

Cost Comparison between RCC Slab & Steel Composite Slab Structure of G+5 Storied Building The Overall Plan Dimension Of The Building Is 56.3 M X 31.94M

Aniket Sijaria, Prof. Anubhav Rai, Prof. Y. K. Bajpai

Abstract- The Project involves Planning, Analysis, Design & Cost Comparison of an Institutional Building with steel-concrete composite construction. The proposal structure is a G+5 building, with 3.658m as the height of each floor. The overall plan dimension of the building is 56.3 m x 31.94m.

Index Terms- Abstract, Introduction, Advantages, Methodology, Design Consideration ,Plan & Elevation ,Observation Table, , Results & Discussion, References.

1 INTRODUCTION

In building construction, role of steel is same as that of bones is a living being. Steel is very advantages because it:-

- Officer considerable flexibility in design and is easy for fabrication
- Facilities faster construction scheduling of projects.
- Enables easy construction scheduling even in congested sites.
- Permits large span construction repair/modification.
- In an ideal material in earthquake prone locations due to high strength stiffness, ductility.
- Is environment friendly and fully recyclable on replacement.

2 ADVANTAGES

conventional composite construction, concrete slabs rest over steel beams IN and are supported by them. Under load, these two components the concrete slab, the slip between them can be eliminated. In this independently and a relative slip occurs at the act and interface if there is no connection between them. With the help of deliberate and appropriate connection provided between the beam case, the steel beam and the slab act as a "Composite beam" and their action is similar to that of a monolithic Tee beam. Since concrete is stronger in compression than in tension, and steel is acceptable to book ling in compression, by the composite action between the two, we can utilize their respective advantages to the fullest extent. There are many advantages associated with steel-concrete composite construction. Some of these are listed below:-

- The most effective utilization of steel and concrete is achieved.
- Keeping the span and loading unaltered, a more economical steel section (in terms of depth and weight) is achievable in composite construction compared with conventional non-composite construction.
- As the depth of beam reduces, the construction depth reduces, resulting in enhanced headroom.

• Aniket Sijaria is currently pursuing master's degree program in Structural . Civil Engineering Dept. GGITS Jablapur (M.P.) India, M RGPV University Bhopal, India, M-+91-9926908765. E-mail: go4ami@rediffmail.com.

• Prof. Anubhav Rai -+918516078002. E-mail: anubhavrai.str4@gmail.com.

• Prof. Y.K. Bajpai, HOD Civil Engineering Dept. GGITS Jabalpur(M.P.) India, M- +919584827555.

- Because of its larger stiffness, composite beams have less deflection than steel beams.
- Composite construction is amenable to “fast-track” construction because of using rolled steel and pre-fabricated components, rather than case-in situ concrete.
- Considerable flexibility in design Encased steel beam areas.
- sections have improved fire resistance and corrosion.

, pre-fabrication and construction schedule in congested

3 METHODOLOGY

The Analysis and design involves the structure planning, load calculation, analysis it by 2D modeling using STAAD-Pro 2003, design of composite floors and columns, design beams and design of foundation. Analysis of steel has been done for various load combinations including seismic load, wind load, etc. as per the Indian standard Code of Practice. The project also involves analysis and design of an equivalent R.C.C. structure so that a cost comparison can be made between a steel-concrete composite structure and an equivalent R.C.C. structure.

4 DESIGN CONSIDERATION

Composite floors are developed based on limit state design philosophy. Since IS 456:2000 is also based on limit state methods, the same has been followed wherever it is applicable. The design should ensure an adequate degree of safety and serviceability of structure. The structure should

therefore be checked for ultimate and serviceability limit states. The main economy in using profiled deck is achieved due to speed in construction. Normally 2.5 to 4.0m spans can be handled without propping and spans in excess 4m will require propping. The yield strength of decking steel is in the range of 220 to 460 N/mm². Though light – weight concrete is preferable both from reducing the effect of ponding deflection as well as increasing the fire resistance, the normal practice in India is to use concrete of grade M20 to M30. The analysis of composite section is made using Limit state of collapse method. IS:11384-1985 Code deals with the design and constructions of only simply supported composite beams. Therefore, the method of design suggested in EC 4 is also referred along with IS:11384.



6 OBSERVATION TABLE

SLABS

Consider 1m length of the slab,

Material	Rate	Composite Design	Amount	R.C.C. Design	Amount
Steel	Rs. 45Kg.	9.36kg./sq.m	Rs. 421	3.9 kg./m	Rs. 175.5
Concrete	Rs. 4390/m ³	0.075 m ³ /m	Rs. 329	0.15 m ³ /m	Rs. 658.5
Form work	Rs. 219/sq.m	--	--	0.075 Sq.m./m	Rs. 16
		Total	Rs. 750	Total	Rs. 850

7 RESULTS & DISCUSSION

1) A G + 5 structure of plan dimensions 56.3m x 31.94m has been analyzed, designed and cost per unit quantities worked out.

2) An equivalent R.C.C. structure has also been analyzed, designed and cost per unit quantities worked out.

3) (A) A comparative study of the quantity of material and cost has been worked out both for composite and concrete construction.

(B) Though, the cost comparison reveals that Steel-Concrete composite design structure is more costly, reduction in direct costs of steel composite structure resulting from speedy erection will make Steel Composite structure economically viable. Further, under earthquake considerations because of the inherent ductility characteristics, Steel Concrete structure will perform better than a conventional R.C.C. structure.

4) For analysis, STAADPro-2003 software has been used.

5) Manual design has been carried out both for Steel-Concrete composite and R.C.C. structure.

6) Sufficient insight into the analysis and design of Steel-Concrete composite structure which is an emerging area has been gained

7) Immense confidence has been gained in the analysis and design of a multi-storeyed structure using STAAD Pro 2003 software which will benefit us as we step out of the portals of the college

8 REFERENCES

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