Part 7

BATTERED FLEXIBLE WALL SYSTEMS

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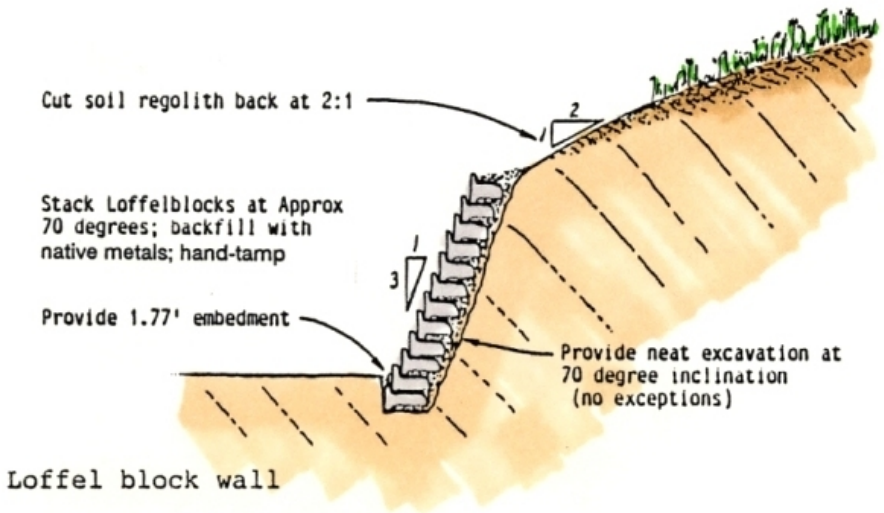

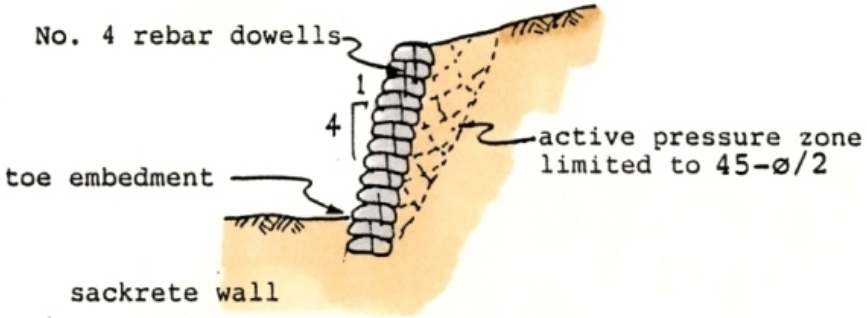

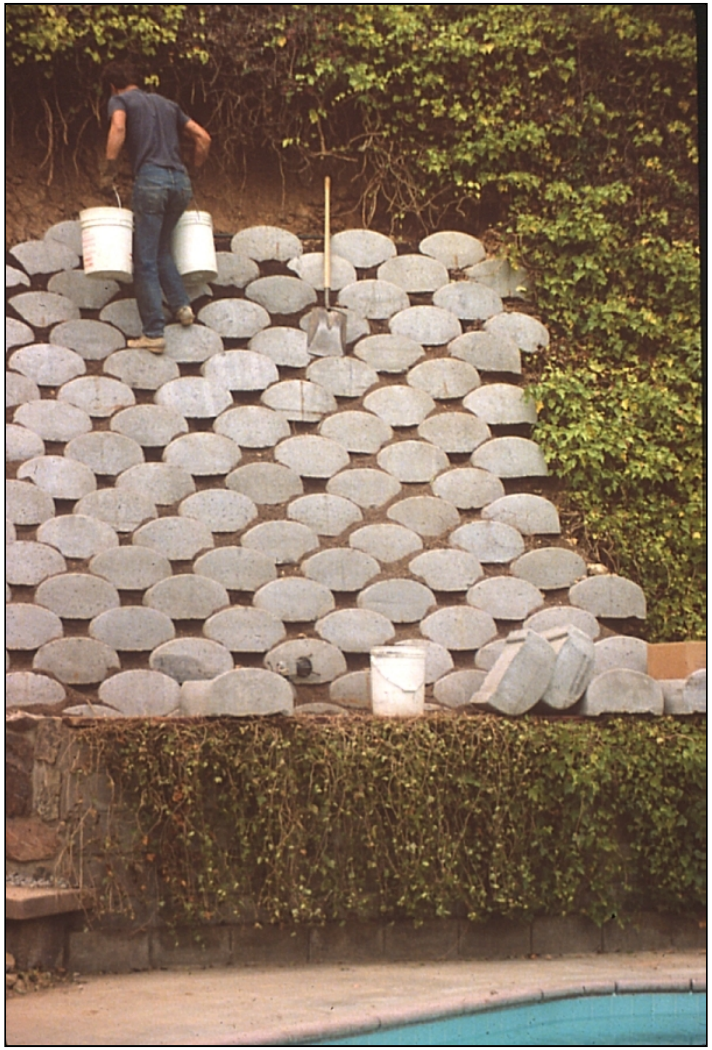

Stacked precast masonry retaining wall systems have become popular over the past two decades. Most of these are built on back batters of 1:3 to 1:5. These walls operate on the assumption that active earth pressures are redistributed by arching through deflection, like sheetpile walls.

