Design Of Normal Concrete Mix

Water Content

Cement Content

Fine Aggregate

Coarse Aggregate

Given Data

f_{cu} (MPa)	Slump (mm)	Cement Type	Agg. Type	Max. Agg. Size (mm)	Zone of fine Agg.	Max. W/C	Max. Cement content (kg/m^3)	Min. Cement content kg/m^3)
25	60-180	OPC	Uncrushed	40	3	0.55	300	250
35	30-60	OPC	Uncrushed	20	2	0.5	350	300
45	10-30	OPC	Crushed	10	1	0.48	400	350

Step no (1)

Characteristic Strength (f_{cu}) (Given)

Target mean strength(f_{tms}) (Calculate)

$$F_{tms} = f_{cu} + 120 \ \ kg/cm^2$$

Step no (1)

Characteristic Strength (f_{cu}) (250)

Target mean strength(f_{tms}) (Calculate)

$F_{tms} = 250 + 120 = 370$ kg/cm^2

Step no (2) W/C

Free Water / Cement ratio

Table. 4.1 approximate compressive strength of concrete mixes with a water cement ratio 0.50.

Fig. 4.2 Relation between compressive strength and water-cement ratio.

Table 4.1 Approximate compressive strength (kg/cm2)of concrete mixes with a water/ cement ratio of 0.5

Type of cement	*Type of coarse aggregate*	*Compressive strength (MPa) Age (days)*			
		3	*7*	*28*	*91*
Ordinary (CEM 1) or sulphate	Uncrushed	22	30	43	49
resisting cement (SRPC)	Crushed	27	36	49	56
Rapid-hardening	Uncrushed	29	37	48	54
Portland cement	Crushed	34	43	55	61

