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Comparative Analysis of BIPV System Building and Normal Building: A Review

Jeetender Kumar Thakur, Dr. Rakesh Patel, Deepak Bandewar

Department of Civil Engineering, Sagar Institute of Research Technology & Science, Bhopal, M.P, India

ABSTRACT:-The main intension of this project is to design the multistory building of BIPV System. I have taken 10 story building in 3-D frame, design and analysis on the STAAD Pro Software for the design of the building. I have considered dead load, live load and wind load. On the STAAD Pro I have assign dead load, live load and generate wind load definition. For the generate of wind load definition I took help of IS code IS 875:Part 3 for the wind load case. I have use STADD Pro software for the analysis of the two building and did comparative analysis between these two building on the STAAD Pro software this STAAD Pro software under the Indian standard code of practice it adopt limit state design method. I have analyzed two building one with the BIPV system building and another is without BIPV system building after analyzing I have find out the extra load bending moment ,Shear force etc in the BIPV building and compare these force with the normal structural building compare between these two building. I will calculate extra load,shear force,bending moment and cost analysis etc.

KEYWORDS: -BIPV System,Cost analysis ,Solar Panel ,Solar energy, Environment.

I. INTRODUCTION

Structure is the collection and arrangement of members together which forms proper meaningful purpose which effect the load of structure component vertically or laterally. There is different types of structure like concrete framed, truss , cables and arches , surface structure can be viewed in many models.These structure were using in our environment for different purpose like building, bridge,dam ,etc. Now a days structural building in which we are using for the living and we are bearing electric bills which building are consuming as per the building demand like residential building have the low demand of the electric but the institutional building and the official building have high demand of electricity which generate high electric bills .for saving electric bills we are installing solar panel on the roof that is short area of the roof .in this short area there can be very few solar panel cane adjust on the roof which is capable to bear the electric of the houses .but in the case of high rise building like residential official and institutional building ,there is the huge demand of electricity in the market small roof area that is not sufficient to full fill the utility of the electricity of the whole building. Now I have introduced BIPV structural building (with solar Panel).This building is the good for the environment and producing good electricity in the building which is sufficient for the bear of electricity .in the multistory building there is a large area of the floor side of the building in comparison of the roof area after utilizing this area in the solar solar panel installing we can install large number of solar panel and it produce large electricity from which we can utilize for the bear whole electricity of the structure.

II. BIPV SYSTEM

BIPV system is the building integrated photovoltaic system it the system which integrate of the solar cells as a building envelope it can be use on the wall in the building as a envelope and it is use on the roof of building it convert solar energy into electrical energy mainly in our environment we are using BIPV system in building which save the cost of electric bill and make building cost free electric. General BIPV system is formed from the collection of the solar panel and it is many types which is given in below.

III. OBJECTIVE OF THE STUDY

- To analyse the Seismic Performance of BIPV structural building and compare with the normal building after analyzing of the normal building do compare both building.
- Study the beaviour of the BIPV system building and find out the external strength require in the BIPV System of Building as compare to the normal building.

- We find out the cost of the BIPV System of building as compare to the normal building.
- To Seismic analyze the BIPV System of building on STAAD Pro V8i for the check of the stability of the structure.

IV. LITERATURE REVIEW

- British Columbia institute of technology (BCIT): Technology centre 2004 For grid tied PV technology BIPV as the most economically attractive application ,BCIT participated on various Building integrated photovoltaic project across Canada. Each project height is a different aspect of BIPV and demonstrate PV potential in the built environment. In this paper analyzes the benefit of each building integrated photovoltaic system and also describe the lesson learned during the design and installation process. Overriding feature of each of these BIPV project were amount of design work of custom is required to integrate the PV Component into building and to inter connect with the various component within the system. There is the required of the collaboration of design engineers.
- B.dhana 2014 Wind analysis and design of high rise residential building by using STAAD Pro. He took G+11 story building under the wind speed 58 km/hour.
RESULT:- He analyse building on STAAD Pro as well as estimate the quantity of the steel and concrete along with this he find out the shear force, bending moment and deflection of the beam
- Yang Hongxing and Liyutong 2007 Application of the BIPV technology has develop very fastly in recent year .This paper is shows the review of the development of the building integrated photovoltaic application in major countries around the all over world. It is said that demonstration Project help per motion of the BIPV research and consultancy project completed in Hong Kong.Past, present and future application of the technology have summarised. The future scope of the BIPV contribution can be a substantial part of the demand design engineers architects electricians galleries,impaction authorities and equipment manufacturer. For the analysis of each project gave the experience to make recommendation for the change to the code, suggested best practices for the BIPV system development and design as well as highlight some of the deficiencies in the existing PV market place.
- Daniel EturosibinaAttoye, Tim othyD.adekunle 2018 This is aimed at market and research ,proposal which justify finical investment and investigation and design research methodology, Principles .the Study develop and approach which combines requirement of core communication the pillars of sustainability and hierarchical description of BIPV alongside its unique advantage a two step education strategy involving a literature-based checklist and online pilot survey was used to validate the effectiveness of the development approach.
RESULT :- our result shows that economic benefit and understanding environmental was formed to be significantly important to the people who likely adopter of the BIPV ,making these benefit Crucial driver of the adoption .We conclude proper communication of these benefit can safely be advance as important facilities of BIPV adoption .In this general this study elaborates the need and strategies for appropriate disseminateinnovative ideas to encourage and promote adoption of technological advancement for a sustainable global future.

V. RESULT

- Bending moment is same of the both building BIPV and without BIPV System. We can see there is no difference between these two building inspite of the load on the BIPV system of building load of the solar panel maximum bending moment is 0.1 mm in the both building. I have also shown in the above building details data. Generally in the BIPV system due to the load increase in outer beam there is more bending moment will be occur which will but due to the less load comes on the outer beam it is negligible that why the bending moment is same in the both building.
- Quantity of concrete in the BIPV System of Building is 484.6 m³ but in the without BIPV system of building there is 491.8m³ concrete .It is Shows that quantity of concrete in the BIPV system of building have increased.But in the BIPV system of building quantity of concrete is decreased. We can see that in the BIPV system of building there is the more required of the steel which provide more strength in the BIPV system of building but in the without BIPV system of building there is required of steel is less because there is the less quantity of steel required as compare to the BIPV system of the building. That's why due to the increase of the quantity of the steel in the BIPV system of building quantity of concrete has decreased and in the without BIPV system of building. In this graph shows the quantity of concrete with BIPV system of building in below and also I will explain in the difference of the concrete between these two building. So there is not to much difference between two building in the quantity of concrete only 7 m³ is the difference between these two building. I have shown in below graph.

- Now I'm explaining quantity of steel which shows in the below graph .quantity of steel in both graph that I have mention in the BIPV system of building and in the without BIPV system of building steel quantity is 57.9608 ton and in the without BIPV System of building there is 51.42 ton steel is required ,So for the BIPV system of building there is 57.9608 ton Steel is required which is the 6.5 ton of the steel is more in the BIPV system of building as compare to the without BIPV system of building .
- In the BIPV system of building steel required more because there is the more required of the strength because of the more strength of steel of steel required more as compare to the without BIPV system of building.

VI. OUTCOMES

After the analysis of both structural building we come on the conclusion

- 1 There is 4.1mm difference in deflection and there is 0 difference in bending moment
- 2 In the quantity of steel and concrete there is little difference in building in BIPV building there is 6.5 ton steel is required and in without BIPV system building there is 7cum concrete is required
- 3 Over all very less difference in building both are the stable structure and almost strength and deflection is equal there is little more cost is required in BIPV building and the deflection and bending moment is almost same.

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