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	$i =$	−30°	−12°	±0	+12° 1:4.7	+30° 1.1:7
$\phi = 20°$	$\beta' = +20°$		0.57	0.65	0.81	
	$\beta' = +10°$		0.50	0.55	0.68	
	$\beta' = \pm 0°$		0.44	0.49	0.60	
	$\beta' = -10°$		0.38	0.42	0.50	
	$\beta' = -20°$		0.32	0.35	0.40	
$\phi = 30°$	$\beta' = +20°$	0.34	0.43	0.50	0.59	1.17
	$\beta' = +10°$	0.30	0.36	0.41	0.48	0.92
	$\beta' = \pm 0°$	0.26	0.30	0.33	0.38	0.75
	$\beta' = -10°$	0.22	0.25	0.27	0.31	0.61
	$\beta' = -20°$	0.18	0.20	0.21	0.24	0.50
$\phi = 40°$	$\beta' = +20°$	0.27	0.33	0.38	0.43	0.59
	$\beta' = +10°$	0.22	0.26	0.29	0.32	0.43
	$\beta' = \pm 0°$	0.18	0.20	0.22	0.24	0.32
	$\beta' = -10°$	0.13	0.15	0.16	0.17	0.24
	$\beta' = -20°$	0.10	0.10	0.11	0.12	0.16

for $\phi_w = 0$; $\beta' = \beta - 90°$

Coefficient of active stress as function of inclination of wall and backfill.

- **Flexible MBU walls are battered to reduce their active earth pressures, as shown in this chart relating active stress as a function of wall inclination**

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Past examples of battered flexible wall systems include stacked rock walls using a tapered prism (shown at left) and redimix stacked sacrete walls, shown at right. Sacrete walls usually employ No 4 rebars as shear pins/dowells between the sacks, which set up with absorption of moisture.

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Stacked flexible MBU wall systems are widely employed in other parts of the world, where they are commonly employed to face weathered or raveling rock cuts, as well as in stream channels. The wall at right is in Taiwan and supports a steep slope cut in blocky colluvium. These walls are stacked with tapered cross section, as seen at right side of upper right photo.

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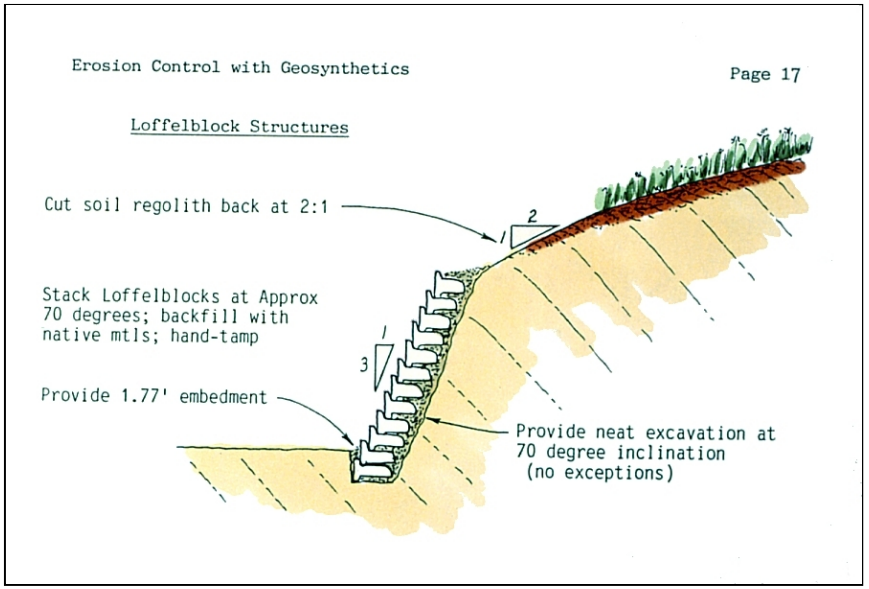
Flexible block walls are most suited to facing steep cuts in competent materials, as shown here. Their utility for supporting softer materials, such as clay, is more limited.



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A number of MBU flexible block wall systems employ PVC shear pins to increase inter-block friction, helping them to behave more monolithically. The Keystone wall at left was backfilled with clayey sand and gravel and was actively rotating when this photo was taken. Stacked walls can be employed, but should be regarded with caution unless they are supported with tensile soil reinforcement and backfilled with granular material. They should still be checked for "global" geotechnical slope stability.

