



# DEIVA BUILDERS

**Dream - Plan - Execute**

05.12.2018

To

The Principal,  
Indra Ganesan College of Engineering,  
Manikandam,  
Trichy, 620 012


**Dear Sir/Madam,**


Subject: Enquiry Regarding consultancy work brochure - Concrete Mix Design M40 Grade

We would like to express our attention in collaborating with your prestigious institution for our consultancy project endowment on Concrete Mix Design M40 Grade.

We are interested in providing opportunities of consultancy work. We would like to offer the consultancy work on Concrete Mix Design M40 Grade to your department of civil engineering.

We look forward for your early reply to take this forward.

  
Dr. G. Balakrishnan, M.E., Ph.D.,  
Principal  
Indra Ganesan College of Engineering  
IG Valley, Madurai Main Road  
Manikandam, Trichy-620 012.

  
D.R. SIVARAJAN B.Tech  
DEIVA BUILDERS  
Veera Complex  
Udhayasuriyapuram  
Ph : 7639699176



12.12.2018

To

DEIVA Builders  
6/54 Veera Complex,  
Udhayasuriyapuram  
Pattukottai, 614602

Respected Sir,

**Sub:** Submission of consultancy work quotation- Reg.

Greetings from Indra Ganesan College of Engineering!!!

We thank you for considering our consultancy work brochure and we received your requirements about Concrete Mix Design M40. In this connection, we would like to inform you that the consultancy charges for the following test is furnished here.


S.NO	TYPE OF TEST	CHARGES IN Rs. PER UNIT
1	Concrete Mix Design M40	15000


We request you to kindly consider the above proposed consultancy charges and we are eagerly awaiting for your kind sanction of the consultancy work.

Thanking you

  
PROJECT INVESTIGATOR



  
Dr. S. BHARATHI RAJA  
PRINCIPAL

  
Dr. G. Balakrishnan, M.E., Ph.D.  
Principal  
Indra Ganesan College of Engineering  
IG Valley, Madurai Main Road  
Manikandam, Trichy-620 012

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# DEIVA BUILDERS

Dream - Plan - Execute

Date: 22.12.2018

To

The Principal,  
Indra Ganesan College of Engineering,  
Manikandam,  
Trichy, 620 012


Dear Sir/ Madam,


**Subject: Sanctioned Amount – Concrete Mix Design M40 Grade**

I am happy to inform that the proposal submitted by the department of civil engineering under the work title “Concrete Mix Design M40 Grade” has approved by our organization.

With reference to the discussion, we are pleased to sanction a sum of Rs. 15000/- (Fifteen Thousand Only).

In this connection, the management would feel happy to render its support, if necessary

  
Dr. G. Balakrishnan, M.E., Ph.D.  
Principal  
Indra Ganesan College of Engineering  
IG Valley, Madurai Main Road  
Manikandam, Trichy-620 012.

  
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Ph : 7639693176



# **Indra Ganesan**

**COLLEGE OF ENGINEERING**

Madurai Main Road (NH-45B), Manikandam, Tiruchirapalli- 620 012

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## **CONSULTANCY PROJECT ENDOWMENT REPORT**

**CONCRETE MIX DESIGN**

**SUBMITTED**

**TO**

**DEIVA BUILDERS**

**6/54 Veera Complex**

**Udhayasuriyapuram**

**Pattukottai**

**Trichy-614602**

**Delivery Date: 22.01.2019**

**Dr. G. Balakrishnan, M.E., Ph.D.**

Principal

Indra Ganesan College of Engineering

IG Valley, Madurai Main Road

Manikandam, Trichy-620 012.

## CONSULTANCY REPORT

Date of Casting: 22.12.2018

Date of Testing: 22.01.2019

### Test Conducted for Cement:

S.No	Name of the Test	Test Result	Range
1	Specific gravity of cement	3.15	3.10-3.15
2	Fineness of cement	340 m <sup>2</sup> / kg	300-400 m <sup>2</sup> / kg
3	Consistency test on cement	30%	25-30%
4	Setting time of cement	30-60 min	30-60 min

### Test Conducted for Fine Aggregate:

S.No	Name of the Test	Test Result	Range
1	Specific gravity of fine aggregate	2.68	2.5-2.9
2	Grading of fine aggregate	2.46	2.22-3.2
3	Water absorption test on fine aggregate	1%	1-3%

### Test Conducted for Coarse Aggregate:

S.No	Name of the Test	Test Result	Range
1	Specific gravity of coarse aggregate	2.78	2.5-2.9
2	Water absorption test on coarse aggregate	0.3%	0.5-2%
3	Elongation index	7%	5-10%
4	Flakiness index	3%	15-20%

### Admixture type:

Metakaolin (10%)

### STIPULATION FOR PROPORTIONING:

- a) Grade designation : M40  
b) Type of cement : OPC 43 grade  
c) Type of mineral admixture : 10% of Metakaolin  
d) Maximum nominal size of aggregate : 20mm



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Principal

Indra Ganesan College of Engineering

IG Valley, Madurai Main Road

Manikandam, Trichy-620 022.

