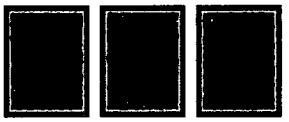

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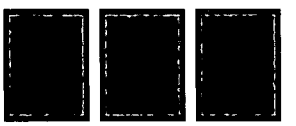

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5

Overview of Erosion and Sedimentation Control Practices

5

Overview of Erosion and Sedimentation Control Practices

This chapter provides an overview of the practices recommended for control of erosion and sedimentation on construction sites, a key to symbols, and a practice selection guide. The practice selection guide refers the reader to principal control practices for construction considerations and site characteristics. Following the selection guide is a key to symbols which may be used on erosion control plans to represent each of the practices discussed in the manual. In the remainder of the chapter each practice is illustrated and described briefly. Additional details for planning, design, construction, and maintenance of practices are presented in *Chapter 6*. Many of these practices are also used in the sample erosion and sedimentation control plan presented in *Chapter 7*.

Table 5.1
Practice Selection Guide

CONSTRUCTION CONSIDERATIONS	SITE CHARACTERISTICS	PRINCIPAL CONTROL PRACTICES [1]
I. Scheduling	Disturbed areas	**Site Preparation:** Const. Scheduling. **6.01**
II. Installing access routes, and controlling runoff from roads.	Slopes <5%	**Site Preparation:** Tree Preservation . . . . . **6.05** Construction Entrance/Exit. . . . . **6.06** **Other Related Practices:** Road Stabilization . . . . . **6.80** **Surface Stabilization:** Temp. Seeding . . . . . **6.10** Mulching . . . . . **6.14** Riprap . . . . . **6.15** RECP . . . . . **6.17** **Runoff Control:** Temp. Diversions . . . . . **6.20** Water Bars . . . . . **6.23** **Runoff Conveyance:** All practices. . . . . **6.30-6.33** **Outlet Protection:** Outlet Stabilization Structure . . . . . **6.41** **Inlet Protection:** (for storm drains) Excavated . . . . . **6.50** Hardware cloth . . . . . **6.51** Block and Gravel. **6.52**
	Slopes 5 - 12%	Same as above except **Runoff Conveyance:** Riprap-lined and Paved Channels. . . . . **6.31** Note: Grass-lined channels not generally recommended
III. Sediment Retention (measures to be installed before major land disturbance begins)	Disturbed areas <2 acres	**Sediment Traps and Barriers:** Temp. Sediment Trap . . . **6.60** Sediment Fence . . . . . **6.62** Skimmer Basin **6.64**
	Disturbed areas 2-5 acres	**Sediment Traps and Barriers:** Temp. Sediment Trap . . . **6.60** Sediment Basin. . . . . **6.61** Rock Dam . . . . . **6.63** Skimmer Basin **6.64**
	Disturbed areas 5-10 acres	**Sediment Traps and Barriers:** Sediment Basin. . . . . **6.61** Rock Dam . . . . . **6.63** Skimmer Basin **6.64**
	Disturbed areas >10 acres	**Sediment Traps and Barriers:** Sediment Basin. **6.61**

[1]Additional practices may be needed depending on site conditions.

Table 5.1 (continued)

CONSTRUCTION CONSIDERATIONS	SITE CHARACTERISTICS	PRINCIPAL CONTROL PRACTICES [1]
IV. Runoff Disposal	Slopes <5%, Drainage area <20 acres	**Runoff Conveyance:** All practices. . . . . **6.30-6.33** **Outlet Protection:** All practices. . . . . **6.40-6.41** **Inlet Protection for storm drains:** All practices. . . . . **6.50-6.55** ***Runoff Control Measures:*** All practices. **6.20-6.23**
	Slopes > 5% Drainage area <20 acres	**Same as above except** **Runoff Conveyance:** Riprap-lined and Paved Channels. . . . . **6.31** Note: Grass-lined channel not generally recommended
	Drainage area >20 acres	**Special Considerations**
V. Stabilizing Streambanks	Design Velocity <6 ft/sec	**Stream Protection:** Natural Channels **6.71**
	Design Velocity >6 ft/sec	**Stream Protection:** Structural Streambank Stabilization. **6.73**
VI. Crossing Streams	Temporary use (to move equipment)	**Stream Protection:** Temp. Stream Crossing . **6.70** **Surface Stabilization:** Temp. Seeding . . . . . **6.10** Mulching . . . . . **6.14** Riprap . . . . . **6.15** RECP **6.17**
	Permanent use (to carry traffic)	**Stream Protection:** Perm. Stream Crossing. . **6.71** **Surface Stabilization:** Perm. Seeding . . . . . **6.11** Mulching . . . . . **6.14** Riprap . . . . . **6.15** RECP **6.17**
VII. Clearing and Grading	Disturbed Areas	**Site Preparation:** All practices. . . . . **6.01-6.06** **Surface Stabilization:** Temp. Seeding . . . . . **6.10** Perm. Seeding . . . . . **6.11** Mulching . . . . . **6.14** Riprap . . . . . **6.15** RECP **6.17**

