

Construction Phasing

What is Phasing?

Phasing is one of the most important elements of a SWPPP and should be considered for every construction project. Phasing helps to limit the amount of exposed soils that can be eroded; therefore, it has the potential to reduce total stormwater runoff management costs. Essentially, phasing reduces the amount and duration of bare soil that is exposed to wind, rain, tracking, and compacting. It is accomplished by creating and following a work timetable that schedules land disturbance activities so only the smallest amount of soil is exposed (USEPA, 2002). The ultimate goal of construction phasing is to reduce onsite erosion and sediment transport offsite (USEPA, 2002).

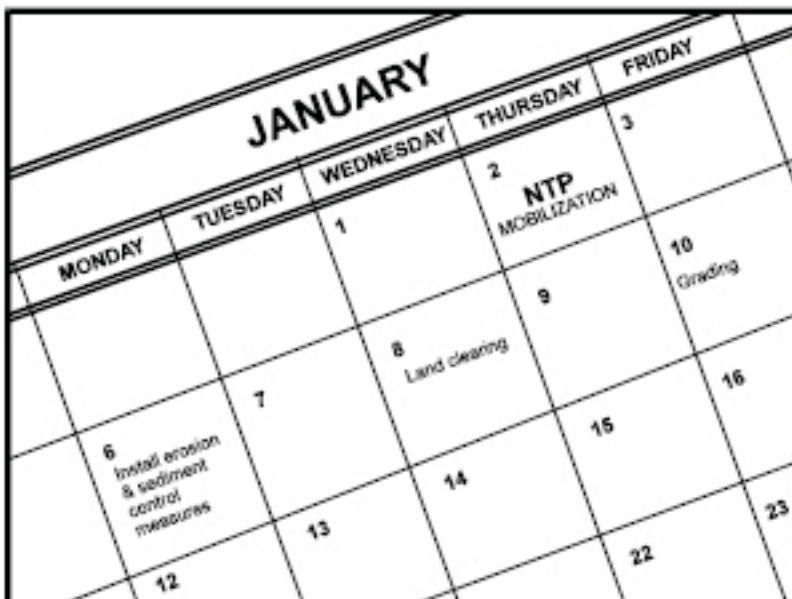
The careful use of Construction Phasing can cut total construction costs.

Why is Phasing Important?

According to current studies, land disturbance at construction sites causes soils to be 2 to 40,000 times more erodible than they were prior to disturbance (Harbor, 1999). Highly erodible soils translate into excess sedimentation: some 80 million tons of sediment is supplied to water bodies in the United States every year (Harbor, 1999). Sedimentation has significant adverse economic impacts that are often not seen directly by those working in the construction industry. It can clog sewer systems, reduce reservoir storage capacities and may increase flood frequencies and magnitudes of receiving waters (Harbor, 1999).

Many construction sites have difficulty in controlling erosion. Current studies provide insight into the problem: oftentimes, roads are built early so construction vehicles may gain access to the site and storm drains are installed concurrently (Kaufman, 2000). In due time, the newly placed storm drains become clogged with sediment from the construction site access points, rendering them virtually ineffective (Kaufman, 2000). This example shows

that a better approach to phasing construction is needed, as this is a common occurrence. The state of Ohio presents a particular challenge for the runoff-conscious construction professional: as current studies illustrate, erosion potential in Ohio can vary greatly depending on the month (see Figure 1) (Harbor, 1999).



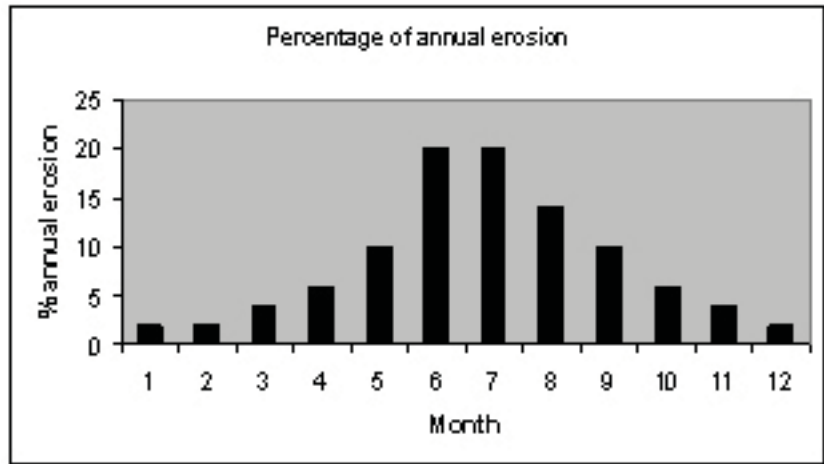


Figure 1: Percentage of annual erosion in Ohio on slopes greater than 2% for bare, medium textured soils. (January = 1, February = 2, etc.) Data from Harbor, 1999.

