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ANALYSIS OF NEW FORMWORK TECHNOLOGY ADOPTED ON A CONSTRUCTION SITE IN PUNE

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ABSTRACT
To fulfil the housing and infrastructure requirements of increasing population, in last few decades Indian construction industry has grown in large amount. With the introduction of multinational companies in Indian construction sector, accuracy and speed of work has increased. Now-a-days to cope up with the demand is becoming crucial. Conventional construction methods are economical but they are unable to give required quality work and speed. Hence, in today's date there is a need to think on latest construction technology. Formwork is an important part of construction which takes almost 30-35% of total cost of construction. The various new technologies of formwork systems are introduced which helps to increase the overall economy, high quality construction and speed of construction. In this paper, analysis of new formwork technology implemented on site is done and it is proven that how it is more useful than the previous method of formwork technology.

KEYWORDS: DOKA formwork, H-beam, High speed technology, MS Formwork, Quality control etc.

INTRODUCTION

The main base component of construction is formwork. Formwork is a mould or matrix pattern in which fresh concrete is poured and it supports that concrete till its hardened state. Mainly it is in two types of support which are horizontal support and vertical support. Formwork carries all kind of loads such as dead load, live load etc. Formwork is a temporary structure which gives necessary shape and dimensions to the structure. Vertical kind of support is known as shuttering and horizontal kind of support is known as centring. To support such vertical and horizontal supports staging is provided in the form of bellies, props and jacks.

INVENTIONS IN THE FORMWORK TECHNOLOGY

In earlier days only, wooden formworks were used in construction but now-a-days different kinds of materials are introduced to create new formwork technology. Newly invented formwork technologies available in the market are: -

1. Table formwork system.
2. Aluminium formwork system.
3. MS formwork system.
4. Slip form technology.
5. Plastic formwork.
6. FRP formwork system.

Different companies like PERI, DOKA, MIVAN, KUMKANG, RMD, and PLASTECH are working very prominently in the production of such kind of formwork technology.

METHODOLOGY

The following methodology is adopted:

i. Choose typical floor layout of structure. Application of Dokamatic Table formwork technology.
ii. Data collection of materials used in both type of formwork application.
iii. Data analysis of Doka formwork with compare to conventional formwork.
iv. Merits and demerits of formwork one over the other.

EXECUTIVE SUMMARY

It is a commercial project whose client is K. Raheja Corporation. This project consists of 6 buildings named as G1, G2, R1, R2, and R4. On G2 building Millennium Engineers and Contractors Pt. Ltd. are working as a contractor a site.

PROJECT DESCRIPTION

Construction of commercial building with 2 Parking floors +1 Podium +11 floors situated at one of the Emerging IT hub at Kharadi Pune.

Name of the Project: KRC IT PARK G2 TOWER
Project Address: Kharadi Pune
Client:KRC Infrastructure and Project P.v.t. Ltd.
Architect:P. G. Patki Architects
RCC consultant: STUP consultants
Contractor: Millennium Engineers and Contractors P.v.t. Ltd.

The typical floor layout of the G2 building and placing H-beam and Table formwork arrangements is shown below: -