[1]Additional practices may be needed depending on site conditions.

Table 5.1 (continued)

CONSTRUCTION CONSIDERATIONS	SITE CHARACTERISTICS	PRINCIPAL CONTROL PRACTICES [1]
VII. Clearing and Grading (continued)		**Runoff Control:** All practices. . . . . **6.20-6.23** **Runoff Conveyance:** See IV. Runoff Disposal **Sediment Traps and Barriers:** See III. Sediment Retention **Other Related Practices:** Dust Control **6.84**
VIII. Installation of Utilities and Building Construction	Disturbed areas	**Surface Stabilization:** Temp. Seeding . . . . . **6.10** Perm. Seeding . . . . . **6.11** Mulching . . . . . **6.14** RECP . . . . . **6.17** **Runoff Control:** Temp. Diversions . . . . . **6.20** Water Bars . . . . . **6.23** **Sediment Traps and Barriers:** Temp. Sediment Trap . . . **6.60** Sediment Fence . . . . . **6.62** Check Dam With Weir. . . **6.87** **Other Related Practices:** Road Stabilization. **6.80**
IX. Borrow and Waste Disposal, Topsoil Stockpiling	Disturbed areas	**Surface Stabilization:** Temp. Seeding . . . . . **6.10** Perm. Seeding . . . . . **6.11** Trees, Shrubs, Vines, and Ground Covers. . . . **6.13** Mulching . . . . . **6.14** **Runoff Control:** Temp. Diversions . . . . . **6.20** **Sediment Traps and Barriers:** See III. Sediment Retention
X. Special Site Problems	Seepage areas or high water table	**Other Related Practices:** Subsurface Drainage . . **6. 81**
	Unstable Temp. channels	**Surface Stabilization:** RECP . . . . . **6.17** **Other Related Practices:** Check Dams . . . . . **6. 83** Check Dam With Weir. . . **6.87**
	Unstable Perm. channels	**Runoff Conveyance:** Riprap-lined and Paved Channels. . . . . **6.31** **Other Related Practices:** Grade Stabilization Structure **6. 82**

[1]Additional practices may be needed depending on site conditions.

Table 5.1 (continued)

CONSTRUCTION CONSIDERATIONS	SITE CHARACTERISTICS	PRINCIPAL CONTROL PRACTICES [1]
X. Special Site Problems (continued)	Rill and gully erosion	**Runoff Control:** All practices. . . . . **6.20-6.23** **Runoff Conveyance:** Riprap-lined and Paved Channels. . . . . **6.31** Temp. Slope Drains. . . . . **6.32** Paved Flumes. . . . . **6.33** **Outlet Protection:** Outlet Stabilization Structure . . . . . **6.41** **Surface Stabilization:** All practices. **6.10-6.17**
	Blowing dust or sand	**Other Related Practices:** Dust Control . . . . . **6.84** Sand Fence. **6.85**
	Dune reinforcement and stabilization	**Surface Stabilization:** Vegetative Dune Stabilization. . . . . **6.16** **Other Related Practices:** Sand Fence. **6.85**
XI. Final Site Stabilization	Disturbed areas	**Surface Stabilization:** All Practices . . . . . **6.10-6.17** RECP . . . . . **6.17** **Runoff Control:** Perm. Diversions. . . . . **6.21** **Runoff Conveyance:** Grass-lined Channels . . . **6.30** Riprap-lined and Paved Channels. . . . . **6.31** Paved Flume. . . . . **6.33** **Outlet Protection:** Outlet Stabilization Structure . . . . . **6.41** **Inlet Protection:** Sod Drop Inlet Protection . . . . . **6.50** (or perm. paving) Rock Doughnut. . . . . **6.54** Rock Pipe **6.55**

[1]Additional practices may be needed depending on site conditions.

