with respect to its chloride content (known to promote corrosion of reinforcement and suspected of enhancing efflorescence) and the shell content (which in early days was suspected of having negative effects on workability and permanence) . Although offshore sand is reportedly used in many countries such as the U.K., Netherlands, India, Seychelles and Singapore, proper documentation regarding its use was found mainly regarding U.K. practice. A distinction must also be made between the use of offshore sand and sand deposits in dry coastal areas. The latter would tend to have very high chloride contents, resulting from salt spray and evaporation over long periods of time. In particular, the use of such deposits for concrete construction in the Middle East has led to very early onset of corrosion (Fookes and Higginbottom 1980, Rasheeduzzafar et al. 1985). A study done on Sri Lankan beach sands has also shown fairly high chloride levels in some samples (Chandrakeerthy 1994), the use of sea water for batching or for curing (Rasheeduzzafar et al. 1985, Katwan 2001) would also promote corrosion; such practices should not be resorted to. In the U.K. around 11% of its aggregate extraction is from offshore sources. In South East England and South Wales, this figure is as high as 30% and 90% respectively (marine 2002). While much of this aggregate is processed (inclusive of washing), it is largely unprocessed sand (together with land based coarse aggregate) that is used on the wet coast and the Bristol Channel (Gutt and Collins 1987). The use of such aggregate in concrete has not caused any major durability problems in the U.K. during the last 60 years of its use. In fact, chloride related to durability problems in the U.K. have largely been due to the use of Calcium chloride as an accelerator (up to a dosage of 0.15% by weight of cement), a practice that had been permitted up to 1977 (Gutt and Collins 1987).

A comprehensive test were carried out for both the ' offshore' sand and ' manufactured sand' using ICTAD standards. Varying climatic conditions, with practitioners of differing attitudes, under different rainfall conditions to arrive at a more balanced set of conclusions. The main areas of differences when we compare Offshore sand with river sand appears to be that in Offshore sand the chloride content is 0.3% whereas in River sand there is no such chloride level and the maximum acceptability limit of chloride for construction purposes is 0.75% as specified by ICTAD. Also in Offshore sand there is a shell content. The shell content of 2% can be assumed as typical.



The results indicated that Offshore sand saturated with sea water clearly violate the above chloride limit. Also if Offshore sand losses its sea water through evaporation, its chloride content is likely to be unacceptable. However, if it losses its sea water through drainage then the CI' content would be reduced to almost the acceptable level. Further washing via rain or artificial washing would easily reduce the chloride level to acceptable standards. As for the shell content, if the sand is subjected to a sieving process this shell content can be used to produce lime which could be marketed as a by product of the process. For all intents and purposes it could be considered appropriate to reproduce the conclusions of the above study in detail.

Conclusions.

The following conclusions have been arrived at through the literature review and experimental programme.

Physical Properties

1.Although the grading of Offshore sand can be variable, they are generally within the BS 882 limits, and can be used for concretes, mortars and plasters. Both Offshore sand and manufactured sand can be used in concrete mixer. However, the use of Offshore sand is more advantageous, as the water content.

1.requirement is around 20Kg/m3 lower; this results in cement contents that are around 30 to 40Kg/m3 lower for concrete grades from 20 to 30.

2.The shell content of Offshore sand is within BSS 882 limits. The shells larger than 5 mm (which constituters around 2% of the entire sample) can be extracted for

sale to lime Kilns, this could reduce the harvesting of coral for lime production. Shells do not impair the workability, permeability or other engineering properties of the concrete.

3. Both Offshore sand and manufactured sand are satisfactory for both mortar and plasters and reasonably acceptable to masons, although they may rank River sand as their first choice.

