PROPORTIONING

EXAMPLE:

C = FINE AGGREGATE……..2.67 F.M.

A = COARSE AGGREGATE……...5.42 F.M.

B = DESIRED BLEND……..3.70 F.M.

X = DESIRED PERCENTAGE OF FINE AGGREGATE

$$X = 100\ \frac{(A)\ (5.42 - 3.70)}{(A)\ (5.42 - 2.67)} = 100\ \frac{(B)\ (1.72)}{(C)\ (2.75)} = X = 62.5\%\ \text{FINE}$$

Methods of mathematically designing a block mix from two (2) separate materials are shown below and to clarify the symbols in the equation are offered in the following.

$$X = 100\ \frac{(A-B)}{(A-C)}$$

X = Desired percentage of fine aggregate
A = F.M. of coarse aggregate (5.42)
B = F.M. of desired or combined aggregate (3.70)
C = F.M. of fine aggregate (2.67

$$X - 100\ \frac{(5.42 - 3.70)}{(5.42 - 2.67)} = 100\ \frac{(1.72)}{(2.75)} = 62.5\%$$

The 62.5 percentage figure represents that percentage of fine aggregate which will be used to make up a blend.

It then follows that if 62.5% is fine aggregate, then the difference between 100 and 62.5% = 37.5% or that percentage of coarse aggregate to be used.

As a check on this cleared equation and it further value, let's take a step whereby we multiply the fine aggregate F.M. Which is 2.67 x 62.5% = 1.66875 F.M. similarly, take 37.5% of the coarse aggregate F.M. which is 5.42 x 37.5% = 2.03250.

Adding these two (2) F.M. figures as follow:

1.66875
+2.03250
3.70125 Or rounded to two (2) places past the decimal point, we get the desired 3.70 F.M. on the blending form below. You will note that the percentage figures have been rounded out to full percentages; namely 63% and 37% for easier calculations.

