

Construction Practices Sequencing



Description

A work schedule that coordinates the sequence of land-disturbing activities with the installation of erosion and sedimentation control practices.

A construction sequence schedule is a specified work schedule that coordinates the timing of land-disturbing activities and the installation of erosion-protection and sedimentation-control measures.

Purpose

To reduce on-site erosion and off-site sedimentation from land-disturbing activities by installing erosion and sedimentation control practices in accordance with a planned schedule.

Reduce on-site erosion and off-site sedimentation by performing land-disturbing activities and installing erosion-protection and sedimentation-control practices in accordance with a planned schedule.

Preserving the natural vegetation on-site to the maximum extent practicable will minimize the impacts of development on stormwater runoff. Preferably 65 percent or more of the development site should be protected for the purposes of retaining or enhancing existing forest cover and preserving wetlands and stream corridors.

Effectiveness

All land development that clears, grades or fills a significant land area. The removal of existing surface ground cover leaves a site vulnerable to accelerated erosion.

Good planning will:

- Reduce land clearing
- Provide necessary controls
- Restore protective cover.

New development often takes place on tracts of forested land. In fact, building sites are often selected because of the presence of mature trees. However, unless sufficient care is taken and planning done, in

Purpose

	Water Quantity
Flow attenuation	<input type="checkbox"/>
Runoff volume reduction	<input type="checkbox"/>
	Water Quality
Pollution prevention	
Soil erosion	<input checked="" type="checkbox"/>
Sediment control	<input checked="" type="checkbox"/>
Nutrient loading	<input checked="" type="checkbox"/>
Pollutant removal	
Total suspended sediment (TSS)	<input checked="" type="checkbox"/>
Total phosphorus (P)	<input checked="" type="checkbox"/>
Nitrogen (N)	<input checked="" type="checkbox"/>
Heavy metals	<input checked="" type="checkbox"/>
Floatables	<input type="checkbox"/>
Oil and grease	<input type="checkbox"/>
Other	
Fecal coliform	<input type="checkbox"/>
Biochemical oxygen demand (BOD)	<input type="checkbox"/>

<input checked="" type="checkbox"/>	Primary design benefit
<input checked="" type="checkbox"/>	Secondary design benefit
<input type="checkbox"/>	Little or no design benefit

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the interval between buying the property and completing construction much of this resource is likely to be destroyed.

The property owner is ultimately responsible for protecting as many trees as possible, with their understudy and groundcover. This responsibility is usually exercised by agents -the planners, designers and contractors. It takes 20 to 30 years for newly planted trees to provide the benefits for which we value trees so highly.

Forest and native growth areas allow rainwater to naturally percolate into the soil, recharging ground water for summer stream flows and reducing surface water runoff that creates erosion and flooding. Conifers can hold up to about 50 percent of all rain that falls during a storm. Twenty to 30 percent of this rain may never reach the ground but is taken up by the tree or evaporates. Forested and native growth areas also may be effective as stormwater buffers around smaller developments.

Requirements

Planning

Purpose of the construction sequence schedule is to address erosion prevention and sediment control in an efficient and effective manner. Appropriate sequencing of construction activities can be a cost-effective way to help accomplish this goal. The plan can be open to changes that should be discussed at the erosion control project meetings.

The generalized construction activities shown in the following table do not usually occur in a specified linear sequence, and schedules will vary due to weather and other unpredictable factors. However, the proposed construction sequence should be indicated clearly in the erosion-and-sedimentation-control plan.

- Construction access is normally the first land-disturbing activity. Exercise care not to damage valuable trees or disturb designated buffer zones as well as establish initial areas on site for preservation.
- Trees should be protected around the drip line of the branches. Avoid activities that will compact the root zone.
- The preserved area should be situated to minimize the clearing of existing forest cover, to maximize the preservation of wetlands, and to buffer stream corridors.
- The preserved area should be placed in a separate tract or protected through recorded easements for individual lots.
- If feasible, the preserved area should be located downslope from the building sites, since flow control and water quality are enhanced by flow dispersion through duff, undisturbed soils, and native vegetation.
- The preserved area should be shown on all property maps and should be clearly marked during clearing and construction on the site.
- Principal sediment basins and traps should be installed before any major site-grading takes place. Erect additional sediment traps and silt fences as grading takes place to keep sediment contained on site at appropriate locations.
- Key runoff-control measures should be located in conjunction with sediment traps to divert water from planned undisturbed areas out of the traps and sediment-laden water into the traps.
- Install diversions above areas to be disturbed prior to grading. Place necessary perimeter dikes with stable

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outlets before opening major areas for development. Install additional needed runoff-control measures as grading takes place.

The main runoff-conveyance system with inlet and outlet protection devices should be installed early, and used to convey stormwater runoff through the development site without creating gullies and washes.

