Southern Builder

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Role of construction in nation building

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அகத்துறுப்பு அன்பி லவர்க்கு

- குறள்

அன்பு எனும் அகத்து உறுப்பு இல்லாதவருக்கு புறத்து உறுப்புகள் அழகாக இருந்து என்ன பயன் என்று வினவுகிறார் திருவள்ளுவர். மனிதன் தான் செய்யும் ஒவ்வொரு செயலிலும் தனக்கு ஏதேனும் ஒரு பலனை பெற விரும்புகிறான். எந்த ஒரு நிகழ்வாக இருப்பினும் அதில் தனக்கு சாதகமாக இருக்கும் அனுகூலத்தை பெற விரும்புகிறான். கல்வி, செல்வம், வீரம் ஆகிய மூன்றையும் மனிதன் தவறாது பெற விரும்புகிறான். இவ்வாறு அனைத்தையும் சிரமமாக இருப்பினும் பெறுவதற்கு முற்படும் மனிதன் எதையாவது கொடுக்க ஆயத்தமாகிறானா என்ற கேள்விக்கு பதில் சொல்வதற்கு சாலையில் வேகத்தடையை எதிர்கொண்ட வாகனத்தை போல் சற்று நிறுத்தி நிதானித்து யோசிக்கத்தான் செய்கிறான்.

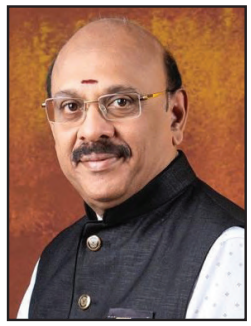
"அன்பு" என்று சுலபமாக எழுதக்கூடிய மூன்றெழுத்து வார்த்தையானது மிக சுலபமாக பெறுவதற்கும் கொடுப்பதற்கும் மனிதனுக்கு இயல்பாகவே அளிக்கப்பட்ட ஓர் நற்குணம் ஆகும். யார் வேண்டுமானாலும் யாருக்கு வேண்டுமானாலும் அன்பை பொழியலாம். ஆறறிவு உடைய மனிதன் ஐந்தறிவு உடைய உயிரினங்களுக்கும் பாகுபாடு காட்டாமல் பகிரக்கூடிய ஒரு பகிர்வு அன்பு என்றால் அது மிகையாகாது.

ஒரு காலத்தில் புன்னகை மற்றும் பூக்கள் நிறைந்த அமைதியான பூமியாக காட்சியளித்த உலகம் தற்போதைய சூழ்நிலையில் போர் முழக்கமும் பூசலும் நிறைந்த பதட்டத்துடன் மக்கள் தங்களது அன்றாட இயல்பு வாழ்க்கையை நடத்துவதற்கு வழியில்லையே என்ற அவலக்குரலை ஆங்காங்கே கேட்கும் நிலைமைக்கு தள்ளப்பட்டுள்ளோம்.

தாலிபானின் கொடும்பிடியில் சிக்கிய ஆப்கானிஸ்தானின் அப்பாவி மக்களின் அவலநிலை கண்ணை விட்டு அகலும் முன்பே, ரஷ்யநாடு உக்ரேன் நாட்டின் மீது தொடுத்துள்ள போர் உலக அமைதியை உலுக்கும் ஒரு நிகழ்வாக நடந்து கொண்டிருப்பது மேலும் மன வேதனையை அதிகரிக்கின்றது. கொரோனா எனும் கொடிய வைரஸ் தாக்கி உலகம் முழுக்க மக்கள் லட்சக்கணக்கில் பலியாகினர். அந்த கொடிய நோய்த்தாக்குதலை எதிர்த்து போராடி உலகம் இயல்பு நிலைக்கு மீண்டு வரும் இத்தருணத்தில் ரஷ்யா உக்ரேன் மீது போர் தொடுப்பது மனித இனத்தை அழிக்கும் முயற்சியின் முதற்படி என்றே கூறலாம். எதற்கும் போர்தான் தீர்வு என்ற போர் குணத்தை விடுத்து மனித நேயத்துடன் அறவழியில் செயல்பட்டு அமைதியான முறையில் அணுகி இரு நாட்டவரும் பேச்சுவார்த்தையின் மூலம் பிரச்சனைக்கு தீர்வு காண்பதே உலக அமைதிக்கு வழிவகுக்கும்.

இயற்கை உலகில் வாழும் உயிரினங்களுக்கு பாரபட்சம் காட்டாமல் அதன் வளங்களை கொடுப்பது போல மனிதர்களாகிய நாம் சக மனிதர்களுக்கும் மற்ற உயிரினங்களும் எந்த ஒரு அடிப்படையிலும் தீங்கு செய்யாது அன்பு செலுத்தி அகிம்சைக்கு உயிர் கொடுத்து உலக ஒற்றுமைக்கு வழி வகுத்து பூமியில் அமைதி நிலவச் செய்து "யாதும் ஊரே யாவரும் கேளீர்" என்ற கூற்றுக்கிணங்க எல்லாருடனும் அன்பு பாராட்டி நம் சந்ததியினருக்கு அன்பு தேசமாய் பரிசளித்து உலக அமைதி காக்கப்பட வேண்டும்.

என்றும் அன்புடன்
S. அய்யநாதன்



அன்பார்ந்த நண்பர்களே வணக்கம்,

நமது மய்யத்தின் சார்பில் 30வது அகில இந்திய கட்டுநர் மாநாடு வரும் மார்ச் 11, 12 மற்றும் 13 தேதிகளில் நடைபெறவுள்ளதை அடுத்து அதற்கான முன்னேற்பாட்டு பணிகள் தீவிரமாக நடைபெற்று வருகிறது. மாநாட்டிற்காக அமைக்கப்பெற்ற துணைக்குழுக்கள் ஒவ்வொன்றும் தமது பணிகளை சிறப்பாகக் செய்ய ஆலோசனை கூட்டங்களை நடத்திக் கொண்டும் வழி வகைகளை செய்து கொண்டும் உள்ளன.

இதன் தொடர்ச்சியாக மாநாட்டிற்கான சிறப்பு விருந்தினர்களை அழைப்பதற்கான ஏற்பாடுகளும் தொய்வின்றி நடைபெற்று வருகின்றன. குறிப்பாக நமது மாநில முதல்வர் மாண்புமிகு மு.க. ஸ்டாலின் அவர்களை அழைக்கவும், ஆலோசிக்கப்பட்டு, மாநாட்டு தலைவர் நமது மரியாதைக்குரிய பீஷ்மா திரு. R. இராதாகிருட்டிணன் அவர்களும், மாநாட்டின் ஒருங்கிணைப்புக்குழுத்தலைவர் திரு. Mu. மோகன் அவர்களும், மாநிலத்தலைவர் திரு. R. சிவக்குமார் அவர்களும், நானும் முதல்வர் அவர்களை நேரில் சந்தித்து மாநாட்டிற்கு வருமாறு அழைப்பு விடுத்துள்ளோம். மேலும் தமிழக அமைச்சர் பெருமக்களையும் விழாவிற்கு நேரில் சென்று அழைத்துள்ளோம்.

செய்யாறு தொழிற்பூங்காவில் Schwing Stetter நிறுவனம் தனது தொழிற்சாலையில் Latest Equipment Exhibition and Demonstrationஐ நடத்தியது. இதில் நமது மய்யத்திலிருந்து பெரும்பான்மையான உறுப்பினர்கள் கலந்து கொண்டோம்.

14.02.2022 மற்றும் 15.02.2022 அன்று மய்யத்தலைவர்கள் மற்றும் குழுத்தலைவர்கள் கூட்டம் திருச்சி மய்யத்தின் உபசரிப்பில் திருச்சியில் நடைடைபெற்றது. இதில் உடனடி அகில இந்திய முன்னாள் தலைவர் திரு. Mu. மோகன் அவர்களும், நானும் மற்றும் துணைக்குழுத்தலைவர்களும் கலந்து கொண்டோம்.

தமிழ்நாடு அரசின் தலைமைச் செயலகமான நாமக்கல் கவிஞர் மாளிகையில் 21.02.2022 அன்று மாலை 3.00 மணி அளவில் அரசின் Pre-Budget கூட்டம் நடைபெற்றது. இதில் நமது மய்யம் சார்பாக நானும், துணைத்தலைவர் திரு. R.R. ஸ்ரீதர் அவர்களும், முன்னாள் மய்யத்தலைவர் திரு. L. வெங்கடேசன் அவர்களும் கலந்து கொண்டோம்.

நான்காவது மாநில அளவிலான மேலாண்மை மற்றும் பொதுக்குழு கூட்டம் சேலம் மய்யத்தின் உபசரிப்பில் ஏற்காட்டில் 24.2.2022 மற்றும் 25.02.2022 தேதிகளில் நடைபெற்றது. அக்கூட்டத்தில் தென்னக மய்யத்தின் சார்பாக பெரும்பான்மையான உறுப்பினர்கள் கலந்து கொண்டோம்.

மாண்புமிகு மத்திய நிதி அமைச்சர் திருமதி நிர்மலா சீதாராமன் அவர்கள் தலைமையில் Post Budget கலந்தாய்வுக்கூட்டம் 28.02.2022 அன்று ITC Grand Chola ஓட்டலில் நடைபெற்றது. அக்கூட்டத்தில் நானும் மய்யத்துணைத்தலைவர் திரு. R.R. ஸ்ரீதர் அவர்களும், கலந்து கொண்டோம்.

நடைபெற இருக்கும் 30வது அகில இந்திய கட்டுநர் மாநாட்டில் அனைவரும் கலந்து கொண்டு சிறப்பிக்க வேண்டுகிறேன்.

என்றும் அன்புடன்

L. சாந்தகுமார்

Role of Builders in the Development of Sustainable Infrastructure as a Green Nation Building activity in the 21st Century

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Former Emeritus Professor,
Department of Civil
Engineering IIT Madras

1.0 INTRODUCTION

The term Engineer is derived from the Latin word ingerere, i.e. to create. In essence, Engineers are creators of artefacts, using their ingenuity and capacity for original thinking within the constraints of affordability and practicability. Modern society expects the Engineer to understand the role of financing, project management and information technology in improving the quality of his designs. Thus, close collaboration with other specialised disciplines is vital. Full and on-going interaction between other members of the design team is essential in order to maintain effective communication across professional boundaries. Besides his principal role as an innovator, the designer of a constructed facility has the responsibility to ensure that his plan is

- fit for its purpose
- economical and durable
- safe, both for the users and for the environment
- buildable, without inconveniencing the community and
- aesthetically pleasing.

The world we left behind at the end of the 20th century was very different from what it was at the beginning of that century [1]. Dramatic changes to the scientific and engineering world have - undoubtedly - brought enhanced wealth and living standards to a small proportion of the world's population but it has also been accompanied by unpredictable upheavals in the economy of every part of the world, uncompromising social attitudes and unacceptable pollution and damage to the environment. Societal transformations and upheavals have occurred due to the insatiable consumption of the world's natural resources, uncontrolled pollution of our environment, creation of unacceptable quantities of waste, unacceptable disparity in the standards of living, unprecedented population growth and worldwide urbanisation. This complex scenario has also resulted in unbelievable damage, deterioration and destruction of our infrastructure.

India's per capita income remains very low; its per capita GNP (Gross National Product) is $436, which is even less than that of Pakistan ($492). Nevertheless the purchasing power of the country as a whole has increased. The wealth has not spread out among all the citizens, but is confined to a fifth of the population. A little more than 200 million Indians are going up the ladder. This distorted economic scenario has encouraged overcrowding in the cities, caused by people looking for work and the consequent growth of slums coexisting with affluent neighbourhoods has already caused significant environmental deterioration in major cities. Durable, eco-friendly and sustainable development alone can prevent this unredeemable environmental degradation and enable the maintenance and enhancement of good quality of life. Engineers have to develop sensitivity to these deeply felt concerns for the natural and man-made environment and face increasingly complex challenges in their everyday work for ensuring environmental sustainability. We begin by describing the challenges facing the Indian Engineer in the 21st century and proceed to discuss the various factors and impediments affecting the creation of sustainable and durable environment.

2.0 THE CHALLENGE FACING THE DESIGNER

Design problems are seldom amenable to solution by exact mathematical formulae. There is a considerable scope for exercising engineering judgement. Hence, there is no "correct solution" to a design problem, as there could be several so-called "correct solutions" to the same problem. This is because

- the designs are invariably subject to individual interpretation of Standards and Codes,
- the solutions are also subject to differing ideas about what is or what is NOT required from an engineering and environmental stand point, and
- the individual designers have ingrained ideas from their past experience, which may be valid to-day only to a limited extent, or may not be valid at all.

Thus the design problems are referred to as " open ended" problems. Nevertheless the Designer has the responsibility for ensuring that the goal of the project is achieved (i) safely, without taking any undue risks to lives and materials and without causing a liability, (ii) within time and (iii) within the (budgeted) cost. Hence, "Engineering Design" may be defined as a creative activity of building a new artefact which provides an

optimum solution to satisfy a defined requirement or need, without endangering the environment.

Herbert Hoover, a former President of the United States of America - (the massive arch dam called "Hoover Dam" in the U.S.A. is named after him), described the Engineering profession as follows (1961):

"It is a great profession. There is the fascination of watching the figment of the imagination emerge through the aid of Science to a plan on paper. Then it moves to realisation in stone or metal or energy. Then it brings jobs and homes to men. Then it elevates the standards of living and adds to the comforts of life. That is the Engineer's high privilege. The great liability of the engineer compared to men of other professions is that his works are out on the open, where all can see them. His acts, step by step, are in hard substance. He cannot bury his mistakes in the grave like physicians. He cannot argue them into thin air or blame the judge like the lawyers. He cannot, like the architects, cover his failures with trees and vines. He cannot, like the politicians, screen his shortcomings by blaming his opponents and hope that the people will forget. The engineer simply cannot deny that he did it. If his works do not work, he is damned forever….

"On the other hand, unlike the doctor, his is not a life among the weak. Unlike the soldier, destruction is not his purpose. Unlike the lawyer, quarrels are not his daily bread. To the engineer falls the job of clothing the bare bones of science with life comfort and hope. No doubt, as the years go by, the people forget which engineer did it, even if they ever knew. Or some politician puts his name on it. Or they credit it to some promoter, who used other people's money… But the engineer himself looks back at the unending stream of goodness which flows from his success with satisfaction that few other professions may know. And the verdict of his fellow professionals is all the accolade he wants."

Thus, Hoover described the professional role and responsibilities of the Engineer succinctly. But what is meant by the "professional" role? The word "profess" has religious connotations and probably has its origin in 17th century England [2]. Monks professed their vows and were generally well educated. It is from this group of religious men, erudite University educators were drawn. ("Professors" were those who professed.) Hence the term "professional" was associated with a high degree of education and societal responsibility.

In today's context, all professions require

- extensive specialised education of significant intellectual content
- the practitioner to provide a recognisable service to the community
- a certification (usually by government or by a chartered body).

Professions are organised into professional societies, which police themselves. People engaged in these professions are independent of external influences and cannot be coerced by their clients, employers or governments to carry out unethical instructions. Controlling governments yield power to the professionals or their Societies. (For example, in many western countries, only a physician can write prescriptions; only a registered engineer/architect can approve the plans of a structure/building). In return, the professions take on a very responsible position, vis-à-vis the public. Generally, the professional should not hurt anyone unless it is required, (e.g. a dentist!).

