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COST EFFECTIVE METHOD FOR SLAB CASTING

Deepak Kajla[1] and Harish[2]
[1]B.Tech Scholar, SET, Ganga Technical Campus, Bahadurgarh - HR, India
[2]Department of Civil Engineering, SET, Ganga Technical Campus, Bahadurgarh - HR, India

ABSTRACT

This research paper introduced a cost effective method for slab casting. Here an introduction to RCC slab is given and then the various materials and equipment's used here is discussed and then a complete methodology is described for slab casting at site. The new design for slab casting is shown and then calculations are done to find the required steel for design the both type and at last a comparison is shown for both method and their cost and in the result an cost effective method is arrived.

Keywords: *Slab, Casting, Cost, Method, Iron.*

I. INTRODUCTION

A concrete slab is a main structural component of new design buildings. The slabs are provided with reinforcing the steel bars into the concrete, their thickness generally varies from 4 and 20 inches (100 and 500 mm) , these are mostly used to construct floors and ceilings of the buildings, and for exterior paving a little thinner slab are used. Generally the thickness of these slabs, varies from 2 inches (51 mm) to 6 inches (150 mm), these are also called mud slabs when it is used under the main floor slabs or in scrabble space.

In many domestic and industrial structures a thicker reinforced slab is used, which is supported on footings or directly on the underground soil, for constructing the ground floor of a building. These may be in the form of "ground-bearing" or "suspended" slabs. In high rise structure and tall buildings, pre cast concrete slab are used which are generally less in thickness to form the floors and ceilings on each floor.

II. DESIGN

For a hanging slab, there are a number of designs to better the strength and weight ratio. In these cases the top surface remains fallen, and the underside is modulated:

- Corrugated, usually where the cemented is poured into a rugged steel tray. This improves strength and prevents the slab from bending under its own weight. The corrugations run across the short dimension, from side and side.
- A ribbed slab, giving considerable extra strength on one direction.
- A waffle slab, giving added strength in both directions and it looks hollow from bottom. Reinforcement design
- A one-way slab needs advantage resisting reinforcement only in short-direction because the advantage along long axis is so small that it can be dismissed. When the ratio of the length of long direction and short direction of a slab is greater than two it can be considered as a one way slab.

Long direction = ly, Short direction = lx

One way slab IF ly/lx > 2

- A two-way slab wants moment resisting reinforcement in both directions. If the ratio of the lengths of long to short side is less than two then moment in both directions should be considered in design.

Two way slab IF ly/lx < 2

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One Way Slab	Two Way Slab
One way slab is supported by beams in only 2 sides.	Two way slab is supported by beams in all four sides.
The ratio of longer span panel (L) to shorter span panel (B) is equal or greater than 2. Thus, L/B >= 2	The ratio of longer span panel (L) to shorter span panel (B) is less than 2. Thus, L/B < 2.
Main reinforcement is provided in only one direction for one way slabs.	Main reinforcement is provided in both the direction for two way slabs.

III. CONSTRUCTION

A concrete slab may be construct or on site. Prefabricate concrete slabs are built in a factory and transported to the site, ready to be lowered into place between steel and concrete beams. This slab is either pre stressed (in the factory), or post stressed (on site), or unstressed. It is vital that the wall supporting structure is built to the correct dimensions, or the slabs may be not fit.

In site concrete slabs are finished on the building site using formwork - the type of boxing into which the wet concrete is poured. If the slab is to be reinforced, the rebars are located within the formwork before the concrete is poured in. Plastic tipped metal and plastic bag chairs are used to hold the rebar away from the bottom and sides of the form-work, so that when the concrete sets it completely envelops the reinforcement. The ground slab, the form-work may consist only of sidewalls pushed into the ground. For a suspended slab, the form-work is regulating like a tray, often promoted by a temporary scaffold until the concrete sets.

The formwork is generally built from wooden planks & boards, plastic, & steel. On thefinancial building sites today, plastic or steel are more common as they save labour. On low-budget sites, for instance at laying a concrete garden path, wooden planks are very general. After the stelled has set the wood can do be removed, or left there permanently.

A few cases formwork is not compulsory - for instance, a ground slab enclosed by brick or block bottom walls, position the walls execution as the sides of the tray and rigid acts as the base.

