ABSTRACT

Structural Design is the science and art of understanding the behaviour of members of structures when loads are subjected to them designing these members with elegance and economy to give a serviceable safe and durable structure.

Engineering is a professional art of applying science to the efficient conversion of natural resources for the benefit of man. Engineering, therefore, requires above all creative imagination to innovate application for natural phenomenon. The entire procedure of structural planning along with design need not only conceptual thinking and imagination also in depth knowledge of science of structural engineering besides knowledge of practical aspects, such as bye laws and recent design codes, backed up by sufficient experience, intuition and judgement. It may be clarified that Code of practice, which is compendia of good practices drawn up by experienced engineers, is intended as guides to engineers and should never be allowed to replace the conscience and competence of the engineer's. The purpose of standards is to ensure and enhance the safety, keeping careful balance between economy and safety.

The process of design of the structure, primarily to meet its functional requirements, initially, the requirements proposed by the client are taken into consideration They maybe vague, ambiguous or even unacceptable from engineering point of view because he is not aware of the various implications involved in the process of planning and design, and about the limitations and intricacies of the structural science

This research work, wherein finding of structural analysis and structural design way (structural analysis and members design), which is to be adopted to do, structural analysis and design of practical life line structure. Author names the practical life line structure to a multi-storey building structure which is permitted
and regularly built RCC multi-storeyed building structure in Karnataka states Hyderabad Karnataka area (Gulbarga, Raichur, Bidar, Yadgir Districts are taken into consideration over here) and their district head quarters are taken for investigation. The first most commonly/frequently constructed RCC multi-storeyed building structure is named by the author to as practical life line structure as this structure recurrently comes in their life line of the structural engineer for structural design. Karnataka states

Hyderabad Karnataka area which is the mainly backward region of Karnataka state wherein government of India has implemented the article 371 of the constitution to give extraordinary facilities this region. Educationally this part is very backward, no availability to train the latest accessible structural design software's is available over here. A committee was constituted under the leadership of eminent economist late Dr D M Nanjundappa way back in 2002 in which had suggested removal of discriminations and amendment of the considering its backwardness and deficiency of facilities available in region. The report was prepared after an exhaustive and scientific study over a two year period and submitted to the then chief minister Karnataka Mr S M Krishna. The same Dr D M Nanjundappa way back in 2002 had studied detailed the Educational backwardness of region submitted its report of many pages which was clearly defined the nature of Educational facilities available in this region of Karnataka, which was very backward. We can understand the nature of educational and other backwardness of the region from the high power committee has also recommended formation up of the regional area development boards such as the Hyderabad Karnataka area development boards and hence it was formed. By the educational and other backwardness of this region union Government of India has given a special status to this region and provided reservations in educational and other sectors for the people of this
area. The topic feasible analysis and design way for practical life line structure is a outcome or result of unrelenting demand from lots of the students, practicing engineers, even some buildings designers, new engineering graduates and also from postgraduates, specially many practicing government engineers who are not able to structurally design by confidence normally day to day encountered building structure even after academically sufficiently qualifying in, and often they are seen visiting structural consultants for accomplishing the same in this part or region, that encouraged the research scholar or author and created zeal in author to carry out the research work under consideration. Easily it can be noted that this is a burning topic or problem engineering students, practising engineers, yet for some building designers, fresh or new civil engineering graduates as well as to post graduates of structural or civil engineering, specifically for so many government engineers, to reach at a simplified cum easy approach of structural analysis and equally simplified cum easy way or technique of structural design method that can be search and hence can be adopted confidence, with no confusion without tedious and time wasting calculations and without using computers huge memories with sophisticated structural analysis software’s which are accessible in the market, without greatly affecting the limits of technicalities like elegance, economy, safety cum durability serviceability conditions by adopting idealizations/assumptions) to the, recurrently constructed RCC multi-storeyed building structure amongst the RCC multi-storeyed building structures constructed/ permitted in Karnataka states Hyderabad Karnataka area. As it is presumed between buildings relatively tall building structure is technically complicated to analyse and design, therefore to give a solution to comparatively technically complicated building structures to needy technocrats among the structures they come across in daily routine life the recurrently permitted or constructed tall building structure is zeroed or picked as an ideal problem, which is termed by research scholar or author as life line structure The simplest and
easiest way of structural analysis as well as structural design of these building structures provide a ready reference guide intended for above mentioned technocrats and enhance confidence in them to carryout structural analysis and design.