SYMBOLS FOR EROSION AND SEDIMENT CONTROL PRACTICES

SITE PREPARATION


6.02
Land Grading


6.03
Surface Roughening


6.04
Topsoiling


6.05
Tree Preservation & Protection


6.06
Temp. Gravel Const. Enter/Exit

SURFACE STABILIZATION

TS
6.10
Temporary Seeding

PS
6.11
Permanent Seeding

S
6.12
Sodding

GC
6.13
Trees, Shrubs, Vines & GC

M
6.14
Mulching

RR
6.15
Riprap

DS
6.16
Vegetation Dune Stabilization

RECP
6.17
Rolled Erosion Control Prod.

RUNOFF CONTROL MEASURES

→ TD →
6.20
Temporary Diversions

→ PD →
6.21
Permanent Diversions

→ D →
6.22
Diversion Dike (Perimeter)

→ WB →
6.23
Right-of-Way Diversions

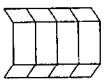
RUNOFF CONVEYANCE MEASURE

GL
6.30
Grass-lined Channels

RR
6.31
Riprap-lined Channels

P
Paved Channels

TSD
6.32
Temporary Slope Drains


6.33
Paved Flume (Chutes)

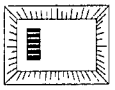
OUTLET PROTECTION


6.40
Level Spreader


6.41
Outlet Stabilization Structure

Practice Symbols (cont'd)

INLET PROTECTION


6.50
Temp. Exc. Drop Inlet Prot.


6.51
Hardware Cloth & Gravel Inlet Prot.


6.52
Temp. Block & Gravel Intel Prot.


6.53
Sod Drop Inlet Protection


6.54
Rock Doughnut Inlet Prot.

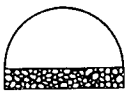

6.55
Rock Pipe Inlet Protection

SEDIMENT TRAPS & BARRIERS


6.60
Temp. Sediment Trap


6.61
Sediment Basin

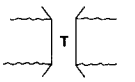

6.62
Sediment Fence


6.63
Rock Dam

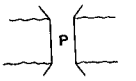

6.64
Skimmer Sediment Basin


6.65
Porous Baffles

STREAM PROTECTION



6.70
Temp. Stream Crossing



6.71
Perm. Stream Crossing

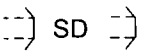
6.72
Vegetative Streambank Stab.

6.73
Structural Streambank Stab.

6.74
Buffer Zone

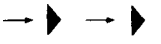
OTHER RELATED PRACTICES

6.80
Constr. Road Stabilization



6.81
Subsurface Drain

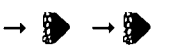

6.82
Grade Stabilization Structure


6.83
Check Dam

6.84
Dust Control

6.85
Sand Fence (Wind Fence)

6.86
Flocculants


6.87
Check Dam with Weir

Practice no. 6.01 CONSTRUCTION SEQUENCE SCHEDULE

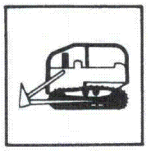
Following a specified work schedule that coordinates the timing of land-disturbing activities and the installation of control measures is perhaps the most cost-effective way of controlling erosion during construction.

The removal of surface ground cover leaves a site vulnerable to accelerated erosion. Construction procedures that limit land clearing, provide the timely installation of erosion and sedimentation controls, and restore protective cover quickly can significantly reduce the erosion potential of a site.

The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sedimentation control measures planned for a project. This type of schedule guides the contractor on work to be done before other work is started so that serious erosion and sedimentation problems can be avoided.

Construction sequence schedule allows completed area to be vegetated while active construction continues on adjacent area. Note sediment control measures in place.