IV. METHOLOGY

RCC SLAB CASTING – WORK PROCEDURE

During A slab casting there are many equipments and materials are used some of them are given below

Equipments used

Batching plant, Transit mixer, Concrete pump, Vibrators, Chute and CI Pipes

Possibilities of the work

Marking the slab, placing the reinforcement, Form work for slab, placing the concrete

Reinforcement

It shall be as per BBS prepared according to accepted drawing. The R/F shifting or binding shall be started as soon as shuttering is completed. R/F binding shall continue as formwork and shuttering work is progresses

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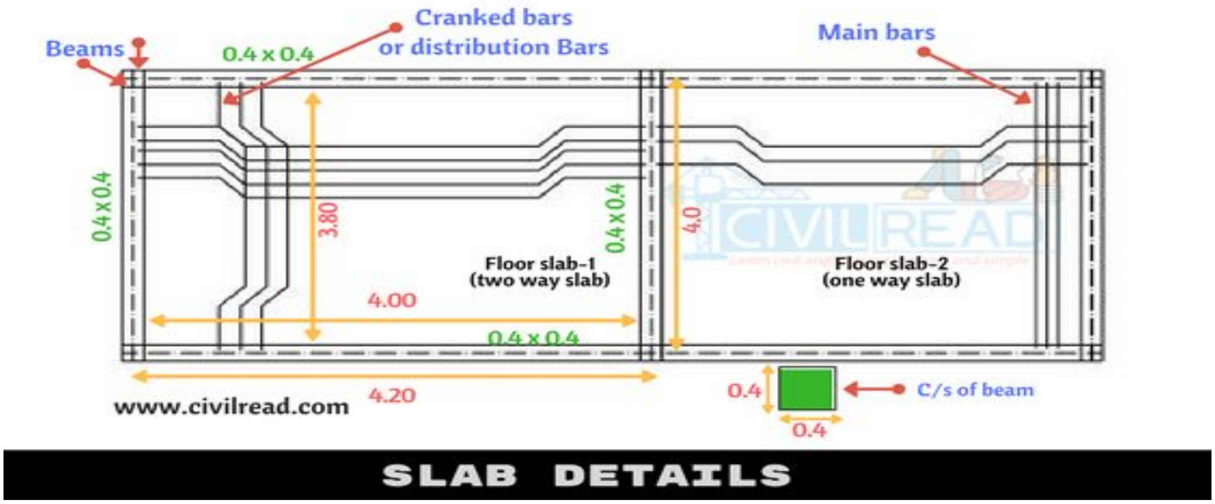

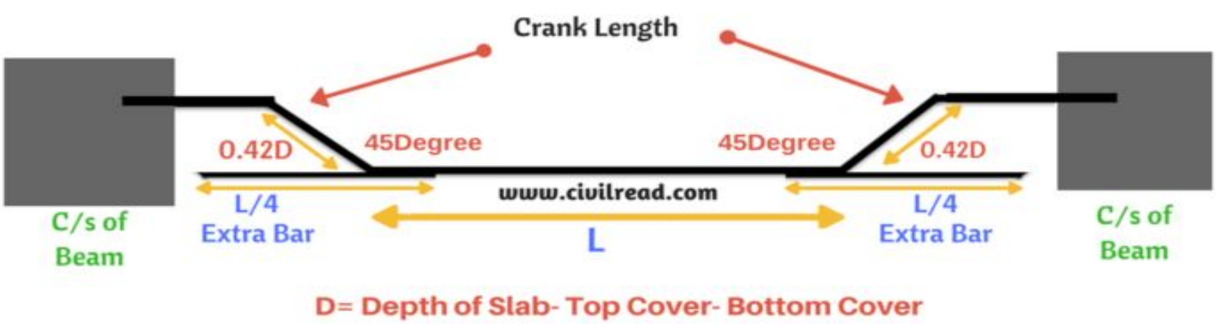

Concreting: construction joint

The structure joint shall be pre decided or fixed prior and start of the concreting. It is planned to have two construction joints for main building as absolute. In case of better break down from the Batching plant, the further Construction joint may be left. The location of the construction joint shall be at the one-third span. Construction joint must be straight and have profile of 'L'shape so that successive layer of concrete shall be perfectly bonded with previous laid layer.Preparation of construction joint shall include roughening, removing all laitance adhering to the joint and application of thick slurry before start of the new concrete.