Influence of Chlorides

1.A Conservative limit of allowable CI ions in Offshore sand for OPC based reinforced or metal embedded concrete is 0.075 by weight of the sand. This is based on (1) an allowable CI; percentage of 0.3% by weight of cement (lower than the BS5328 Part 1 limit of 0.4% to account for warmer Sri Lankan temperatures etc.) (11) An allowance of 0.5% by weight of cement for chlorides in cement (which is the acceptable upper limit). (111) A sand cement ratio of 3.3 which is rarely exceeded for reinforced concrete. (IV) The availability of chloride free coarse aggregate.

2.Offshore sand saturated with sea water has a CI; content of around 0.3%, whereas if the sea water is gravity drained, it reduces to around 0.075% . Some care has to be taken at the top of the stockpile where the Chloride % may be higher due to excessive evaporation, and at the bottom of the stockpile where sea water may be held by capillary action.

3.The action of even 80mm rainfall will reduce the CI; contents to below acceptable levels, even at the top and bottom of a 2m high stockpile. (The lowest mean monthly rainfall in Colombo is 71mm in February).

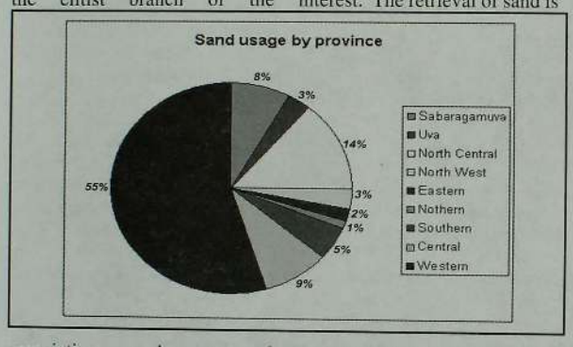
4.The efflorescence and corrosion performance of grade 20 concrete (i.e. the most critical grade) with the allowable CI content of 0.075% in the sand is satisfactory and similar to a chloride free control mix; on the other hand, a mix with 0.3 CI in the sand shows clear evidence of efflorescence and early corrosion.

Contd. on page 14...

Contd. from page 13...

The River Sand Crisis...

Fine Aggregate Resourses Ltd.
The study reports appear to be consistent with certain unconfirmed studies made earlier and there is little doubt now as to the suitability of Offshore sand provided it is washed and sieved to rid the Offshore sand of its high chloride and shell content. Encouraged by these reports and pressed against the irregular supply and increasing cost of river sand it is the ' Major and specialists branch' of the National Construction Association of Sri Lanka that have taken the initiative in carrying out a feasibility study for a Project to retrieve sand, wash and sieve and make available processed sand to the construction Industry. After having carried out the feasibility study with very positive results they now hope to incorporate a company called ' FINE AGGREGRATE RESOURCES LTD'. National Construction Association is the country's contracting community and the 'major and specialists branch' is the elitist branch of the association made up of specialists and professionals of the construction industry.



Sale of sand of the Project
Since the contracting community constitutes the largest share of end users it is quite appropriate that the share holders of the proposed company is also made up of the contracting community. The feasibility report maintains that the primary target investment group will be Construction contractors, Ready Mix concrete suppliers and Cement block manufacturers who as a group use approximately 25% of the sand consumed in the country. This proposal appears quite feasible since the project envisages to produce only 615,000 m3 of sand during the first year of operation and this would be only approx. 17% of the sand volume used in the industry. There is provision for increase in the production every year but with the overall increase in use, the increase in market share over the next few years could be marginal. The project also intends to lease out land in the Western Province from the Land Reclamation and Development Corporation, who, the feasibility proposals also hopes to invite to be a shareholder for very practical reasons, making this project Western Province oriented. This also would be a positive factor from the sales point of view since the Western province consume 55% of the sand used in this country and that is more than 2.5 million m3 of sand for a year.