To eliminate conflicts developing between the roles of the professional and of the citizen, every profession has a Code of Ethics developed by the professionals themselves. For example, the Code Of Ethics, developed by the American Society of Civil Engineers, is based on three fundamental principles requiring Engineers to (i) use their skills to benefit mankind (ii) be honest and fair, and faithfully serve others; and (iii) improve the competence and prestige of the profession.

3.0 DURABILITY AND LIFE CYCLE COST ISSUES

Traditionally the professional Structural Engineer had invariably played a vital role in the design of constructed facilities, often, in close association with other professionals like Architects and others in related disciplines. As a designer, he is responsible for the complete process from the conceptual stages to the finished structure. Increasingly, the Society expects him to assume responsibility for the durability of the product. In other words, the responsibility of a professional Structural Engineer in the 21st century will not be confined merely to the immediate economic and environmental impact of his design decisions; society expects him to make rational and responsible choices by considering the life cycle costs and the long-term environmental effects on the community In the following pages, we will highlight the enhanced role of the Professional Engineer in the 21st century and explore how the two design criteria are interlinked.

3.1 The Infrastructure Crisis

The Construction Industry, with all its imperfections and limitations, is rightly perceived as the provider of the Nation's infrastructure. Clearly, it is of paramount

importance to train and educate those who create and manage it, in order to ensure the economic and environmental survival of the world. While the world has witnessed some fantastic advances in Science and Technology in recent years, many of these achievements have been made at an outrageous price, plunging the world into a number of crises, which have impacted directly on the construction industry. The global effect of these dramatic changes in the world in the last 50 years can be collectively termed the "infrastructure crisis", which has to be encountered and managed by the construction industry.

Three-fourths of the world's population live in the (non-industrialised) developing world like India. Uncontrolled population growth, (particularly in the developing world), and evolutionary industrialisation have resulted in global urbanisation. The world population has grown from 5 bn in the late 1980's to 6 bn in 2000 and is now estimated to grow to 8 bn by 2036 and to over 9 bn. by 2050. (The population of India is now just over 1 bn). More than 95% of this increase will take place in the developing parts of the world, India included. For the first time in history, more than half the world population will live around the cities. It is estimated that there are more than 120 cities with over a million people, the majority in the developing world, thus accelerating urban decay in cities which can least afford repeated remedial action.

The magnitude of the problem in the Indian context is illustrated next by considering the "housing sector". Over the next 40 years, India is set to overtake China as the most populous country in the world. The present urban population is estimated to be 330 million, equalling the total population of the country 50 years ago. The urban population that was merely 14% of the total number of citizens 50 years ago now amounts to 33% and is set to grow to 50% by 2025. With economic liberalisation and expected enhanced growth, the rate of urbanisation in India in coming decades is likely to increase. Despite the best of efforts of well-intentioned people in Government and aid agencies, the Nation has not been unable to cope up with the ever-increasing need for shelter for every citizen. India needs some 200 million houses to accommodate all its citizens, whereas we have only167 million houses, of various types [3]. Half of these houses had mud, grass and straw walls and more than a third had grass, straw and thatch roofs. The need for upgrading the housing stock and the magnitude of the task are obvious, particularly in the context of expected urban growth.

It has been estimated that over 50% of the land in urban areas is second-hand. Much land is adversely affected by foundations from demolished buildings, which previously stored harmful chemicals, petroleum products etc. Old foundations must be viewed as contaminants and it is important to prevent land contamination by sub-structures.

Another major source of concern is water pollution. Many rivers and streams in India are not in their natural state, mainly because of industrial pollution and irresponsible drainage of sewage into them. The adverse effects of high pollution levels in our water resources are already painfully evident in India.

It is now widely recognised that much of the recent economic progress in the Western world has been at the expense of the environment and the effects of this environmental degradation are being felt globally, for instance in the form of climate change, ozone depletion, deforestation and acid rain. It is necessary therefore to assess and improve the environmental performance in all economic sectors including construction. Global warming caused by the emission of Greenhouse Gases (i.e. CO2) into the atmosphere puts increased energy into the climate system, resulting in increases in the number and intensity of storms, rapid climatic changes, and larger, more damaging and extreme weather events. As the effects of greenhouse gases in the atmosphere take 30 years to show, the current changes in the world weather (rise in sea levels, global warming, larger deserts, severe draughts and storms) relate to emissions up to the year 1970. The effect of current pollution levels will not be evident until 2030; the present century will, therefore, be a century of disaster management. Besides the large-scale deaths and devastation of the environment that follow from these disasters, the greatest effect will be the destruction of the infrastructure and therefore its impact on the Construction Industry [1].

3.2 The "Durability Crisis"

Issues of durability have always been subjects of debates among Engineers. Is it better to spend (say) 40% more initially, in order that the life of a structure could be doubled? What is better value to the client? Spend less initially or opt for a longer life? Total neglect of durability considerations in all the infrastructure projects undertaken so far combined with primitive construction practices still prevailing in India have resulted in what can only be termed a "durability crisis". It is now well established that degradation of all structures has become very common in almost all the cities in India and this is

particularly true of buildings and structures made of reinforced/prestressed concrete. The great tragedy is that there have been no efforts to address this issue by the present generation of Developers, Engineers, Architects and other design professionals. As a consequence, major problems have been allowed to accumulate for future generations of owners and taxpayers to face.

This is not to say that other parts of the world are free from this "durability crisis". For example, the present total construction expenditure in the UK is 56 million British Pounds, of which 50% is spent in repairs and rehabilitation of recently completed structures. As an example, the Midlands Link Motorway around the city of Birmingham cost around 28 million British Pounds to construct; this motorway needed repairs and rehabilitation within 20 years of its completion. Between 1972 and 1989, a further 45 million British Pounds were spent in repairs. It is now estimated that another 125 million Pounds will be required in the next 15years. In Europe, the annual repair cost is estimated as 1.4 billion ECU; in the U.S. the cost of rehabilitating half a million bridges (mostly concrete) is estimated to be $100 billion. It must be noted that in many countries in the West, life cycle costing is now a mandatory requirement in the planning process. For example, International Surface Transport Efficiency Act of the US (1991) mandates that state wide and metropolitan planning processes consider Life-Cycle Costs (LCC) in the design and engineering of bridges, terminals and pavements, rather than basing decision solely on initial costs alone as until then.

There is no particular merit in Indian Engineers making the same mistakes and blunders as their Western counterparts did and then rectifying them. In any case, India cannot afford the luxury of these blunders. Sustainability of the Environment is NOT an Option; it is vital for the economic and environmental survival. We do not inherit the world from our ancestors - we borrow it from our children [1].

3.3 Time wasted is money wasted and opportunities lost

When a constructed facility - be it a private home or a public highway - is completed, it will be put to use immediately and this results in a return on the capital employed. Delays in the completion of a project would therefore represent a delay in the return on capital invested, besides the loss of interest, which that sum would have earned otherwise. This essential relationship between time and money is well understood in the Western world but unfortunately this is not the case in India.

The recent liberalisation and globalisation of the Indian Economy has brought with it a potential (and an opportunity) for significant growth of the construction activity particularly in the infrastructure industry. Design and construction of buildings and bridges have been major growth areas, supposedly to facilitate the expected economic upturn. In the following paragraphs, we shall discuss the factors affecting the lifetime costs and durability of a structure, in some detail. In a later section, we highlight the fallacies and errors frequently committed by professionals in India that militate against arriving at an optimum overall design.

3.4 Cost competitiveness by using Alternative Materials

Unfortunately for the Indian client, many architects and designers seldom consider the use of alternative materials of construction and the designs are invariably limited to "concrete-intensive" structures. Often the best optimal design solution is obtained by a sensible combination of reinforced and/or prestressed concrete elements with structural steel elements. Even when a "steel-intensive" solution is selected; it is very rare for limiting the selection of materials of construction to steel only.

Although India has an installed capacity to produce 35 million tonnes of steel/year, we manage to produce only 24 million tonnes/year of which the use in the construction sector accounts for around 25% - 30%. By way of comparison, China produced 120 million tonnes of steel during 1999 - 2000 and Japan, 95 million tonnes. The total per capita consumption of steel in all its forms in India is one of the lowest in the world, being 24 kg/annum, compared with 500 kg/annum in the USA and 700 kg/annum in Japan. According to the recent research by the Steel Construction Institute [4], there is a direct link between the gross national product per capita and the per capita consumption of steel.

Indeed, structural steel has inherently superior characteristics to a very significant extent, when compared with competing materials. For example, to replace one unit area of steel in tension, (with a yield stress of 450 MPa), we would need to use an equivalent plain concrete area of about 200 units. For concrete to be able to compete with Structural Steel in construction, we need to put Reinforcing Steel into it! Even then, there is no way to prevent the cracking of concrete in tension, which often encourages corrosion of reinforcement. In compression (or squash loading),

one unit area of steel is the equivalent of 15-20 units of M20 concrete. A comparison of strength/weight ratio will reveal that steel is at least 3.5 times more efficient than concrete. For a given compressive loading, concrete would have 8 times the shortening of steel. Again we need reinforcing steel to prop up the plain concrete.

In structures built of Structural Steel, occasional human errors (like accidental overloading) do not usually cause any great havoc, as there is a considerable reserve strength and ductility. Steel may thus be regarded as a forgiving material whereas concrete structures under accidental overload may well suffer catastrophic collapse of the whole structure. Repair and retrofit of steel members and their strengthening at a future date (for example, to take account of enhanced loading) is a lot simpler than that of reinforced concrete members. The quality of steel-intensive construction is invariably superior, when compared with all other competing systems (including concrete structures) thus ensuring enhanced durability. This is especially true in India, where quality control in construction at site is poor.

Structural Steel is recyclable and environment-friendly. Over 400 million tonnes of steel are recycled annually worldwide, which represents 50% of all steel produced. The infrastructure and technology for the recycling of steel is very well established. Steel is the world's most versatile material to recycle. But once recycled, steel can hop from one product to another without losing its quality. Steel from cans, for instance, can as easily turn up in precision blades for turbines or super strong suspension cables. Recycling of steel saves energy and primary resources and reduces waste. A characteristic of steel buildings is that they can readily be designed to facilitate disassembly or deconstruction at the end of their useful lives. This has many environmental and economic advantages; it can mean that steel components can be re-used in future buildings without the need for recycling, and the consequent avoidance of the energy used and CO2 emitted from the steel production processes.

Steel-intensive construction causes the least disturbance to the community in which the structure is located. Fast-track construction techniques developed in recent years using steel-intensive solutions, have been demonstrated to cause the least disruption to traffic and minimise financial losses to the community and business.

Even though “the initial cost” of a concrete intensive structure may sometimes appear to be cheaper, compared to the equivalent steel-intensive structure, it has been proved time and again that its total lifetime cost is significantly higher [5]. Thus the popular perception of the concrete-intensive structure being cheaper is NOT based on verifiable facts! There is therefore no real cost advantage either.

Except in a few special structures like tower cranes and transmission towers, it is rare to build a structure entirely in steel. Frequently the optimal solution is obtained by employing concrete elements compositely with structural steel, especially in multi-storeyed buildings and bridges. These methods ensure significant cost benefits to the developers (or owners of property) as well as to the community. Composite structural forms have been extensively developed in the western world to maximise the respective benefits of using structural steel and concrete in combination, but this technology is largely ignored in India, despite its obvious benefits. The sizes of composite beams and columns will be appreciably smaller and lighter than that of the corresponding reinforced or prestressed sections for resisting the same load. A direct economy in the tonnage of steel and indirect economies due to a decrease in construction depths of the floors and reduced foundation costs will, therefore, be achieved. Generally, improvements in strengths of the order of 30% can be expected by mobilising the composite action. An independent study carried out by the Central Building Research Institute (CBRI) Roorkee demonstrated that there are substantial cost savings to be achieved by the use of Composite Construction [6].

3.5 Life Cycle Costs

ASTM E917-83 (1983) describes the standard practices for evaluating LCC of buildings and building systems. The motivation for the LCC is that on any investment decision, all costs arising from the decision, both immediate and in future are potentially important. The recent development of fast track methods in construction in the western industrialised world triggered the wide spread implementation of Life Cycle Cost study, which would ensure enhanced productivity and efficient utilisation of the capital. Construction projects completed on the basis of lower initial cost alone have often proved to be far more expensive in the long run, besides causing damage to the environment and bringing poorer return on the investment. Thus the durability of structure and its life cycle cost are closely inter-linked. Enhanced durability invariably reduces or eliminates the construction-related adverse environmental impact

on the community.

As pointed out already, Indian Engineers seldom give any serious consideration to vital factors like durability and lifetime costs. Environmental safety and inconvenience to the community do not seem to be given even a cursory thought. As a result, the owners (and taxpayers) do not get the most rational choice arrived at by taking into account all aspects of the design challenge. The result is that - both in the short term as well as on a long-term basis -. the construction costs in India are among the highest in the world, (despite the labour costs being very low, compared to the West) while the Construction Industry continues to pollute the environment and cause long-term damage to it.

At this stage it is appropriate to define the Life Cycle Cost of a Structure, made up of several components listed below [7].

1. Initial Cost
   - Actual "Cash" Cost of the project
   - Cost of the Investment locked-up without Returns ("The Time Cost")
   - Cost penalty to the community by traffic delays and detours; Losses suffered by local Business ("Hidden Penalty Cost")
   - Cost of damage to the Environment due to Pollution ("The Environment Cost")
2. Periodic Maintenance Cost, including energy cost
3. Cost of dismantling the structure, at the end of its life
4. Less the salvage value of the construction products.

All these values are evaluated in life cycles, present value terms or Annual Value terms. A more comprehensive LCC analysis may include adjustment for taxes, adjustment of financing cost etc. The basic aspects of lifetime costs are discussed in some detail in the following paragraphs:

3.5.1 Initial Cost

(a) Actual "Cash" Cost: Many government departments report the "cash cost" as the Cost of the project. This is both wrong and misleading. Frequently, many reputed Designers also report that the cash costs of Reinforced or Prestressed concrete alternatives are cheaper than Steel Options. This is because the Steel Intensive Options considered by them are based on outdated design and construction practices. For example, they do NOT employ the relatively new "Steel-concrete composite" construction, or Limit State methods of Design, possibly because Indian Codes have not kept pace with developments in technology! A recently published CBRI study has demonstrated that likely cash savings by using Steel-Intensive Designs, compared with concrete-intensive option for multi-storey buildings will be at least 3% - 16%. The experience in Europe, particularly in the United Kingdom, bears this out. (Over 90% of the new buildings in the London area are built of Steel-Concrete Composite Construction; over 60% of all bridges throughout Great Britain are built of Steel-concrete composite construction.) It is difficult to believe that the necessary expertise is unavailable in India, as the technology is not complex.

(b) Cost of the Investment Lock-Up without Returns ("The Time Cost"): Ignoring the "time cost" has been a cultural weakness in India and needs to be overcome if we are to take our place in the community of Nations. It must be recognised that time does cost money. The time taken for concrete-intensive construction would be 2-3 times it takes for steel-intensive alternative. Locking up the capital – without any return – by choosing the former results in a loss to the owner of at least 12% - 15% per year of delay. A recent study reported that even for a modest project like a flyover costing Rs. 10 crores, [See Fig. 1] the loss under this head amounts to Rs. 1.00 crore of taxpayer's money, i.e. 10% of the total cost.

