Planning and Design of Multi Star Caravansary Using STAAD.Pro

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ABSTRACT- In our project, Park Hyatt, Banjara Hills, we've aimed to satisfy the fundamental necessities of a multi star hostel. Allocating the accessible house for various functions the complete structure was developed. The structure was then analyzed and designed in STAAD Pro. Park Hyatt, Banjara Hills, a luxury edifice that mixes business with pleasure, vogue with substance, kind with operates. Centrally placed within the up market Banjara Hills, our 5-star luxury edifice offers customized services and unforgettable experiences to business travelers and discerning native guests. With 209 roomily appointed rooms, 3 award winning restaurants, technology friendly meeting areas and a Nizami themed Spa, luxury at its best awaits to form seamless experiences for you. Park Hyatt Hyderabad offers free onsite parking facilities for up to five hundred vehicles.

Built across on a section of 32,256 sq. metres (347,200 sq ft) the development of the edifice started in 2006. Owned by Gayatri sophisticated Hotels and managed by Hyatt, the edifice was inaugurated on 29 April 2012 cost accounting Rs 7 billion approximately.

The edifice has 185 rooms, twenty four suites on the primary six floors and forty two furnished service flats referred to as The Residence on the 2 uppermost floors. Every of the hotel's guestrooms are among the most important in Hyderabad, measurement a minimum of 463 sq. feet. The lobby is meant with carbonated water feature and plants that surround a 35-foot tall white abstract sculpture. Park Hyatt Hyderabad is that the 1st edifice in India to feature Hyatt's residential vogue meeting idea named The Manor. The whole conferences and events facilities live over one, 600 sq. metres (17,000 sq ft). Accommodating a spread of feeding the edifice incorporates a Lobby Lounge – The lounge, The feeding area – All Day feeding building, Tre-Forni Bar & building Northern Italian preparation, Oriental Bar & room – South East Asian preparation. The edifice is additionally equipped with Spa & Fitness Facilities.

1. INTRODUCTION

Our project, the design and style of the most building of a five star building, has aimed toward filling this void. The project was developed thus on embody the analysis and style a locality of civil engineering. Our project is that the accomplishment of the structural style of the most building of the building, Park Hyatt, Banjara Hills.

METHODOLOGY

The study is finished in 2 phases

i. Planning
ii. Design

Planning enclosed book reviews, site visits etc. that formed basis of our study. The second half comprised of developing a purposeful requirements of the plan/master in accordance with the purposeful requirements of the building. Then modeling of the structure was exhausted STAAD Pro. The full analysis and style of the structure was exhausted STAAD Pro. One frame was designated, analysis and style of the building was done manually. Numerous structural components comprising slabs, stair, lintels, wall and isolated foundations were designed manually. Manually style confirms to the Indian standards as per the varied codes of the bureau of Indian standards. The load calculations and analysis results along with the look of the numerous structural members are recorded in tables.

2. LITERATURE REVIEW

Research into the cost effectiveness of post-tensioned concrete structural systems has been done by Li Shengping and Dr. Henry M. Robert Tiong, who thought of completely different grid systems and loads to search out the foremost cost effective system for a building within the article "Cost-Effective concrete Structural Systems" (Shengping and Tiong 2004). Shengping and Tiong examined the value of fabric, labor, transportation, and necessary equipment. The paper focuses on construction in Singapore and provides an example of a way to perform a cost analysis. The variables of fabric value and labor value are going to be adopted within the analysis for this project.

The article "To Bond or to not Bond" covers the topic of bonded versus un-bonded post-tensioning (Truby 2005). A bonded system is represented as a system wherever the post-tensioning strands are put in among ducts that are crammed with cementitious material when the strands are tensioned, thereby totally bonding the strands to the concrete. Un-bonded tendons contain high-strength, steel strands coated with rust inhibiting, lubricating grease and lined with a high-density synthetic resin sheath. Each system have other ways of transferring load to the tendons from the concrete and have completely different installation procedures, material costs, and relevance to completely different comes (Truby 2005). As a result of most post-tensioned slabs within the u. s. utilize un-bonded systems; this thesis focuses its design victimization un-bonded tendons.