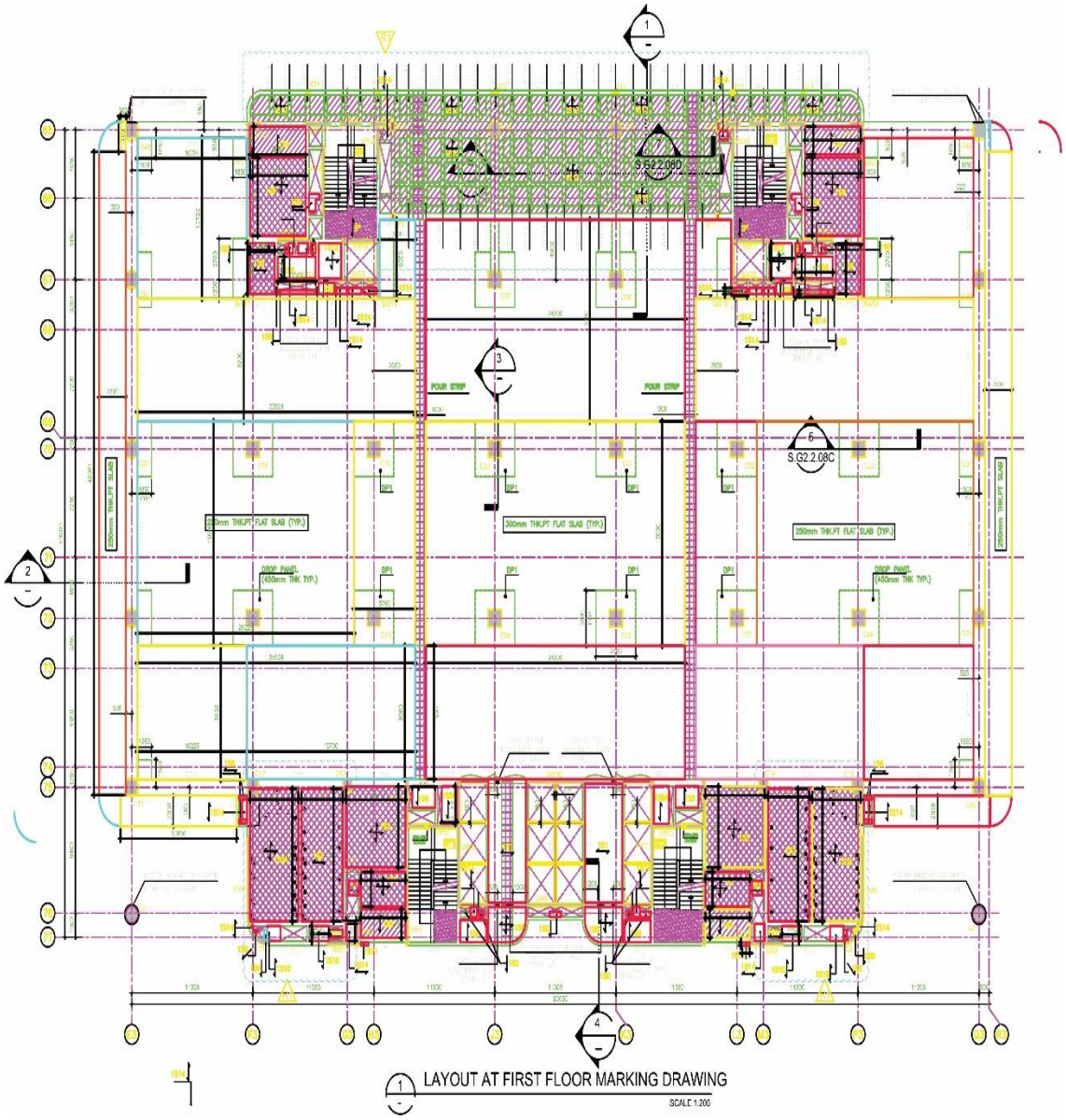

Figure 1: Typical Floor Layout

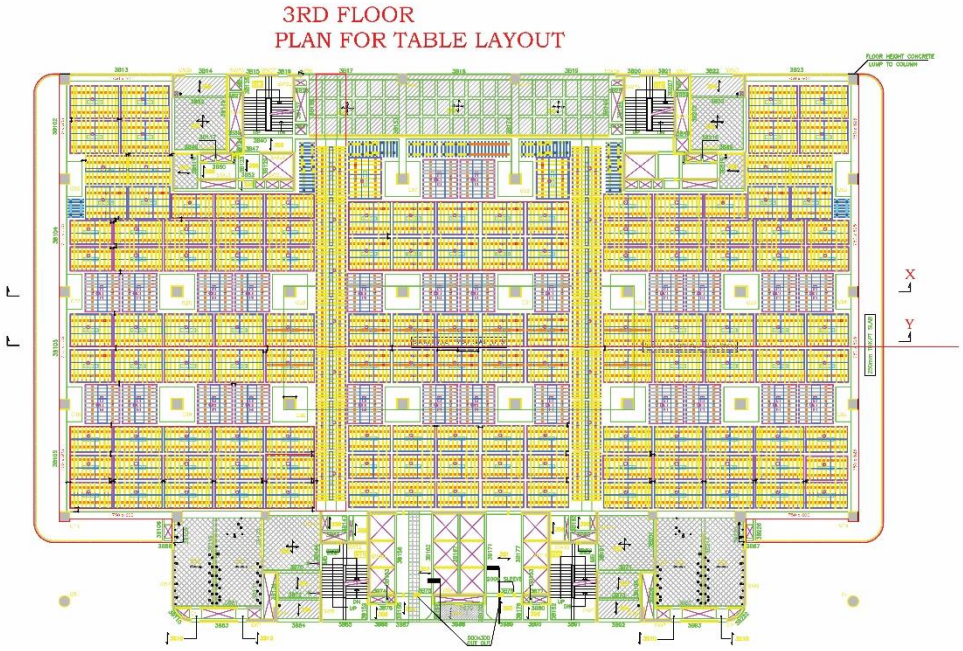

Figure 2: Typical floor H-Beam and Table Formwork Layout

DATA COLLECTION

Consider the following typical floor layout of the structure for laying of table formwork. The material selected in this formwork technology is:

i. Plywood – 18 mm thickness
ii. Secondary beam – DOKA beam H20 Eco P
iii. Primary beam – DOKA beam double H20 Eco P
iv. Support – DIND prop 30-400+1.0 m extension

To form of the table for laying the formwork H-beams of different dimensions are used which are:

Table 1: H- Beam dimensions

H20 3300	H20 3500
H20 4900	H20 2650