Financial Feasibility of the Company
The company budgets to make a profit of Rs. 122 million in the first year of operation and this amounts to a 31% of the revenue of that year. Such profits appear realistic since total cost (direct and overhead) of production per cubic is Rs. 1155 and the sale price is expected to be Rs. 1750 which is the current market price of sand. Such profits may be required too since the company expect to raise 60% of the capital requirement through Bank loans at 16% interest. The retrieval of sand is to be done by a contracting dredging company and the payment is accounted at US $ 3.5 per m3. This however, appears to be on the high side since this forms 88% of the total cost of processed sand. Profitability of the project could be further enhanced if the direct cost (dredging cost) is reduced from the proposed 88% of the total cost. At least proportionately with the increase in volume in the future years. The total cost of production of the project for the 2nd and 3rd years also appear to be on the high side since the cost per cube should reduce and not increase with the increase in volume of production. Also no reference has been made to the lime that is extracted from the sieving process which is quite saleable as a by product. All these factors could make this project only more profitable than it is made to appear in the report and therefore there could be very little reason to doubt the projects financially survivability.

Concluding Observations
The construction industry is presently experiencing problems with the supply of one of the major raw material of the industry i.e. River sand. The traditional sources of supply of this raw material are showing signs of exhaustion and therefore due to factors mentioned in this article and our previous research continued dependence on river sand may cause a crisis in the industry. Suitable substitutes with seemingly unlimited exploitable sources should be evaluated having regard to economical, ecological and environmental factors. There are two suitable substitutes that have emerged in the form of manufactured sand and Offshore sand. While the detailed feasibility of Manufactured sand is yet to be made available, a comprehensive detailed feasibility study of Offshore Sand has been carried out and on the strength of the results a company is to be formed to commence the commercial production of construction sand from Offshore sand. This company however would cater to only 17% of the construction industry and therefore more such companies may be necessary to save the Construction Industry from the RIVER SAND CRISIS.

(The writer acknowledge with gratitude the permission granted by the Civil Engineering Dept. of the University of Moratuwa and the Major & Specialist Branch of the NCA to quote the 'Properties of Concrete and Plaster made using Offshore sand ' and the feasibility report of the Fine Agregrate Resources (pvt.) Ltd. respectively)

The Finco Group
market leader in construction chemicals

A new composite building centering system was introduced recently to Sri Lanka's building industry by Finco Limited in association with Master Builder Technologies (MBT) of Singapore. This new system known as FRP – MBraceTM (Fibre reinforced polymer) is an advanced technique for structural strengthening which increases the load bearing capacity of beams, columns and walls and has resistance against corrosion, crack propagation and bomb blast. Mr. Richard Tan, Business Manager –Business Systems of MBT Singapore elaborated the different dimensions of this new product and said that this product is put through extensive testing and development laboratories in the world over and have come out with very positive results.

MBT is the construction and environment division of Degussa GmbH, Germany and is an active supplier of specialty chemicals to the construction industry worldwide. The company has many affiliated companies in most countries of South East Asia and has built an enviable reputation as the region's leading supplier of quality construction chemicals. Finco Limited has been associated with MBT Singapore for the past 20 years.

Finco Limited - Engineering Sales Directorate (ESD) Sri Lanka's pioneer construction supplier, has also been granted the ISO 9001: 2002 certification.

According to Rohan Delgoda, Managing Director ofFinco Limited (ESD), the ISO 9002 certification by United Kingdom Accreditation Society (UKAS). Quality Management which is represented by Bureau Veritas Quality International (BVQI) covers quality management systems, pertaining to construction, water proofing and marketing of specialized products and services.

Finco Ltd.,(ESD)is believed to be the first construction chemicals company in Sri Lanka to receive the ISO 9001 certification.

"The timing of the certification is particularly significant," Mr.Delgoda the company MD remarked, explaining that the number of foreign investors coming in who insist on ISO accreditation of suppliers is on the increase. "We are the market leaders in the sector and receiving the certification, will give us an additional edge over the competitors in the sector", he added.