(c) Cost penalty to the Community due to inappropriate construction planning (e.g. Traffic Delays and Detours; Losses suffered by local Businesses etc. collectively termed - "Hidden Penalty Cost"): A prestressed concrete fly-over built in Chennai was chosen as a case study. This construction, which lasted 15 months, had resulted in all local road users and residents having to take a detour of 2 km for each trip resulting in a needless extra expenditure by the community of one crore of rupees in a project costing approximately Rs. 10 crores! This was spent in burning petrol bought by using the valuable foreign exchange. Is this a wise use of foreign exchange?

Fig. 1 Flyover construction – The Indian way

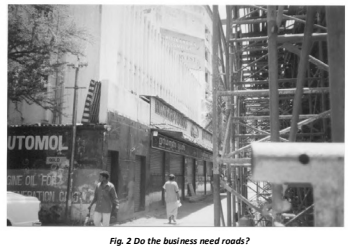

Fig. 2 Do the business need roads?

Fig. 3 Where else do we store junk?

Secondly, many businesses had lost huge sums of money because of road closures during construction and some smaller businesses had closed down, probably forever. [See Fig. 2] The study referred above estimated the total loss to the business community due to this one fly-over, to be around Rs 40,00,000, to Rs. 75,00,000. (There are 15 fly-overs currently being built in Chennai!!) A third "penalty" is the time spent by busy executives in the traffic jams and hold-ups, caused by this construction work.

There is no evidence to suggest that the Community had given its informed consent for the colossal sums being spent on their behalf. Hiding "the hidden penalty cost" (particularly in metropolitan cities) would cause long-term damage to the attractiveness of the city as a place to invest. As the public become aware that technologies do exist to create infrastructure with minimum negative impact or inconvenience to public they will increasingly demand utilisation of such technologies.

(d) Cost Of Damage to The Environment Due To Pollution ("The Environment Cost"): As a direct result of pollution by particulate material (construction dust, movement of heavy construction equipment etc), the penalties paid by the hundreds of residents in the locality, by way of health-care costs must be adding to staggering sums. It is, of course, impossible even to guess this figure unless a detailed study is undertaken. Many road users are horrified to observe that the highway is closed up for prolonged periods merely for storing construction materials and junk, contributing to substantial dirtying of the environment. [See Fig. 3] Traffic hold-ups due to the construction cause added air pollution in the neighbourhood. It is clear that Professional Engineers are unlikely to be admired for irresponsibly causing pollution in the neighbouring environment for prolonged periods.

(e) Total Initial Cost: From the foregoing it is clear that the total likely savings by adopting steel-concrete composite construction to the taxpayer when a building, fly-over or bridge is completed, (compared with concrete-intensive construction) will be at least 30% - and more. Substantial reduction in pollution levels, environmental damage and traffic hold-ups will be added bonuses.

3.5.2 Periodic Maintenance Cost

Periodic and preventive maintenance undoubtedly contributes to the longevity of the structure. Unfortunately this is the most neglected activity in India. Economising on periodic maintenance will invariably result in much enhanced expenditure at a later date. The problem is compounded by several myths that seem to prevail among Engineers and Architects. Some of these that affect the periodic and timely maintenance of structures are discussed below:

(a) Myth No. 1: Concrete lasts forever without maintenance: The reality is that there is no magical ingredient in concrete to do it! Concrete is subject to deterioration by the same environmental factors as steel (viz. Chloride contamination, alkali silicate reactions, sulphate attack etc.) In addition, we have problems due to poor site control, insufficient concrete cover, ineffective drainage, insufficient cement content, shrinkage, creep etc.

(b) Myth No. 2: Concrete bridges outlast steel bridges: The reality is that there is no credible statistical evidence that concrete bridges outlast steel bridges. Many steel bridges with over 100 years of service life are still performing well. In contrast, the first major prestressed concrete bridge in the USA (Walnut Lane Bridge in Philadelphia) had to be replaced by a steel bridge after a service life of about 40 years. The deterioration rates of 57000 bridges listed in Federal Highway Administration analysed by Lehigh University showed no correlation with the material of construction. The only factors they could identify are (1) age, (irrespective of the material of construction) and (2) the intensity of daily traffic.

Studies by the OECD (Organisation for Economic Co-operation and Development) reveal that steel bridges are expected to last much longer than prestressed concrete bridges. Indeed in Belgium and Japan they found that steel bridges outlast prestressed concrete bridges by 15 – 26 years.

(c) Myth No. 3: Concrete bridges last forever without maintenance: Some people believe that once in place, reinforced and prestressed concrete bridges last forever and that steel bridges are slowly corroding away. The perception is that concrete is an inert material, less vulnerable to the environment than structural steel. The fact is that Concrete deterioration is a subject, which is widely researched but not so

widely discussed. Appearances can be deceiving – at least in the case of Concrete Bridges; according to US Govt. Strategic Highway Program, a bridge deck or sub-structure that appears sound, may actually be deteriorating from inside out.

Steel is easily repairable at almost any stage of corrosion and over the years has shown a remarkable tolerance to lack of maintenance.

(d) Myth No. 4: Structural steel can not be adequately protected from corrosion: The reality is that there are high performance coatings available to day, which provide long term protection for EXPOSED Structural Steel at an economic price. Frequently, interior Steelwork does NOT require any paint or other protective coatings.

For Steelwork to corrode we need the presence of both water and air SIMULTANEOUSLY, or exposure to aggressive conditions. These conditions do NOT exist in most buildings and in many inland structures and bridges. There is certainly no evidence to suggest that many landmark structures like the London Bridge, Eiffel Tower, Empire State Building, Sears tower and many other Steel intensive structures are corroding away!

(e) Myth No. 5: A steel structure is less safe in a fire than other types of structures: The reality is that Steel Structures are no less safe than other structures. The properties of all materials are degraded when exposed to fire. The modulus of elasticity of concrete is permanently reduced; the cross section of timber is consumed. The modulus of elasticity of steel is however, not permanently reduced and recovers once the member cools down. Steel structures can be economically fire protected to meet all building code requirements. Steel structures can be rehabilitated after a fire at a modest cost.

(f) Myth No. 6: Maintenance of Concrete intensive structures is significantly cheaper than that of Steel intensive Structures: Concrete–intensive construction is not as simple as is usually imagined. Nor are concrete-intensive structures cheap, to maintain (contrary to popular myth). Structural steel forgives human errors or lapses in maintenance, but not concrete! It is vital that Engineers pay attention to vital maintenance issues and not be carried away by myths.

The incidence of major concrete repairs to bridges is significantly greater than many realise and time cost of such repairs, when all costs including traffic delay costs are taken into account is very significant. It has been shown in published literature that the probability of significant repair work to be carried out within each 20 year life of concrete bridges is as high as 0.185. The direct cost of such repairs is insignificant (around 0.1 to 0.5% of the initial cost in present value) whereas the indirect cost due to the traffic delay during such longer repairs in concrete structures has been estimated to be at least 25%. Further, it is well known that repair and retrofit of steel members is a lot simpler than reinforced concrete members.

3.5.3 Cost of Dismantling the Structure at the End of its Life

Many structures in the urban environment are being demolished due to deterioration beyond repair, due to land values escalating very high, rendering the building economically unviable, or due to their inability to meet the modern functional requirements. At this stage a cost is incurred to dismantle or demolish the structure. It is well known that the cost of dismantling the steel structure is well below that of reinforced concrete structures.

3.5.4 Salvage Value of the Construction Products

Some of the products salvaged from the structure dismantled are of some economic value. This value is subtracted from the total cost after adjusting for the time of salvage. It is well known the cost of material recovered from steel intensive construction is almost equal to the original cost of the structure, although this value is to be reckoned at a later time in the life cycle, whereas in concrete intensive construction, substantial additional cost is incurred in disposing off the material. The recycling of demolished material from urban construction has become a major problem in urban areas, leading to intensive research on the subject.

3.5.5 Uncertainties in Life Cycle Costing

The effort to evaluate the life cycle cost is fraught with many difficulties listed below.

- Non-availability of reliable and consistent cost data
- Non-availability of reliable historical information on costs associated with construction, maintenance, repair, rehabilitation, and demolition (structure management system).
- Data on and experience with some of the recent technologies being only subjective and not rational and impartial (e.g. Prestressed concrete versus Steel bridge.).
- Changes in design criteria and techniques with time and location, construction materials and methods, patterns of use including magnitude and frequency of loads, maintenance methods etc.

As a direct consequence, many decision-makers experience uncertainties in arriving at reasonable estimates for LCC evaluations. Analytical techniques such as sensitivity analysis and probability analysis are sometimes used to make decisions about investments whose economic consequences are uncertain. It should, however, be noted that the LCC decisions are more influenced by life and discount; both these factors favour steel structures, since steel structures generally exhibit longer life and shorter construction and repair/rehabilitation time duration.

There is no doubt that a massive research effort is needed to assess the life cycle cost reliably and the durability aspects and environmental impact of any design decision. A sustained educational effort is also needed to persuade engineers to take a holistic approach to structural design, rather than merely confining themselves to myths and dogmas not based on rational analysis.

4.0 THE EVERYDAY LIFE OF STRUCTURAL ENGINEER

A structural engineer's responsibility is to design the structural systems of buildings, bridges, dams, offshore platforms etc [8,9,10]. A system is an assemblage of components with specific objectives and goals and subject to certain constraints or restrictions. System components are required to co-exist and function in harmony, with each component meeting a specific performance. Systems design is the application of a scientific method to the selection and assembly of components to form the optimum system, to achieve the specified goals and objectives, while satisfying the given constraints or restrictions.

In practice, any constructed facility can be considered as a "System". The Structural System is one of its major subsystems and is indeed its backbone. Some of the other coexisting subsystems are those connected with the mechanical, electrical, plumbing and lighting facilities.

Structural components have to meet the design requirements of adequate strength under extreme loads and required stiffness under day-today service loads, while satisfying the criteria of economy, buildability and durability.

Examples of civil engineering systems include buildings, bridges, airports, railroads, tunnels, water supply network etc. For example, a building system is an assemblage constructed to provide shelter for human activities or enclosure for stored materials. It is subject to restrictions by building specifications on height, floor area etc. Constraints include ability to withstand loads from human activities and from natural forces like wind and earthquakes.

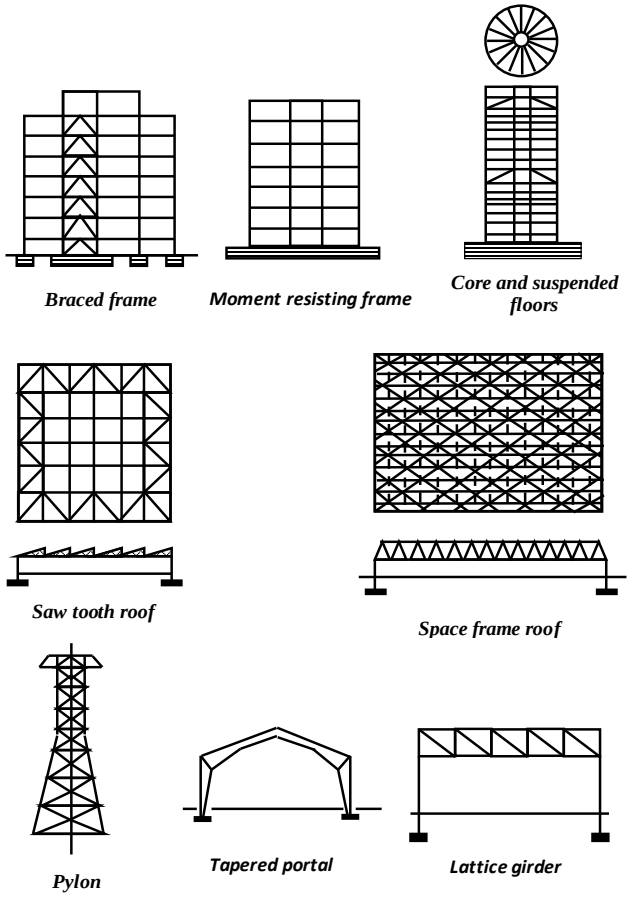

Fig. 4 Examples of steel-framed structures

As pointed above, a system consists of many subsystems, i.e. components of the system. For example, in a building, major subsystems are structural framing, foundations, cladding, non-structural walls and plumbing. Each of these subsystems consists of several interrelated components. In the case of structural framing, the components include columns, beams, bracing, connections etc.

The richness and variety of structural systems can be appreciated by the available building structural types that range from massive building blocks to shell structures, from structures above or below ground or in water, to structures in outer space. Examples of a few steel-framed structures are shown in Fig. 4.

4.1 Goals

Before starting the design of a system, the designer should establish the goals for the system. These specify what the system is to accomplish and how it will affect the environment and other systems or vice versa. Goals are generally made in statements of specific design objectives such as purpose, time and cost limitation, environmental constraints etc., which

would enable the generation of initial and alternative designs.

The goals for a system design applied to a subsystem serve the same purpose as for a system. They indicate the required function of the subsystem and how it affects and is affected by other subsystems.

4.2 Objectives

Having set down the goals, the designer defines the system objectives. These objectives are similar to goals but explain in detail the requirements that the system must satisfy to attain the goals. Some of the essential objectives of any project relate to health, safety and welfare requirements of the occupants, which are generally defined in local building codes or building regulations. Other special objectives include minimisation of initial costs, life-cycle costs, construction time etc.

At least one criterion (e.g. Fire resistance) must be associated with each objective. A criterion is a range of values within which the performance of the system must lie (e.g. Two hours fire rating is needed). The criterion serves as a guide in the evaluation of alternative systems to the project.

4.3 Constraints and standards

Constraints are restrictions on the values of design variables, which may or may not be under the control of the designer. For example, an I-beam section of 200 mm depth may be desirable, but not available. There are also various legal and building code requirements. A minimum of one standard must be associated with each constraint.

4.4 Codes and Specifications

A structural engineer is guided in his design efforts by the relevant codes and specifications. Although the word 'codes' and 'specification' are normally used interchangeably, there is a distinction between them. A detailed set of rules and suggestions prepared by an interested party is called an engineering specification.

On the other hand, Codes are frequently formulated by a group of professionals with a view to their adoption by the profession as a whole. These are revised at regular intervals based on new developments in materials, research, construction techniques etc.

Though codes offer general guidance to a certain extent, they do not provide answers to all the problems that arise in practice. Mere adherence to codes and specifications will curb all initiatives and innovative designs.

4.5 Construction and other costs

Construction cost and time are usually dominant design concerns. If the construction cost exceeds the budget, the completion of the project may be in jeopardy. Minimisation of the life cycle cost of a system would result in the most desirable solution.

5.0 DESIGN REQUIREMENTS

The principal design requirements of a structure are set out already under Introduction. The primary structural safety requirement is met by ensuring that the structure has an acceptably low risk of failure during its design life. Another important requirement is that the structure must be sufficiently stiff to ensure that excessive deflection and vibrations do not affect the in-service performance of the structure.

The requirement of harmony within the structure is affected by the relationships between the different subsystems of the main system, the architectural subsystem, the mechanical and electrical subsystems, and the functional subsystems required by the use of the structure. Finally, the system should be in harmony with its environment, and should not react unfavourably with either the community or its physical surroundings.

