

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

DESIGN & CONSTRUCTION OF FLYOVER & WIDENING OF ROAD AT MUMBRA JUNCTION FROM CH - 131/200 TO CH - 133/800 ON NH-4 (Old Mumbai Pune Highway)

PMC: STUP CONSULTANTS P. LTD.

CONTRACTOR: SMC INFRASTRUCTURES PVT. LTD.

RMC - SBK RMC, MAHAPE

CONCRETE MIX DESIGN FOR M15

Date : 12.07.2017

TM NO. 1

1. DESIGN STIPULATIONS :-

1.1 Grade of Concrete	: M15
1.2 Characteristic Compressive strength at 28 days	: 15 N/mm ²
1.3 Target Compressive Strength at 28 days (As per MORTH Table - 1700-5)	: 25 N/mm ²
1.4 Nominal size of aggregate	: 20MM
1.5 Degree of Workability in terms of Slump	: 100 +/- 25 MM
1.6 Type of Exposure	: VERY SEVERE
1.7 Minimum Cementitious Content (As per MORTH Table - 1700-2)	: 380 Kg/m ³
1.8 Maximum W/C Ratio (As per MORTH Table - 1700-2)	: 0.40
1.9 Sources of Materials -	
a. Cement	: ACC OPC-53
b. Fly - ash	: Dirk India Pvt. Ltd.
c. Microsilica	: -----
d. Coarse Aggregates	: Turbhe Quarry (VSI)
e. Natural Sand	: -----
f. Crushed Sand	: Turbhe Quarry (VSI)
g. Admixture	: Addchem Low PCE 305
h. Water	: External Supply

2. TEST DATA FOR CONCRETE INGREDIENTS :-

2.1 Cement type / Brand	: ACC OPC - 53 grade
2.2 Fly-ash type / Brand	: Dirk India Pvt. Ltd. as per grade I of IS: 3812
2.3 Specific Gravity of Materials	
a. Cement	3.15
b. Fly-ash	2.20
c. Coarse Aggregates - 20mm	2.77
- 10mm	2.76
d. Fine Aggregate - Natural Sand	—
- Crushed Sand	2.70
2.4 Water Absorption of Materials	
a. Coarse Aggregates - 20mm	1.00
- 10mm	1.20
b. Fine Aggregate - Natural Sand-NA	—
- Crushed Sand	3.50

3. TARGET MEAN STRENGTH :-

As per Table 1700-5 of MORT & H, the target mean strength for M15 grade of concrete is 25 N/mm².

4. BLENDING PROPORTION OF COARSE & FINE AGGREGATE :-

20MM	34.00%
10MM	18.00%
R/SAND	0.00%
C/SAND	48.00%

5. QUANTITIES OF INGREDIENTS (By Absolute Vol.method) :- As per IS:10262-2009

Cement used	272	kg/m ³
Fly - ash used	108	kg/m ³
Mirosilica used	0	kg/m ³
W / (C+F)	0.43	
Free Water Content	163	kg/m ³
Absolute volume of Cement	0.086	m ³
Absolute volume of Fly - ash	0.049	m ³
Volume of Air	0.000	m ³
Absolute volume of Free Water	0.163	m ³
Total Absolute Volume of Aggregates	= 1.0 - (0.086 + 0.049 + 0.00 + 0.163)	
	= 1.0 - 0.299	
	= 0.701 m ³	

6. TOTAL QUANTITY OF COARSE & FINE AGGREGATE :-

$$= [(Sp\ Gr.\ of\ 20mm \times \% \ of\ 20mm) + (Sp\ Gr.\ of\ 10mm \times \% \ of\ 10mm) + (Sp\ Gr.\ of\ C.Sand \times \% \ of\ C.Sand)] \times Absolute\ Volume\ of\ Aggregates.$$

$$= [(2.77 \times 0.34) + (2.76 \times 0.18) + (2.70 \times 0.48)] \times 0.701 \times 1000$$

$$= 660 + 348 + 908$$

$$= 1916 \quad Kg/m^3$$

$$\begin{aligned} \text{FREE W/(C+FA) RATIO :} & \quad \underline{0.43} \\ \text{AGGREGATE / (C +FA) RATIO :} & \quad \underline{5.04} \end{aligned}$$

7. QUANTITY OF INGREDIENTS REQUIRED FOR 1 m³ OF CONCRETE

Mix Proportion

OPC - 53 Grade	272 Kg/m ³	}	1
FLY - ASH	108 Kg/m ³		
MICROSILICA	0 Kg/m ³		
20MM	660 Kg/m ³		1.74
10MM	348 Kg/m ³		0.92
R/SAND	0 Kg/m ³		0.00
C/SAND	908 Kg/m ³		2.39
WATER	163 Ltr/m ³		0.43
ADMIXTURE	4.56 Kg/m ³		
(1.2% by wt. of C+F+MS)			

Note :-

1. All values for aggregates are for SSD conditions.

2. Adjustments to aggregate & water content shall be done based on the free moisture content in the aggregate.