According to the Certification of Approval issued to Finco by BVQI, the scope of supply covered by the certification encompasses Finco's role as a provider of reliable solutions to the construction industry through import and supply of specialized products such as admixtures for concrete, structural grouts, concrete repair, water proofing, industrial flooring, special construction materials, geosynthetics and gablons and the provisions of specialized services in the areas of concrete repair, waterproofing and industrial flooring.

L.H.Piyasena & Co. diversifies in to Designing building projects, Aluminum fabrications, Plastering and Cladding

L.H. Piyasena & Co (Pvt) Ltd., Building contractors and Engineers, commenced business as a partnership in 1960 & subsequently incorporated into a Limited Liability Company. The Company holds ICTAD M1 registration and is fully equipped with its own Machinery and Equipment to undertake projects of any magnitude with its vast professional and manpower resources, and also to handle projects locally and overseas. It has a workforce of over 1000 personnel, where 500 are skilled workers in various vocations.

The company is fully geared to meet the exacting demands of the modern construction industry deploying the building construction techniques of the highest caliber while adhering to the codes of conduct of the relevant Professional Institutions.

The philosophy of the company is to segment large projects in to parts manageable by their specialist staff and then to drive each and every member to accomplish the highest possible standards by setting individual goals and agendas and then skilful integration with team work to obtain the best possible end result. With the experience and the background of the Directors, small and big projects are treated equally for standardized performance. Efficient application of these norms have enabled the Company to undertake and successfully complete several large and prestigious projects like High-rise Commercial Buildings, Industrial and Factory Buildings, Holiday Resorts and Office Buildings, Housing Projects and Residential Buildings, Education and Special Purpose Buildings, Multi-storey Apartment Complexes and Mixed Development Projects.

The Company is now diversifying in to Designing of Building Projects, Interior Designing, Fabrication of Stainless Steel, Brass, Aluminum and Wooden Accessories, Hand railings and Balcony railings, Plaster Ceilings and Plaster Cornices, etc. The company is also engaged in aluminum curtain walls and composite panel cladding.

The Company is also well versed in Architectural and Structural Drawings, Engineering Works, Landscaping, Quantity Surveying and Project Management

Bulletin's September theme,

Property development

a dynamic sector with a lot of promice

(See cover story)

Mr. Cryshantha Jayawardhana, was an Associate of the Surveyors Institute of Sri Lanka from 1977 and a Fellow since 1982. He commenced his practicing at Matara as a Licensed Surveyor and a Commissioner of Courts from 1977 to 1982. He joined the Ministry of Roads and Bridges in Iraq and also was the Designer Surveyor for a period of two years. On his return in end of 1983 he worked as the Chief Surveyor of M/s Bec and Feres SA, main contractor for Nilwala Ganga Scheme 1983 – 1989. In 1991 he was the Project Manager Roads for the Minipe Nagadeepa Rural Development Project under Japanese Grant Aid, that constructed 125 Km Road work. In June 1991 he joined the Finance and Guarantee Company of Ceylinco Group as a Land Sales Manager and introduced a new concept of infrastructure development. In 1994 he was promoted as the General Manager and with the incorporation of the Company "Ceylinco Homes International Ltd." a new concept of housing. " Lotus Grove Project" was introduced.

Thereafter Ceylinco Homes International (Lotus Tower) Ltd was incorporated and the Company commenced its 1st Apartments Project with the introduction of "Barnes Place Residencies" which was completed within 15 months. Its success was overwhelming and that resulted in the commencement of yet another project in "Hyde Park Residencies" that was completed in 22 months. This project too was a tremendous success.

Mr. Jayawardhana now functions as the Executive Director of three Housing Companies within the Group, which are ;Ceylinco Housing and Real Estate (Public Quoted Company), Ceylinco Homes International Ltd.& Ceylinco Homes International (Lotus Tower) Ltd.,

Q. Mr. Jayawardene you know that we wanted to make 'Property development' the theme of our bulletin in view of the considerable progress this sector has made during the past decade or so. Would you agree with this or how do you feel about it?