3. METHODOLOGY ADOPTED AND FUNCTIONAL PLANNING

The design of post-tensioned slab is done by two methods, load balancing method and the equivalent frame method. In this method the 65 to 80% of dead load is balanced by the tendons so that the flexural member will not be subjected to bending stress under a given load conditions. Here load balancing method and equivalent frame method are discussed in the following section.

A. Load-Balancing Method

The concept of load balancing is introduced for pre-stressed concrete structures, as per T.Y Lin et al a third approach after the elastic stress and the

ultimate strength method of design and analysis. It is first applied to simple beams and cantilevers and then to continuous beams and rigid frames.

B. Equivalent Frame Method of Analysis

The equivalent frame method of analysis is known as the beam method. This method of analysis utilizes the conventional elastic analysis assumption and models the slab or slab and columns, as a beam or as a frame, respectively. This is the most widely used and applied method of analysis for the post-tensioned flat plates.

Limit State Method

In the Limit State Design method, the structure shall be designed to withstand safely all loads likely to act on it throughout its life.

Generally structures and elements shall be designed by Limit State Method. Where Limit State Method cannot be conveniently adopted Working Stress Method may be used.

- For ensuring the design objectives, the design should be based on characteristic values for material strengths and applied loads (actions), which take into account the probability of variations in the material strengths and in the loads to be supported.

Design Action ≤ Design Strength

- Limit states are the states beyond which the structure no longer satisfies the performance requirements specified. The limit states are classified as

a. Limit state of strength

b. Limit state of serviceability

- The limit state of strength are those associated with failures (or imminent failure), under the action of probable and most unfavorable combination of loads on the structure using the appropriate partial safety factors, which may endanger the safety of life and property.

- The limit state of serviceability include

  a. Deformation and deflections, which may adversely affect the appearance or, effective, use of the structure or may cause improper functioning of equipment or services or may cause damages to finishes and non-structural members.

  b. Repairable damage due to fatigue.

  c. Corrosion and durability.

4. SEISMIC AND WIND EFFECT

LATERAL FORCES

Very often the planning of structures is governed by lateral load resistance needs in reference to gravity loads. Lateral forces owing to seismic loading should be thought of in style of structures at the side of gravity forces.

Wind Loads:

The effects of wind on structures are still not absolutely understood and our data during this space is continually improving with the periodic revisions of the applicable wind code provisions

1. Collapse
2. Partial collapse

3. Over damage
4. Sliding

Earth Quake Load:

Seismic motions incorporate horizontal and vertical ground motions, with the vertical motion sometimes having a much smaller magnitude. The issue of safety provided against gravity loads typically will accommodate additional forces owing to vertical acceleration owing to earthquakes.

5. DESIGN PROCESS OF POST TENSION SLABS

Mix design of M_{35}

Standard Deviation: 1.91 Mpa

Target Mean Strength: T.M.S. = Fck +1.65 x S.D.

(From I.S 456-2000) = 35+ 1.65×1.91 = 38.15 Mpa

Test Data for Material:

Aggregate Type: Crushed

Specific Gravity Cement: 3.15

Coarse Aggregate: 2.67

Fine Aggregate: 2.62

Water Absorption Coarse Aggregate: 0.5%

Fine Aggregate: 1.0 %

Mix Design:

Sand content as percentage of total aggregates = 36%

Water Cement Ratio = 0.43 for concrete grade M_{35}

Select Water Content = 172 Kg

(From IS: 10262 for 20 mm nominal size of aggregates Maximum Water Content = 186 Kg/m^3)

Hence, Cement Content= 172 / 0.43 = 400 Kg /m^3

Formula for Mix Proportion of Fine and Coarse Aggregate:

1000(1- a_o) = {(Cement Content / Sp. Gr. Of Cement) + Water Content + (F_a / Sp. Gr. × P_f)}

1000(1- a_o) = {(Cement Content / Sp. Gr. Of Cement) + Water Content + (C_a / Sp. Gr. × P_c)}

Hence, Fa = 642 Kg/ Cum

As the sand is of Zone II no adjustment is required for sand.

