WATER BOUND MACADAM

COARSE AGGREGATE

	Sub-Base	Base	Surfacing
Grading Used	G1	G2 or G3	G3
Aggregate Impact Value	< 50	< 40	< 30
Flakiness Index	< 30	< 25	< 20
Soundness Test	Loss with Sodium Sulphate < 12% Loss with Magnesium Sulphate < 18%		

Grading Requirements *

	G-1 (90-45)	G-2 (63- 45)	G-3 (53- 22.4)	
125mm	100			*Engineer may allow ±5 per cent variation from the specified upper and lower limits excluding the first sieve in the gradings*
90mm	90-100			
75mm		100		
63mm	25-60	90-100	100	
53 mm		25-75	95-100	
45mm	0-15	0-15	65-90	
22.4mm	0-5	0-5	0-10	
11.2mm			0-5	

* The gradings for the aggregate are to be met with before using them for WBM construction. After rolling, compaction and retrieving of WBM layer for test, the grading may vary from the specified values as given.

SCREENINGS

The screening material can be of crushable type or non-crushable type (stone screening).

- **Crushable Screenings**
  For economic considerations in hilly areas, crushable type screening is mostly used with non-plastic material such as moorum or gravel, with a Liquid Limit (LL) less than 20 and a Plasticity Index (PI) less than 6. The fraction passing a 75-micron sieve should not exceed 10 percent.
- **Stone Screenings**

Type	IS Sieve	Passing %
Type – A 13.2 mm	13.2 mm	100
	11.2 mm	95-100
	5.6 mm	15-35
	180 micron	0-10
Type - B 11.2 mm	11.2 mm	100
	9.5 mm	80-100
	5.6 mm	50-70
	180 micron	15-35

BINDING MATERIAL

Application of binding material may not be necessary when the screenings used are of crushable type. Binding material if used as a filler material shall comprise of a suitable material approved by the Engineer having a Plasticity Index (PI) of value less than 6 for sub-base/base course and 4-10 for surfacing course.

CONSTRUCTION OPERATIONS

Preparation of base

- The surface shall be prepared to the specified lines, grade and camber. Any existing bituminous surface over which WBM is to be laid shall be completely removed before laying WBM layer.
- Provision of lateral confinement of aggregates
- For lateral confinement of aggregates and proper compaction, the earthen shoulders should be constructed simultaneously with the WBM construction

Spreading coarse aggregates

- The coarse aggregates shall be spread uniformly and evenly to proper profile by using templates placed across the road about 6 m apart. The surface shall be checked frequently with a straight edge while spreading and rolling.

Rolling

- Immediately following the spreading of the coarse aggregate, rolling shall be started with three wheeled power rollers of 80 to 100 kN capacity or tandem or vibratory rollers of 80 to 100 kN static weight.
- Roll the surface till aggregates are partially compacted with sufficient void space left for application of screenings. The edges should be first compacted with roller running forward and backward.
- Rolling shall proceed from inner edge to outer edge at the super-elevated portions and from the edges towards the center in other portions.

Application of screenings

- Apply screenings to completely fill the interstices maintaining a slow and uniform rate, in three or more applications. The screenings should not be damp at the time of application.
- Continue dry rolling and brooming till no more screenings can be forced into the voids of course aggregates.

Sprinkling of water and grouting

- After the screenings have been applied, sprinkle water on the surface copiously, swept and rolled taking care that the underlying layer is not damaged
- Sprinkling, sweeping and rolling should continue till aggregates are thoroughly keyed, well bonded and firmly set in its full depth and a grout has been formed of screenings

Application of binding material

- In case the screenings are not of crushable type such as moorum or gravel, it is necessary to add binding material. The binding material should be applied in two or more layers at a slow and uniform rate.

Setting and drying

- The finished surface of WBM should conform to the prescribed tolerances
- After the final compaction of water bound macadam course, the pavement shall be allowed to dry overnight. Next morning hungry spots shall be filled with screenings or binding material, lightly sprinkled with water if necessary and rolled.

The spreading, rolling, and brooming of screenings shall be carried out in only such lengths of the road which could be completed within one day's operation

APPROXIMATE QUANTITIES

Loose quantity in m³ for 10 Sqm

	G-1	G-2	G-3
Compacted thickness	100 mm	75 mm	75 mm
Course Aggregate	1.21 to 1.43	0.91 to 1.07	0.91 to 1.07
Screenings	Type A - 0.27 to 0.30	Type A - 0.12 to 0.15 Type B - 0.20 to 0.22	Type B - 0.18 to 0.21
Crushable Screenings	0.30 to 0.32	0.22 to 0.24	0.22 to 0.24
Binding Material	0.08-0.10	0.06-0.09 for sub-base/ base course 0.10-0.15 for surfacing course	