A. I couldn't agree more when you say that there had been an extra ordinary progress in this sector. This may be due to number of factors such as the general state of the economy, entrepreneurial skills, Income redistributing factors, Govt. policies, industrialization etc. When you say that there had been a progress I agree, and when you ask me how I feel about it I should ay that I feel 'good'.

Q. Mr. Jayawardene how do you define property development in the broader sense of the word?

A. Basically property development is adding value to the property .The most common form of primary property is land and the Property developer will take over land and develop it having regard to the commercial, environmental, social factors. When I say commercial what I mean is that when a property developer makes an investment he is an entrepreneur and he has to recover his capital and also make a reasonable profit, and that is his responsibility towards the investors or the share holders of the company.

When I say environmental what I mean is that the project has to meet the environmental regulations and it has to be as environmentally friendly as possible, and by social I mean that the whole project has to promote social interaction with responsibility.

This act of adding value could be either for commercial or for domestic purposes. Commercial purpose is, after the development, the property should be used either to house a Company, an Industry or house your staff or still you make a profit by disposing off the developed property at a profit. Domestic is where you use it primarily for dwelling. One more thing I wish to stress on this definition is that 'Property development' should not be mixed up with blocking and selling of land. Those are 'Land sales' and those who carry out such operations are land salesman and not property developers. If a person buys a property where value has been added, then he is buying a property but otherwise that person could be investing his money on a speculative future value of land.

Q, What made you chose Property development as a career and also if you could delve in to the history of property development?

A, You can see from my profile that I am a Land Surveyor and my earliest recollection was that in the early 60's there was one Mr. Munasinghe who was actually a land salesman who offered divided land plots at kottawa to my father, that time it was about ½ acre plots and property development was not known to be practiced. However eventually I witnessed how the land in that area went up in price with the development. As far as the history of property development is concerned and as far as I could remember Mr. Peter keneman when he was the Minister of Housing took a lot of initiative on property development but then there was a lot of restrictive legislation during that time it was really mr. Premadasa who took property development upon himself,he did not wait for developers to come.

Q. As it is presently practiced in Sri Lanka could we call property development as an Industry?

A. Well, it all depends on what you consider to be an industry and what you don't .and also what characteristics an industry should have. Primarily Property development is a commercial venture but in a practical sense I think you could call it an industry because it has satisfied most of the criteria to be an industry. There are quite a number of property development companies and they have their employees. We have our raw material suppliers , starting from land ,and we have our own clients and this is a continuing process. This could be called the industry that produces houses and apartments

Q. How do you quantify, in general terms , the contribution this industry makes to the National Economy?

A. We add value to the property on an organized scale. and there are so many other companies that do so. Also there are informal organizations that add value to property .Therefore I suppose we make a sizeable contribution to the National Economy.

When a person is building a house probably he does it only once in a life time and as a result he faces quite a number of problems for the first time in his life. A person who has built a house before probably has solutions but then it is unlikely that he will build again unless he is in the property development industry. We are the professional property developers so we have the organization, the machinery, the raw material, supplier and also the clientele We make available a ready made house for a client local or foreign and also suitable to each ones needs, luxury, Semi luxury, economy or sometimes made to certain specifications also. 80 % of our labour force is rural and we create direct and indirect employment opportunities for mainly rural population. We buy all the suitable raw material locally so that provides a reliable source of disposal to the local building material supplier. Last but not least is our investor . We have to look after him too. We have to make a decent profit on our operation to give a good return to our investors. Our biggest contribution however should be on capital formation.

Q. How do you view the efforts of property development from the day to day needs of the Sri Lankan public?

A, What are the day to day needs of the average man? Everybody needs a house from where they can go to their job and from where they can send their children to a decent school. Therefore They all want houses from urban areas. Unfortunately these concepts like 'popular schools' are making life difficult for the ordinary man as a result our life also becomes difficult. Therefore we have to cater to their needs no matter what.