Conceptual design refers to the task of choosing a suitable system. (As an example architect is generally concerned with the building layout, limits and parameters). In modern construction practices, a multidisciplinary team of architect, structural designer and service engineer together evolve the conceptual design. A typical organisational chart for a multidiscipline design team is seen in Fig. 5, which shows the inter-relationship between the various design professionals.

The structural engineer is charged with the task of ensuring that the structure will resist and transfer the forces and loads acting on it with adequate safety, while supporting other subsystems and making due allowance for the requirements of serviceability, economy, harmony and constructibility. The iterative process of achieving such a design is shown in Fig. 6.

Since several simplifying approximations are made in the preliminary design, it is necessary to re-check the design. The loads are recalculated more precisely and the structure is reanalysed. The performance of the structure is then re-evaluated with respect to the structural requirements, and any changes in the member and joint sizes are made [See Fig. 7].

Frequently, there is a fundamental confusion among students between a problem on Analysis and one on Design. In an analysis problem, all the parameters are known. (For example, if deflection of a loaded beam is required and the span, loading and the cross sectional properties are all known then a unique

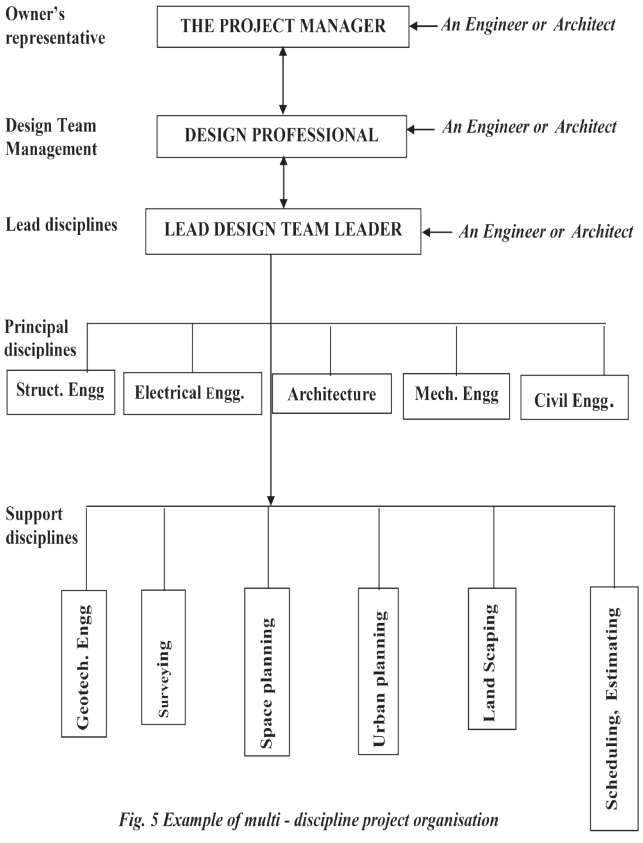

Fig. 5 Example of multi - discipline project organisation

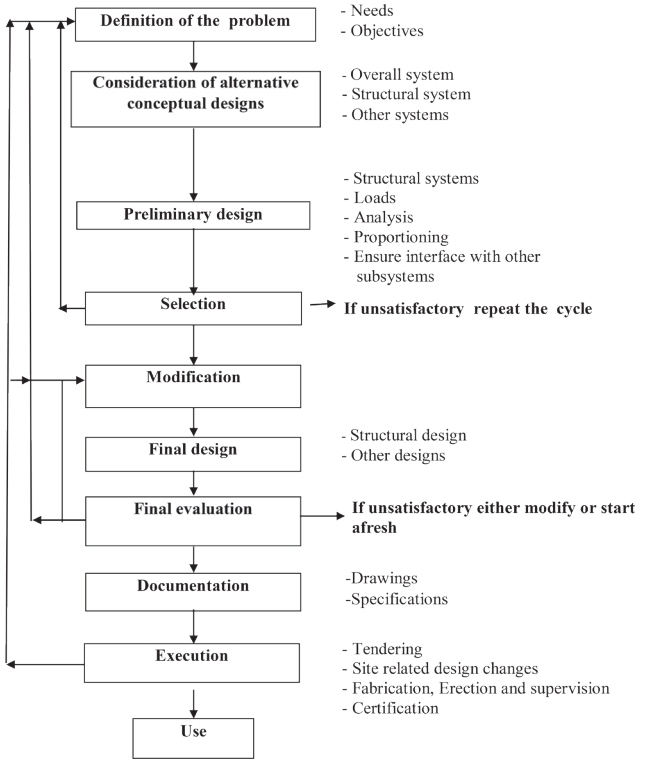

Fig: 6 The overall design process (Iterative)

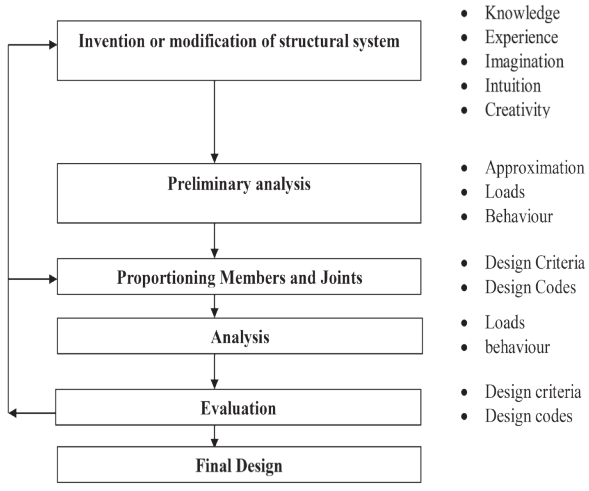

Fig. 7 The structural design process

solution for the value of deflection can be arrived). The problem encountered in design (as compared to analysis) is that it involves the selection of the span, assessment of the loading, choice of the material of which the beam element is made, definition of its cross section and so on.. As a consequence, no unique solution can be offered for any design problem. It is clear that the designer has to make several decisions, each of which could affect the final result. Considerable engineering discretion of the designer is implicit in every design project.

The aim of the comparison of designs is to enable the designer to ascertain the most acceptable solution that meets the requirements for the given structure. All factors must be taken into consideration. Factors to be taken into account in a typical building project are given below by way of illustration:

1. Materials to be used
2. Arrangement and structural system (e.g. flooring system) to be adopted
3. Fabrication and type of jointing
4. Proposed method of erection of the framework
5. Type of construction for floor, walls, cladding and finishes
6. Installation of ventilating/ heating plant, lifts, water supply, power etc.
7. Corrosion protection required
8. Fire protection required
9. Operating and maintenance costs

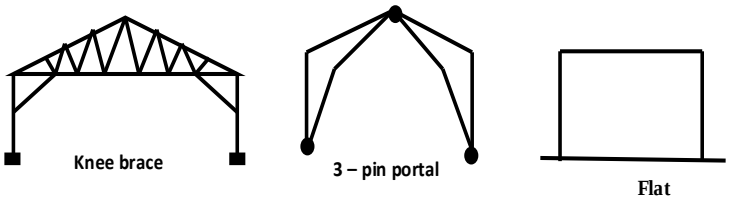

Fig: 8 Single Bay, Single-storey Structures

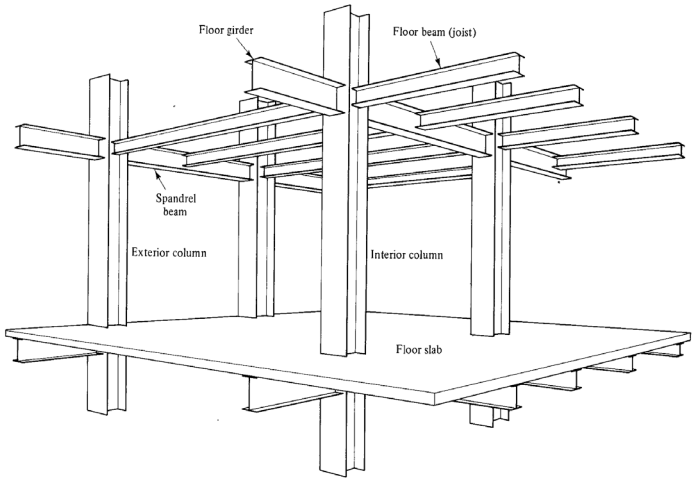

Fig.9 Beam and column construction

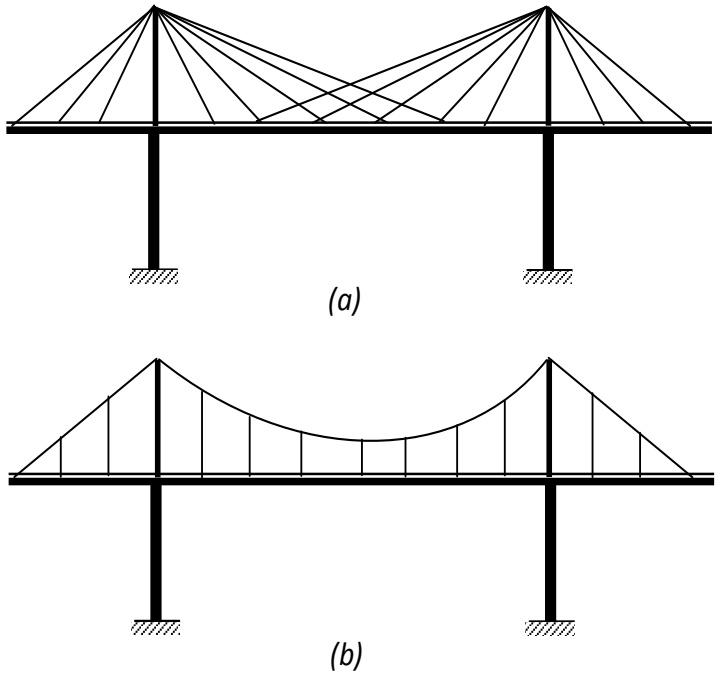

Fig. 10 Cable-stayed structures

Aesthetic considerations are important in many cases and the choice of design may not always be based on cost alone. The weight saving may be offset by the higher cost of the stronger material or the higher cost of fabrication/construction of complicated systems. Often no one solution for a given structure is prominent or obvious to the exclusion of all other alternatives. As an example, we can illustrate several choices available to the designer for a single bay, single storey structure [See Fig. 8]. An example of beam and column system frequently used is illustrated in Fig. 9. Cable stayed structures are frequently employed in long span bridges and buildings and are shown in Fig. 10. In the following chapters, the analysis and design of steel elements are discussed in depth, followed by the analysis and design of selection of structural elements.

6.0 CONCLUDING REMARKS

The paper discussed the role of a Structural Engineer in designing constructed facilities in the 21st century. The relevant environmental factors which affect his work, the durability and infrastructure crises, which face the Industry, are all discussed in detail. The importance of life cycle costing and the rational selection of appropriate materials for construction are discussed in depth.

A strong case is made for taking account of the durability and environmental considerations in the design process. They make a vital contribution to the life cycle cost of a structure. The paper concludes with a description of the structural design process in the everyday life of a structural engineer.

திரு. S.D. கண்ணன்
Taxation Committee

PENALTY FOR E-WAY BILL CONTRAVENTIONS

As per the Notification 39/2021-CT(R) dated 21.12.2021, wherein Central Government appoints 01.01.2022 as the date for various amendments made through Finance Act, 2021 to come into force. Amongst others, amendments to section 129 of CGST Act, ie, Detention, seizure and release of goods and conveyances wrt e-way bill contraventions, shall come into effect from 01.01.2022. Relevant Provisions of section 129 of CGST Act prior and post 01.01.2022

Particulars		Prior to 01.01.2022	Post 01.01.2022
In case owner of goods comes forward	Taxable Goods	Tax and penalty equal to 100% of the tax payable	Penalty equal to 200% of tax payable
	Exempt Goods	2% of the value of goods or Rs 25,000, whichever is less	
In case owner of goods does not come forward	Taxable Goods	Tax and penalty equal to 50% of the value of goods reduced by tax paid	Penalty equal to 50% of the value of goods or 200% of the tax payable on goods, whichever is higher
	Exempt Goods	5% of the value of goods or Rs 25,000, whichever is less	

Further, time limits have been prescribed for issuance of notice as well as order in respect of goods and conveyance so detained. Notice for payment of penalty shall be issued within 7 days from date of detention and order shall be passed within 7 days from the date of such notice. Therefore, e-way bill proceedings under section 129 shall be concluded within 14 days from date of detention.

In addition to the above, if the transporter of owner of the goods does not pay the penalty within 15 days from the date of order, the goods or conveyance is liable to be sold or disposed of to recover the penalty. In case, the transporter pays the penalty as mentioned in table above or Rs 1,00,000, whichever is less, the conveyance shall be released. It is pertinent to note that such option was not available to the transporter prior to the amendment (01.01.2022)

Under the earlier provisions, there was ambiguity on whether taxes for supply of goods will have to be paid in addition to the taxes paid under section 129, specifically in light of ITC restriction under section 17(5)(i). Moreover, no mechanism was provided to adjust the taxes paid under section 129, in the GSTR 3B. With the amendment of provisions of section 129, by increase the penalty to 200%, the ambiguity is now put to rest.

Whether penalty needs to be paid even in case of minor offenses

Circular 64/38/2018-GST dated 14.09.2018 clarifies that in case the consignment of goods is accompanied with an invoice and also e-way bill, penalty under section 129 is not applicable and nominal penalty of Rs 1,000 shall be levied under section 125 of CGST Act, in the following cases:

a) Spelling mistakes in the name of the consignor or the consignee but the GSTIN, wherever applicable, is correct;

b) Error in the pin-code but the address of the consignor and the consignee mentioned is correct, subject to the condition that the error in the PIN code should not have the effect of increasing the validity period of the e-way bill;

c) Error in the address of the consignee to the extent that the locality and other details of the consignee are correct;

d) Error in one or two digits of the document number mentioned in the e-way bill;

e) Error in 4 or 6 digit level of HSN where the first 2 digits of HSN are correct and the rate of tax mentioned is correct;

f) Error in one or two digits/characters of the vehicle number. While the Circular lists the scenarios mentioned above, various courts have taken liberal interpretation of the Circular and extrapolated to various scenarios wherever there is no revenue loss.

