Check Dams

BENEFITS

	L	M	H
Flow Control	■	■	■
Erosion Control			
Sediment Control	■		
Runoff Reduction			
Flow Diversion			

Description: Check dams, sometimes called ditch checks, consist of a vertical barrier constructed across swales, ditches, and waterways. These structures are most commonly constructed of erosion stone, although silt fence and manufactured devices are also used. Straw bales were used at one time, however, due to their high rate of failure and low level of effectiveness, their use is severely limited.

Typical Uses: Check dams are used to control the velocity of concentrated runoff in ditches and swales, and to prevent gully erosion until the channel can be stabilized. The structures may also provide some sediment removal benefits, however this is not their primary function.

Advantages:
- Highly effective at reducing flow velocities in channels.
- Simple to construct.
- Low maintenance.

Limitations:
- Steep slopes require short spacing between check dams.
- Sediment removal practices are still required.
- Straw bales are ineffective and prone to failure.
- Removal difficulties if not permanent

Longevity: Rock check dams - 1 year; may be considered permanent. Manufactured devices and silt fence - 6 months.

SUDAS Specifications: Refer to Section 9040, 2.07 and 3.10

A. Description/Uses

A check dam is a small, temporary obstruction in a ditch or waterway used to prevent erosion by reducing the velocity of flow. A dam placed in the ditch or channel interrupts the flow of water, thereby reducing the velocity. Although some sedimentation may result behind the dam, check dams do not function as sediment trapping devices and should not be designed as such.

Check dams are most commonly constructed of loosely placed erosion stone or rip rap, or from stone-filled gabions.

Silt fence, placed across a ditch or swale, is often used incorrectly under moderate or high flows as a check dam. Silt fence may be used as a check dam; however, it should be limited to applications where the flow rate will be less than 1 cfs. See Section 7E-14 for additional information on using silt fence as a ditch check.

A variety of manufactured devices are also available for installation as ditch checks. One type of manufactured ditch check consists of a 9 to 10 inch tall, triangular-shaped structure constructed from sheets of perforated HDPE (High Density Polyethylene Pipe). Another manufactured product is constructed from a length of triangular-shaped urethane foam. The foam is wrapped in a geotextile fabric for protection.

Gravel bag berms, formed from a pile of gravel-filled bags, may also be used to construct check dams. The bags may be constructed from a variety of porous fabrics, and are filled with clean, poorly-graded gravel. The purpose of the bag is to prevent individual gravel particles from being dislodged, and to allow the gravel barrier to be easily removed or relocated upon completion of the project.

Straw bales were commonly used in the past. However, field experience has shown that this technique is highly ineffective and prone to failures.

B. Design Considerations

Regardless of the type of check dam installed, the concept for controlling the flow is the same. The check dam interferes with the flow in the channel, dissipating the energy of the flowing water, thereby reducing velocity and channel erosion.