Q. How do you view the Government policies, if any, with regards to the Property development industry?

A.I don't think there are any policies specially meant for this industry but we have to function within the broader framework of policies common to every body, but of course there are incentives and tax concessions which are regulating the pace of the industry. For instance the Tax concessions for BOI projects and the present rate of interest is having a big effect on the industry.

I agree that the Govt. has to do more than that to regulate the industry. However we are only a part of the plan and we cant do more than what the Govt, expects from us, in case if our advise is sought then we shall be only too glad to be of service to the country and the Govt.. The resource of Land is a non expendable and non extendable and we have to plan the exploitation of this resource to optimize its use. For instance the plan has to be comprehensive to include areas for residential, agricultural, common amenities, commercial and other areas depending on the needs of the society.

Q. The document 'Regaining Sri Lanka' forecast that by the year 2010 half our population would be living in Urban areas. What are your plans for this?

A. I read the article on Urbanization in the last issue of your bulletin and agree with most of the sentiments expressed therein. We have to have a total plan for the country where you develop the rural areas simultaneously so that the people don't rush to urban areas. This is in fact the concept Mr. Premadasa also had. This involves a total economic plan as you have also mentioned in your article to uplift the rural economy. As for us we are building different classes of houses and apartments to cater to the peoples needs and depending on the demand we will draw our stratergy.

Q. I am surprised to hear a senior executive of a company involved in urban development being so concerned about the rural economy , why don't your company start a rural development project?

A I am only saying what is good in the National interest, but companies like ours have to have the necessary infrastructure to start these projects. Even if we are to build our own infrastructure and start projects one thing is that such projects will be very costly and the other is that such projects will transform such areas in to urban areas so then that would be not rural development again.

Q. May I invite your views on the environmental aspect of property development and the concept of integrated urban planning which is gathering momentum the world over?

A. If the people are prepared to pay we could bring in all those features, In our own way we have successfully implemented the concept of integration in our projects such as the milleniumcity at Athurugiriya. Lotus Grow at Dehiwala is another example and in our latest project at Eden Garden, Thalawathugoda we have gone a step further where we have a sports center, swimming pool, security, garbage disposal system and a clean neighborhood in addition to the standard facilities. We cannot plan on a period longer than 5 years for we have to show our return on capital to the investors.

Q. Recently there was a lot of criticism about the loss of plantation due to land plots being made out of plantations, specially the coconut plantation, what are your views on that?

A. Blocking land and selling is not property development as I have mentioned before this problem has come about because of the indiscrete utilization of land by those who want to indulge in speculative land dealings.

The Govt. should step in and introduce legislation. As you mention there is this problem in the Western province and the coconut triangle where agriculture land was converted in to residential or rather speculative market and I could give you another example of how a residential garden city was converted in to an agricultural property. During the potato boom in Nuwaraeliya all the plots including the garden plots were used for agriculture, transforming the garden city into one big agricultural plot. No sooner the price of potatoes dropped now the city is one land mass devoid of the tourist attraction the city was so famous for. Anyway as I mentioned before we are only part of the plan. Land as I mentioned before is one of the most valuable of the resources and proper use of it should be a National policy. Properly speaking land cannot be owned by anybody it can only be used and handed over to the future generations.

The chamber will make the following facilities available to the members at a very concessionery rate

(A) The CCI auditorium, air conditioned and fully furnished, [30ft X 15ft].

For the members to have their seminars discussions, meetings or even functions. With a multi media projector.

(B)The Information Technolodgy Bureau.

For the members to have system analysis and design facilities, data bases, web designing and graphic work.

Lanka Transformers

A powerful partner in the National Power industry.

