Temporary Diversion Dikes

Diversion dikes can be used to contain stormwater onsite

Description
An earthen perimeter control usually consists of a dike or a combination dike and channel constructed along the perimeter of and within the disturbed part of a site. An earthen perimeter control is a ridge of compacted soil, often accompanied by a ditch or swale with a vegetated lining, at the top or base of a sloping disturbed area. Depending on its location and the topography of the landscape, an earthen perimeter control can achieve one of two goals. When on the upslope side of a site, earthen perimeter controls help to prevent surface runoff from entering a disturbed construction site. An earthen structure located upslope can improve working conditions on a construction site. It can prevent an increase in the total amount of sheet flow runoff traveling across the disturbed area and thereby lessen erosion on the site. Earthen perimeter control structures also can be located on the downslope side of a site. They divert sediment-laden runoff created onsite to onsite sediment-trapping devices, preventing soil loss from the disturbed area. These control practices are called temporary diversion dikes, earth dikes, and interceptor dikes. No matter what they are called,, all earthen perimeter controls are constructed in a similar way with a similar objective--to control the velocity or route (or both) of sediment-laden stormwater runoff.

Applicability
Temporary diversion dikes apply where it is desirable to divert flows away from disturbed areas such as cut or fill slopes and to divert runoff to a stabilized outlet (USEPA, 1992). The dikes can be erected at the top of a sloping area or in the middle of a slope to divert stormwater runoff around a disturbed construction site. In this way, earth dikes can be used to reduce the length of the slope across which runoff travels, reducing the erosion potential of the flow. If diversion dikes are placed at the bottom of a sloping disturbed area, they can divert flow to a sediment-trapping device. Temporary diversion dikes are usually appropriate for drainage basins smaller than 5 acres. With modifications they can service areas as large as 10 acres. With regular maintenance, earthen diversion dikes have a useful life span of about 18 months. To prevent stormwater runoff from entering a site, earthen perimeter controls can be used to divert runoff from areas upslope around the disturbed construction site. A continuous, compacted earthen mound is constructed along the upslope perimeter of the site. As an additional control measure, a shallow ditch can accompany the earthen mound.

Siting and Design Considerations
The siting of earthen perimeter controls depends on the topography of the area surrounding the construction site. Another factor is whether the goal is to prevent sediment-laden runoff from entering the site or to keep stormwater runoff from leaving the site. When determining the appropriate size and design of earthen perimeter controls, consider the shape and drainage patterns of the surrounding landscape. Also consider the amount of runoff to be diverted, the velocity of runoff in the diversion, and the erodibility of soils on the slope and in the diversion channel or swales (WA State Dept. of Ecology, 2005). Construct diversion dikes and fully stabilize them before any major land disturbance begins. This approach makes the diversion measure effective as an erosion and sediment control device. The top of earthen perimeter controls designed as temporary flow diversion measures should be at least 2 feet wide. The bottom width at ground level is

typically 6 feet. The minimum height for earth dikes should be 18 inches, with side slopes no steeper than 2:1. At points where vehicles will cross the dike, make sure the slope is no steeper than 3:1 and make the mound gravel rather than soil. This design makes the dike last longer and strengthens the point of vehicle crossing. If a channel is excavated along the dike, its shape can be parabolic, trapezoidal, or V-shaped. Before any excavating or mound-building, remove all trees, brush, stumps, and other objects in the path of the diversion structure. Till the base of the dike before laying the fill. The maximum design flow velocity should range from 1.5 to 5.0 feet per second, depending on the vegetative cover and soil texture. Most earthen perimeter structures are designed for short-term, temporary use. If the expected life span of the structure is more than 15 days, seed the earthen dike and the accompanying ditchwith vegetation immediately after construction. This increases the stability of the perimeter control and can decrease the need for frequent repairs and maintenance.

Limitations
Earth dikes are an effective means of diverting sediment-laden stormwater runoff around a disturbed area. But the concentrated runoff in the channel or ditch has increased erosion potential. Direct diversion dikes to sediment-trapping devices, where sediment can settle out of the runoff before it is discharged to surface waters. Sediment-trapping devices that work with temporary diversion structures include sediment basins, sediment chambers/filters, and any other structures designed to allow sediment to be collected for proper disposal. If a diversion dike crosses a vehicle roadway or entrance, its effectiveness can be reduced. When possible, design diversion dikes to avoid crossing vehicle pathways.

Maintenance Considerations
Inspect earthen diversion dikes after each rainfall to ensure continued effectiveness. Maintain dikes at their original height. Repair any decrease in height due to settling or erosion immediately. To remain effective, earth dikes must be compacted at all times. Regardless of rainfall frequency, inspect dikes at least once every 2 weeks for evidence of erosion or deterioration.

Effectiveness
When properly placed and maintained, earth dikes used as temporary diversions can control the velocity and direction of stormwater runoff. Used by themselves, they do not have any pollutant removal capability. They must be used with an appropriate sediment-trapping device at the outfall of the diversion channel.

Cost Considerations
The cost of constructing an earth dike can be broken down into two components: (1) site preparation (including excavation, placement, and compacting of fill) and grading, and (2) site development, including topsoiling and seeding for vegetative cover. The Southeastern Wisconsin Regional Planning Commission (1991) estimated the total cost of site preparation to be $46.33 to $124.81 for a 100-foot dike with 1.5-foot-deep, 3:1 side slopes. The cost of site development was estimated at $115.52 to $375.44. The total cost was between $162 and $500. The cost for constructinig diversion berms range from $15 to $55 per ft for both earthwork and stabilization and depends on the availability of suitable material, site location, and access. Small dikes range from $2.50 to $6.50 per linear ft and large dikes cost about $2.50 per cubic yard of earth (CASQA, 2003).

References
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