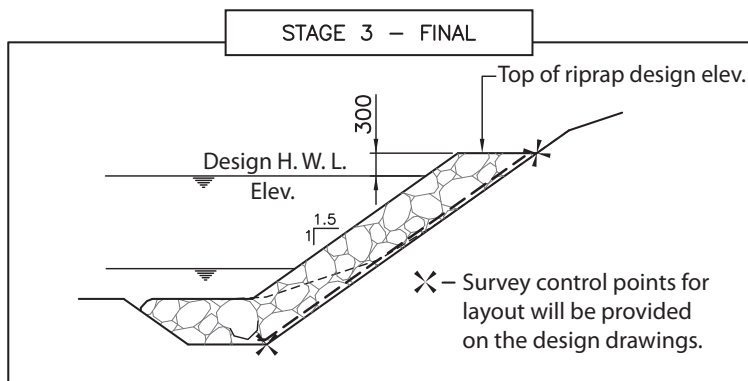
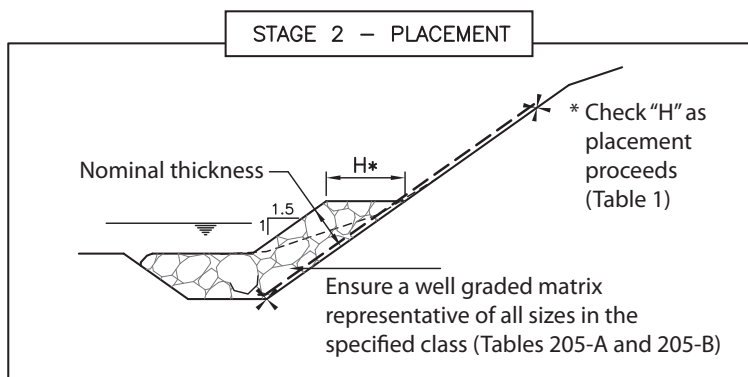
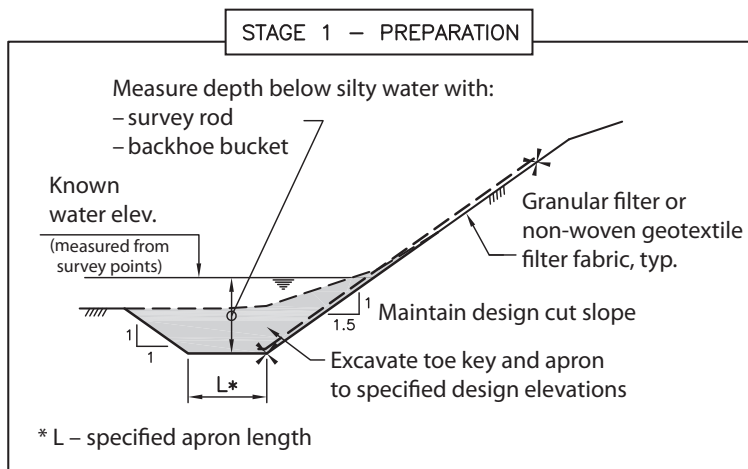


Riprap Installation Guide – 1



WOLMAN EXAMPLE – CLASS 500 KG

For every 100 rocks set aside in Quarry, you need the following:

- From Table 205-B: 15%=330, 50%=715, 85%=1030mm, 100%=<1220mm
- The riprap has to meet ALL the following conditions

Class 500	330	715	1030	1220
15% (330mm)	15 rocks less than 330mm	85 rocks bigger than 330mm		
50% (715mm)	50 rocks less than 715mm		50 rocks bigger than 715mm	
85% (1030mm)	85 rocks less than 1030mm			15 rocks bigger than 1030mm
100% (<1220mm)	All 100 rocks less than 1220mm			

Table 1: Riprap Horizontal Dimensions

Class of Riprap (kg)	Nominal Riprap Thickness (mm)	Surface Width, H (mm)	
		2H : 1V Slope	1.5H : 1V Slope
10	350	783	631
25	450	1006	811
50	550	1230	992
100	700	1566	1262
250	1000	2236	1803
500	1200	2684	2163
1000	1500	3355	2704
2000	2000	4473	3606
4000	2500	5591	4507

Table 205-A: Gradation of Rock Sizes in Each Class of Riprap – Mass (kg)

Class of Riprap (kg)	Nominal Riprap Thickness (mm)	Rock Gradation Percentage Smaller Than Given Rock Mass (kg)		
		15%	50%	85%
10	350	1	10	30
25	450	2.5	25	75
50	550	5	50	150
100	700	10	100	300
250	1000	25	250	750
500	1200	50	500	1500
1000	1500	100	1000	3000
2000	2000	200	2000	6000
4000	2500	400	4000	12000

Table 205-B: Approximate Average Dimension of Each Specified Rock Class Mass (S_g=2.640) – Equivalent Diameter (mm)

Class of Riprap (kg)	Approximate Average Dimension (mm)			
	15%	50%	85%	<100%
10	90	195	280	330
25	120	260	380	450
50	155	330	475	565
100	195	415	600	715
250	260	565	815	965
500	330	715	1030	1220
1000	415	900	1295	1535
2000	525	1130	1630	1935
4000	660	1425	2055	2440

CONSTRUCTION MONITORING

- Hold and Witness Points
 - Rock quality (hardness and gradation) (hold)
 - Stake-out (hold)
 - Clearing and grubbing (witness)
 - Toe/ Terminal end-key excavations (witness)
 - Preparation of back slope/ surface (witness)
 - Application of filter(s) (witness)
 - Toe construction (witness)
 - Front slope / H-width / thickness / gradation (witness)
 - Design height (witness)
- Getting the Right Size Riprap
 - by Visual Inspection with colour-coded samples from Tables 205-A and 205-B
 - one set at quarry and one at worksite
- Checking Gradation at Quarry and Worksite
 - Wolman Pebble Count (see example other side)
- Placement
 - Controlled placement on specified design slope (no end dumping)



POOR INSTALLATION

- Single rocks (not graded)
- Toe not keyed
- Inadequate thickness
- Steep slope (not visible)



GOOD INSTALLATION

- Environmental monitor
- Good site separation
- Toe and Terminal Ends are keyed
- Well graded matrix
- Design slope
- Sufficient thickness