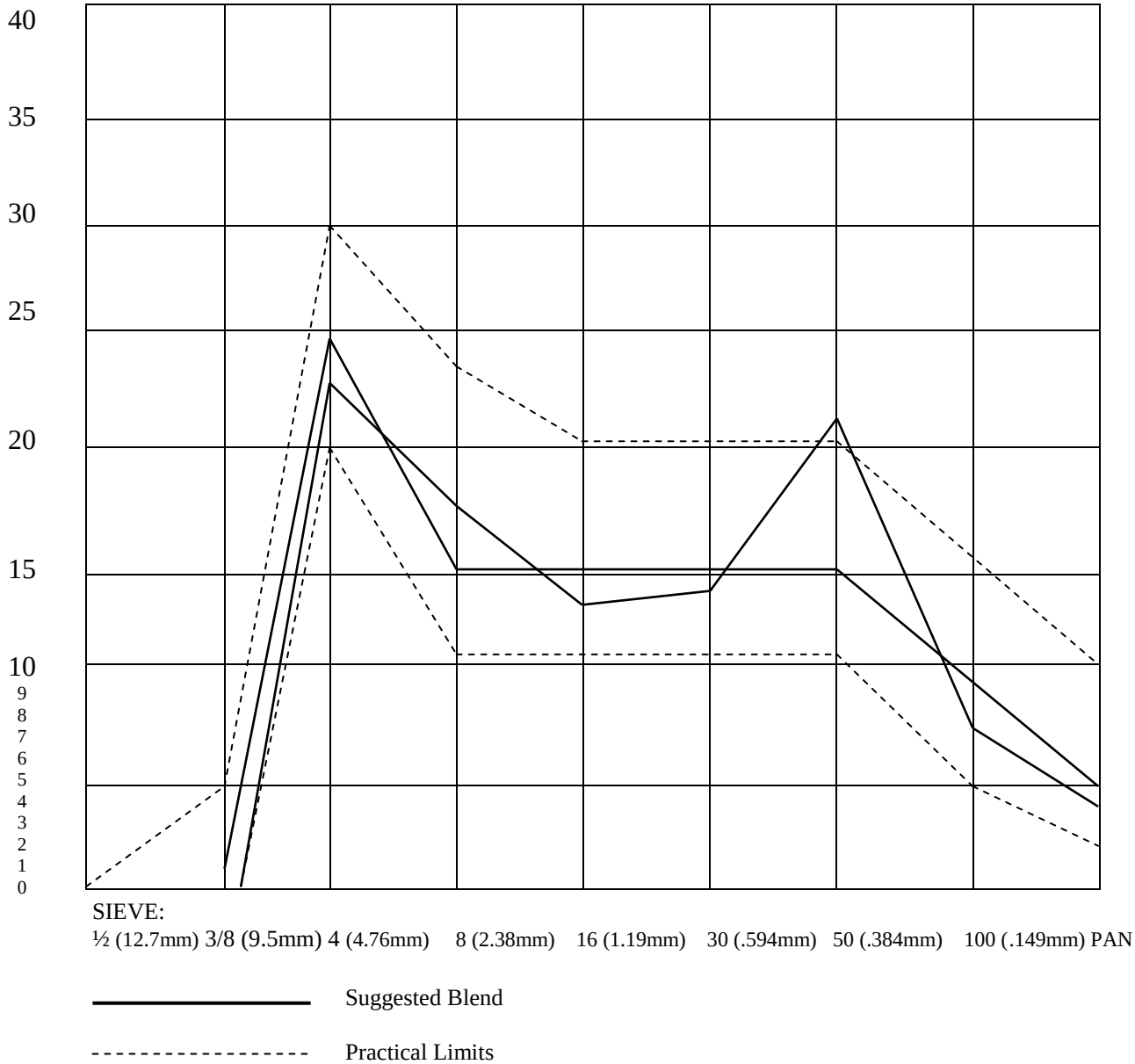
PERCENTAGE RETAINED ON EACH SIEVE

Material	%	3/8	4	8	16	30	50	100	PAN	F.M.	Remarks
Fine Aggregates	63			6.3	12.0	13.2	20.8	7.6	3.1		
Coarse Aggregates	37		23.3	11.1	.7	.4	.4	.4	.7		
	Total		23.3	17.4	12.7	13.6	21.2	8.0	3.8		
	Acc.		23.3	40.7	53.4	67.0	88.2	96.2		368.8=3.69	

The procedure above is relatively simple and calls for multiplying the percent retained on each screen size of the two separate aggregate by the designated percentage arrived at for this blending procedure.

Sand			**Stone**		
Sieve		% Retained	Screen		% Retained
3/8	9.5mm	0	3/8	9.5mm	0
4	4.76mm	0	4	4.76mm	63X37%=23.3%
8	2.38mm	10X63%=6.3%	8	2.38mm	30X37%=11.1%
16	1.19mm	19X63%=12.0%	16	1.19mm	2 etc. on thru to and Including the pan size
30	.594mm	21.0	30	.594mm	
50	.284mm	33.0	50	.284mm	1
100	.149mm	12	100	.149mm	1
Pan		5	Pan		2

To further evaluate this blend the curve can then be projected onto the graph form as shown below which includes the so-called ideal blend and practical limits within which good quality block can be made.



Next we come to the point of determining our batch proportions by weight or volume. Settings up a normal batch of say 4,500lbs. of aggregate with the two (2) aggregates above, the sand and stone proportions would be as follows:

4500 X 63% = 2835 lbs. sand
4500 X 37% = 1665 lbs. stone

4500 lbs. total batch weight less cement

Similarly a volume batch of the same approximate size would be proportioned as follows:

50 cubic feet x 63% =31.5 cubic feet of fine aggregate
50 cubic feet x 37% =18.5 cubic feet of coarse aggregate

With reference to a previous explanation, consideration should be given to the moisture content of the fine aggregate so that compensation for surface water can be made. This entire procedure is applicable to any aggregates whether it be sand and gravel, crushed limestone chips and manufactured sand, lightweight materials, etc., and for any desired combined F.M. figure for two materials.