Important Amendments to Income Tax Act as proposed vide Finance Bill, 2022

Broad Category	Description	Relevant Section
Individuals	Deduction limit increased to 14% on contribution made by State Government employer to NPS	80CCD
	Money received by an individual from any person in respect of expenses incurred by him on medical treatment of self or family members in respect of illness related to COVID-19	56 (2) (x)
	Any sum received by a member of family of a deceased person from employer (without limit) or any person (not exceeding Rs. 10 lakhs) where death was due to COVID-19 and received within 12 months from the date of death With retrospective effect from 1.4.2020	
	Any sum incurred by employer towards COVID-19 treatment of employee or his family members is not a perquisite With retrospective effect from 1.4.2020	17 (2)
Profit and Gains of Business or Profession	It is clarified that Health and Education cess shall not be allowed as business expenses	37 & 40
Undisclosed Income	No set off of losses brought forward, or otherwise or unabsorbed depreciation shall be allowed while computing total income which includes undisclosed income found in the course of search, requisition or a survey	79A
Startups	Tax holiday extended for eligible startups by one more year till 31.3.2023	80IAC
Virtual Digital Assets	Income from Virtual Digital Assets (Crypto currency) chargeable to tax @ 30%	115BBH
	No deduction in respect of any expenditure (other than cost of acquisition)	
	No other allowance or set off of any loss shall be allowed	
	No carry forward of losses arising from such transfers	
Co-operative Society Alternate Minimum Tax	The rate of alternate minimum tax reduced from 18.5% to 15%	

Broad Category	Description	Relevant Section
Department Appeals	Department appeals will not be preferred if identical question of law is pending before the High Courts or Supreme Court	158AB
Updated Return	New section introduced to facilitate filing of updated return of income by any person whether he has filed return or income for the A.Y. or not	139(8A)
	Allowed anytime within 24 months from the end of the A.Y.	
	Updated return not possible where it results in loss or increased loss or refund or increase in refund	
	Payment towards additional tax liability to be made prior to filing of updated return	140B
Manufacturing entities	Concessional tax regime made applicable for newly incorporated domestic company that commences manufacturing or production on or before 31.03.2024	115BAB
Tax Deduction at Source	**Deduction of tax on benefit of perquisite in respect of business or profession (read as Business Promotion related)** Any person responsible for providing to a resident, any benefit or perquisite, whether convertible into money or not, arising from business or profession shall deduct 10% of the value of such benefit or perquisite	194R
	Deduction of tax on transfer of Virtual Digital Asset Any person responsible for paying to a resident any sum of money by way of consideration for transfer of a Virtual Digital Asset shall deduct an amount equal to 1% of such sum as income tax	194S
	Deduction of tax on sale of immovable property - Any person responsible for paying to a resident any sum by way of consideration for transfer of any immovable property other than agricultural land shall deduct tax at the rate of 1% - Not applicable where consideration is less than Rs.50 lakhs - For the purposes of deduction, sum paid or credited of stamp duty value whichever is higher should be considered	194IA
Surcharge related	Surcharge on Long Term Capital Gains (LTCG) Surcharge on LTCG arising from transfer of any type of assets has been capped at 15%	
	Levy of surcharge @ 12% in cases where tax has to be charged and paid under 92CE Sub-section 2A, 115QA, 115TA or 115TD	
	AOPs - Surcharge on AOPs capped at 15%	
Miscellaneous	**Deduction only based on actual payment basis** Conversion of interest payable into debentures or any other instrument in certain instances by which the liability to payment is deferred to a future date shall not to be deemed to have been actually paid	43B
	No deduction towards exempt income Provisions of section to apply in cases where the exempt income has not accrued or arisen or has not been received during the previous year and the expenses had been incurred in said P.Y. in relation to such exempt income	14A
	Cash credits - new proviso to section has proposed to be added as where the sum so credited consists of loan or borrowing or any such amount any explanation offered by the assessee shall be deemed to be not satisfactory unless a) the person in whose name such credit is recorded in the books of the assessee also offers an explanation about the nature and source of such sum so credited, and b) such explanation in the opinion of the AO has been found to be satisfactory Applicable from A.Y. 2023-24	68

Compiled by: K S D K and Company LLP – Ph No. 9884071956

Schwing Stetter நிறுவனம் செய்யாறு தொழில் பூங்காவில் அமைந்துள்ள தொழிற்சாலையில் Latest Equipment Exhibition and Demonstration–ல் நமது உறுப்பினர்கள் கலந்து கொண்டனர்.

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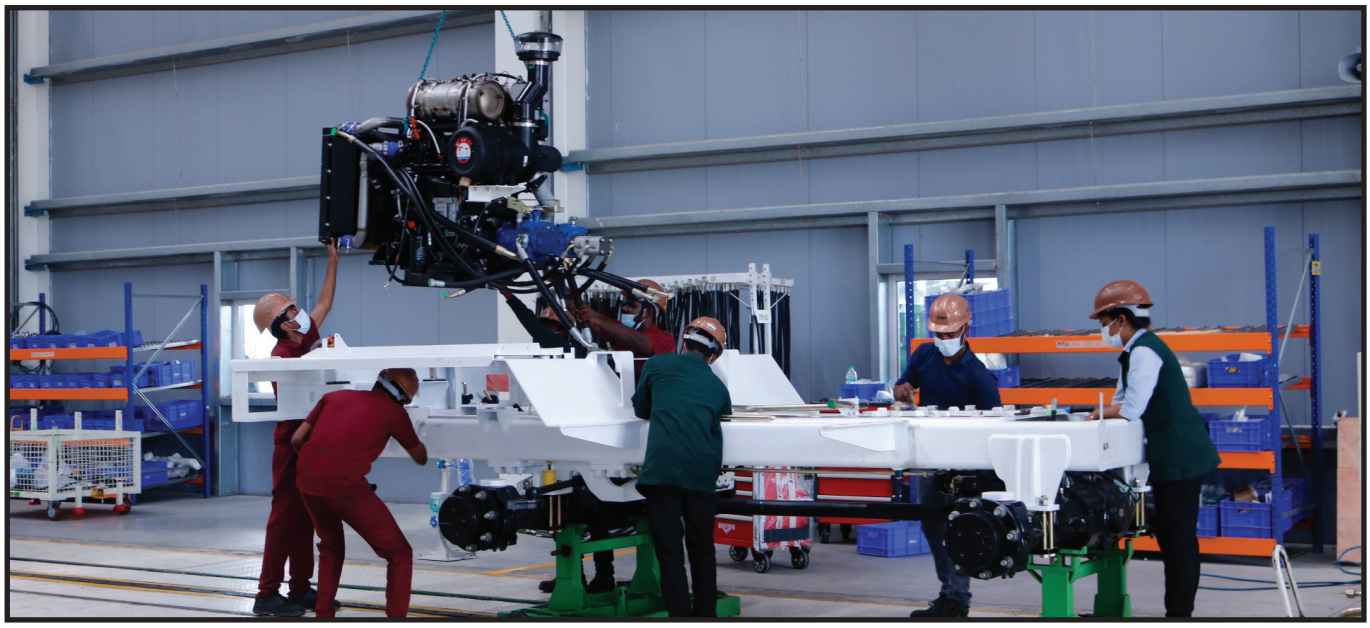

11வது செயற்குழு கூட்டம் ஓட்டல் GRT Grand, T.Nagar, Chennai-17ல் நடைபெற்றது.

4வது மாநில அளவிலான மேலாண்மை மற்றும் பொதுக்குழு கூட்டம் ஏற்காட்டில் 25.02.2022 அன்று நடைபெற்றது.

15.02.2022 அன்று திருச்சியில் மய்யத்தலைவர்கள் மற்றும் குழுத்தலைவர்கள் கூட்டம் நடைபெற்றது

30வது அகில இந்திய கட்டுநர் மாநாட்டிற்கு சிறப்பு விருந்தினராக மாண்புமிகு திரு. A.V. வேலு அவர்கள் அழைக்கப்பட்டார்.

பதிவுத்துறைத்தலைவர் அலுவலகம்,
சென்னை –28.

சுற்றறிக்கை

ந.க.எண். 35083/சி1/2021 நாள்.07.02.2022.

பொருள்: சென்னை உயர்நீதிமன்றம் – நீர்நிலை என வகைப்படுத்தப்பட்ட நிலங்கள் மீது பதிவு செய்திட தடை விதிக்குமாறு கோரி வழக்கு தாக்கல் செய்யப்பட்டது – மாண்புமிகு உயர்நீதிமன்றத்தால் 27.01.2022 தேதியிட்டு தீர்ப்பாணை பிறப்பிக்கப்பட்டது – நீதிமன்ற ஆணையில் தெரிவிக்கப்பட்டவாறு நீர்நிலை என வகைப்படுத்தப்பட்ட நிலத்தில் ஆவணப் பதிவினை மேற்கொள்ள தடை விதித்தல் – தொடர்பாக.

பார்வை: 1 பதிவுத்துறைத்தலைவர் சுற்றறிக்கை எண். 35083/சி1/2021 நாள்.23 .11.2021.

2. சென்னை உயர்நீதிமன்றம் மதுரை அமர்வு நீதிப்பேராணை எண். W.P.No.22163/ 2018 உள்ளிட்ட வழக்குகள் மீதான தீர்ப்பாணை நாள். 27.01.2022

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பார்வை 1–ல் குறிப்பிடும் சுற்றறிக்கையினைத் தொடர்ந்து கீழ்க்காணும் நெறிமுறைகள் பிறப்பிக்கப்படுகிறது.

நீர்நிலை என வகைப்படுத்தப்பட்ட நிலங்கள் மீது உரிய பட்டா வழங்கப்படாமல் தாக்கல் செய்யப்படும் ஆவணங்களை தமிழ்நாட்டில் அமைந்துள்ள பதிவு அலுவலகங்களில் பதிவு செய்யக் கூடாது என உத்தரவிட வேண்டியும், இந்நிலங்கள் மீது மின் இணைப்பு வழங்கப்படக்கூடாது எனவும், அனைத்து உள்ளாட்சி திட்ட அமைப்புகளும் நீர்நிலைகளுக்குச் செல்லும் வழிப்பாதைகளை ஆக்கிரமித்துள்ள நிலங்கள் மீது அங்கீகாரம் வழங்கப்படக் கூடாது எனவும் உள்ளிட்ட உத்தரவு வேண்டி தனிநபரால் சென்னை உயர்நீதிமன்றத்தில் ஒரு பொது நல வழக்கு தொடரப்பட்டதில் பார்வை –2 ல் கண்டபடி ஆணை வழங்கப்பட்டுள்ளது

அதன்படி, நீர்நிலைகள், என வருவாய் துறையின் மென்பொருள் (TAMILNILAM)–ல் பதிவேற்றம் செய்யப்பட்டுள்ள நீர்நிலை எனக் குறிப்பிட்டப்பட்டுள்ள நிலத்தில் எந்த வகையான ஆவணப்பதிவும் மேற்கொள்ளக் கூடாது என நீதிமன்றத்தால் ஆணையிடப்பட்டுள்ளது.

மேலும் ஆவணப் பதிவின்போது, சொத்து உரிமையாளரால் எழுதிக் கொடுக்கப்படும் ஆவணத்தில் கட்டுப்பட்ட சொத்து, நீதிமன்றத்தால் பதிவு செய்ய தடை விதிக்கப்பட்டுள்ள நீர்நிலையில் அமையப் பெறவில்லை என உறுதியளிக்கிறேன் என உறுதி மொழி பெறப்பட வேண்டும் எனவும் நீதிமன்றத்தால் அறிவுறுத்தப்பட்டுள்ளது.

மாதிரி உறுதிமொழி இத்துடன் இணைத்து அனுப்பப்படுகிறது. அசையாச் சொத்துக்கள் குறித்த அனைத்து ஆவணங்களுக்கும் இந்த உறுதிமொழியினை ஆவணத்தின் பகுதியாக சேர்க்கப்பட வேண்டும் எனவும் ஆவணத்துடன் ஒளிவருடல் செய்யப்படவேண்டும் எனவும் தெரிவிக்கப்படுகிறது.

நீதிமன்றத்தின் தீர்ப்பாணையில் தெரிவிக்கப்பட்டவாறு தவறாது செயல்படுமாறு அனைத்து பதிவு அலுவலர்களுக்கும் அறிவுறுத்தப்படுகிறது. நீர்நிலை என வகைப்படுத்தப்பட்ட நிலங்கள் மீது எவ்வித ஆவணப் பதிவும் மேற்கொள்ளப்படக் கூடாது என பிறிதொரு வழக்கில் பிறப்பிக்கப்பட்ட தீர்ப்பாணையின் அடிப்படையில் அனைத்து கள அலுவலர்களுக்கும் பார்வை 1–ல் குறிப்பிடும் சுற்றறிக்கையின்படி நெறிமுறைகள் பிறப்பிக்கப்பட்டது தவறாது கவனத்தில் கொள்ளுமாறும் தெரிவிக்கப்படுகிறது. மேலும் கணினிமயமாக்கப்படாத நத்தம் நிலங்களை பொறுத்து அவற்றில் உள்ள நீர்நிலைகள், நீர்வழிப் பாதைகள், நீர்பிடிப்பு பகுதிகளின் விபரங்களை வருவாய் துறையினைரை தொடர்பு கொண்டு சொத்துக்கள் பட்டியல் பெற்றுக் கொள்ளவும் தெரிவிக்கப்படுகிறது.

மேலும் வழிகாட்டி பதிவேட்டில் மேற்கண்ட நிலங்களுக்கு ' 0 ' மதிப்பு உட்புகுத்தவும் தெரிவிக்கப்படுகிறது.

இதனை தங்களின் எல்லைக்குட்பட்ட பதிவு அலுவலர்கள் சரிவர கடைபிடிப்பதை சம்பந்தப்பட்ட மாவட்ட பதிவாளர்களும் துணை பதிவுத்துறை தலைவர்களும் உறுதி செய்திட கோரப்படுகிறது.

இந்தச் சுற்றறிக்கை பெற்றதற்கான ஒப்புதலை அனைத்து சார்பதிவாளர்களிடமிருந்து மாவட்ட பதிவாளர்களும் மாவட்ட பதிவாளர்களிடமிருந்து துணை பதிவுத்துறை தலைவர்களும் பெற்று கோர்வை செய்துகொள்ள அறிவுறுத்தப்படுகின்றனர். துணை பதிவுத்துறை தலைவர்கள் தங்களின் ஒப்புதலை பதிவுத்துறை தலைவருக்கு அனுப்ப கோரப்படுகின்றனர்.

ஒம்/–07.02.2022.
பதிவுத்துறைத்தலைவர்

/ஆணைப்படி/

கூடுதல் பதிவுத்துறைத்தலைவர்
(முத்திரை மற்றும் பதிவு)

இணைப்பு. மாதிரி உறுதிமொழி படிவம்.

சொத்தானது நீர்நிலை பகுதியில் அமையப் பெறவில்லை என்பதற்கான சான்று/உறுதிமொழி (Declaration) (நீதிபேராணைஎண் 22163/2018ல் வழங்கப்பட்டதீர்ப்புரையைகாண்க)

இந்த ஆவணத்தில் கண்ட சொத்தானது நீர்நிலைகள், நீர்வழிப்பாதைகள், நீர்பிடிப்பு பகுதிகளில் கட்டுப்படவில்லை என சான்றளிக்கிறோம். மேலும் இதனில் தங்களுக்கு தவறான தகவல் அல்லது சான்று அளிக்கப்பட்டதாக பின்னாளில் கண்டுபிடிக்கப்பட்டால் அதனால் நான்/நாங்கள் சட்ட பூர்வ நடவடிக்கைகளுக்கு உட்படுத்தப்படுவோம் என்பதையும் அறிவேன்/அறிவோம்.

ஆவணத்தை எழுதிப் பெறுபவர்களின் கையொப்பம்

ஆவணத்தை எழுதிக் கொடுப்பவர்களின் கையொப்பம்

Er.A.G.Marimuthuraj

வித்தியாசமான கோணத்தில் வாஸ்து

1500 கோடி ஆ.மு.	பிரபஞ்சப் பிறப்பு
500 கோடி ஆ.மு.	பூமி தோன்றியது
350 கோடி ஆ.மு.	உயிரின் உற்பத்தி தொடக்கம்
45 லட்சம் ஆ.மு.	மனித உயிரின் மூதாதையர் தோற்றம்
25 ஆயிரம் ஆ.மு.	இயற்கை வாழிடமான குகை ஆரம்பித்தது
15 ஆயிரம் ஆ.மு.	செயற்கை வாழிடம் வடிவமைக்கப்பட்டது
10 ஆயிரம் ஆ.மு.	குடிசை போன்ற வாழிடம் உருவானது
5 ஆயிரம் ஆ.மு.	நவநாகரிக வாழிடங்கள் உருவானது. அதாவது (அரண்மனை, கோயில், கோட்டை....)

