Benefits of Mascon Construction System in Economical Area

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Abstract—This paper studies the building which are constructed at Low cost. Houses are constructed for EWS (economically weaker section) people. The buildings are the monolithic structures and constructed by using the MASCON technology in which the aluminum form work are used which is very efficient compared to the method used for the construction of the conventional structures. The monolithic structure constructed by using the MASCON technology are much better in strength than the conventional structures. Also the work of construction can be done faster and there are many advantages except the high initial cost. The MASCON technology is very useful when the row houses or the number of houses are to be constructed as the work can be done faster. This paper gives the detail study on monolithic structure in terms of their construction method, costing and timing. Also gives the detailing about Mascon Construction System. The main Objective of this project is to minimize the cost of building construction, also reducing the time of construction along with multi hazards resistance.

I. INTRODUCTION

This is a housing building project for the urban poors. Basically this project is of AMC(Ahmedabad Municipal Corporation). The project is undertaken by M.S.KHURANA constructions pvt. Ltd. The buildings are going to be constructed by using MASCON technology. It is a monolithic structure. There is no masonry work. Only the steel and RCC are used to construct the buildings having 1.BHK. The formwork used are special designed and made of aluminum.

- What is “Monolithic structure”? Monolithic structure is a type of structure in which a building is constructed from a single piece of material without constructing the structural elements primarily.

- What is “Conventional structure”? Conventional structure is a type of structure in which the primary structure elements are formed by system of repetitive form work.

- What is “MASCON CONSTRUCTION SYSTEM”? Developed in the late 1970s by Canadian engineer WJ Malone, the Mascon Construction System is a system for forming the cast-in-place concrete structure of a building. The Mascon System has been used successfully throughout the world over a period of more than 25 years to construct thousands of housing units of all heights and sizes. The Mascon System is most effective when combined with load-bearing wall structural design. It is fast, simple, adaptable and very cost effective.

II. ABOUT THE TECHNOLOGY

The Mascon System is unique because it forms all of the concrete in a building including; walls, floor slabs, columns, beams, stairs, window hoods, balconies and various decorative features in exact accordance with the architect’s design. The Mascon System consists of hundreds of hand held pieces of formwork equipment, manufactured to fine tolerances. The majority of the equipment is comprised of panels while the rest includes vertical and horizontal corner sections, bulkheads and special floor slab beams that can be dismantled without disturbing the props supporting the floor slab concrete.

Ninety-nine per cent of the Mascon equipment is made of aluminium while the remaining one per cent is steel. Unlike other construction systems, the use of aluminium allows the larger components to be big enough to be effective, yet light enough (less than 30 kg) to be handled by a single worker.

Consequently, the need for cranes or other heavy handling equipment is eliminated. All of the individual pieces of equipment are joined by simple steel pins and wedges and the only tool required in assembly is a hammer. This also eliminates the need for skilled workers. The Mascon System has several advantages.

The Mascon formwork can be used to form both concrete structural designs – i.e. traditional RCC frame design or load-bearing wall design. The Mascon aluminium forms can be used over 250 times and are 100% recyclable unlike wooden forms and steel panels.

Although, thickness of the concrete and quantity of reinforcing steel determines the structural strength of a structure built with Mascon System, due to its box or cellular design it is inherently more resistant to earthquakes than traditional RCC frame structures. Due to the fine tolerances achieved in the machined aluminium formwork components, consistent concrete shapes and finishes are obtained floor after floor, building after building, conforming to the most exacting standards of quality and accuracy.

Fig. 1: Building constructed using MCS

Each floor of the multi-storey buildings is broken into four sections and all of the concrete in each floor section (walls, columns, beams, floor slabs, staircases, lift shafts etc.) is concreted in a single working day.
The basic element of the formwork is the panel, which is an extruded aluminium rail section, welded to an aluminium sheet. This produces a lightweight panel with an excellent stiffness to weight ratio, yielding minimal deflection under concrete loading. Panels are manufactured in the size and shape to suit the requirements of specific projects. The panels are made from high strength aluminium alloy with a 4 mm thick.

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Factor</th>
<th>Mascon System</th>
<th>Conventional System</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Quality</td>
<td>Superior</td>
<td>Normal</td>
</tr>
<tr>
<td>22</td>
<td>Speed of Construction</td>
<td>In this system, the walls and floors are cast together in one continuous operation in matter of few hours</td>
<td>The Speed of construction is slow due to step – by – step completion of different stages of activity the masonry is required to be laid brick by brick.</td>
</tr>
<tr>
<td>33</td>
<td>Aesthetics</td>
<td>The Room – Sized wall panels and the ceiling elements cast against steel plates have smooth finishing and the interiors have neat and clean lines without unsightly projections in various corners.</td>
<td>In the case of RCC structural framework of column and beams with partition brick walls is used for construction, the columns and beams show unsightly projections in room interiors.</td>
</tr>
<tr>
<td>44</td>
<td>External Finishes</td>
<td>Textured / pattern coloured concrete facets can be provided. This will need no frequent repainting.</td>
<td>Cement plastered brickwork, painted with cement – based paint. Finishing needs painting every in three years.</td>
</tr>
<tr>
<td>55</td>
<td>Maintenance</td>
<td>The walls and ceiling being smooth and high quality concrete repairs for plastering and leakage’s are not at all required frequently.</td>
<td>In maintenance cost, the major expenditure involved due to repair and maintenance of plaster of walls / ceiling etc.</td>
</tr>
<tr>
<td>66</td>
<td>Consumption of Cement</td>
<td>Consumption somewhat more than that used in conventional structures</td>
<td>Normal</td>
</tr>
</tbody>
</table>

Table 1: Relative Comparison of Mascon System – Conventional System

III. MERITS AND DEMERITS

A. Advantages of Mascon System over Conventional System

- More seismic resistance: The box type construction provides more seismic resistance to the structure.
- Increased durability: The durability of a complete concrete structure is more than conventional brick bat masonry.
- Lesser number of joints thereby reducing the leakages and enhancing the durability.
- Higher carpet area: Due to shear walls the walls are thin thus increasing area.
- Integral and smooth finishing of wall and slab: Smooth finish of aluminium can be seen vividly on walls.
- Uniform quality of construction: Uniform grade of concrete is used.
- Negligible maintenance: Strong built up of concrete needs no maintenance.

- Faster completion: Unsurpassed construction speed can be achieved due to light weight of forms
- Lesser manual labour: Less labour is required for carrying formworks.
- Simplified foundation design due to consistent load distribution.
- The natural density of concrete wall result in better sound transmission coefficient.

B. Limitations

Even though there are so many advantages of MIVAN formwork the limitations cannot be ignored. However the limitations do not pose any serious problems. They are as follows

- Because of small sizes finishing lines are seen on the concrete surfaces.
- Concealed services become difficult due to small thickness of components.
- It requires uniform planning as well as uniform elevations to be cost effective.
- Modifications are not possible as all members are caste in RCC.
- Large volume of work is necessary to be cost effective i.e. at least 200 repetitions of the forms should be possible at work.
- The formwork requires number of spacer, wall ties etc. which are placed @ 2 feet c/c; these create problems such as seepage, leakages during monsoon.
- Due to box-type construction shrinkage cracks are likely to appear.
- Heat of Hydration is high due to shear walls.

IV. CONCLUSION

- We concluded that Creativity and technical skill help to plan, design, construct and operate the facilities essential to life
- Mascon –cost effective and efficient tool to solve problems of the mega housing project
- Mascon construction is able to provide high quality construction at unbelievable speed and at reasonable cost.

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REFERENCES