- Begin grubbing and grading as soon as key erosion- and sediment-control measures are in place. Once a scheduled development area is cleared, grading should follow immediately so that protective ground cover can be reestablished quickly.
- Install inlet protection for storm drains as soon as the drain is functional to trap sediment on site in shallow pools and to allow flood flows to safely enter the storm-drainage system.
- Install outlet protection at the same time as the conveyance system to prevent damage to the receiving stream.
- Site clearing and project construction increases storm runoff, often making stream-bank-stabilization work more difficult and costly.
- Do not leave any area bare and exposed for extended periods (see NPDES permit requirements). Leave adjoining areas planned for development or ones that are to be used for borrow and disposal undisturbed as long as possible to serve as natural buffer zones.
- Runoff control is essential during the grading operation. Temporary diversions, slope drains, and inlet and outlet protection installed in a timely manner can be very effective in controlling erosion during this critical period of development.
- After the land is cleared and graded, apply surface stabilization on graded areas, channels, dikes and other disturbed areas. Stabilize any disturbed area where active construction will not take place for 21 working days (see NPDES permit requirements) by temporary seeding and/or mulching or by other suitable means.
- Install permanent stabilization measures after final grading, in accordance with the vegetative plan. Temporary seeding and/or mulching may be necessary during extreme weather conditions with permanent vegetation measures delayed until a more suitable installation time.
- Coordinate building construction with other development activities so that all work can take place in an orderly manner and on schedule. Experience shows that careful project scheduling improves efficiency, reduces cost and lowers the potential for erosion and sedimentation problems.
- Landscaping and final stabilization is the last major construction phase, but the topsoil stockpiling, tree preservation, undisturbed buffer area, and well-planned road locations established earlier in the project may determine the ease or difficulty of this activity.

All disturbed areas should have permanent stabilization practices applied. Unstable sediment should be removed from sediment basins and traps and incorporated into the topsoil, not just spread on the surface.

- All temporary structures should be removed after the area above has been properly stabilized. Borrow and disposal areas should be permanently vegetated or otherwise stabilized. In planning construction work, it may be helpful to outline all land-disturbing activities necessary to complete the proposed project.
- Develop a list of all practices needed to control erosion and sedimentation on the site. These two lists can then be combined in logical order to provide a practical and effective construction-sequence schedule.

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Requirements

Construction

Many timely construction techniques, such as shaping earthen fills daily to prevent overflows and constructing temporary diversions ahead of anticipated storms, can reduce the erosion potential of a site. These type of activities cannot be put on the construction sequence but should be used whenever possible.

Following a planned construction-sequence schedule to control erosion should help keep field personnel aware of the possibilities of erosion prevention through construction management.

Maintenance

Follow the construction sequence throughout project development. When changes in construction activities are needed, amend the sequence schedule in advance to maintain management control. Orderly modification assures coordination of construction and erosion-control practices to minimize erosion and sedimentation problems. When major changes are necessary, you may want to send a copy of the modified schedule to the local permitting authority.

Vegetation and trees should not be removed from the natural growth retention area, except for approved timber harvest activities and the removal of dangerous and diseased trees.

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Sequencing Table

	Construction Activity	Schedule Consideration
1	Identify and label protection areas (e.g., buffer zones, filter strips, trees).	Site delineation should be completed before construction begins.
2	Construction access. Construction entrance, construction routes, equipment parking areas and cutting of vegetation (necessary perimeter controls).	First land-disturbing activity -- Establish protected areas and designated resources for protection. Stabilize bare areas immediately with gravel and temporary vegetation as construction takes place.
3	Sediment traps and barriers. Basin traps, sediment fences, and outlet protection (necessary perimeter controls).	Install principal basins after construction site is accessed. Install additional traps and barriers as needed during grading.
4	Runoff control. Diversions, silt fence, perimeter dikes, water bars, and outlet protection.	Install key practices after principal sediment traps and before land grading. Install additional runoff control measures during grading.
5	Runoff conveyance system. Stabilize stream banks, storm drains, channels, inlet and outlet protection, and slope drains.	Where necessary, stabilize stream banks as early as possible. Install principal runoff conveyance system with runoff-control measures. Install remainder of system after grading.
6	Grubbing and grading. Site preparation: cutting, filling and grading, sediment traps, barriers, diversions, drains, surface roughening.	Begin major grubbing and grading after principal sediment and key runoff control measures are installed. Clear borrow and disposal areas only as needed. Install additional control measures as grading progresses.
7	Surface stabilization: temporary and permanent seeding, mulching, sodding and installing riprap.	Apply temporary or permanent stabilization measures immediately on all disturbed areas where work is delayed or complete.
8	Building construction: buildings, utilities, paving.	Install necessary erosion and sedimentation control practices as work takes place.
9	Landscaping and final stabilization: topsoiling, planting trees and shrubs, permanent seeding, mulching, sodding, installing riprap.	Last construction phase - Stabilize all open areas, including borrow and spoil areas. Remove and stabilize all temporary control measures.
10	Maintenance	Maintenance inspections should be performed weekly, and maintenance repairs should be made immediately after periods of rainfall.

Source: MPCA , 2000

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Sources

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