நாகரிக காலம்

உலகில் தோன்றிய நாகரிகங்களில் குறிப்பிடத்தக்கது.

1. சுமேரியர் நாகரிகம் - கிரகூத்துக்கள்
2. கிரேக்கர் நாகரிகம் - கோலோகியம்
3. இன்கா நாகரிகம் - அரண்மனை
4. எகிப்திய நாகரிகம் - பிரமீடு
5. சீன நாகரிகம் - பெருஞ்சுவர்
6. மாயன் நாகரிகம் - கோயில்கள்
7. சிந்துசமவெளி நாகரிகம் - மொகஞ்சதாரோ, ஹரப்பா
8. ரோம் நாகரிகம் - தேவாலயங்கள்

கிட்டத்தட்ட மேற்குறிப்பிட்ட அத்தனை நாகரிகமும், கிமு 5000த்தில் இருந்து கிபி 476க்கு முடிவுக்கு வந்தது. அத்துடன் உலகமெங்கும் மன்னர் ஆட்சியின் முதல் கட்டம் முடிவுக்கு வந்தது.

இந்தியாவைப் பொறுத்தமட்டில் நாகரிக காலத்திற்குப் பின் கட்டடக்கலை என்பது வடகுதில், வேதகாலம், நந்தர் காலம், மௌரியர் காலம், குஷானர்கள், குப்தர்கள் தொட்டு மராட்டியர் காலம் வரை அதாவது கிபி 1700 வருகிறது. அதனை அடுத்து

ஐரோப்பியர் வருகை கிபி 1900 வரை நீடித்தது. இதே மாதிரி இந்தியாவின் தென்பகுதியாகக் கட்டடக் கலையானது லெமூரியா, சங்ககாலம், பாண்டியர், பல்லவர், சேரர், சோழர், முகமதியர், விஜயநகரத்தார், நாயக்கர் முதல் மராட்டியர் வரை, அதாவது கிபி 1700க்கு அடுத்து ஐரோப்பியர் வரை நீடிக்கிறது.

இந்த நீண்ட நெடிய வரலாற்றில் கட்டுமானக் கலை என்பது 25,000 ஆ.மு-ல் குகையில் ஆரம்பித்து, கோட்டை கொத்தளம், அரண்மனை, கோயில், குளம் என வளர்ச்சியை எட்டியுள்ளது யாரும் மறுக்க முடியாததாகும்.

இதன் மூலம் என்ன சொல்ல வருகிறேன் என்றால்

கி.பி. 1700ல் தான், முதல் பொறியியல் கல்லூரி, பிரான்ஸ் நாட்டில் உலகிலேயே முதன்முதலாக தொடங்கப்பட்டது. இங்கே படித்து வெளியேறிய பொறியாளர்கள் தான், கட்டடங்களை கட்ட ஆரம்பித்தனர். அதன் பிறகு ஊரெல்லாம் பொறியியல் கல்லூரி தொடங்கப்பட்டு, தேவைக்கும் அதிகமான பொறியாளர்களை உருவாக்கி அவர்கள் அனைவரும் கட்டுமானத் துறையை ஆக்கிரமித்தனர் இல்லையா.

இந்த நூற்றாண்டில் தான், கட்டுமான மூலப்பொருள்களின் பிரதானமான, இரும்பு, சிமெண்ட் கண்டுபிடிக்கப்பட்டு கட்டுமானத்துறை நீள, அகல, உயர வாக்கில் கிடுகிடு என வளர்ந்தது. இன்னும் புதுப்புது தொழில்நுட்பத்துடன் வளர்ந்து கொண்டே இருக்கின்றது. நான் என்ன சொல்ல வருகிறேன் என்றால் முதல் பொறியியற் கல்லூரி தோன்றுவதற்கு முன் ஏறத்தாழ 5000 வருடங்களாக, கட்டப்பட்ட உலக அதிசயங்கள், யாரால் கட்டப்பட்டது என்றால் மயன், விஷ்வகர்மா போன்ற வானியல் அறிவு மிகுந்த பல்வேறு அறிஞரால் கட்டப்பட்டது. அவர்கள் வகுத்து வைத்த விதிகள் தான் வாஸ்து நூலில் உள்ளது என்பதைத்தான் வலியுறுத்துகின்றேன்.

மேலும் பொதுவாக ஓர் உருவ வடிவமைப்பு என்பது ஏதோர் கணக்கியல் அடிப்படையிலானதாகவே இயற்கை கனகச்சிதமாக படைத்துள்ளது. அதன்படி பார்த்தால், கட்டிடம் என்ற உருவ வடிவமைப்பு என்பதும் இருபக்க சமச்சீர் வடிவமைப்பாக உள்ளது என்றால் அது மிகையாகாது. (Bilateral Symmetry).

இந்த தொழில்நுட்பத்தை எல்லாம் எழுதிவைக்க முடியாது. பழியில்லாத வரலாற்றுக்கு முந்தைய காலத்தில் அவைகளைக் கொண்டு எழுப்பப்பட்ட கட்டடங்களைத் தோண்டி எடுத்து இன்றைக்கு அறிகின்றோம். இல்லை

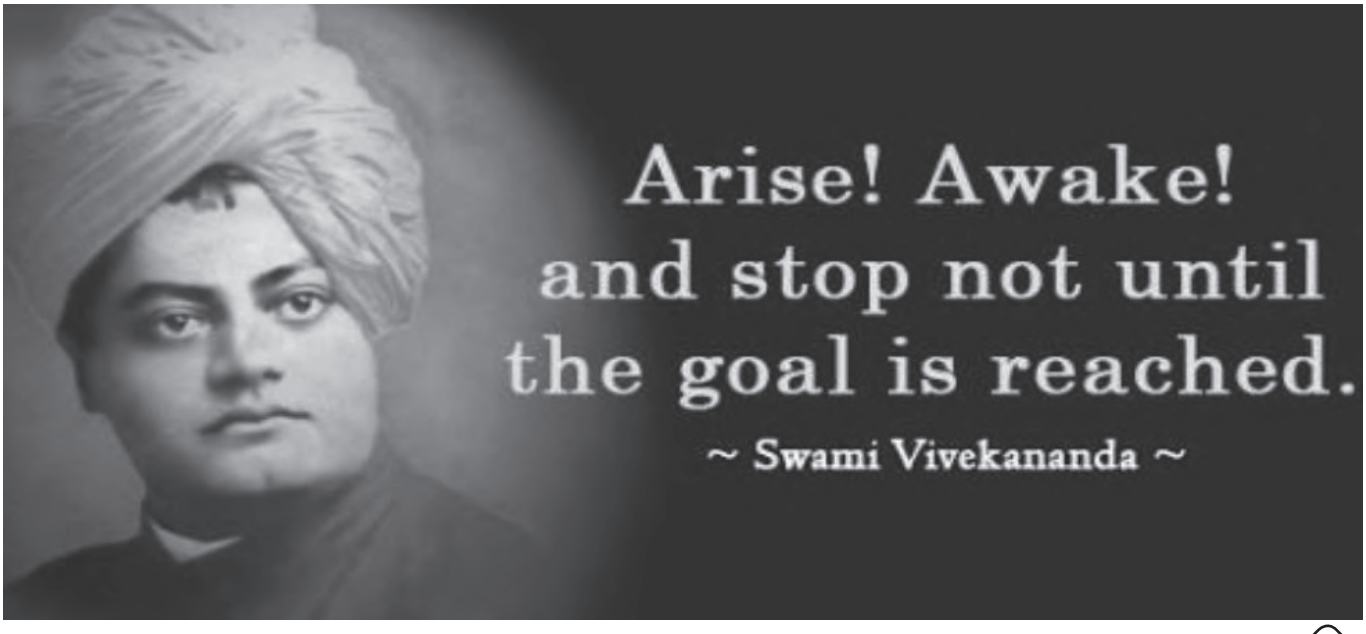
மேலும்

கட்டடக்கலை என்பது கட்டுனர்களுக்கு சொந்தமானது. அவர்கள்தான் அதன் அடிப்படை விதி மற்றும் புதிய தொழில்நுட்ப முறைக்கு அதிலே புகுத்தக்கூடிய வல்லமை பெற்றிருப்பர். அவரை அணுகாது, கட்டிடத்திற்கு சம்மந்தம் இல்லாத ஜோதிடர் மற்றும் பலரைத் தேடிச் செல்வது எப்படி சரியாகும். இல்லையா?

வாஸ்து நூல் என்பதில் முழுக்க, முழுக்க மனித ஆரோக்கியத்திற்கும் மன அமைதிக்கும் முக்கியத்துவம் கொடுத்து கட்டுமான விதிமுறைகள் வகுத்து தொகுத்து கூறப்பட்டுள்ளன.

முடிவாக இன்றைய நவீன கட்டடக்கலையில் எத்தனையோ புதிய தொழில்நுட்பங்களால், கற்பனையை விஞ்சும் அளவு கட்டமைக்கப்படுகிறது. இந்தக் காலத்தில் வாஸ்து என்பது ஒரு சிறிய பகுதியாக, அதாவது கட்டிடத்தின் மண்ணுக்குள் இருக்கும் அஸ்திவாரம் போன்று பயன்பாட்டில் உள்ளது. அந்தச் சிறிய பகுதியை பொறியாளர்கள் அனைவரும் தெரிந்து வைத்திருந்தால் நல்லது. ஏனென்றால் இன்றைக்கு பயனாளிகள் அதை எதிர்பார்க்கின்றனர் என்பது கண்கூடு இல்லையா.

இதுவரை வாஸ்து குறித்த எனது கருத்தை இங்கே பதிவு செய்தேன். இனி வித்தியாசமான கோணத்தில் வாஸ்து என்ற தலைப்பை ஒட்டிய தகவல்களுக்குள் செல்வோம் வாருங்கள்.



FIRE SAFETY REGULATIONS FOR THE RESIDENTIAL BUILDINGS

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Introduction.

Fire poses a major threat to various occupancies in India. Almost every day some fires are reported by media across the country. These fires not only resulted in the loss of many precious lives and injuries to many but also inflicted heavy property loss. During the last two decades, there was a vibrant growth in construction activities in India, especially in high rise buildings. Because of its peculiar nature, fire in residential buildings, in particular, high rise buildings, become more complex and the salvaging operations become more difficult and sometimes even result in many deaths and huge property losses. The rapid modernisation of Indian Industry has made the scenario more complex. Awareness towards fire safety had not been quite forthcoming. This article will focus on the overall scenario of the existing fire safety regulations in India and the effectiveness of these regulations for combating potential fire hazards.

Common Fire Hazards in a Building. Any actions, materials, or conditions that might increase the size or severity of a fire or that might cause a fire to start are called fire hazards. The main causes of fire in the building are: (a) Electricity – neglect or misuse of wiring can lead to short circuits. (b) Rubbish and waste material- fire is likely to spread through accumulated waste. (c) Smoking -carelessly discarded cigarette butts or lit matches are one of the major causes of fire. (d) Cooking-kitchens provide opportunities for a fire to start and materials on which it can feed. (e) Heating appliances - portable heaters are a threat when placed beside combustible furniture or fittings. (f) Combustible materials including - flammable liquids, glues and solvents are all liable to combust unless stored and used properly arson or wilful fire-raising. (g) False ceiling, wooden furniture and carpets etc. (h) Non-standard and faulty office equipment. (i) Free use of extension cords, ungrounded plugs and unfused multiple outlet adapters.

Fire Safety Codes and Standards. The National Building Code (NBC) 2016, is the basic model code in India on matters relating to building construction and fire safety. Fire prevention and fire protection is a state subject. BIS has formulated more than 150 standards on fire safety in buildings and firefighting equipment & systems and important ones are: Code of practice for fire safety of building (IS 1641 to IS 1646), Electrical generating and distributing stations (IS 3034), Cotton textile mills (IS 3079), Rubber and plastic (IS 11457- Part 1), Libraries and archives (IS 11460), Iron and steel industries (IS 13694), Hotels (IS 13716), educational institutions (IS 14435); fire detection and alarm systems (IS 2189); first aid fire extinguishers (IS 2190); Internal hydrants and hose reels (IS 3844); Fire safety associated

(IS 8757); Temporary structures (IS 8758); Fire protection-safety signs (IS 12349); External hydrant systems (IS 13039); Fixed automatic sprinkler fire extinguishing systems (IS 15105); Gaseous fire extinguishing systems (IS 15493); HFC 227ea (IS 15517); water mist system (IS 15519); Portable fire extinguishers (IS 15683); Long range foam monitors (IS 15811); Fire detection and alarm system (IS 15908), etc.

Codes/ Standards Followed in a Major Project. They are: Fire Suppression System- National Fire Protection Association (NFPA). NFPA 10- “Standard for Portable Fire Extinguishers”. NFPA 13- “Standard for Installation of Sprinkler Systems”. NFPA 14- “Standard for the Installation of the standpipe, private hydrant and Hose Systems". NFPA 24- “Standard for Installation of Private Fire Service Mains and Their Appurtenances”. NFPA 25- “Standard for the Inspection, Testing and Maintenance of water-Based Fire Protection Systems”. NDPA 2001- “Clean Agent Fire Extinguishing Systems”. NFPA 72- “National Fire Alarm Code”

The National Building Code (NBC) 2016. NBC is a national instrument that delineates the construction norms in the country vital for the safe and orderly development of buildings. Any developer who fails to abide by the standards is bound to suffer penalties, cancellation of building permit or property demolishment. The NBC also comprises various guidelines and provisions for regulating and preventing fire in Indian buildings. The main objective of NBC is to specify measures that will provide that degree of safety from fire, which is practical and can be reasonably achieved. The Code insists upon compliance with minimum standards of fire safety necessary for building occupants and users. For ensuring compliance of fire protection equipment/installations to the laid down quality requirements, it is desirable to use such equipment/installation duly certified under the BIS Certification Marks Scheme. As per the code, buildings in India are classified into nine categories and depending upon the nature and occupancy of the structure; the fire safety measures are laid down. Residential buildings are classified under category A, whereas industrial, business and storage buildings are kept under categories G, E and H, respectively. These groups have been subdivided into various categories. The NBC also deals with three types of fire zones and four types of constructions.

