Silt Curtain Anchoring
Applications & Deployment Methods

One of the most important factors in determining the effectiveness of a curtain is the deployment and proper anchoring to bear against hydraulic loads. Your GEI representative can discuss safe load conditions based on performance criteria and site-specific conditions at the deployment location. Performance, effectiveness and maintenance parameters require confirmation of your specified anchoring plan.

Factors

Construction factors affect performance and maintenance, and may require analysis of site specific anchor loads. The factors are:

- Current
- Waves
- Wind

Water Conditions

Calm water: Barriers with short skirts in calm conditions may be anchored with stakes or tied off on opposing shores, bridge abutments, or anchored with light duty anchors as applicable.

Flowing water: In flowing water, anchoring should focus on orienting the curtain so that it is parallel to the flow.

Deployment

In general, if there is no current and little to no wind, anchors may be set after the silt barrier is towed into position. Otherwise, it is recommended that anchors are deployed before moving the barrier from the staging area, and that each anchor line is attached to a buoy for easy retrieval. Each section of turbidity barrier contains marked anchor points (with an anchor symbol) that are located on each connector and optionally at center location(s) of the turbidity curtain.

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Types of Anchors

We have several anchor types available that we recommend

Concrete Anchors

Concrete anchors rely on friction or suction, but since concrete loses 50% of its weight in water, concrete blocks or barriers are typically up to 2,000 lbs. Concrete anchors range in sizes, styles, and weights.

Fluke Anchor

Fluke-style, "navy" or "mushroom" anchors are readily available, and inexpensive. They require firm silt, mud, or sand bottoms. Bottoms with a "crust" or rocky floor may not be suitabe for this type of anchor.

Earth Anchor

Must be driven in with specialty equipement/divers through several feet of soil. This anchor is lightweight, stable, corrosion resistant, and an excellent option for both shoreline and underwater anchoring.

*Alternate anchors available at an additional cost include: navy, mushroom, grapnel, plow/CQR, Richter

Dual Anchoring

Anchoring the curtain or boom in tidal or other conditions where the turbidity curtain may be subject to loading from either side, may require anchoring from both sides so that a wind or current change does not compromise the loading.

Deployment Methods For Silt Curtain

Prior to deployment, an anchoring plan should be developed based on hydraulic load, velocity, flow, and location of submerged debris that would impact the performance of the turbidity barrier. The following illustrations will elaborate on silt barrier anchoring methods.

Once the curtain is deployed and secured, the skirt can be unfurled and allowed to fall. In order to maintain the integrity of the curtain as it unfurls, anchors may have to be adjusted accordingly. As an added feature, reefing lines make it easy to furl (or unfurl) the curtain panels to the necessary depths. This feature is beneficial if the water body's floor has different depths across the containment area, or if the water flow is expected to fluctuate. Reefing lines are also useful when moving or uninstalling the turbidity curtain.

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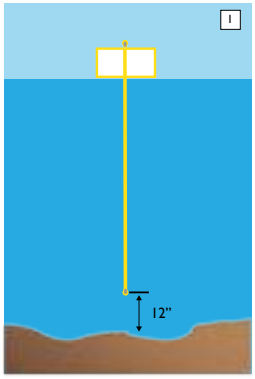
The following are examples of effective deployment methods:



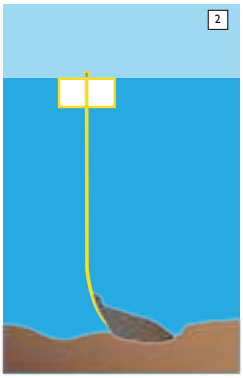
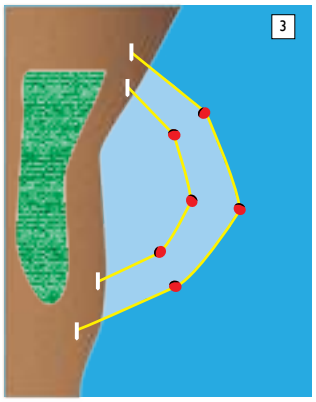


Figure 1 illustrates the standard practice of installing a barrier so that the lower edge of the skirt is about 12 inches from the bottom, with the ballast chain keeping the skirt more vertical in the water column. Depending on the site conditions, it is recommended that the curtain should be at least 25 feet from an outlet. This allows the sediment to settle naturally. If the lower edge of the curtain drapes at the bottom, silt will build up as shown in Figure 2. The buildup of silt may submerge the curtain, disturbing the settling process and sending sediment back into the water course upon removal.

The distance from an outlet may vary depending on the diameter of a discharge pipe and anticipated high velocity flows. Occasionally, a smaller diffusion barrier may be required to break up the force prior to reaching the barrier. A Type 1 DOT barrier is designed for use in calm water, near any construction along roads, work in protected areas, or construction sites requiring runoff control. Figure 3 displays an example of a site that has low exposure to winds, a current of less than 1 foot per second, and a depth of 15 feet. If there is no current and little to no wind, anchors may be installed after the curtain is deployed.