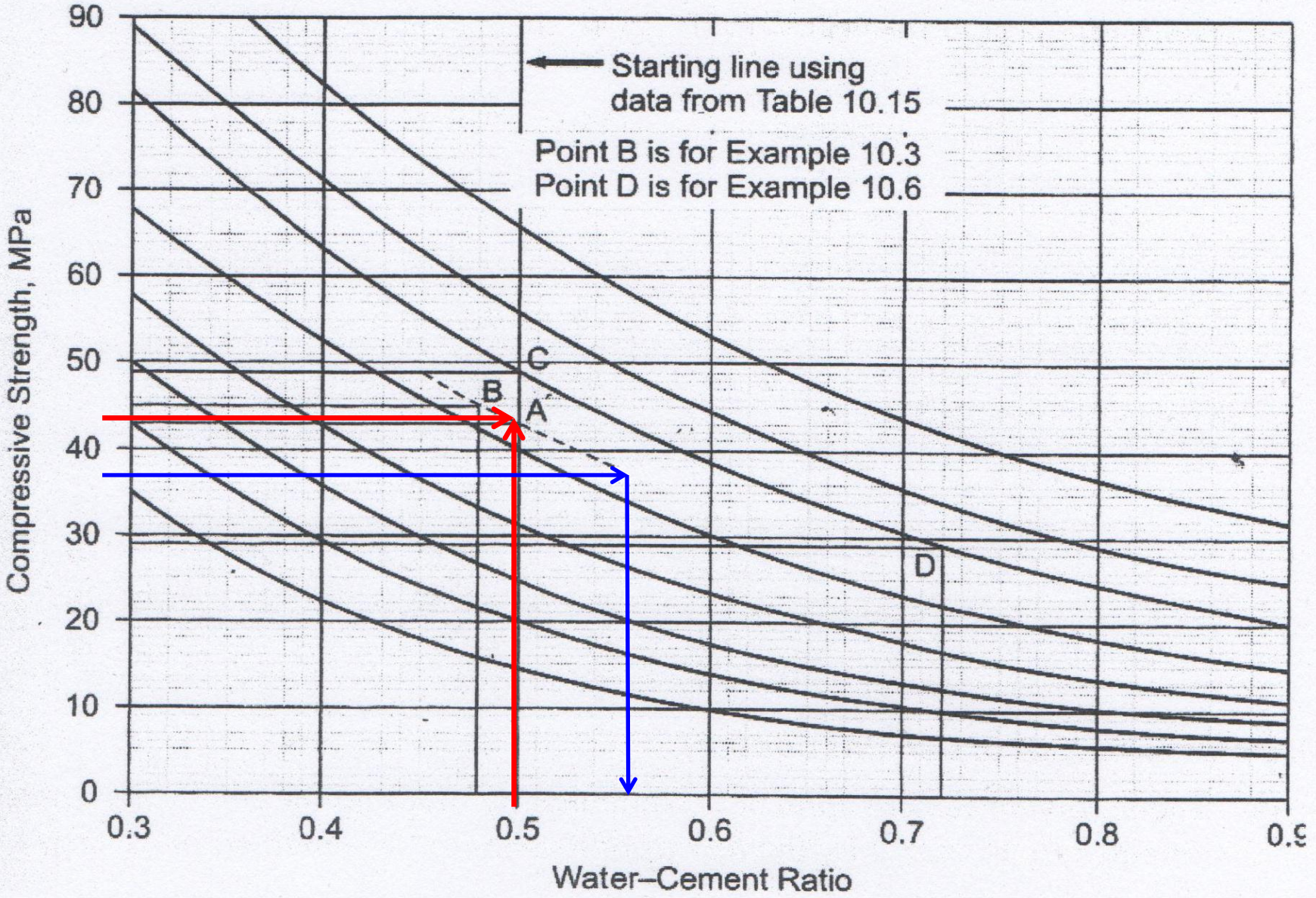


Fig. 4.2 Relation between compressive strength and water-cement ratio

Step no (3) C

Determination of Cement Content

Table. 4.2 approximate free- water cement required to various levels of workability.

Table 4.2 Approximate free-water contents (kg/m3) required to various levels of workability

Slump(mm) V.B (sec)		0 – 10 >12	10 – 30 6 – 12	30 – 60 3 – 6	60 – 180 0 - 3
Maximum size of coarse aggregate (mm)	Type of aggregate				
10	Uncrushed	150	180	205	225
	Crushed	180	205	230	250
20	Uncrushed	135	160	180	195
	Crushed	170	190	210	225
40	Uncrushed	115	140	160	175
	Crushed	155	175	190	205

Step no (3) C

Determination of Cement Content

C = Water content / (w/c)