Lanka Transformers Ltd. a company established in 1982 to manufacture transformers, is today a pioneer in the development of technology in many fields of construction including, Transformer manufacturing, Hot Dip galvanizing, Thermal and Hydro Generation, Energy management, Renewably power projects and the energy audits. The uniqueness of the operations of Lanka Transformers Ltd. is their ability to excel and almost totally dominate every area of activity they have chosen to do business in. In an era where manufacturing transformers was alien to the Sri Lankan industry Lanka Transformers ventured in to the field of transformer manufacturing in an extensive scale and today they command not only the leadership in transformer manufacturing but the virtual monopoly in the Sri Lankan market. Having a monopolistic control has not made the management of Lanka Transformers complacent about their operations because being the local leader in a highly [illegible]nical field such as transformers manufacture can render them vulnerable to competition from exports. Therefore, aware of the need to be technologically upbeat, the company has made many strides, not only in keeping up to the world trends in transformer technology but also in diversifying in to other allied fields.

Hot Dip galvanizing plant of Lanka Transformers is a plant with the best available technology in the world and if not for the pressure created in meeting the local demands the galvanizd products of Lanka Transformers could hold themselves against the best products in the world and even make an impact in the export market too. The galvanizing facility at Sapugaskanda is provided with German equipment and technology with a 7 meter long bath capable of galvanizing full-length members of towers and other structures, and with state of the art controls. It has a production capacity of 100 MT per day. It is perhaps the most up to date plant in South East Asia where all galvanizing is carried out to survive for a period of 30 years in the environment specified by the customer with a guarantee. Galvanizing work for major utilities and industries such as the Ceylon Electricity Board, Sri Lanka Telecom, Colombo Dockyard and major organizations that undertake infrastructure projects, have been carried out by LTL.

LTL is a member of the American and the Australian Galvanizers Associations. The plant has recently won the International Award for Galvanizing excellence and is accredited with ISO 9002 quality management system certification by Det Norske Veritas of Netherlands.

Lakdhanavi Ltd., a fully owned subsidiary of LTL was the first Independent Power Producer. Its 24 MW diesel plant at Sapugaskanda built in 1997 has a 15 year BOO contract to supply its output to the national grid. This plant constructed, operated and maintained by Sri Lankan engineers, technicians and others largely of LTL continues to supply more than the annual guaranteed amount of energy every year since it was commissioned. The deployment of in-house Sri Lankan staff has considerably reduced capital and operational costs and enabled Lakdhanavi to provide the national grid at cost perhaps the lowest price per unit. The recent power shortages made the authorities request Lakdhanavi to construct Emergency Power Plants and supply energy to the national grid. Lakdhanavi established three such plants totaling 90 MW, each within 8 weeks of signing the Power Purchase Agreement. A joint venture between Lakdhanavi and Hemas Group, incorporated as Heladhanavi Limited, has entered into contract with GOSL/CEB in May 2003 to establish a 100 MW thermal power plant at Puttalam. This plant is to be commissioned by the end of 2004.

LTL Projects (Pvt) Limited, another purposeful subsidiary of Lanka Transformers, was established on the basis of experience gathered by working on major construction projects alongside world renowned project engineering organizations, such as, Siemens, Energie GmbH and ABB of Germany, and ABB AS and Betonmast Energie AS both of Norway, and Wartsila of Finland. The projects constructed included thermal power stations, 132 kV transmission lines, 132 kV grid substations and a 220kV grid substation. The subsidiary has now developed into a specialized organization to handle project-engineering activities including Consultancy, Design, and Turnkey Construction of projects, encompassing all the major fields of engineering. It has successfully undertaken construction of Thermal Power Plants, Mini-Hydro Plants, Transmission Lines and Grid Substations, and a number of other power sector related projects. The company has obtained ISO 9001 Quality Management System accreditation from Bureau Veritas Quality International for Design, Project Management, Construction, and Commissioning of Transmission Lines up to 220 kV. The wide experience and the quality accreditation has enabled LTL Projects to independently compete in international tenders and to receive an award of contract for a 132 kV Transmission Line project, a unique achievement for a Sri Lankan organization.