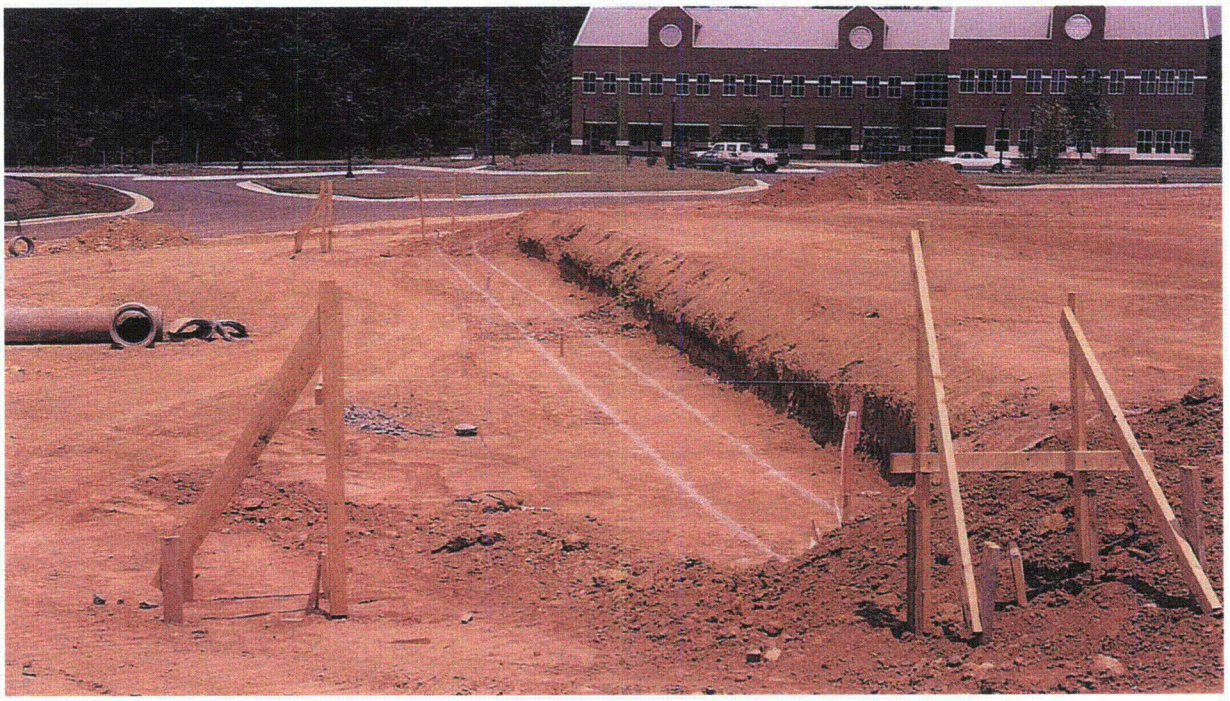
Practice no. 6.02 LAND GRADING



Reshaping the ground surface by grading is common in site development. It is also the primary cause of erosion and sedimentation from construction activities. Fitting a proposed development to the natural configurations of the landscape reduces the erosion potential of the site and the cost of installing control measures.

The grading plan forms the basis of the erosion and sedimentation control plan. What areas are to be graded, when the work will start and stop, the degree and length of finished slopes, where borrow will be needed, and how the excess material will be wasted are key considerations that affect erosion and sedimentation.

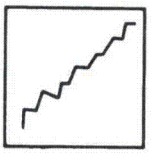
The grading plan establishes drainage areas, directs drainage patterns, and affects runoff velocities. The plan should include all necessary erosion and sedimentation control measures such as sediment basins, diversions, mulching, vegetation, vegetated and lined waterways, grade stabilization structures, and surface and subsurface drains.



Land grading shapes the surface to a specific line and grade.

Practice no. 6.03

SURFACE ROUGHENING



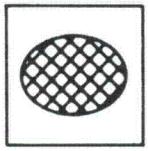
Roughening a sloping bare soil surface with horizontal depressions helps control erosion by aiding the establishment of vegetative cover with seed, reducing runoff velocity, and increasing infiltration. The depressions also trap sediment on the face of the slope.

Consider surface roughening for all slopes. The amount of roughening required depends on the steepness of the slope and the type of soil. Stable sloping rocky faces may not require roughening or stabilization, while erodible slopes steeper than 3:1 require special surface roughening.

Roughening methods include stair-step grading, grooving, and tracking. Equipment such as bulldozers with rippers or tractors with disks may be used. The final face of slopes should not be bladed or scraped to give a smooth hard finish.

