



McCARTHY

• Builders • Designers

Date: 24.08.2021

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 require Concrete Mix Design M40. To satisfy our needs, kindly give us your budget for consulting project work, i.e., to determine the optimal combination of cement, fine aggregates, coarse aggregates, water and admixtures. Please feel free to contact us at your convenience to discuss this matter further or to schedule a meeting.

For McCARTHY

D.AUGUSTUS MANIMARAN

Engineer

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

Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.



31.08.2021

Trichy

To

McCARTHY Builders & Designers
N0.6, III Floor, Near Vasam Medicals
15-A, Colony Main Road, Thillainagar
Trichy-18

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 M 40. 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.)	UNIT
1	Concrete Mix Design M 40	15000	1
	TOTAL	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.

PROJECT INVESTIGATOR



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

Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012,

Dr. S. BHARATHI RAJA
PRINCIPAL



McCARTHY

• Builders • Designers

Date: 13.09.2021

To

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

Dear Sir/ Madam,

Subject: Sanctioned Amount - Concrete Mix Design M 40.

We wish to bring to your kind notice that our company hereby has sanctioned an amount of Rs.15000/-, out of the quoted budget for the testing of Concrete Mix Design M40 for a concerned period.

Based on our terms and conditions, the work order and payment will be sanctioned. Please proceed your work further progress, as early as possible.

For McCARTHY

D.AUGUSTUS MANIMARAN
Engineer

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



Indra Ganesan

COLLEGE OF ENGINEERING

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

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

CONSULTANCY PROJECT ENDOWMENT REPORT

CONCRETE MIX DESIGN M40

SUBMITTED

TO

**McCARTHY Builders & Designers
No.6, III Floor, Near Vasan Medicals
15-A, Colony Main Road, Thillainagar
Trichy-18**

Delivery Date: 08.10.2021

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: 13.09.2021

Date of Testing: 08.10.2021

Test Conducted for Cement:

S.No	Name of the Test	Test Result	Range
1	Specific gravity of cement	3.14	3.10-3.15
2	Fineness of cement	390 m ² / kg	300-400 m ² / kg
3	Consistency test on cement	31%	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	2.65	2.5-2.9
2	Grading of fine aggregate	2.29	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	2.79	2.5-2.9
2	Water absorption test on coarse aggregate	0.6%	0.5-2%
3	Elongation index	9%	5-10%
4	Flakiness index	18%	15-20%

Admixture type:

Polypropylene (1.5%)

STIPULATION FOR PROPORTIONING:

- a) Grade designation : M40
- b) Type of cement : OPC 43 grade
- c) Type of mineral admixture : 1.5% of polypropylene
- d) Maximum nominal size of aggregate : 20mm

- e) Minimum cement content : 320 kg/m³
- 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/m³

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

$$f'_{ck} = f_{ck} + 1.65 s$$

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

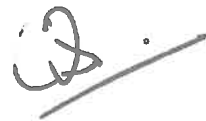
Max. water content for

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

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

4. Cement and Calcium chloride content

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



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

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

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

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

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

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

Polypropylene @ 1.5% of

$$\begin{aligned}\text{Total cementitious content} &= 385 \times 1.5/100 \\ &= 5.77 \text{ kg/ m}^3\end{aligned}$$

$$\begin{aligned}\text{Cement (OPC)} &= 385 - 5.77 \\ &= 379.2 \text{ kg/ m}^3\end{aligned}$$

Saving of cement while using

$$\begin{aligned}\text{Polypropylene} &= 350 - 379.2 \\ &= -29.2 \text{ kg/ m}^3\end{aligned}$$

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 m^3

ii. volume of cement = $\frac{\text{mass of cement}}{\text{specific gravity of cement}} \times 1/1000$

$$\begin{aligned}&= \frac{379.2 - 29.2}{1} \times 1/1000 \\ &= -0.12 \text{ m}^3\end{aligned}$$



$$\begin{aligned} \text{iii. volume of water} &= \text{mass of water} / \text{specific gravity of water} \times 1/1000 \\ &= 140/1 \times 1/1000 \\ &= 0.140 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{iv. Volume of chemical admixture} &= \text{mass of chemical ad.} / \text{sp.gravity of chemical ad.} \times 1/1000 \\ &= 7/1.145 \times 1/1000 \\ &= 0.007 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{v. Volume of all in aggregate} &= (a - (b+c+a)) \\ &= 1 - (0.12+0.002+0.140 + 0.007) \\ &= 0.971 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{vi. Mass of coarse aggregate} &= e \times \text{volume of coarse aggregate specific} \times 1000 \\ &= 0.971 \times 0.56 \times 2.74 \times 1000 \\ &= 1489.9 \text{ kg} \end{aligned}$$

$$\begin{aligned} \text{vii. Mass of fine aggregate} &= e \times \text{volume of fine aggregate} \times \text{specific gravity of fine aggregate} \times 1000 \\ &= 0.971 \times 0.44 \times 2.74 \times 1000 \\ &= 1170.63 \text{ kg} \end{aligned}$$

MIX PROPORTIONS

Cement	= 379 kg/ m ³
Polypropylene	= 5.77 kg/ m ³
Water	= 140 kg/ m ³
Fine aggregate	= 1170 kg/ m ³
Coarse aggregate	= 1489 kg/ m ³
Water-cement ratio	= 0.364


TEST CONDUCTED


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


Dr.S.BHARATHIRAJA
PRINCIPAL



08.10.2021

Trichy

UTILIZATION CERTIFICATE

Certified that an amount of **Rs 15000/- (Fifteen Thousand Only)** sanctioned during the year **2021-2022** in favor of civil engineering received from **McCARTHY Builders & Designers** has been utilized for the recommended project consultancy work titled **"Concrete Mix Design M40"**. The purpose for which it was sanctioned has been duly fulfilled and delivered as per the conditions of the grant.

PROJECT INVESTIGATOR



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

Indra Ganesan College of Engineering
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