MAP CODE
GRDG

GRADING

USE
Erosion
Sediment
Stormwater

What

- Reshaping the ground surface to prepare the site for processing equipment, stock pile areas, etc., and for post extraction reclamation.

Purpose

- To provide suitable topography for post-mining land uses.
- To facilitate equipment operation and stockpiling.
- To control surface runoff.
- To minimize soil erosion and sedimentation both during and after development of the site or aggregate extraction.

Source: City of Los Angeles

Where

YES: Wherever re-contouring is necessary for operational activities, site development, operation of sediment control practices, stockpiling, or to achieve land forms required for reclamation.

Materials Equipment & Costs

None.

Grader, scraper, or bulldozer with blade.

$ Low.

Plans & Spec's

- Careful shaping of an aggregate site for operations and for post-reclamation activities reduces the potential for erosion and the cost of installing erosion and sediment control measures.
- Before grading begins, decisions must be made on the steepness of cut-and-fill slopes and how they will be protected from runoff, stabilized and maintained. A grading plan can establish drainage areas, direct drainage patterns and affect runoff velocities.

- A grading plan can form the basis of an erosion and sediment control plan. Key considerations that affect erosion and sediment control include deciding which slopes are to be graded, when the work will start and stop, the slope angle, the length of finished grades, where and how excess material will be stored or disposed of, and where borrow material will be needed. Early completion of grading work allows for prompt topsoiling and vegetation for erosion control and eliminates temporary seeding expense.
- Undisturbed temporary and permanent buffer zones may provide an effective and low-cost erosion control measure for adjacent grading work.
- Intercept and redirect stormwater to avoid flows on newly graded slopes.
- Use slope breaks, such as diversions or benches, as appropriate, to reduce the length of a cut or fill slope, limit sheet and rill erosion and prevent gullying. A spacing guide is shown below.

Spacing guide for slope breaks

	Slope *	Slope Break Spacing (metres)
Steep Slopes	2:1 (50%)	6.0
	3:1 (33%)	11.0
	4:1 (25%)	14.0
Long Slopes	15-25%	15.0
	10-15%	24.0
	6-10%	38.0
	3-6%	61.0
* *100% slope* = 1:1 = 45°	<3%	91.0

- Stabilize all graded areas with hydroseeding, vegetation, crushed stone, riprap or other appropriate ground cover as soon as grading is completed. Use mulch or straw to temporarily stabilize areas where final grading must be delayed.
- For grass and legume cover, finished slopes should not be steeper than 2:1. Slopes to be maintained by tractor or other equipment should not be steeper than 3:1.
- Roughen the surface of all slopes during the grading to retain water, increase infiltration and facilitate vegetation. Running a tracked vehicle up and down the slope leaves divots perpendicular to the slope length that can roughen the hill slope. Do not drive the tracked vehicle across the contour of the slope, as that will leave divots that channel water down slope.
- In areas with high water tables, install underground drainage to prevent seepage, and thus keep the surface dry.
- Fill should not be placed adjacent to a channel bank, where it can create bank instability and failure, or result in deposition of sediment downstream. Also avoid placing fill in places where it will block or limit natural flooding.

- Provide stable channels and floodways to convey all runoff from the developed area to an adequate outlet without causing increased erosion or off-site sedimentation.

Installation

- Construct and maintain all erosion and sediment control practices and measures in accordance with sediment control planning.
- Timing of grading should account for the conditions for revegetating the site after the machine work is completed. For example, grading should not be done during an extreme rainfall event.
- Scarify the surface to a minimum depth of 8 centimetres before placing topsoil.
- Excessively compacted areas should be thoroughly ripped/subsoiled to facilitate drainage and root growth.
- Keep diversions and other water conveyance measures free of sediment until other vegetation is established.
- Permanently stabilize all graded areas immediately after final grading is completed.

Maintenance

- Periodically check all graded areas and supporting erosion and sediment control measures, especially after heavy rainfalls.
- Remove excess sediment from diversions and other water-disposal structures.
- If washouts or breaks occur, repair them immediately.

Sources

National Conference on Urban Runoff Management (1993): **Training for Construction Site Erosion Control and Stormwater Facility Inspection;** Enhancing Urban Watershed Management at the Local, County and State Levels.