Surface roughening is the first step in vegetative stabilization.

Practice no. 6.04 TOPSOILING



Topsoil provides the major zone for root development and biological activities for plants, and should be stockpiled and used wherever practical for establishing permanent vegetation.

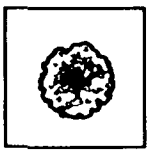
Advantages of topsoil include higher organic matter, more friable consistency, and greater available water-holding capacity and nutrient content. In some cases, however, handling costs may be too high to make this practice cost-effective. In site planning, compare the option of topsoiling with that of preparing a suitable seedbed in the existing subsoil.

Topsoiling is a common practice where ornamental plants or high maintenance turf will be grown. It may also be required to establish vegetation on shallow soils, soils containing potentially toxic materials, very stony areas, and soils of critically low pH.

Do not place topsoil on slopes steeper than 2:1 to avoid slippage.

Topsoil is stockpiled for final site preparation and stabilization.

Practice no. 6.05 TREE PRESERVATION AND PROTECTION



Preserving and protecting trees can often result in a more stable and aesthetically pleasing development. Trees stabilize the soil and help prevent erosion, decrease storm water runoff, moderate temperature, provide buffers and screens, filter pollutants from the air, supply oxygen, provide habitat for wildlife, and increase property values.

Some desirable characteristics to consider in selecting trees to be protected include: tree vigor, tree species, tree age, tree size and shape, and use as wildlife food source.

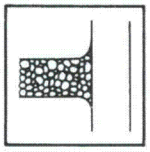
Construction activities are likely to injure or kill trees unless adequate protective measures are taken. Direct contact by equipment is the most obvious problem, but damage is also caused by root zone stress from filling, excavating, or compacting too close to trees.

Trees to be saved should be clearly marked so that no construction activity will take place within the dripline of the tree.

Tree preservation and protection somtimes requires special effort.

Practice no. 6.06

TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT



A graveled area should be located where vehicles enter and leave a construction site to provide a buffer for the deposition of mud and sediment. This is especially important where vehicles exit construction areas directly onto public roads or other off-site paved areas.

Make the gravel pad the full width of the entrance area, sufficiently long for vehicles to drop their mud and sediment and stable enough for construction traffic. Avoid entrances on steep grades or at curves in public roads.

In some cases it may be necessary to wash vehicle tires in this area. Stabilize the graveled area well at these points, and provide drainage to a sediment trap.

Construction entrance/exit provides an immediate buffer for on-site deposition of mud and sediment.

Practice no. 6.10 TEMPORARY SEEDING

TS

Protective cover must be established on all graded slopes and fills within 21 days after a phase of grading is completed. Temporary seeding and mulching are the most common methods used to meet this requirement.

Annual plants that are adapted to site conditions and that sprout and grow rapidly should be used for temporary plantings. Proper seedbed preparation and the use of quality seed are also important.

Because temporary seedings provide protective cover for less than one year, areas must be reseeded annually or planted with perennial vegetation.

Temporary seeding is used to protect earthen sediment control practices and to stabilize denuded areas that will not be brought to final grade for several weeks or months. Temporary seeding can provide a nurse crop for permanent vegetation, provide residue for soil protection and seedbed preparation, and help prevent dust during construction.

Seeding of temporary vegetative cover provides quick, effective erosion control.

Practice no. 6.11 PERMANENT SEEDING

PS

Permanent vegetation controls erosion by physically protecting a bare soil surface from raindrop impact, flowing water, and wind. Vegetation binds soil particles together with a dense root system, and reduces the velocity and volume of overland flow. It is the preferred method of surface stabilization wherever site conditions permit.

Permanent seeding of grasses and legumes is the most common and economical means of establishing protective cover. The advantages of seeding over other means of establishing plants include the relatively small initial cost, wide variety of grasses and legumes available, lower labor input, and ease of application. Problems to consider are potential for erosion during the establishment period, the need to reseed areas, seasonal limitations on seeding dates, weed competition, and the need for water during germination and early growth.

Give special attention to selecting the most suitable plant material for the site and intended purpose. Good seedbed preparation, adequate liming and fertilization, and timely planting and maintenance are also important.

Permanent seeding of slopes requires use of a protective mulch until grass becomes established.