Current research shows that preserving vegetation on a site can remove most sediment from runoff.

Advantages to Phasing

Construction phasing can greatly limit the amount of total site disturbance (CASQA, 2003). The use of phasing may also decrease the need for other erosion and sediment control measures that may be more expensive and less effective (CASQA, 2003). Phasing also allows for more plants to grow on the construction site, which can act as filters for sediment. Current research has found that grassed areas have the ability to remove up to 97% of total suspended solids from runoff, depending on the type of grass used, soil type, slope of the area, velocity and volume of the runoff (Deletic, 2005). Grasses can also remove other contaminants such as metals (Deletic, 2005).

Phasing also has other economic benefits. By dealing with stormwater issues in a proactive manner, money is not lost through regulatory action from failed stormwater BMPs. Regulatory action may include stop-work orders, penalties, and other fines for improper site management.

Limitations to Phasing

Phasing may be difficult to implement in some construction projects due to site limitations or time constraints (CASQA, 2003). Some unpredictable variables such as weather may have an adverse effect on the phasing schedule (USEPA, 2002). Therefore, a procedure for making changes due to unanticipated events should be developed and stated in the work schedule (USEPA, 2002).

“The construction [schedule] should be followed throughout the project and the written plan should be modified before any changes in construction activities are executed.”

-USEPA

Phasing Implementation

The first task that must be undertaken in implementing construction phasing is the creation of a phasing schedule. According to the USEPA (2002), the minimal requirements for an effective phasing schedule should include the following:

- The Stormwater Best Management Practices, including erosion and sediment controls, which are to be installed
- All major land development activities
- Which measures should be installed before other construction activities are begun
- Compatibility with the general contract construction schedule

Table 1 (p. 1-13) describes other important phasing considerations in addition to those listed above. For more detailed information concerning BMPs, consult the Stormwater BMPs in Section 2, 3, and 4.

References

California Stormwater Quality Association (CASQA). 2003. California stormwater best management practices handbook for construction.

Deletic, A. 2005. Sediment transport in urban runoff over grassed areas. *Journal of Hydrology* 301: 108-122.

Harbor, J. 1999. Engineering geomorphology at the cutting edge of land disturbance: erosion and sediment control on construction sites. *Geomorphology* 31: 247-263.

Kaufman, M.M. 2000. Erosion control at construction sites: the science-policy gap. *Environmental Management* 26: 89-97.

USEPA. 2002. National menu of best management practices.

Notes:

Table 1: Phasing Considerations for Selected Construction Activities

| Construction Activity | Phasing Consideration |
|--|--|
| Construction access points (site entrances, construction routes, equipment parking) | As soon as construction begins, stabilize all bare areas with gravel and temporary vegetation. |
| Sediment traps (basins, fences, outlet protection) | Basins should be installed after construction site is accessed, with the addition of more basins and fences as needed when grading commences. |
| Runoff controls (diversions, dikes, outlet protection) | Runoff controls should be installed after principal sediment traps and before land grading, with additional runoff control measures installed during grading if necessary. |
| Runoff conveyance system (stabilize stream banks, storm drains, channels, inlet and outlet protection, slope drains) | Stream banks should be stabilized as soon as possible, where applicable. Install runoff conveyance system concurrently with runoff control. The rest of the systems may be installed after grading. |
| Land clearing and grading (site preparation including cutting and filling) | Implement major clearing and grading activities only after sediment and runoff control measures have been installed. Install additional control measures as needed during the grading process. Mark trees and buffer areas for preservation. |
| Surface stabilization (seeding, mulching, sodding, riprap) | Temporary or permanent stabilizing measures should be implemented immediately on disturbed areas where work has either been completed or delayed. |
| Building construction (buildings, utilities, paving) | During the construction process, any additional erosion or sediment control measures should be installed as needed. |
| Landscaping and final stabilization (topsoiling, trees and shrubs, seeding, mulching, sodding, riprap) | Since this is the last construction phase, all open areas should be stabilized. All non-biodegradable temporary control measures should be removed. |

Adapted from USEPA, 2002