Marshal Mix Design Cheat Sheet

General Work Flow

1- Prepare three pills.
2- Prepare a loose specimen.
3- Using the compacted pills, determine the specific gravity for each of the compacted pills and calculate the average (G_{mb}).
4- Using the loose specimen, determine the theoretical maximum density (G_{mm}).
5- Carry out the Stability and Flow test for each pill and calculate the average.
6- Prepare a table containing the data obtained by your group and pass it to the laboratory supervisor. A complete table (results for all binder contents) will be established and provided to all groups.
7- As soon as receiving the complete table, student shall carryout the Marshall analysis and provide a complete report.

Lab. Work Steps

1- Collect aggregate of different sizes. 1200 gm.
2- Find the weight percentage and specific gravity of each size.
3- Find the bulk specific gravity of aggregate mixture (G_{sb}).
4- Heat the aggregate to 160 °C for 3 to 4 h.
5- Find the weight of the asphalt based on the designated asphalt content percentage.
6- Find the specific gravity of asphalt G_b.
7- Heat the asphalt cement to 155 °C for not more than one hour to prevent overheating.
8- Mix all four specimens at temperature not less (145 °C).
9- Use 75 blows on each side of the specimen to compact three specimens for heavy traffic.
10- Do not mix the fourth specimen.
11- Leave the specimens to cool.
12- Find the mix bulk specific gravity (G_{mb}) using the three bills.
13- Find the theoretical maximum density (G_{mm}) using the loose specimen.
14- Cary out the Stability and Flow test and make stability correction.
15- Tabulate the results and hand it to the lab. supervisor.

Marshal Analysis Steps

P_b	4			4.5			…
Specimen	1	2	3	1	2	3	…
Weight in air							…
Weight in water							…
Weight in SSD							…
Volume							…
G_{mb}							…
Average G_{mb}							…
Measured stability							…
Correlation factor							…
Corrected stability							…
Average stability							…
Flow							…
Average flow							…

	Asphalt Content					
	4.0	4.5	5.0	5.5	6.0	6.5
Stability						
Flow						
G_{mb}						
G_{mm}						

1- Find effective specific gravity of aggregate G_{se} using G_{mm} obtained from lab.
2- Find calculated G_{mm}.
3- Find absorbed asphalt percentage P_{ba}.
4- Find effective asphalt content of a mixture P_{be}.
5- Find percentage of void in mineral aggregate VMA.
6- Find percentage of air voids in compacted mixture V_a.
7- Find percentage of voids filled with asphalt VFA.
8- Plot trends and relations of test data.
9- Find optimum asphalt content OAC.

P_b	G_{mm} Measured	G_{se}	G_{mm} calculated	P_{ba}	P_{be}	G_{mb}	VMA	V_a	VFA	Stability	Flow
4											
4.5											
5											
5.5											
6											