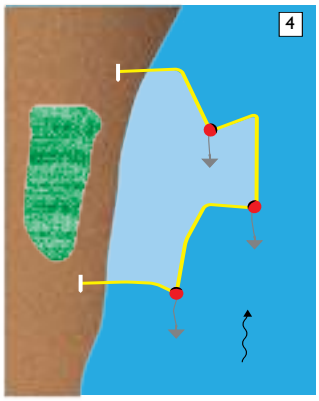
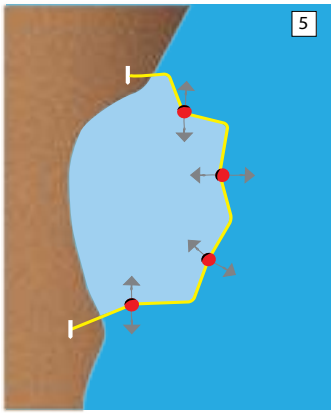
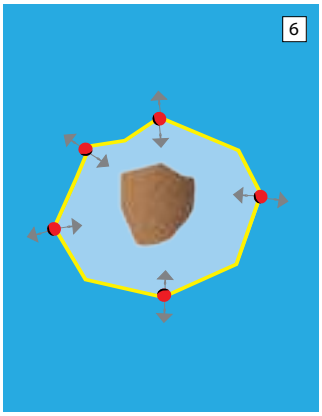


Figure 4 displays a site with a one directional current of 3 feet per second or less, running parallel to the shore line. Sites that have moving water, currents, waves, or tides, require the installation of a Type 2 DOT barrier. This type of barrier is specifically designed for areas near dredging projects, rip rap installation, and DOT roadwork and construction. In areas with flowing water, accurate anchor installation will ensure that the curtain bears against changes in wind or current.



In areas with flowing water, dual anchoring is recommended so that the orientation of the silt curtain remains parallel to the flow. Figure 5 displays a barrier system in a tidal environment. When anchoring the curtain in tidal or other conditions that may be subject to loading from either side, it is best to anchor from both sides so that a wind or current change doesn't override the effectiveness of the anchors.

Figure 6 displays the placement of a barrier surrounding a submerged construction site such as a bridge pier or caisson. Anchors are required around the outside perimeter and may be required on the inside perimeter as well in order for the curtain to retain its shape and position.



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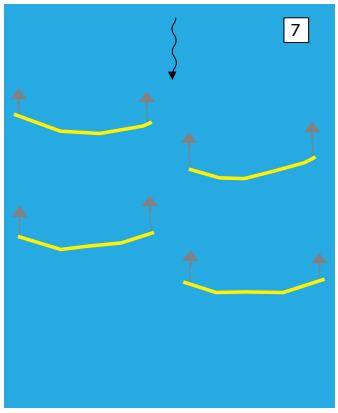
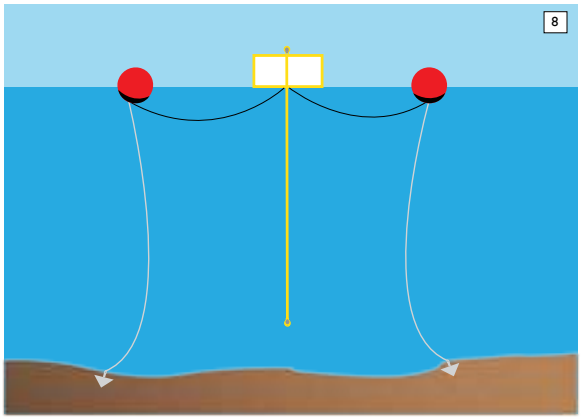
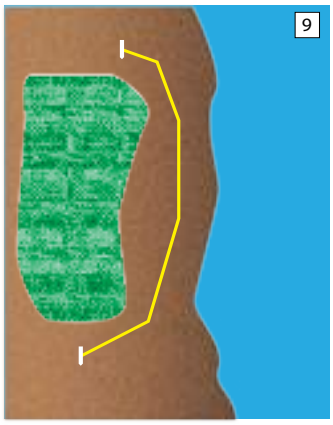


There are instances where longer settling times may be needed for finer sediment particles, or mixed sediment. Heavier particles will subside first, and finer suspended particles may require a longer time in still water to settle naturally. Some silt requires the aid of flocculants to adhere to, creating a larger mass that will then be heavy enough to fall to the bottom. As shown in Fig. 7, using a baffle system to push silt into redirected water flow channels allows increased time, while water flows in a given direction, for gravity to act upon the suspended sediment. A baffle design may also be used where marine traffic requires access through the channels. Alternatively, submerged barriers can also be used to manage silt, based on site specific requirements.

Fig. 9 shows a cross section of a barrier line as it would appear in a tidal zone. Anchors are placed on both sides of the curtain to hold it in both ebb and flow tides. Anchor buoys are attached to the anchor lines allowing the curtain to shift during tidal changes without being pulled under by the anchor line. Any sustainable type of marine anchor for the conditions may be used. Figure 8 shows penetrating pyramid cast iron anchors which, due to their large surface area, retain a high suction effect which increases as they penetrate deeper into the sea floor. Lighted buoys may be required when the barrier is located in navigable waters. Anchor loads must be calculated. We can assist you in determining appropriate anchoring for your site conditons.





A staked barrier is designed specifically for locations dealing with high water flow. It is primarily used to control and direct storm water or sheet flow to sediment settling ponds or retention basins. Staked silt barriers function best in porous soils on sloping grades as shown in Figure 9.

For more complete information on GEI Works products and solutions, visit us on the Web at www.geiworks.com.

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2017-04-01