C = 175 / (0.55) = 318 kg

Step no (4) Aggregates

Computation of Total Absolute Volume of Aggregates

Fig.4.3 Estimated wet density o fully compacted concrete

Volume of aggregates = 1 – Cement - Water Content

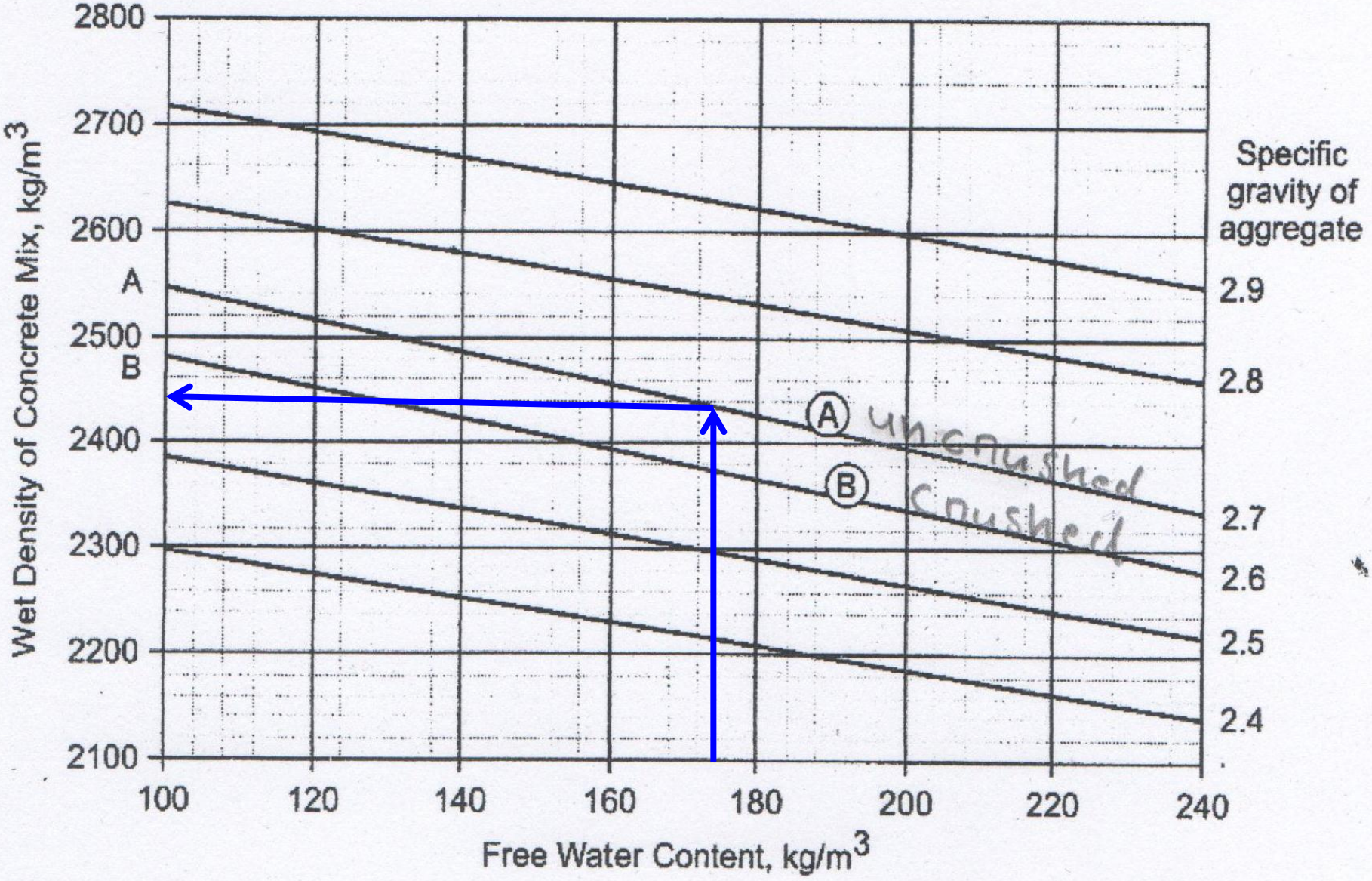