Production or placement of concrete

Stock of material shall be acceptable to start the concrete. It shall be ensured by stores/purchase dept that concreting is not stopped on account of materials.All plant and equipment are checked and made in working conditions.

Material of grade M-25 shall be produced from our batching plant and directly pumped to the location of concrete placement concluded the pipeline. The pouring sequence shall be from grid A towards structure joint. Since the grade of material for column is M-40 and surrounding concrete is M-25, sufficient set off around column must be casted with M-40.The set off dimensions must be provided by PMC.Proper walkways/platforms shall be arranged so that the supports of the pipeline and manpower not directly stand on coating.

Acceptable carpenters along for supervisor shall inspect the behavior of supports below the slab during the casting. Extra Props shall be stocked below slab to provide additional supports in case of any failure of supports.

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Healing

The healing shall be started directly after thumb set of the concrete laid. Hessian clothe /Plastic shall be covered over the set concrete to reduce moisture evaporation from the concrete when hardening and hence to minimize shrinkage crazy cracks. These cracks are inheriting property of the concrete specially appears during casting of flat surfaces.Final curing shall be done by ponding and stacking water for minimum period of 7 days.

V. CALCULATION WORK

The calculation work consist two parts:

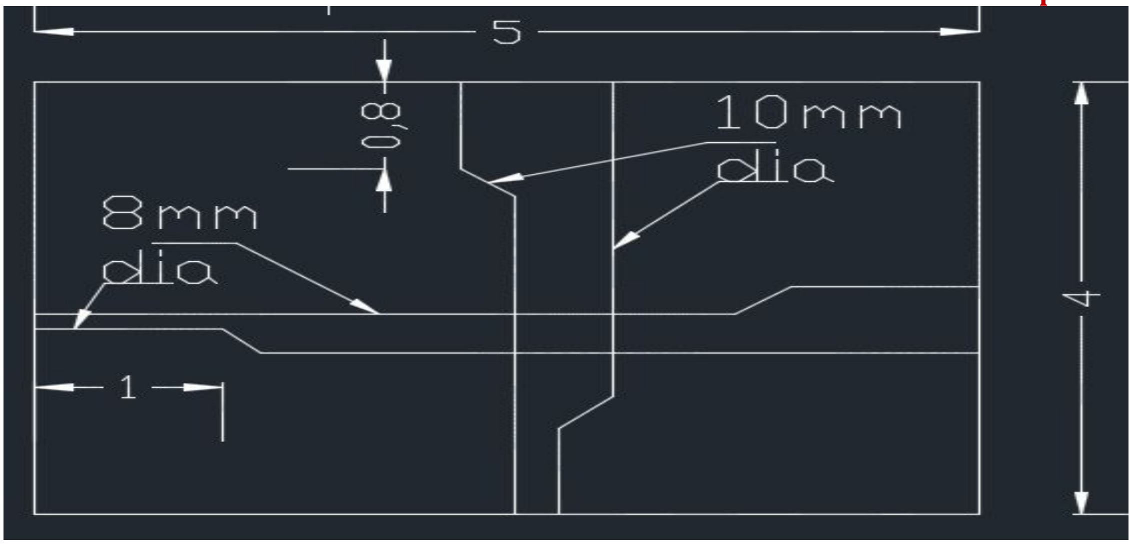
- When the steel is provided with the crank in the slab for full length
- When the steel is provided with crank in the slab up to crank length.