Sand Content = 642 Kg/ Cum

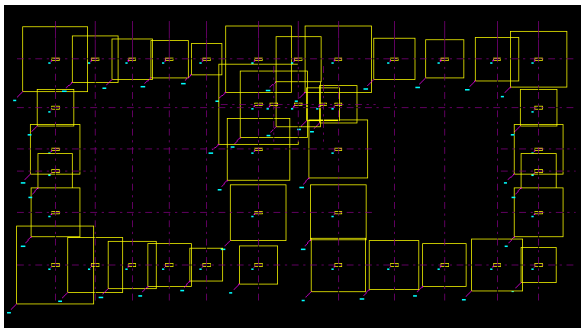
Hence, Ca = 1165 Kg/ Cum

Hence the Mix Proportion becomes:

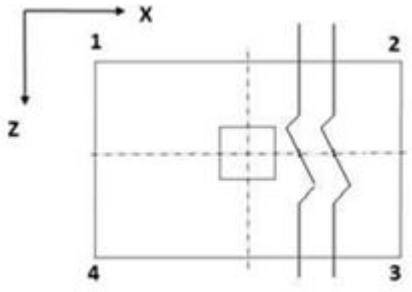
	W/C	Water	Sand	20mm	10mm	Admix
400	0.43	172	635	319	564	1.2
1		0.43	1.6	1.547	1.36	0.003

6. STRUCTURAL DESIGN

DESIGN OF FOOOTINGS



Pressure at four corners:



Load case	Pressure at corner 1 (q_1) (KN/m^2)	Pressure at corner 2 (q_2) (KN/m^2)	Pressure at corner 3 (q_3) (KN/m^2)	Pressure at corner 4 (q_4) (kN/m^2)	Area of footing in uplift (A_u) (m^2)
7	34.6882	33.9338	33.3127	34.0671	0
7	34.6882	33.9338	33.3127	34.0671	0
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7	34.6882	33.9338	33.3127	34.0671	0

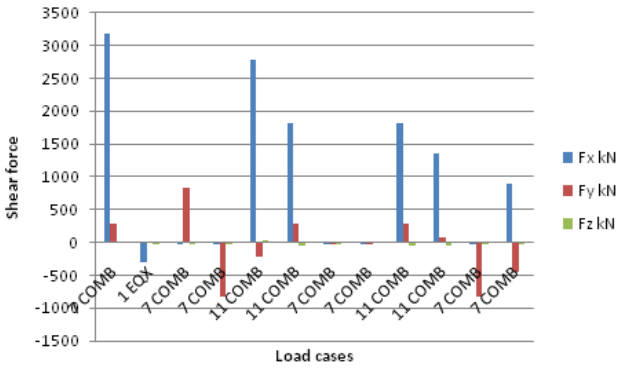
7. STRUCTURAL ANALYSIS AND RESULTS

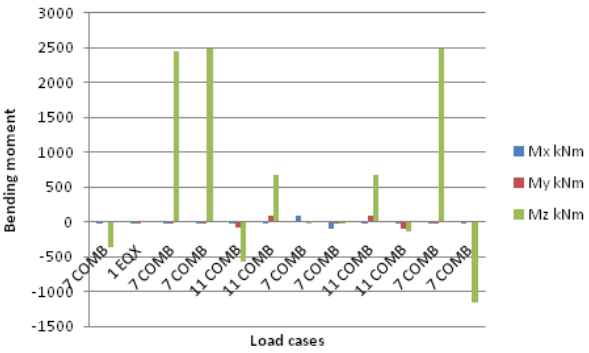
NODE DISPALCEMENT:

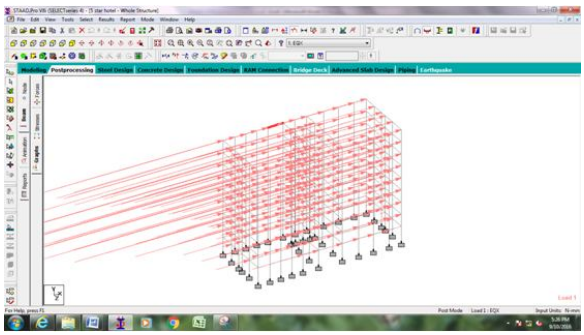
	Node	L/C	Horizontal X mm	Vertical Ymm
Max X	389	10 COMB	76.993	-6.135
Min X	348	9 COMB	-2.448	-2.605
Max Y	377	1 EQX	34.101	1.292
Min Y	376	10 COMB	69.534	-13.883
Max Z	381	11 COMB	0.065	-3.27
Min Z	400	10 COMB	47.153	-3.974
Max rX	25	9 COMB	0.001	-0.558
Min rX	368	10 COMB	47.188	-6.621
Max rY	364	16 COMB	26.725	-2.979
Min rY	379	11 COMB	0.101	-3.06
Max rZ	5	7 COMB	0.091	-2.316
Min rZ	12	7 COMB	0.015	-2.341
Max Rst	381	11 COMB	0.065	-3.27

SUPPORT REACTIONS:

Node	Env	Horizontal Fx Kg	Vertical Fy Kg	Horizontal Fz Kg	Moment Mx Knm	My Knm	Mz Knm
41	+Ve	589.195	69844.51	458.028	6.12	0.277	92.375
		11 Comb	7 Comb	7 Comb	7 Comb	6 Wlz	8 Comb
41	-Ve	-3295.4	-18209.06	-2605.8	-58.202	-2.98	-7.857
		8 Comb	1 Eqx	9 Comb	9 Comb	11 Comb	11 Comb
42	+Ve	13.348	91488.04	452.856	6.022	1.16	112.224
		2 Eqz	7 Comb	7 Comb	7 Comb	11 Comb	10 Comb
42	-Ve	-4834.3	-19629.59	-3195.7	-71.279	-0.721	-0.253
		10 Comb	2 Eqz	9 Comb	9 Comb	8 Comb	2 Eqz
43	+Ve	664.06	1.06E+05	465.495	6.642	0.18	102.019
		7 Comb	10 Comb	10 Comb	10 Comb	13 Comb	8 Comb
43	-Ve	-4041.4	-19879.09	-3210.8	-71.553	-1.38	-8.454
		8 Comb	2 Eqz	9 Comb	9 Comb	16 Comb	7 Comb
44	+Ve	0	95078.98	456.464	6.096	2.658	101.179
		-	10 Comb	7 Comb	7 Comb	11 Comb	10 Comb
44	-Ve	-4015.9	-13640.99	-2591.2	-57.866	-0.365	0
		10 Comb	2 Eqz	9 Comb	9 Comb	6 Wlz	-







8. CONCLUSION

As we tend to are getting in a brand new era of property development, the requirements for projects like this and their construction and implementation will amendment the full situation of the human society. Whereas considering the requirement of a star edifice within the city of Hyderabad, Park Hyatt has been designed to square up to the mark. The proximity of the location to the Rajiv Gandhi International airport and its access to the National highway has promoted the suitableness of the project.

The placement of the site at an area like Banjara Hills can sure as shooting give a peaceful, serene and peaceful atmosphere to the visitors of Park Hyatt.

The planning of the project was done solely when having case studies and reviews of various such comes and additionally references and interviews with well-known civil engineers and architects. This project has enabled us to possess a review of what we've got learnt. Through this we tend to were ready to peep in and affect the trendy phases regarding civil engineering like analysis and design of the structures in STAAD.

In our project the designing of slabs is of post tensioned slabs. By doing such a project, we've got learnt to share our concepts and incorporate them within the project, that we tend to hope has given the means that for a decent design.

With the coming of the many different challenging projects, we tend to hope Purple Ace stands out and becomes a landmark for the attractive city of Hyderabad.

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