Fig. 4.3 Estimated wet density of fully compacted concrete

Step no (4) Aggregates

Volume of aggregates = 1 – Cement - Water Content

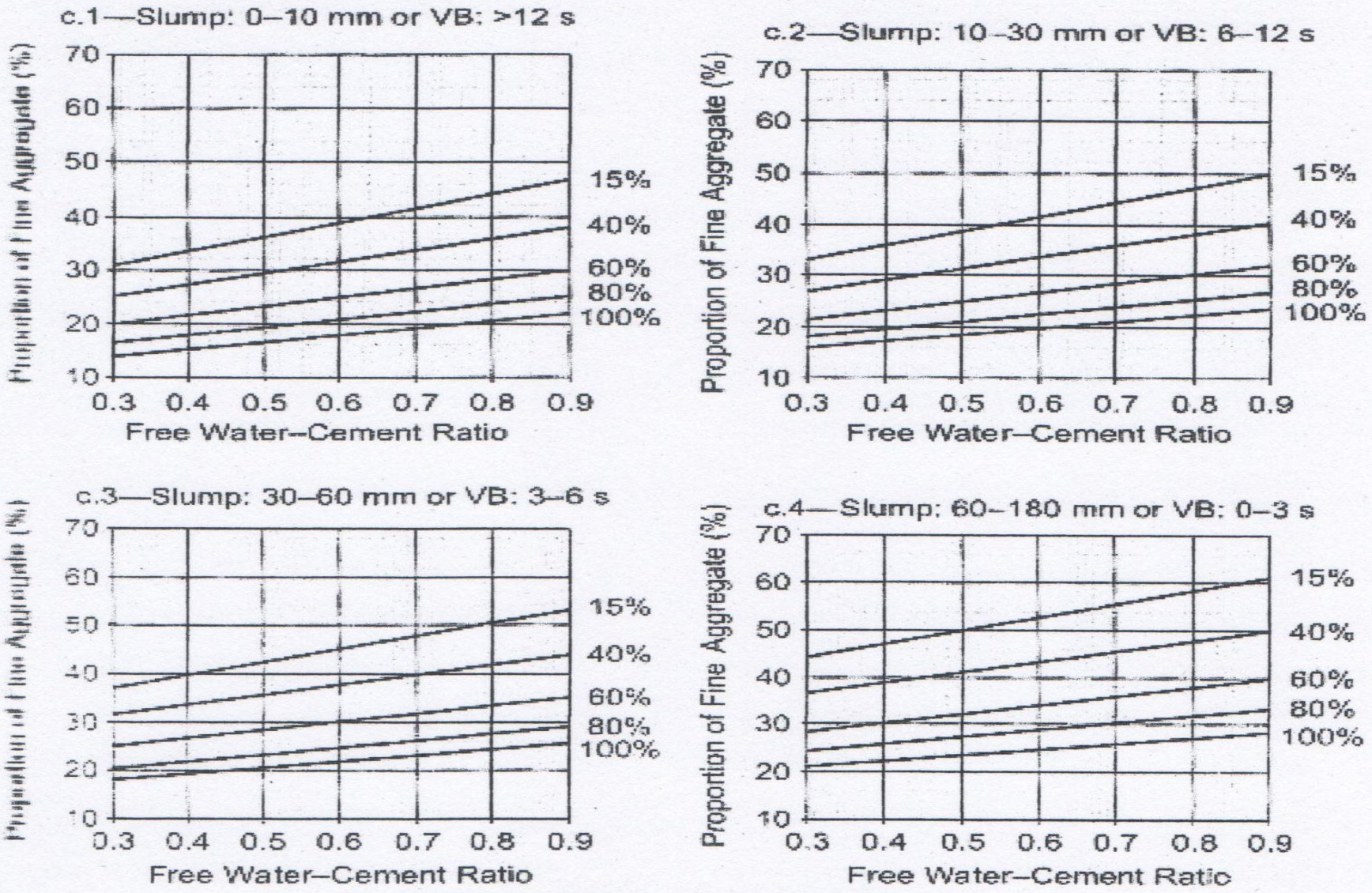
Volume of aggregates = 2450 – 318 – 175 = 1957 kg

Step no (5)

