

**CHAPTER 5**  
**EROSION CONTROL PLANNING**

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The purpose of erosion and sediment control planning is to establish clearly which control measures are intended to prevent erosion and off-site sedimentation during construction. The Erosion and Sediment Control Plan (ESCP) serves as a blueprint for the location, installation, and maintenance of practices to control erosion and prevent sediment from leaving the site during construction.

Sections 1 and 2 of this chapter discuss planning issues relevant to designers, contractors and inspectors, including:

- Site information
- Data collection
- Types of construction
- Prevention vs. sediment control
- Assessing the project site
- 5 basic rules
- Project scheduling
- Site characteristics

Chapter 6 discusses the ODOT ESCP design process. Chapter 6 will be of interest primarily to designers, however, much of the information included is useful to persons involved in ESCP implementation.

### 5.1 Site Information

An erosion and sediment control plan must contain sufficient information to describe the site development and the system intended to control erosion and prevent off-site damage from sedimentation.

#### 5.1.1 Data Collection

The base map for the ESCP is prepared from a detailed topographic map. If available, a soils map should be obtained from the local office at the USDA Natural Resource Conservation Service. Transferring soil survey information to the topographic map is helpful for site evaluation.

The design engineer responsible for the plan should inspect the site to verify the base map with respect to natural drainage patterns, drainage areas, general soil characteristics, and off-site factors. The base map should reflect such characteristics as:

- Soil types.

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- Natural drainage patterns.
- Unstable stream reaches and flood marks.
- Watershed areas.
- Existing vegetation, noting special vegetative considerations.
- Critical areas such as steep slopes, eroding areas, rock outcroppings, and seepage zones.
- Critical or highly erodible soils that should be left undisturbed.

In the analysis of these data, identify:

- Buffer zones.
- Suitable stream crossing areas.
- Access routes for construction and maintenance of erosion and sediment control devices.
- Borrow and waste disposal areas.
- The most practicable sites for control practices.

### 5.1.2 Types of Construction

ODOT construction projects may include new roadway alignments, shoulders, lanes, drainage improvements, retaining walls and soundwalls, structure widening, paving and pavement replacement. Other activities may include the reconstruction of interchanges, retrofitting of bridges, channel improvements, landslide stabilization, and the protection of environmentally sensitive areas. Typical activities that result in soil disturbance include clearing and grubbing existing vegetation, construction of staging areas, excavation and embankment work, construction of drainage facilities, grading of slopes, and preparation for final seeding and soil stabilization. Other related construction activities generate wastewater directly, such as wet sawing of concrete. The type of construction activities greatly affects the amount and type of BMP's which may be required.

### 5.1.3 Prevention vs. Sediment Control

The driving consideration in creating and implementing an effective ESCP is providing erosion prevention measures rather than sediment control. Although every ESCP will have elements of both, it is often far more cost effective and practical to emphasize erosion prevention. Erosion prevention measures are designed to prevent exposed soil particles from becoming dislodged by rain or wind. Such measures include temporary ground covers (mulch, temporary grasses, straw mulch and tackifier, etc.), matting, plastic sheeting, and numerous other products designed to

provide mechanical or physical protection to exposed soil. Sediment control involves techniques to re-capture transported sediment from runoff. Sediment control measures include sediment basins, sediment traps, sediment fences, check dams, sediment barriers, catch basin filters, etc. The benefit of erosion prevention is that it seeks to prevent the problem before it starts. It is also often impractical to recover large amounts of sediment after it becomes dislodged and suspended in runoff. On projects where the predominant soil particle size is very small (fine silts and clays), the amount of time required to allow for settling of solids can reach days or even weeks. It is also generally true that erosion control measures are more reliable, whereas sediment control measures require continual and costly maintenance. Because successful erosion control requires minimizing disturbed areas, the ESCP should emphasize scheduling and phasing. Project scheduling and phasing is often driven by factors other than erosion control, however, so contingency planning is essential. Most importantly, the ESCP should be designed and implemented as a living, dynamic plan that can be adapted to address changes in the project as work progresses.

### **5.2 Assessing the Project Site**

The erosion and sediment control plan should seek to protect the soil surface from erosion, control the amount and velocity of runoff, and capture all sediment on-site during each phase of the construction project.

When assessing erosion control needs for the project, the designer should note any of the following conditions:

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### Regulatory Requirements

1. Particular requirements from the permitting agency, municipality or county.
2. Special requirements by the Oregon Department of Fish and Wildlife, Department of Environmental Quality or other agencies.
3. Recommendations and considerations, including endangered species, mentioned in the E.A., EIS, Environmental Technical Report and any other project related documents.

### Existing Conditions

4. Type and condition of existing vegetation.
5. Soil types expected.
6. Runoff flowing onto the construction site.
7. Swales or streams which run through the site.
8. Runoff which concentrates in drainage swales or ditches.
9. Streams that could rise during high water flow.
10. Storm drain system with inlets, which might receive sediment-laden water.
11. Outlets at culverts and other storm water conveyances.
12. Permanent landscaping.