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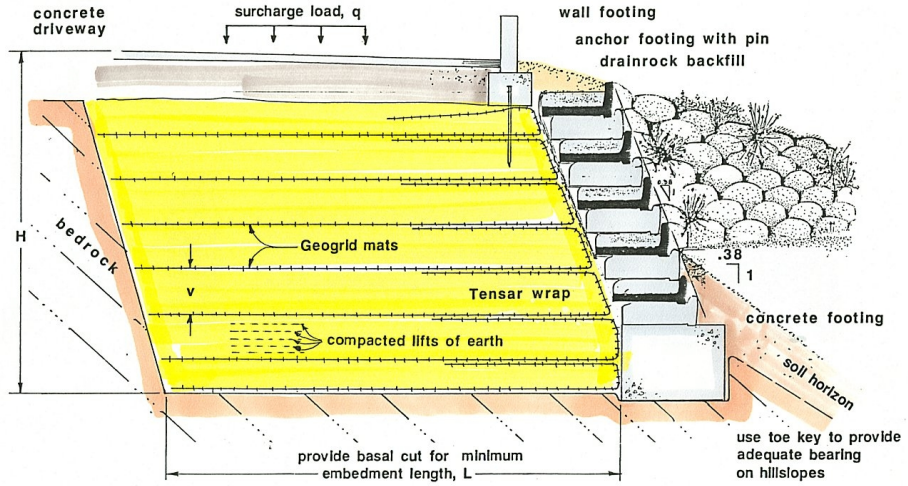

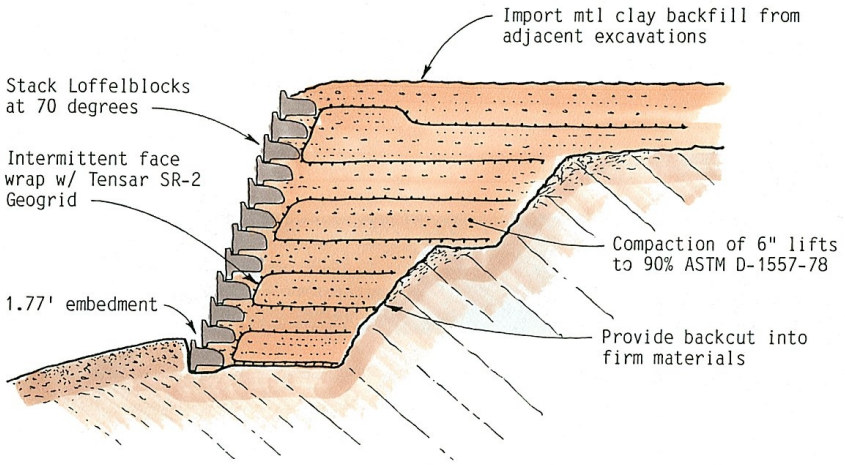

LOFFELBLOCK WALL FACING ON GEOGRID-REINFORCED EMBANKMENT

Battered flexible MBU walls support cohesive soils are difficult to design for heights greater than about 5 or 6 feet. Tensile soil reinforcement (geogrids, etc) can be used to engender sufficient strength to the backfill to allow walls of heights up to 30 feet to be constructed, provided that stiffness variances between the backfill and the MBU blocks are considered. Note that these details do not provide active attachment between the grid and the blocks. Other MBU systems, such as Keyblock, provide for mechanical attachment.

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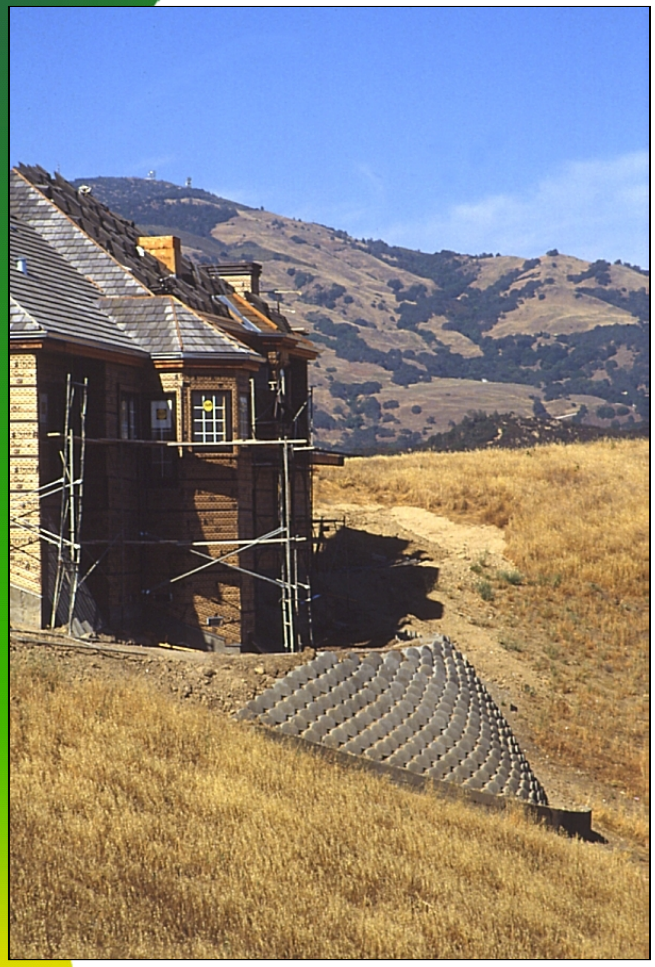

An advantage of flexible MBU walls is the option to curve them to accommodate a “softer” visual impact and increase their aesthetic value. The walls can also be constructed along steep grades, as shown at right. In both cases, the design capacity was diminished somewhat to account for outward curvature or inclination.

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