Fine / coarse aggregate

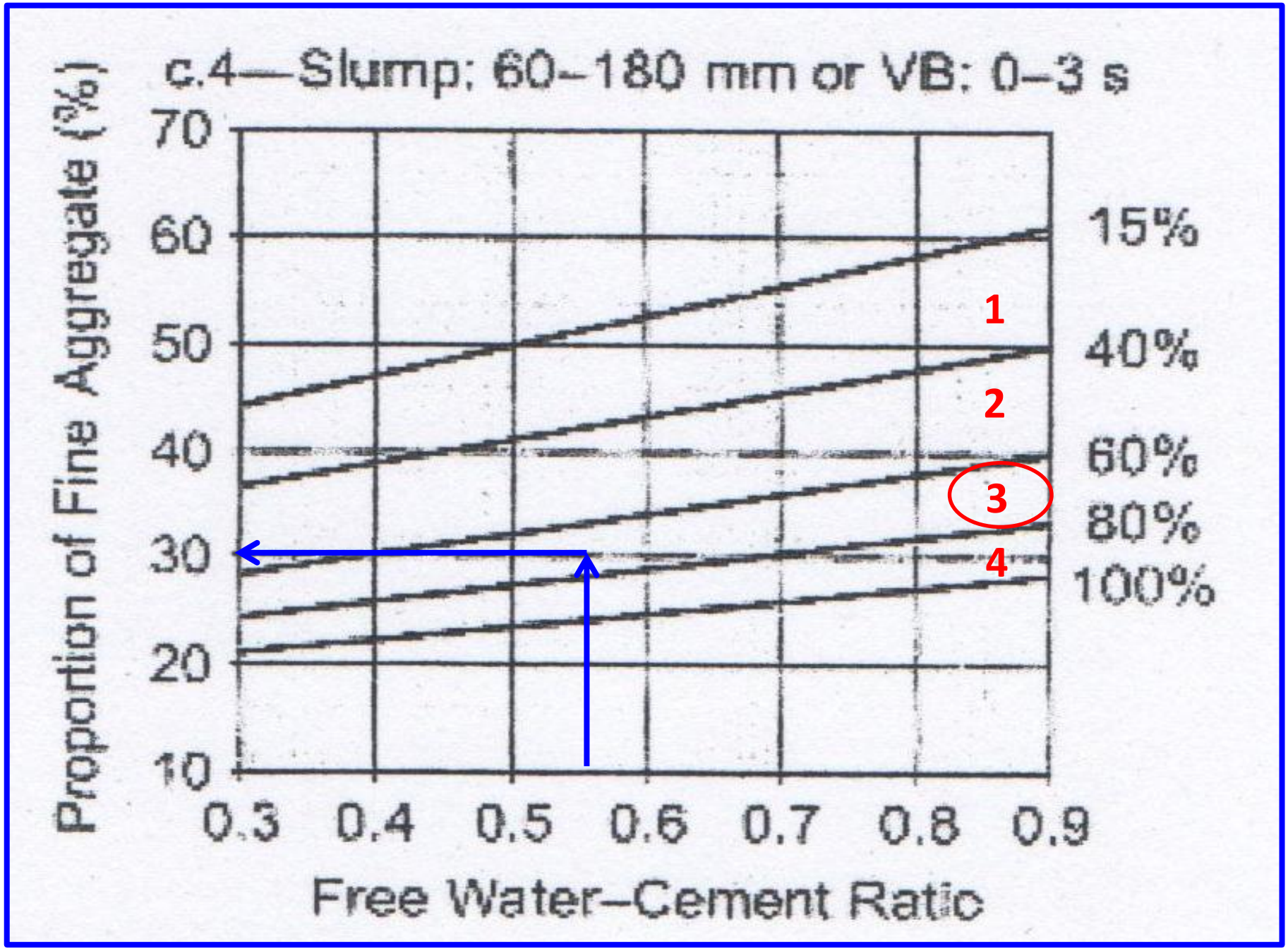
Fig.4.4 . The percentage of fine aggregate

Coarse aggregates = 100 - content of fine aggregate



(c) Maximum Aggregate Size—40 mm

Fig. 4.4 Cont.


c.4—Slump: 60–180 mm or VB: 0–3 s
Proportion of Fine Aggregate (%)
70
60
50
40
30
20
10
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Free Water–Cement Ratio
15%
40%
60%
80%
100%
1
2
3
4

Step no (5)

Fine / coarse aggregate

Fig.4.4 . The percentage of fine aggregate

0.30 %

Fine aggregates = 1957 x 0.30 = 587 kg

Coarse aggregates = 1957 - 587 = 1370 kg

Summary :

Water Content 175 L

Cement Content 318 kg

Fine Aggregate 587 kg

Coarse Agg. 1370 kg

Thanks for Your Attention

Next Lecture

Chapter 5
Setting of Concrete