Blending Materials

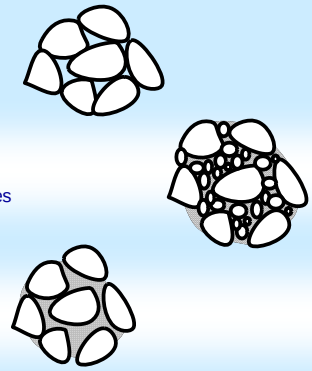
Gradations

Why Blend?

- Achieve desired end-result gradation
  - Meet special specification
  - Hot Mix Asphalt
  - Readymix concrete
- Increase / Decrease permeability
- Achieve desired angularity
- Correct out of Spec. material

Gradation Descriptions

- Uniformly-Graded
  - Few points of contact
  - Poor Interlock
  - High permeability
- Well-Graded
  - Good distribution of sizes
  - Good Interlock
  - Low permeability
- Gap-Graded
  - Gap between sizes



Advantages of Blending Stockpiles

- Being able to Plot individual gradations
- Being able to Plot specification limits
- Blending Can be used for initial assessment, e.g.
  - Can a blend be made from available materials? (Yes)
  - Identification of critical sieves
  - Estimate trial proportions

Blending Gradations

- Select critical sieves in blend
- Determine initial proportions which will meet critical sieves
- Check calculated blend against the desired specification
- Adjust if necessary and repeat above steps

Aggregate Blending

- P = Aa + Bb + Cc + ….

Where:

P =	% of material passing a given sieve for the blended aggregates A, B, C, …
A, B, C, … =	% material passing a given sieve for each aggregate A, B, C, …..
a, b, c, …. =	Proportions (decimal fractions) of aggregates A, B, C, … to be used in blend

Blending Aggregates

Material	Agg. # 1		Agg. # 2			
% Used	50%		50%			
US Sieve	% Passing	% Batch	% Passing	% Batch	Blend	Target
3/8"	100		100			100
No. 4	90		100			80 - 100
No. 8	30		100			65 - 100
No. 16	7		88			40 - 80
No. 30	3		47			20 - 65
No. 50	1		32			7 - 40
No. 100	0		24			3 - 20
No. 200	0		10			2 - 10

Blending Aggregates

First Try
(remember trial & error)

Material	Agg. # 1		Agg. # 2			
% Used	50%		50%			
US Sieve	% Passing	% Batch	% P	tch	Blend	Target
3/8"	100	50				100
No. 4	90	45				80 - 100
No. 8	30	15				65 - 100
No. 16	7	3.5				40 - 80
No. 30	3	1.5				20 - 65
No. 50	1	0.5				7 - 40
No. 100	0	0				3 - 20
No. 200	0	0				2 - 10

100 * 0.5 = 50
90 * 0.5 = 45
30 * 0.5 = 15
7 * 0.5 = 3.5
3 * 0.5 = 1.5
1 * 0.5 = 0.5
0 * 0.5 = 0
0 * 0.5 = 0

Blending Aggregates

Material	Agg. # 1		Agg. # 2			
% Used	50%		50%			
US Sieve	% Passing	% Batch	% Passing	% Batch	Blend	Target
3/8"	100	50	100	50	100	100
No. 4	90	45	100	50	95	80 - 100
No. 8	30	15	100	50	65	65 - 100
No. 16	7	3.5	88	44	47.5	40 - 80
No. 30	3	1.5	47	23.5	25	20 - 65
No. 50	1	0.5	32	16	16.5	7 - 40
No. 100	0	0	24	12	12	3 - 20
No. 200	0	0	10	5	5	2 - 10

Blending Aggregates

Material	Agg. # 1		Agg. # 2			
% Used	50%		50%			
US Sieve	% Passing	% Batch	% Passing	% Batch	Blend	Target
3/8"	100	50	100	50	100	100
No. 4	90	45	100	50	95	80 - 100
No. 8	30	15		50	65	65 - 100
No. 16	7	3.5		44	47.5	40 - 80
No. 30	3	1.5		23.5	25	20 - 65
No. 50	1	0.5		16	16.5	7 - 40
No. 100	0	0		12	12	3 - 20
No. 200	0	0	10	5	5	2 - 10

Let's Try and get a little closer to the middle of the target values.

Blending Aggregates

Material	Agg. # 1		Agg. # 2			
% Used	30%		70%			
US Sieve	% Passing	% Batch	% Passing	% Batch	Blend	Target
3/8"	100	30	100	70	100	100
No. 4	90	27	100	70	97	80 - 100
No. 8	30	9	100	70	79	65 - 100
No. 16	7	2.1	88	61.6	63.7	40 - 80
No. 30	3	0.9	47	32.9	33.8	20 - 65
No. 50	1	0.3	32	22.4	22.7	7 - 40
No. 100	0	0	24	16.8	16.8	3 - 20
No. 200	0	0	10	7	7	2 - 10

Summary

- Gradation Descriptions
  - Well Graded
  - Uniformly Graded
  - Gap Graded
- Blend Aggregates
  - Achieve desired end-result gradation
  - Increase / Decrease permeability
  - Achieve desired angularity
- Correct “Out of Spec” Materials

Questions - ?