LTL Energy (PVT) Ltd., also of Lanka Transformers, provides a full range of services to large - scale energy users in the industrial and business sector for efficient Demand Side Energy Management which include energy audits and analysis; energy consumption efficiency; energy conservation and design, installation and maintenance of energy efficient equipment on a turn key basis with performance monitoring and cost savings. LTL Energy(pvt) Ltd also coordinates with financing Institutions and facilitates funding for the projects in the case of customers who are in need of such funding. LTL Energy utilizes advanced technology in its professional services, and is very selective in the design, installation, and maintenance of energy efficient equipment. It has adopted a stringent performance monitoring procedure and ensures guaranteed cost savings in energy management projects implemented.

These services have been provided to a large number of high energy consuming industries in the Tea, Garments, Printing, Ceramic and Hotel sectors with proven results in achieving reduction in the expenditure on electricity. All energy savings achieved are verified by Measurement and Verifying Protocols (M&V), which comply with international standards. In recognition of its services in the areas of Energy Management and Conservation LTL Energy has been awarded membership in NAESCO (National Association of Energy Service Companies) a prestigious international body.

Wins Products Lanka (Pvt)Ltd.

Promoting the Use of Alternative Sources of Energy

[illegible]ri Lanka is a tropical country with sunlight on 300 days of the year. The country also has been in and out of many a power crisis and in any case the cost of power in Sri Lanka is said to be the highest in the South Asia in spite of the fact that bulk of our power comes from hydro-generation. Therefore it has become all the more necessary, in the interest of the national economy that the Companies in Sri Lanka, big or small, concentrate on technologies that can develop alternative sources of energy.

'Wins' Products Lanka (Pvt) Ltd., is the newest manufacturer in the Solar Water Heating industry in Sri lanka. Solar Water Heating System was initially developed by the National Engineering Research and Development Center (NERD) of Sri Lanka and several manufacturers commenced operations to cater to the increasing demand in the Solar Water Heating market.

Wins are the latest company who are geared to supply an extremely good quality product embedded with the latest technology at a very reasonable price. Their products come with an unbeatable warranty period of 10 years. Wins Solar Hot water Storage tanks are fabricated out of High Grade Stainless Steel corrosion free materials and pressure tested to ensure safety and reliability. These are insulated with Polyurethane foam to minimize over night heat loss. The Solar Panels are manufactured out of Black Bond Copper, a superior conductor of heat and a corrosion free material. An Electrical Backup Booster Heating Element with an adjustable Temperature Controller from 30 degrees to 75 degrees Centigrade is also incorporated to the systems in order to cater during heavy consumption or on continuous rainy days.

'Wins' Solar Water Heating System is now in par with any advanced Solar Water Heating Systems manufactured locally or internationally. Wins Products Lanka has the technological capability to design and install either stand-alone or central forced circulation systems to cater to specific requirements of users. In addition, already they have introduced over 500 units into the local market during a short span of time.

'Wins' Products Lanka (Pvt) Ltd., firmly believe that the future energy requirements will have to be met by the environment friendly Solar Energy which is the primary source of energy to the earth. Also we perceive that, conservation of the energy from currently existing sources is too important, as much as the usage of alternate energy is important from a national perspective. In that context the scarce energy generation we possess can be saved through the use of alternatives such as solar water heating systems. Bearing that in mind Wins have joined hands with certain foreign Technology Providers to offer the most energy efficient systems for large-scale use of hot water in institutions. These heating systems based on 'heat pumps' principle offer air-cooling and de-humidification as by-products. Wins will be glad to offer more details of this new product to those who are interested. The superior performance exhibited by this system result in enormous savings in the energy costs of large institutional users.

Wins Products Lanka (Pvt)Ltd. have introduced systems in Five different capacities to suit any domestic or institutional requirements.

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