For the work of searching the simple and easy structural analysis and also structural design way to practical life line structure, (Commonly constructed and cement concrete Multi-storeyed building structure in Karnataka states Hyderabad Karnataka region, this piece or research work is done which has resulted in a breakthrough as it has given easy guide for structural analysis as well as structural design to lots of technocrats who lack confidence in practical structural design. Thus, in this work most commonly permitted and constructed RCC multi-storeyed building structure of Hyderabad Karnataka is investigated.

For investigation of Practical life line structure the following process is adopted

With extensive investigation from responsible technocrats as decided, be contacted from (1. Gulbarga 2 .Raichur 3 Bidar 4.Yadgir). Districts from Hyderabad Karnataka area and their head quarters are selected for investigation, data is gathered as follows . From about 100 No's of buildings extensive information is gathered. These 100 no's RCC multi-storeyed buildings contain stories more than or equivalent to Ground plus three stories, they are constructed after availing permission from civic authorities during preceding 15 years in Karnataka states Hyderabad Karnataka region, data is gathered. For doing this 100 No's of people from domain as given below are contacted. These comprised of Engineers from civic authorities, Structural consultants, Civil engineering contractors, contacting them information data is to collect. Beside this personnel observation is also done; within different cities of the region namely 1) Gulbarga 2) Raichur3) Yadgir and 4)
Bidar cities are selected, since high rise constructions rarely beyond city limits. Above technocrats selected are met personally thereafter proper discussion is carried out on technicalities of with them and also via personal observation the data or information is gathered, which is properly tabulated in tables for further analysis to attain the targeted conclusion.

The information gathered has exposed astonishing results. That practical life line structure got was not a enormous technically complicated multi-storeyed building structure, however it was a simple ground plus three storied Reinforced cement concrete commercial building comprising regular layout, which was having simpler sections almost all component parts of it were cast by utilising M20 to M25 Concrete Grade.

Hence for selecting a ideal model of frame of (most commonly permitted by civic authorities and hence build, building structures of area is named by author here in as practical life line structure. For further studies in order to continue to achieve the goal under consideration the most commonly noticed Typical frame i.e. Floor Plan of Typical Commercial Building of the structure under consideration is selected and it was found and shown in figure-1

And again as continuation of this study searching the easy cum simple way of structural analysis plus design to practical life line structure Different methods of structural analysis obtainable in civil engineering and in structural engineering sphere are gathered by using which the structure in consideration which is shown in figure-1 can be structurally analyzed. From these various methods and procedures after cautious study a simple method is chosen so that it must be relatively easy less time consuming , be easily understood by technocrat of this area, thus can be adopted (without confusion, with confidence, and without tiresome and time eating calculations and without utilising large
memories of computers and sophisticated structural analysis software's which are obtainable in the market, with no much affecting the technicalities limitations like elegance, economy, durability, safety and serviceability conditions by adopting the idealizations).

As the structure in consideration is having rigid jointed plane frame, with the required degree of accuracy in structural analysis for such a building structure is not very high, therefore Substitute frame method has been selected and utilised. This method is suitable for manual calculations also for non sway structures.

Similarly to ascertain the simplest and easy method of structural design that can be used without confusion with confidence, and without tedious and time consuming computation and without utilising large memories of the latest computers with no much upsetting the limitations of technicalities like elegance, economy, durability, safety as usual serviceability conditions by adopting assumptions idealizations by which the structure under consideration and hence its frame under consideration which is as shown in can be structurally designed. The method to be adopted should be such that easily understood by technocrat who are unconfident in structural design of this region and should save time and labour of structural designer. Therefore in order to fulfil these requirements design details can be worked out using design tables, etc which considerably help in saving the time and labour.

The research of the author has given a breakthrough and has boosted unconfident technocrats. As figures gathered has exposed some surprising results that the practical life line structure got was not a technically difficult multi-storeyed building structure however it was uncomplicated ground plus three storied reinforced cement concrete commercial building comprising regular layout
with simpler sections and simpler components parts which were cast mostly by utilising M20 to M25 Concrete Grade. Secondly the structural analysis of structure can be done comfortably by using simple method namely substitute frame method of analysis, also its structural design also can be done by using simple method by using Design tables Charts etc, Hence author has succeeded in achieving his motive of giving a simple way of structural analysis and structural design to investigated practical life line structure of backward Hyderabad Karnataka area of Karnataka.