Classification of Building According to NBC. Group-A - Residential building. e.g. lodging and rooming, houses; one or two family private dwellings; dormitories; apartment houses; hotels etc. Group-B- Educational building. e.g. schools; colleges; educational institutions etc. Group- C -Institutional. e.g. hospitals; homes for the aged; orphanages; jails; mental hospital; reformatories etc. Group-D -Assembly building. e.g. theatres; motion picture houses; assembly halls; auditoria; exhibition halls; museums; skating rinks; gymnasiums; restaurants; places of worship; dance halls; club rooms; passenger stations and terminals of air, surface and marine public transportation services; and stadia

etc. Group- E- Business building. e.g. offices; laboratories; libraries; computer installations; IT parks; Telephone exchanges; broadcasting/ TV stations; air traffic control tower etc. Group- F -Mercantile building. e.g. shops; stores; markets; underground shopping centers etc. Group- G -Industrial building. e.g. Assembly plants; industrial laboratories; dry cleaning plants; power plants; generating units; pumping stations; fumigation chambers; laundries; buildings or structures in gas plants; refineries; dairies and saw-mills etc. Group- H -Storage building. e.g. warehouses; cold storages; freight depots; transit sheds; storehouses; truck & marine terminals; garages; hangars; grain elevators; barns & stables etc. Group J -Hazardous building. e.g. buildings used for storage and handling of highly combustible or explosive materials which may produce poisonous fumes or explosions toxic etc.

NBC - Part 4 (Fire and Life Safety). It contains the fire safety norms through detailed provisions on fire prevention, life safety and fire protection. The fire protection, not only deals with fire prevention and fire protection but also gives guidance by specifying the standards for construction, plumbing, electrical installations including wiring, lighting, ventilation, heating and air conditioning, safety sanitation, active and passive fire protection systems, etc. It mentions the restrictions of buildings in each fire zone, classification of buildings based on occupancy, the demarcation of fire zones, limitations of height, types of building construction according to the fire resistance of the structural and non-structural components and other restrictions and requirements necessary to minimise danger to life from fire, smoke, fumes or panic before the building can be evacuated. The Code recognizes that the safety of life is more than a matter of means of egress and accordingly deals with various matters which are considered essential to the safety of life. The Code, therefore, covers provisions relating to means of egress covering various components thereof namely exit access, exit and exit discharge. It also covers provisions relating to fire protection of various occupancies through portable and fixed fire fighting installations in Table 7 of NBC.

Fire Related Regulations. Apart from the specific State Acts and Rules stated above, a number of legislations are available on matters relating to fire prevention and fire protection. Amongst these, the Factories Act and State Factories Rules are important ones. Section 38 of the Factories Act, 1948, emphasises, the obligations of the occupier, which include (a) to adopt all practicable measures to prevent the outbreak and spread of fire, (b) to provide safe means of escape, (c) to maintain the firefighting equipment properly and (d) to familiarise all the workers with the means of escape during the fire and train them in steps to be taken in a fire accident. Section 37 of the Factories Act, 1948, also prescribes detailed measures to prevent explosions hazards.

Fire Safety Approval Process. A building 15 meters above the ground level or exceeding three storeys is considered a high-rise structure and must obtain a

certificate of approval from the Director of Fire Force or an officer authorised by him before commencing the construction of any such structure. The building plan submitted to the authority should indicate all the fire protection arrangements and the means of access/escape for the proposed building with suitable signs and symbols on the drawings. The same should be duly signed/certified by a licensed Fire Consultant/Architect. The detailed plan showing the arrangement of booster pumps, pipelines and water tanks at various levels should also be submitted to the concerned authority for approval along with other plans and sections of the buildings. The Chief Fire Officer will examine the safety plan and escape means and forward the reviewed plan to the sanctioning authority. Once the plan is reviewed and approved by the sanctioning body for construction, the Fire officer can issue a No Objection Certificate (NOC). The fire officer must visit the site and examine the project after all the measures have been installed. Any deficiencies found during the inspection should be communicated to the sanctioning authority, and the rectification process should begin immediately.

Measures to Check Fire Safety. Fire safety is a fundamental consideration in building design and management, but unfortunately, one that is often overlooked- firewalls are today more likely to be associated with security than with physical safety. Checklist to assess fire safety measures in a building:

(a) Provide adequate means of escape. The first rule of fire management requires sufficient escape routes out of the building, in accordance with its scale and occupancy. The number, size and location of exits are specified in the National Building Code (NBC) 2005, a detailed set of guidelines for constructing, maintaining and operating buildings of all types. Office occupiers must additionally ensure that staircases, stairwells and corridors are well-maintained, ventilated and free of obstacles in order to be effective in an emergency. Open spaces in buildings play a crucial role in fire management.

(b) Outline clear pathways to exit doors. Getting to exits is as important as providing enough exits. NBC guidelines specify the maximum distance a person must travel in order to access a fire exit, and the importance of photo-luminescent signage to enable evacuation at night. Refuge areas such as terraces are critical for high-rises where people can safely congregate when asked to leave the building in phases.

(c) Install smoke detection systems. The first few minutes of a fire are crucial in containing it. Automatic fire alarm systems such as smoke and heat detectors are mandatory elements in international building codes and are useful in spotting fires during times when occupancy in the building is low.

(d) Maintain smoke suppression systems. Fire extinguishers are only useful if they work, so check them regularly. High-rise buildings, which are harder to access and evacuate, should consider installing automatic sprinkler systems.

(e) Conduct regular fire drills.

Preventing panic in an emergency is as important as staying away from flames and fumes. Regular fire drills familiarize people with emergency evacuation methods at little cost. Nominate a fire safety officer in every building to ensure that this becomes standard operating procedure.

(f) Use flame-retardant materials in interiors. Materials used in the interiors can save or endanger lives. The combination of wood, paper and textiles makes workstations highly combustible. Fabrics can be made flame-retardant, however, so that they self-extinguish when lit. An increasing number of companies, especially multinationals, request such fabrics despite their price premium, according to data from Indian office furniture manufacturer BP Ergo. Doors are also assigned a fire-resistance rating, measuring how long they can remain resistant to excessive temperatures and flames without collapsing.

(g) Office accessible to firefighters. Grilled windows are a widespread urban phenomenon, observes that "residents who have grills on their windows presume that only thieves are kept out, and not firefighters". Occupants of offices in residential buildings with few exits should be wary of locking themselves into confined spaces.

(h) Keep the building plans handy. The tragedy at a major hotel was heightened by the lack of buildings plans to guide rescue agencies. It is imperative to make multiple copies of the building plan available, especially during an emergency.

(i) Local fire brigade to assess safety. Fire departments, for a nominal fee, will independently assess your building's level of fire safety. Storage of hazardous or inflammable materials, old and unstable structures, inadequate escape routes or electricity overloads are potential death traps that are best assessed by professionals.

(j) Comply with National Building Code. "Green buildings" are in vogue but safe structures are sadly not. Both the Mumbai Fire Brigade and BMC commissioner concede that 80% of buildings likely violate accepted codes of building safety, with ignorance and personal whims leading to illegal modifications after gaining requisite occupancy permission.

Fire Protection. Buildings shall be planned, designed and constructed to ensure fire safety and this sha1l be done in accordance with part IV Fire Protection of National Building Code of India unless otherwise specified in these Bye-Laws. In the case of buildings, the building schemes shall also be cleared by the Chief Fire Officer. Fire protection can be divided into two broad categories. Non-structural fire protection or Active fire protection and Structural fire protection or Passive fire protection.

Design Stage Considerations. Table 16A of IS 456:2000 specifies the nominal cover to meet the specified period of fire resistance. Minimum two hrs of fire resistance is considered for residential buildings. Other points that shall be considered during the design stage are: (a) Fire resistance for staircases and lift wells. Wide staircases and lobbies

to permit orderly evacuation in an emergency. Pressurization of staircases and lift lobbies to restrict smoke penetration. (b) Critical areas such as the refuge area to be protected with fire check doors. (c) Fire lift for the exclusive use of fire-fighters. (d) Electrical wiring to be the conduit, Emergency switches at ground floor for disconnecting power and to floor-wise. (e) Provision of automatic fire dampers in air-conditioning ducts to restrict smoke travel throughout the building. (f) Sealing of service shafts/ ducts with fire-resistant material. (g) Provision of alternate power supply for emergency lighting, fire lift and stand by fire pumps. (h) Provision of fire detection/ alarm system, hydrant system, sprinkler system, fire and life safety measures as per NBC.

Balanced Design: Balanced design re-established the importance of passive design, including compartmentalization, in combination with active design, to deliver a more comprehensive fire protection system. Active Fire Protection: Fire protection systems that must be activated to perform, such as sprinklers smoke detectors, duct detectors, fire alarms. Passive Fire Protection: Fire resistance is provided by elements that inherently resist fire, such as non-combustible precast concrete, concrete and masonry block, Fire-rated walls, Fire-rated floors, Fire-rated separations. Total Fire Protection. It is a combination of active fire protection and passive fire protection. A combination of active and passive design elements, as well as the concept of compartmentalization, greatly enhance fire protection at a minimum cost. Compartmentation acts to contain fires to a specified area of the building or structure. Without compartmentation, fire may spread from one room or building to another.

Construction of Building Using Non-Combustible Materials. Non-combustible materials are building materials that do not burn, does not produce smoke, fumes or gases or ignite when subjected to expected levels of fire or heat. Examples of non-combustible materials include brick masonry, concrete blocks, hardy backer board, calcium silicate board, cement board, metal, and certain types of glass Fire-safe non-combustible construction provides a minimum two-hour separation between units. Advantages are: Serves passively for the life of the building. Adjacent units are projected. Structural collapse is unlikely. Provides quality community assets for many decades. Cast-in-place. Hollow-core precast. Concrete floors, ceilings, and roofs. Cast-in-place concrete. Precast concrete. Concrete masonry walls.

Fire Containment: Fire containment is the last line of defence should sprinklers fall. To be effective, walls and floors/ ceilings providing compartmentation should be of non-combustible construction with at least 2 hours of fire resistance.

Occupation Stage. Minimise combustible material for furnishing. Use fire-retardant material for false ceiling, partition and upholstery. Develop a simple, written fire safety plan which should include precautions for fire prevention at occupants level, fire

control by building maintenance/security team and the emergency plan covering evacuation procedure. All occupants should know clearly how to identify/raise fire alarms, call the fire brigade and evacuate safely.

Maintenance Stage. Ensure good maintenance of fire and safety equipment. Check periodically the availability of dedicated water for firefighting. Undertake Fire drills and mock drill exercises for evacuation. Have stringent control against overloading of electrical circuits, accumulation of flammable material underneath the staircase, lobbies and escape routes.

Fire Fighting Measures. Massive static water storage in the form of underground water should be made available in the buildings at the rate of 1,000 litres per minute. Automatic sprinklers should also be installed in the basements used for car parking or storage occupancy exceeding 200 meters. Every building with a height of more than 25 metres should have diesel generators that can be used for controlling fire in the case of power failure.

Fire Safety Provisions. (a) Control of fire. (b) Active fire protection: Fire can be controlled or extinguished, manually (fire fighting-like extinguisher, Hydrant) or automatically (sprinklers, gas suppression). Active fire protection measures such as: Initiating Devices: Smoke detectors, heat detectors, flame detectors, flow switches, MCPs etc. Indication Devices: Hooters, electrical bell, speakers, lamps etc. Control Panel: Conventional and addressable type. Other safety provisions considered are: (a) Selection of material for the construction of elements of the structure. (b) Compartmentation- More the combustible material smaller the compartment or vice-versa. (c) Constructional requirements- Stability, Integrity and Installation. (d) Selection of building material- Non-combustible materials should be used. However, if combustible materials are used, they should be properly protected and meet the criteria laid down in Indian Standards. (e) Passive fire protection- An integral three components like structural, fire protection and fire safety in a building (Fire rated walls, floors, doors etc). (f) Firefighting features- The fire command centre, remote annunciation panels, fire escape corridors. (g) Occupant evacuation management- Voice communication system, exit staircase, fire escape corridors. (h) Smoke spread management- Fire-rated staircases and fire escape corridors, pressurized exit access corridors, Smoke extract system, lift lobby, dampers, etc.

Fire Fighting and Fire Detection Systems. Various provision of fire safety arrangements for different occupancy is: (a) Access. (b). Wet riser. (c) Down comer. (d) Hose reel. (e) Automatic sprinkler system. (f) Yard hydrant. (g) U G Tank withdraws connection. (h) Terrace tanks. (i) Fire pump. (j) Terrace pump. (k) First aid fire fighting appliances. (l) Auto-detection system. (m) Manual operated electrical fire alarm system. (n) PA System with talkback facility. (o) Emergency light. (p) Auto DG set. (q) Illuminated exit sign. (r) Means of escape. (s) Compartmentation.

(t) MCB /ELCB. (u) Fire a switch in lift. (v) Hose boxes with delivery hoses and branch. (w) Pipes refuge area. Few fire safety arrangements are discussed:

Setback for Access During Fire. Access shall be provided as per Building Bye-Laws 4.7. Provisions of exterior open spaces around the building to be provided as in building bye-laws 4.9.4. Exit from the building shall be provided as per building Bye-Laws 4.8 based on: Type of exits, number of size of exits, arrangements of exits, occupant load, the capacity of exit, staircase requirements, minimum width provision for stairways. minimum width provision for passageway/corridors, doorways and stairways.

Fire Escapes or External Stairs. Each floor of the building should have two staircase exits for faster evacuation during a fire. This is crucial for buildings where residential accommodation exceeds 150 sq meters of the floor area and holds a capacity of 20 occupants. Also, the width of the staircases should be at least two meters wide since a narrow staircase heightens the risk of a stampede during evacuation. Fire Escapes or External Stairs requirement: (a) Fire escape shall not be taken into account while calculating the number of staircases for a building. (b) All fire escapes shall be directly connected to the ground. (c) Entrance to the fire escape shall be separate and remote from the internal staircase. (d) The route to fire escape shall be free of obstructions at all times except the doorway leading to the fire escape which shall have the required fire resistance. (e) Fire escape shall be constructed of non-combustible materials. (f) Fire escape stairs shall have straight flight, not less than 125 cm wide with 25 cm treads and risers not more than 19 cm. (g) Handrails shall be at a height not less than 100 cm. (h) Fire escape staircase in the mercantile, business, assembly, hotel buildings above 24 m. height shall be a fire tower and in such a case width of the same shall not be less than the width of the main staircase. No combustible material shall be allowed in the fire tower.

Ramps. Ramps of the slope of not more than 1 in 10 may be substituted for and shall comply with all the applicable requirements of all required stairways as to enclosure capacity and limiting dimensions. Larger slopes shall be provided for special uses but in no case greater than 1 in 8. The minimum width of the ramps in the Hospitals shall be 2.4 m and in the basement using car parking shall be 6 m. Handrails shall be provided on both sides of the ramp. The ramp shall lead directly to outside open space at ground level or courtyards of a safe place. For building above 24 m in height, access to ramps from any floor of the building shall be through a smoke fire check door. In the case of nursing homes, hospitals etc. area exceeding 300 sq m on each floor one of the exit facilities shall be a ramp of not less than 2.4 m in width.

Fire Lifts. Apart from the regular lifts used by the residents, high-rise buildings should comprise separate lifts exclusively for firemen in case of an emergency. The speed of the fire lifts should be higher

than the regular elevators. The speed should be such that the firemen could travel from the ground floor to the top level within a minute. Provision of the lifts shall be made for all multi-storied buildings having a height of 15 m and above. All the floors shall be accessible for 24 hrs by the lift. The lift provided in the buildings shall not be considered as a means of escape in case of emergency. The lift machine room shall be separate and no other machinery be installed in it. To enable fire service personnel to reach the upper floors with the minimum delay, one or more of the lifts shall be so designed so as to be available for the exclusive use of the fireman in an emergency and be directly accessible to every dwelling floor space on each floor. The lift shall have a floor area of not less than 1.4 sqm. It shall have a loading capacity of not less than 545 kg (8 person lift) with automatic closing doors. The electric supply shall be on a separate service from electric supply mains in a building and the cables run in a route safe from fire, that is within a lift shaft. Lights and fans in the elevator having wooden panelling or sheet steel construction shall be operated on a 24-volt supply. In case of failure of normal electric supply, it shall automatically switch over to the alternate supply. For apartment houses, this changeover of supply could be done through a manually operated changeover switch. Alternatively, the lift should be so wired that in case of power failure, it comes down at the ground level and comes to standstill with the door open. The words 'F1RE LIFT' shall be conspicuously displayed in fluorescent paint on the lift landing doors at each floor level.