When the steel is provided with the crank in the slab for full length

Area of slab:-5.000×4.000=20 m^2

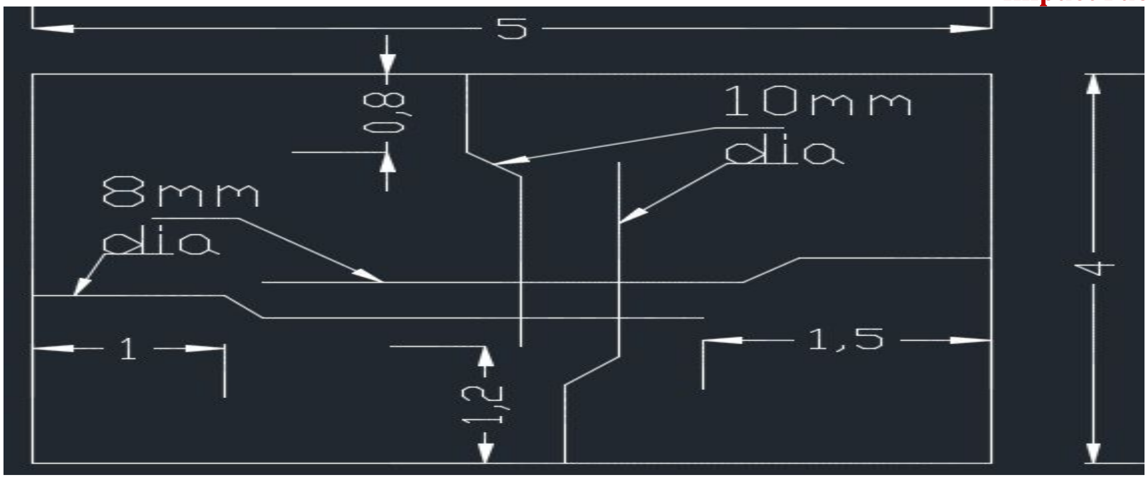
Bottom:-

- Main bar 10ϕ 150 mm c/c short span
  4000×24 No. = 96 Rmt
  4000×09 No. = 36 Rmt
  = 132 Rmt ×0.617 wt
  = 81.44 kg
- Distribution bar 8ϕ 150 mm c/c long span
  5000×20 No. = 100 Rmt
  5000×6 No. = 30 Rmt
  =130 Rmt
- Top Extra bar 8 mm ϕ 300 c/c
  Main bar short span = 800 ×17 No. = 13.6 Rmt
  Main bar short span = 1200×17 No. = 20.4 Rmt
  Distribution bar = 5000×(3+5) No. = 40.00 Rmt
  Main bar long span = 1000×14 No. = 14.00 Rmt
  Main bar long span = 1500×14 No. = 21.00 Rmt
  Distribution bar short span = 4000×(4 NO. + 6 No.) = 40.00 Rmt
  Total = 279 Rmt × 0.3947 kg = 110.13 kg
  Total steel 20 m^2= 81.44 + 110.13 = 191.57 kg
  1 m^2= 9.578 kg
  Steel Weight formula = πr2 × Density × Length
  For 8 mm ϕ = ×××7850×1.000
  = 0.3947 kg/m



When the steel is provided with crank in the slab upto crank length
Area of slab: - 5.000×4.000=20 m^2
Bottom:-

- Main bar 10 mm ϕ
  Short span bar = 3200 × 24No. = 76.8 Rmt
  = 3200 × 9 No. = 28.8 Rmt
  = 105.6 Rmt × 0.617 kg
  = 65.15 kg
- Distribution bar 8 mm ϕ
  Distribution bar = 4000 × 14 No. = 56 Rmt
  = 3500 × 13 No. = 45.5 Rmt
- Top Extra bar 8 mm ϕ
  Short span main bar = 800 mm × 17 No. = 13.6 Rmt
  Short span main bar = 1200mm × 17 No. = 20.4 Rmt
  Short span Distribution bar = 5000 mm × (3+4) No. = 35.00 Rmt
  Long span = 1000 × 14 No. = 14.00 Rmt
  Long span = 1500 × 14 No. = 21.00 Rmt
  Distribution bar = 4000 × (3+5) No. = 32.00 Rmt
  Total = 237.5 Rmt × 0.3947 kg
  Weight = 93.74 kg
  Total weight for 20 m^2 = 65.15 + 93.74
  = 158.9 kg
  Total weight for 1 m^2 = 7.94 kg



Difference Weight:-
When the steel is provided with crank in the slab upto crank length
= 1.63 kg/ m^2
Strength: - Both parts are same
= 300 kg/ cm^2
Cost charge per m^2:-

- When the steel is provided with the crank in the slab for full length
= 1300 Rs / m^2
When the crank is provided in the alternate form in the slab
= 1200 Rs / m^2
Shatteringwith material = 600 Rs/m^2
Ready-mix cement concrete(RMC) = 1100 Rs/m^2

VI. RESULT

The result for the different method of slab casting is given in table given below. Comparison of both type of steel and their differences in cost is given.

S.NO	CASE 1	CASE 2
1(Weight of Steel Per m^2)	9.578kg	7.94kg
2(Cost of Steel Per m^2)	1300Rs	1200Rs

From this table we know that second method is a cost effective method. As from the table we know the difference in cost is arrive 100Rs per m^2. So it is also beneficial for the overall cost of the structure.

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