

# City of Minneapolis

## Principles of Erosion and Sediment Control

**Severe erosion is caused by the action of wind, rainfall, and runoff on bare soil. Clearing, grading, and other construction activities remove the vegetation and compact the soil, increasing both runoff and erosion. Excessive runoff then causes gully erosion, increased stream-bank erosion, and results in increased off-site erosion, sedimentation and flooding problems. Effective erosion and sediment control can be achieved by careful attention to the following principles:**

- ◆ Protect the land surface from erosion.
- ◆ Manage runoff and keep velocities low.
- ◆ Capture sediment on-site.
- ◆ Integrate erosion and sediment control with the construction schedule.
- ◆ Inspect and maintain the erosion and sediment control practices.
- ◆ The following are principles for controlling erosion and off-site sedimentation from construction sites:
- ◆ Fit the development to the existing topography, soils, and vegetation as much as is possible.
- ◆ Schedule construction operations in order to minimize soil exposure during the rainy season.
- ◆ Minimize disturbance and soil exposure by retaining natural vegetation, adopting phased construction techniques, and using temporary cover.
- ◆ Vegetate and mulch all denuded areas to protect the soil from winter rains. The primary effort for controlling sediment pollution from construction sites should be to minimize raindrop impact on bare soil.
- ◆ Use proper grading, barriers, or ditches to minimize concentrated flows and divert runoff away from denuded slopes or other critical areas.
- ◆ Minimize the steepness of slopes and control the length of slopes by using benches, terraces, contour furrows, or diversion ditches.
- ◆ Use rip-rap, channel linings, or temporary structures in the channel to slow runoff velocities and allow the drainage ways to handle the increased runoff from disturbed and developed areas.
- ◆ Keep the sediment on-site by using sediment basins, traps, or sediment barriers.
- ◆ Monitor and inspect sites frequently to assure the measures are functioning properly and correct problems.
- ◆ Vegetation as a Solution
- ◆ Dense, healthy vegetation and the associated leaf litter protects the soil from raindrop impact. Raindrop impact is a major force in dislodging soil particles, which then allows them to move down slope or form a crust on the soil surface. When a crust forms on the soil surface the rainfall infiltration rate decreases and runoff increases.
- ◆ Vegetation also protects the soil from sheet erosion. It shields the soil surface from the transport of soil particles and scour from overland flow and it decreases the erosive energy of the flowing water by reducing velocity.
- ◆ Suitable vegetative cover provides excellent erosion protection, and reduces the need for high cost, low efficiency, and high maintenance sediment control measures. Vegetative cover is relatively inexpensive to achieve, it is often the only practical, long-term solution of stabilization and erosion control on most disturbed sites.
- ◆ Initial investigation of site characteristics and planning for vegetation stabilization reduces its cost, minimizes maintenance and repair, and makes other erosion and sediment control measures more effective and less costly to maintain. Permanent erosion control (post-construction landscaping) is also less costly where soils have not been eroded.
- ◆ Exposed sub-soils are generally difficult to amend, are infertile, and require more irrigation. Natural, undisturbed areas can provide low-maintenance landscaping, shade, and privacy. Large trees increase property values when they are properly protected during construction.
- ◆ Property values can be increased dramatically by small investments in erosion control. The final landscaping represents a small fraction of total construction costs, but can contribute greatly to an increased market value of the development. Healthy vegetation and planned development will reduce concentrated flows and peak discharge, thus reducing channel erosion and flooding. Good, healthy vegetative cover greatly reduces the environmental impacts that poor water quality and habitat reduction is having on rivers and streams.