- e) Minimum cement content : 320 kg/m<sup>3</sup>  
 f) Maximum water cement ratio : 0.45  
 g) Workability : 100mm  
 h) Exposure condition : Severe  
 i) Method of concrete placing : Pumping  
 j). Degree of supervision : Good  
 k) Type of aggregate : Crushed angular aggregate  
 l) Maximum cement(OPC) content : 450 kg/m<sup>3</sup>

**1. Target strength for mix proportioning (M 40 grade)**

$$f'_{\text{CK}} = f'_{\text{CK}} + 1.65 s$$

From IS 10262:2009,  $s = 5 \text{ N/mm}^2$

$$\begin{aligned} \text{Target strength} &= 40 + 1.65 \times 5 \\ &= 48.25 \text{ N/mm}^2 \end{aligned}$$

**2. Water cement ratio**

From Table 5 of IS 456,

Max. Water- cement ratio = 0.45

Adopt water cement ratio = 0.40

$$0.40 < 0.45$$

Hence ok

**3. Water content**

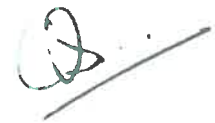
Max. water content for

$$\begin{aligned} 100 \text{ slump} &= 186 + 6/100 \times 186 \\ &= 197 \text{ liters} \end{aligned}$$

$$\begin{aligned} \text{Water content} &= 197 \times 0.71 \\ &= 140 \text{ liters} \end{aligned}$$

**4. Cement and Calcium chloride content**

$$\text{Water-cement ratio} = 0.40$$



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$$\begin{aligned}\text{Cement content} &= 140/0.40 \\ &= 350 \text{ kg/ m}^3\end{aligned}$$

$$\text{Min. cement content serve} = 320 \text{ kg/ m}^3$$

$$350 \text{ kg/ m}^3 > 320 \text{ kg/ m}^3$$

$$\begin{aligned}\text{Cementitious material content} &= 350 \times 1.10 \\ &= 385 \text{ kg/ m}^3\end{aligned}$$

$$\text{Water content} = 140 \text{ liters}$$

$$\begin{aligned}\text{Water cement ratio} &= 140/385 \\ &= 0.364\end{aligned}$$

Metakaolin @ 1.5% of

$$\begin{aligned}\text{Total cementitious content} &= 385 \times 10/100 \\ &= 38.5 \text{ kg/ m}^3\end{aligned}$$

$$\begin{aligned}\text{Cement (OPC)} &= 385 - 38.5 \\ &= 346.5 \text{ kg/ m}^3\end{aligned}$$

Saving of cement while using

$$\text{Metakaolin} = 3.5 \text{ kg/ m}^3$$

### 5. Volume of coarse and fine aggregate content

$$\begin{aligned}\text{The volume of coarse aggregate} &= 0.62 \times 0.9 \\ &= 0.56\end{aligned}$$

$$\begin{aligned}\text{The volume of fine aggregate} &= 1 - 0.56 \\ &= 0.44\end{aligned}$$

### 6. Mix calculation

i. volume of concrete =  $1 \text{ m}^3$

ii. volume of cement = mass of cement / specific gravity of cement  $\times 1/1000$

$$\begin{aligned}&= 346.5 / 3.15 \times 1/1000 \\ &= 0.115 \text{ m}^3\end{aligned}$$

iii. volume of water = mass of water / specific gravity of water  $\times 1/1000$

$$= 140/1 \times 1/1000$$

$$= 0.140 \text{ m}^3$$

iv. Volume of chemical admixture = mass of chemical ad. / sp.gravity of chemical ad. x 1/1000

$$= 7/1.145 \times 1/1000$$

$$= 0.007 \text{ m}^3$$

v. Volume of all in aggregate = (a- (b+c+a))

$$= 1- (0.11+0.014+0.140 + 0.070)$$

$$= 0.665 \text{ m}^3$$

vi. Mass of coarse aggregate = e x volume of coarse aggregate specific x 1000

$$= 0.665 \times 0.56 \times 2.78 \times 1000$$

$$= 988 \text{ kg}$$

vii. Mass of fine aggregate = ex volume of fine aggregate x specific gravity of fine aggregate x1000

$$= 0.665 \times 0.44 \times 2.768 \times 1000$$

$$= 784 \text{ kg}$$

## MIX PROPORTIONS

Cement = 346 kg/ m<sup>3</sup>

Metakaolin = 38.5 kg/ m<sup>3</sup>

Water =140 kg/ m<sup>3</sup>

Fine aggregate = 784 kg/ m<sup>3</sup>

Coarse aggregate = 998 kg/ m<sup>3</sup>

Water-cement ratio = 0.364



**TEST CONDUCTED**



**Dr. G. Balakrishnan, M.E., Ph.D.,**

Principal

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IG Valley, Madurai Main Road

Manikandam, Trichy-620 012.



**PRINCIPAL**

**Dr.S.BHARATHIRAJA**





22.01.2019

Trichy

**UTILIZATION CERTIFICATE**

Certified that an amount of **Rs 15000/- (Fifteen Thousand Only)** sanctioned during the year **2018-2019** in favor of civil engineering received from **DEIVA Builders** has been utilized for the recommended project consultancy work titled **“Concrete Mix Design M40 Grade”**. The purpose for which it was sanctioned has been duly fulfilled and delivered as per the conditions of the grant.

PROJECT INVESTIGATOR



  
Dr. S. BHARATHI RAJA  
PRINCIPAL

  
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