### Construction Conditions

1. Construction traffic crossing a drainage swale or stream.
2. Runoff flowing onto the construction site.
3. Runoff that will flow onto disturbed areas having slopes 1:4 or steeper.
4. Cut or fill slopes 1:3 or steeper and higher than 6 ft.
5. Runoff leaving the disturbed areas as sheet flow.
6. Runoff leaving disturbed areas as concentrated flow.
7. Exposed soils within 100 ft. of a waterway or wetland.
8. Disturbed areas of more than 5 acres that drain to a common location.
9. Disturbed areas of less than 5 acres that drain to a common location.
10. Storm drain system with inlets that might receive sediment-laden water.

11. Outlets at culverts and other storm water conveyances.
12. Permanent landscaping

### 5.2.1 Five Basic Rules

Attention to the following five basic rules at the planning stage will help develop a successful program:

1. **Timing** – Schedule work to minimize overall impacts.
2. **Stage Work** – Identify and process critical areas first, look at new drainage patterns created through phases of construction.
3. **Minimize Disturbances** – Create buffers and reduce mass grading.
4. **Pre-construction Planning** – Identify construction sequences and lay out erosion control measures.
5. **Documentation** – Photograph/video/record existing conditions and throughout construction.

The ESCP should be developed according to the following general principles of erosion and sedimentation (as discussed in Chapter 2).

1. Fit grading to the surrounding terrain.
2. Time grading operations to minimize soil disturbance.
3. Emphasize erosion control measures to stabilize disturbed areas.
4. Retain existing vegetation wherever possible.
5. Direct runoff away from disturbed areas.
6. Minimize the length and steepness of slopes.
7. Use energy dissipation devices to reduce runoff velocities.
8. Install permanent storm drainage facilities as soon as possible.
9. Manage clean water to prevent it from coming into contact with exposed soil.

### 5.2.2 Project Scheduling

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 ground cover leaves a site vulnerable to accelerated erosion. Construction procedures that limit land clearing, provide the timely installation of

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erosion control and sedimentation controls, and restore protective cover quickly can significantly reduce the erosion potential of a site.

Construction projects should be sequenced to reduce the amount and duration of soil exposure to erosion by wind, rain, runoff, and vehicle tracking. The construction 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 sequencing so that serious erosion and sedimentation problems can be avoided.

The ESCP should indicate in each phase of the scheduled work, how the proposed erosion/sediment control measures will divert flows, store flows, limit runoff from exposed areas, stabilize exposed soil and filter sediment. The following activities should be included in the schedule, if applicable:

- Clearing and grubbing for perimeter controls.
- Installation of perimeter controls.
- Construction phasing.
- Clearing and grubbing, grading and trenching for activities other than perimeter control.
- Grading (including off-site activities) related to the project.
- Final grading, landscaping, and stabilization.
- Work on or at bridges and other water course structures.
- Utility installation and removal.
- Work required in any wetland.
- Monitoring of rainfall.
- Inspection of controls.
- Installation and maintenance of permanent controls.
- Installation, maintenance, and removal of temporary controls.
- Disposal of waste materials generated on-site.

Note that the construction activities listed above do not usually occur in a specified linear sequence, and schedules will vary due to weather and other unpredictable factors.

Schedules for temporary and permanent erosion control work and work required in any wetlands, as are applicable for clearing and grubbing, grading, trenching, bridges, and other structures at

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water-courses, construction, and paving should be submitted for review by the Agency. Plans for erosion control on haul roads and borrow pits and plans for disposal of waste materials should also be submitted. The contractor may submit the ESCP from the project plans if it is correct for the proposed stage of construction, or prepare a modified version, proposing methods, materials, and procedures to be used for the weather and site conditions at the time of construction, if applicable.

### 5.2.3 Site Characteristics

The removal of existing surface ground cover leaves a site vulnerable to accelerated erosion. Identifying site characteristics will reduce land clearing, provide necessary controls, and restore protective cover in an efficient and effective manner.

Projects should be designed to integrate existing land contours. Significant regrading of a site will require more costly erosion and sediment control measures and may require installation of on-site drainage and sediment control facilities. The existing site terrain and vegetation should be inventoried and evaluated. Decisions must be made on the steepness of cut and fill slopes, how they will be protected from runoff, how they will be stabilized, and how they will be maintained. Whenever possible, slopes should be inclined 1:2 or flatter to reduce erosion potential and increase slope stability. Steeper slopes are unstable and may increase maintenance issues.

### 5.2.4 Grading Plan

The grading plan should be utilized to establish drainage areas, drainage patterns, and runoff velocities. The plan should identify disturbed areas, cuts, fills, and finished project elevations. All practices necessary for controlling erosion on the graded site and minimizing sedimentation downstream should be included. These practices may be temporary or permanent, depending upon the need after construction is completed