H20 2900	H20 1500
H20 4200	H20 1800
H20 2450	H20 1200
H20 3900	H20 3000
H20 3600	

Using the above H beams following combinations of table forms are used:

Table 2: H-Beam combinations

Pour 1		**Pour 2**		**Pour 3**	
Table	No.	Table	No.	Table	No.
2450*4200	4	2450*4200	5	2450*4200	4
2450*4900	14	2650*4200	10	2450*4900	14
2650*4900	2	3300*4200	22	2650*4200	2
2650*4900	8	3500*3900	10	2650*4900	8
2900*4200	2			2900*4200	2
3300*4200	4			3300*4200	4
3300*4900	12			3300*4900	12
3500*3900	8			3500*3900	8

The details of tertiary member, plywood of 18mm thickness are:

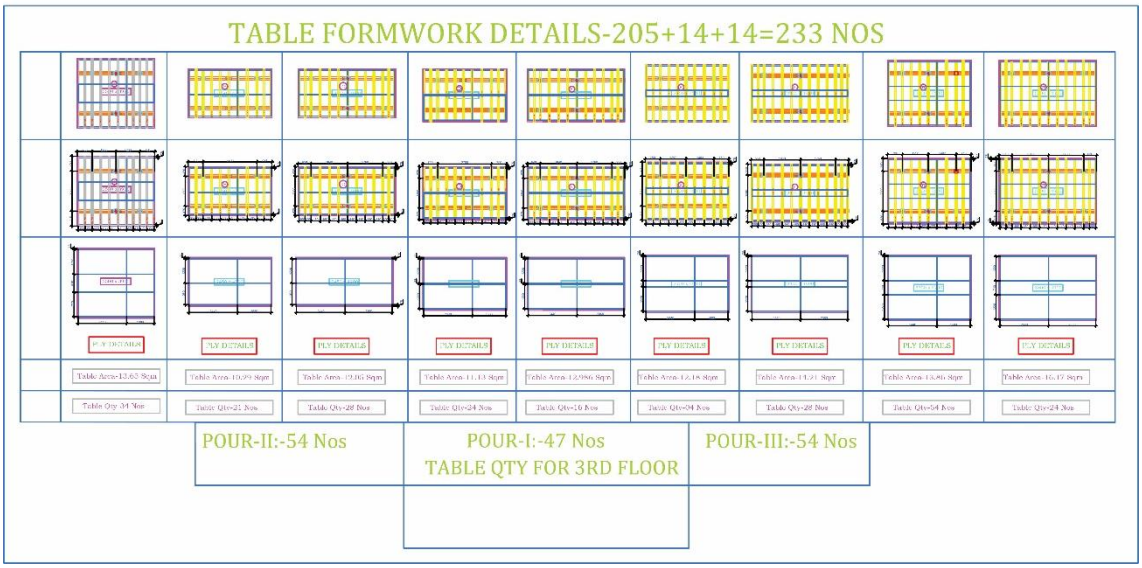

Figure 3: Table and Plywood Details

DATA ANALYSIS:

The first project of Millennium Engineers and Contractors Pt. Ltd. Company using DOKA formwork technology was 'Kalptaru' and 'Gera Trinity Towers'. In this project only, secondary base was H-beam and primary member was MS Square Tubes. These projects were started in 2012. The complete use of DOKA formwork technology was done in their most challenging and prestigious project which was 'EON IT PARK PHASE II' in 2015. Now this is their 2nd project of such type.

The main reason behind the shifting from conventional formwork technology to DOKA formwork technology is comfortability. Also, for the labours this kind of formwork is safe to use.

COMPARISON

Table 3: Comparison between Conventional MS Formwork and DOKA Formwork

Sr. No.	Parameters	Conventional MS - formwork	DOKA formwork
1.	Cost	Comparatively low	Comparatively high
2.	Scrap Value	Maximum	No scrap value
3.	Repetition	25-30	140-150
4.	Cycle time for casting same typical floor area	25 days	17 days
5.	Durability	Low	High
6.	Surface Finishing	Fair	Smooth
7.	Accuracy	Less accurate	Highly accurate
8.	Aesthetics	Not Superior	Superior
9.	Manpower requirements (in no's)	Maximum	Minimum
10.	Manpower requirements (in Skills)	Requires skilled and unskilled manpower	Semiskilled manpower can be employed
11.	Training programs	Not Required	Required
12.	Planning system	Not Required	Required

OBSERVATIONS:

The important demerit of conventional MS formwork was observed that, the MS square tubes can be bend and becomes scrap. The H-beams are non-bendable which can be used for longer time.

Also, the major problem occurred in MS formwork was shifting the formwork on to the next level which is too difficult for workers whereas in the case table formwork system it much easier. In table formwork, only screws of props need to be loosened and they can be easily shift on to the next level with help of crane. In the MS formwork while shifting parts needs to be separated. Safety of labours is more in Table formwork rather than MS formwork. Also, speed work is more in Table formwork rather than MS formwork.

CONCLUSION

According to the above discussion DOKA (H – 20 beam and Table) formwork seems the right option for the above project rather than conventional MS formwork. Although initial investment in DOKA formwork is high still its other merits such as speedy work and high-quality control proves better than conventional formwork system. In the commercial projects the load capacity requires to be very high hence DOKA formwork is the better solution. In the case of less investment and minimum load case again shifting to the conventional MS formwork can be the better option.

REFERENCES

I. Amrut Manvi, Sandeep Gouripur1, Pooja Sambrekar, Ramanjeetkaur, Dr. Kishor S. Kulkurni "*Cost Comparison between Conventional and Flat Slab Structures" Irjet Volume: 02 Issue: 03 | June-2015*

II. Arbaz Kazi, Fauwaz Parkar "*Comparative Study and Decision Making for A Formwork Technique to be Adopted on A Construction Site in Mumbai" IJRET Volume: 04 Issue: 12 | Dec - 2015*

III. Ketan Shah, (2005) "*Modular formwork for faster, economical and quality Construction", Indian Concrete Journal, Vol-79, pg. 6-23.*

IV. Martin Hoerlesberger, *"Modern Formwork Systems for High-rise Construction" Ambuja Foundations, March 2015*

V. Mohd Syazwan Md. Rahim, Nuzul Azam Haron "*Construction Cost Comparison Between Conventional and Formwork System for Condominium Project" IJASCSE, Volume 2, Issue 5, 2013.*

VI. Swapnali M. Karke, M.B. Kumathekar "*Comparison of the use of Traditional and Modern Formwork Systems", Civil Engineering Systems and Sustainable Innovations ISBN: 978-93-83083-78-7*

VII. *http://www.doka.com*