Static Water Storage Tank. a) A satisfactory supply of water exclusively for the purpose of fire fighting shall always be available in the form of an underground static storage tank with a capacity specified with arrangements of replenishment by the town's main or alternative source of supply of 1000 litres per minute. The static storage water supply should entirely be accessible to the fire tenders of the local fire service. Provision of a suitable number of manholes shall be made available for inspection repairs and insertion of suction hose etc. The covering slab shall be able to withstand the vehicular load of 45 tonnes in case of high rise and 22 tonnes in case of low rise buildings. A draw off connection shall be provided. To prevent stagnation of water in the static water tank the suction tank of the domestic water supply shall be fed only through an overflow arrangement to maintain the level at the minimum specified capacity.

Automatic Sprinklers. Fire Sprinklers act on extinguishing fire after a specified temperature is achieved in the upper gas layer. An automatic sprinkler system shall be installed in the following buildings: a) All buildings of 24 m and above in height, except group housing and 45 m and above in case of apartment /group housing society building. (b) Hotels below l5 m in height and above 1000 sq m the built-up area at each floor and or if the basement is existing. (c) All hotels, mercantile, and institutional buildings of 15 m and above. (d) Mercantile building

having basement more than one floor but below 15 m. (e) Underground Shopping Complex. (f) Underground car/scooter parking /enclosed car parking. (g) Basement area 200 sq m and above. (h) Any special hazards where the Chief Fire Officer considers it necessary. (i) For buildings up to 24 m in height where the automatic sprinkler system is not mandatory as per Bye-Laws. (j) NFPA 13, 13D, 13E and 13R are the standard for Installation of Sprinkler Systems.

Fixed Carbon Di-Oxide / Foam / DCO/ Water Spray Extinguishing System. A fire suppression system is an engineered group of units that are built to extinguish fires through the application of a substance. Most commonly, a fire suppression system has built-in components that detect fires at the beginning stages through heat, smoke, and other warning signals. The most common types of fire suppression systems are: Water-based fire suppression systems- One of the most common types of fire protection systems uses water to knock out fires; Chemical foam suppression systems and pressurized gas systems. Fixed extinguishing installations shall be provided as per the relevant specifications in the premises where the use of the extinguishing media is considered necessary.

Fire Alarm System. All buildings of 15 m and above in height shall be equipped with a fire alarm system, and also residential buildings above 24 m height. All residential buildings shall be equipped with a manually operated electrical fire alarm system with one or more call boxes located on each floor. The location of the call boxes shall be decided after taking into consideration their floor without having to travel more than 22.5 m. The call boxes shall be of the break-glass type without any moving parts, where the call is transmitted automatically to the control room without any other action on the part of the person operating the call boxes as per norms. Automatic detection system shall be installed in accordance with the relevant standard specifications. If required, in addition to the manually operated electrical fire alarm system a building can be equipped with an automatic fire alarm system.

Compliance with Fire Safety Norms. Many commercial and residential buildings in particular high-rise buildings have been found flouting fire safety norms. Many occupiers or societies do not bother to conduct regular maintenance of the fire prevention systems installed in their buildings. Though Fire Safety Audit is found to be an effective tool for assessing fire safety standards of an organization or an occupancy, there are no clear cut provisions in any of the fire safety legislation in India, regarding the scope, objectives, methodology and periodicity of a fire safety audit. However, the NBC 2016, recommends a periodical fire safety inspection by the key personnel of the occupants of the building to ensure fire safety standards. As far as industrial buildings are concerned, the statutory authorities like State Factory Inspectorate, insist on fire safety audits by external agencies, depending on the type of activity and

the nature of the materials handled in the building. The rules for fire prevention and fire protection are laid in the form of State Regulations or Municipal By-Laws. Hazard Identification & Risk Assessment (HIRA) can be focused to identify potential hazards. A comprehensive fire safety audit can address the inherent fire hazards associated with the day to day activities in occupancy and recommend measures to reduce the potential fire hazards.

Fire Prevention. Fire prevention measures must be implemented when the building is in occupation. Points to be considered are: (a) Practice good Housekeeping. (b) Storage of flammable substances, such as diesel oil, gasoline, motor oils, etc must not be allowed anywhere within the building. (c) Where heaters are used during winters, precautions must be taken. All heaters, except convector heaters, must be fitted with guards. Heaters must not be placed in direct contact with or too close to any combustible material. Use of heaters must be prohibited in the entire basement, fire control room and in all weather maker rooms throughout the building. Also in all places where there is a profusion of combustible flammable materials. (d) Fluorescent lights must not be directly above the open file racks in offices/record rooms. Where this is unavoidable, such lights must be switched on only for as long as they are needed. (e) More than one portable electrical appliance must not be connected to any single electrical outlet. (f) Keep heat-producing equipment such as Xerox machines, computers, coffee-maker, hot plates etc. away as anything might burn. (g) Ensure that air-vent in computers and other heat-producing devices are not covered and or restricted causing inadequate airflow. (h) Fire detectors must not be painted under any circumstances and must also be kept free from lime/distemper. (i) Welding or use of blow torch shall not be permitted inside the building, except when it is done under strict supervision and in full conformity with the IS: 3016-1966 code of practice for fire precautions in welding and cutting operation.

Conclusion.

Fire safety is an important aspect requiring special attention while designing and constructing high-rise buildings. Mostly fire hazards take place in high-rise buildings because of electricity and defective infrastructure. The codal provisions are followed to: Build safe buildings; Reduce deaths, injuries and property damage; Preserve the built environment; Reduce public and private disaster effect; Maintain the level playing field for engineers, builders and suppliers; Maintain quality of life and property values.

“Fire Safety Audit and Hazard Identification & Risk Assessment (HIRA) identify potential hazards and act as effective tools for assessing fire safety standards of an occupancy.” ~ R. R. Nair.

"A mighty Flame follow a tiny Spark" ~ Dante Alighieri.

"Don't let your future Go up in Smoke" - Follow Fire Safety Norms.

SOUTHERN CENTRE ACTIVITIES

08.02.2022

அகில இந்திய முன்னாள் தலைவர் பீஷ்மா திரு. R. இராதாகிருட்டிணன் அவர்களும், மய்யத்தலைவர் திரு. L. சாந்தகுமார் அவர்களும் அகில இந்திய கட்டுநர் மாநாட்டிற்கு மத்திய மந்திரிகளை அழைப்பதற்கு டில்லி சென்றிருந்தனர்.

09.02.2022

அகில இந்திய கட்டுநர் மாநாட்டிற்கு சிறப்பு விருந்தினராக அழைப்பதற்கு மாண்புமிகு அமைச்சர் நிதின்கட்கரி அவர்களையும், பாராளுமன்ற சபாநாயகர் திரு. ஓம்பிர்லா அவர்களையும், ராஜஸ்தான் மத்திய அமைச்சர் கனக்குனால் கத்தாரா அவர்களையும் சந்தித்தனர்.

Schwing Stetter நிறுவனம் செய்யாறு தொழில் பூங்காவில் அமைந்துள்ள தொழிற்சாலையில் Latestt Equipment Exhibition and Demonstration நடைபெற்றது. அதில் தென்னக மய்யத்திலிருந்துஉறுப்பினர்கள் கலந்து கொண்டனர்.

14.02.2022 – 15.02.2022

மய்யத்தலைவர்கள் மற்றும் குழுத்தலைவர்கள் கூட்டம் திருச்சி மய்யத்தின் சார்பில் திருச்சியில் நடைபெற்றது. அக்கூட்டத்தில் உடனடி முன்னாள் அகில இந்தியத்தலைவர் திரு. Mu. மோகன், மய்யத்தலைவர் திரு. L. சாந்தகுமார் மற்றும் துணைக்குழுத்தலைவர்கள் கலந்து கொண்டனர்.

16.02.2022

தென்னக மய்ய அலுவலகத்தில் சிறப்பு செயற்குழு மற்றும் பொதுக்குழு கூட்டம் நடைபெற்றது, அதில் தலைமையக தேர்தல் பற்றி விவாதிக்கப்பட்டது.

21.02.2022

நாமக்கல் கவிஞர் மாளிகையில் 21.02.2022 அன்று மாலை 3.00 மணி அளவில் Pre-Budget கூட்டம் நடைபெற்றது. இதில் தென்னக மய்யம் சார்பாக மய்யத்தலைவர் திரு. L. சாந்தகுமார், துணைத்தலைவர் திரு. R.R. ஸ்ரீதர், முன்னாள் மய்யத்தலைவர் திரு. L. வெங்கடேசன் ஆகியோர் கலந்து கொண்டனர்.

23.02.2022

மாண்புமிகு முதல்வர் திரு. மு.க. ஸ்டாலின் அவர்களை நமது 30வது அகில இந்திய கட்டுநர் மாநாட்டிற்கு தலைமை விருந்தினராக அழைப்பதற்கு நமது அகில இந்திய முன்னாள் தலைவர் பீஷ்மா R. இராதாகிருட்டிணன் அவர்களும், உடனடி முன்னாள் அகில இந்தியத்தலைவர் திரு. Mu. மோகன் அவர்களும், மாநிலத்தலைவர் திரு. R. சிவக்குமார் அவர்களும், மய்யத்தலைவர் திரு. L. சாந்தகுமார் அவர்களும் சென்று அழைப்பு விடுத்தனர்.

24.02.2022 – 25.02.2022

நான்காவது மாநில அளவிலான மேலாண்மை மற்றும் பொதுக்குழு கூட்டம் சேலம் மய்யத்தின் உபசரிப்பில் ஏற்காட்டில் நடைபெற்றது. அக்கூட்டத்தில் தென்னக மய்யத்தின் சார்பாக பெரும்பான்மையான உறுப்பினர்கள் கலந்து கொண்டு சிறப்பித்தனர்.

28.02.2022

மாண்புமிகு நிதி அமைச்சர் திருமதி நிர்மலா சீதாராமன் அவர்கள் தலைமையில் Post Budget கலந்தாய்வுக்கூட்டம் 28.02.2022 அன்று ITC Grand Chola ஓட்டலில் நடைபெற்றது. இக்கூட்டத்தில் மய்யத்தலைவர் திரு. L. சாந்தகுமர், துணைத்தலைவர் திரு.R.R. ஸ்ரீதர், ஆகியோர் கலந்து கொண்டனர்.

அகில இந்திய கட்டுநர் மாநாட்டிற்கு சிறப்பு விருந்தினராக அழைப்பதற்கு மாண்புமிகு பொதுப்பணித்துறை மற்றும் நெடுஞ்சாலைத்துறை அமைச்சர் திரு. E.V. வேலு அவர்களை அகில இந்திய முன்னாள் தலைவர் பீஷ்மா திரு. R. இராதாகிருட்டிணன் அவர்களும், மாநிலத்தலைவர் திரு. R. சிவக்குமார் அவர்களும் சந்தித்து அழைப்பு விடுத்தனர்.

For Immediate Release

Schwing Stetter 'Technovation 2022'

✓**A successful Experiential Platform for Customers and Vendors**

✓ **The event witnessed the order booking and key handovers for 96 machines and generated new leads for 449 equipment**

✓ **Signs MoU with HPCL & Gulf Oil**

Chennai, February 24, 2022:Schwing Stetter India, one of India's largest manufacturers of concreting and construction equipment's, conducted the much-awaited, "Technovation 2022" which spanned from February 7th till 13th 2022 at the company's Global Manufacturing Hub, located in Cheyyar, Tamil Nadu.

Maintaining the Covid protocol and safety measures in mind, this event had around 2000 customers over the course of 1 week. Some prominent customers who visited were State Trading Organization plc, Godrej RMC, Ultra Tech Cement, ACC, and so on.Members of key trade Associations like the Builders Association of India (BAI), Construction Equipment RentalAssociation (CERA), also attended this event.

During this event, Schwing signed two MoUs with Gulf Oil and HPCLto launch a range of genuine oils for construction equipment. This trailblazer of a partnership aims to bring to the market a range of products that include high technology & high-quality lubricants like premium hydraulic oil, engine oil, axle oil, gear oil & high-end synthetic gear oil for their concrete pump, batching plant, concrete mixture & self-loading mixer and the entire range of Construction equipment.

The event featured a display of 70+ technology-driven products and brought in an experience zone for customers, vendors and new-ageentrepreneurs. Visitors were able to experience the product, understand new technology and understand the business impact. Schwing had signed deals with customers across 20 product categories.

The seminars were presented by over20 speakersfrom different segments of the industry with 18 topics and a lively exchange of knowledge-sharing sessions by impressive technical experts from renowned research institutions and tech industries.

Also during a exclusive event on day 1 along with presence of Press personnel, Schwing Stetter awarded to 40 candidates with Operator certifications , getting trained in the Global manufacturing Hub and 15 Trainees were offered JOB opportunities within Schwing Stetter and also with the Customers of Schwing Stetter.

Speaking about the success of the event, Mr. V.G. Sakthikumar, Managing Director of Schwing Stetter India said, "Keeping in line with our vision 'Customer-first approach', Technovation 2022 was a successful platform that helped us to bring our customers and vendors closer to us and have an opportunity to experience our R&D and technology expertise, especially in our Global Manufacturing Hub facility. We do hope to have this event more frequently to have a perfect knowledge-sharing platform and bring technology closer to our customers & vendors."

About Schwing Stetter India Private Limited:

Incorporated in June 1998, and commencing its manufacturing operations in 1999, Schwing Stetter India is a 100% subsidiary of Schwing GmbH, a 1.30 billion USD German concreting machinery manufacturer and a part of XCMG group. Schwing Stetter is a pioneer in manufacturing equipment for concrete preparation, placement,

transportation, and recycling. Schwing Stetter (India) Private Limited manufactures concrete batching plants, concrete placing booms, concrete pumps, concrete truck mixers for transporting readymade concrete to construction sites, concrete truck mixers with concrete pumps, concrete recycling plants, plastering pumps, self-loading mixers, and sludge pumps.

Schwing Stetter (India) sells and services equipment like concrete pavers, aerial working platform, all terrain crane, cold milling machine, crawler crane, excavator, horizontal directional drilling, motor grader, rotary drilling rig, tower crane, truck crane and wheel loader are our various newer range of equipment that have been launched recently from GOMACO and XCMG. We cater to the requirement of infrastructure developers and act as an OEM supplier to various cement companies who offer ready mix concrete. Schwing Stetter has its manufacturing units in 12 countries including Germany, Austria, USA, Brazil, Russia, Ostrava, UK, India supported by sales and service centers in France, Netherlands, Austria, and Sweden as well as representations in more than 150 countries Worldwide. Contact us on: https://www.schwingstetterindia.com/Follow us on:

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