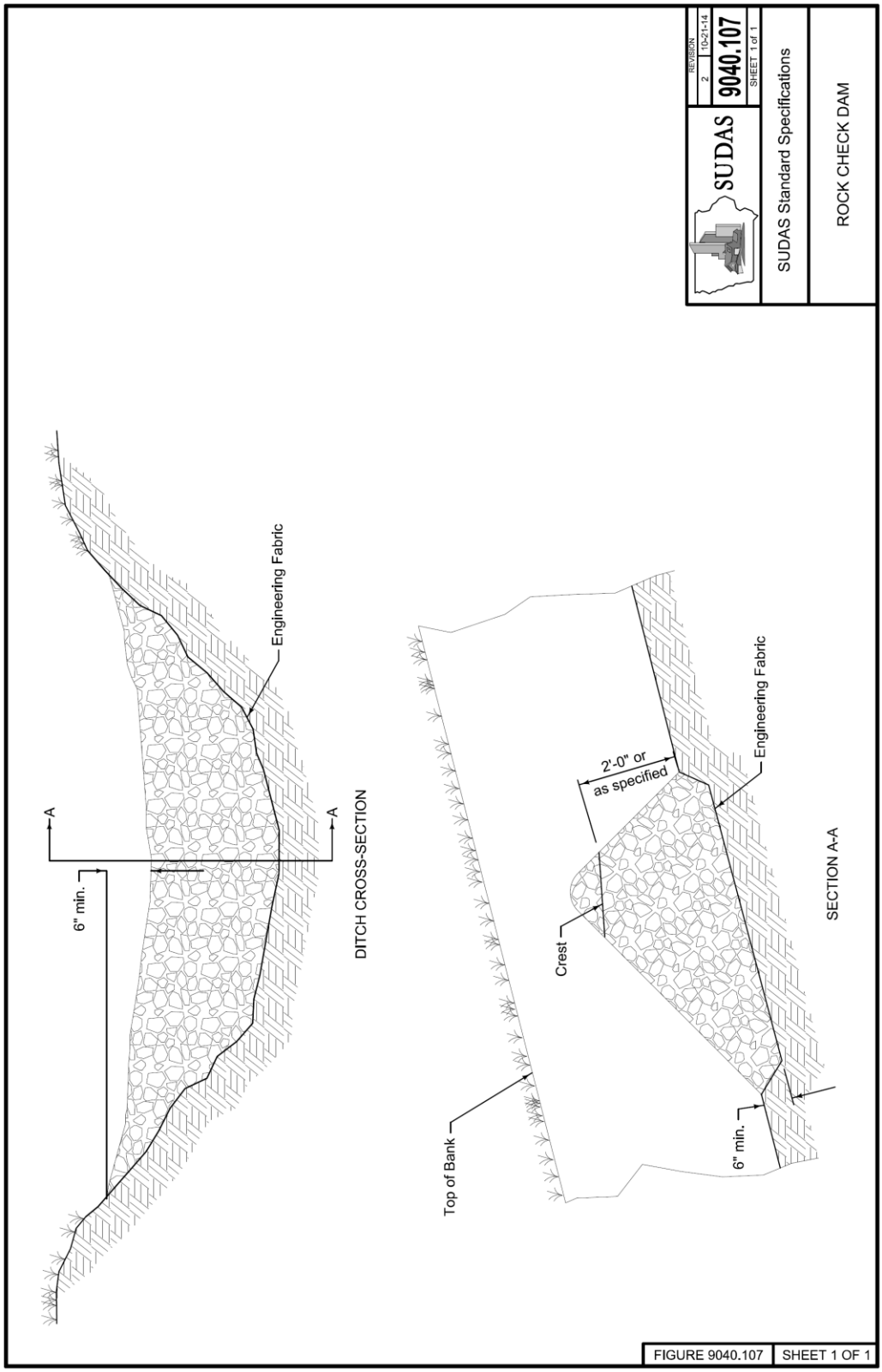
Check dams are not intended to control flows from large drainage areas. Typically, the maximum drainage area to a check dam should be limited to approximately 2 acres.

Check dams should be designed to pass the two-year storm without overtopping the roadway or side slopes of the channel. A weir equation can be used to determine the depth of flow over the structure if necessary.

1. **Rock Check Dams:** Rock check dams should be placed on top of a blanket of engineering fabric to prevent erosion of the underlying surface as water filters through the dam. A typical stone check dam is 2 feet high, with a 4 foot base and 2:1 side slopes. The crest of the check dam should be 6 inches lower than the sides to prevent flows from going around the dam, and eroding the sides of the channel. These dimensions are approximate, and may be modified based upon individual needs and for larger flows. However, heights much greater than 2 feet increase the potential for scour on the downstream side of the dam. For larger check dams, additional channel protection may be required on the downstream side.

The aggregate used should be large enough to prevent the flows from pushing individual stones downstream. A 6 inch erosion stone is normally sufficient.

Figure 7E-7.01: Typical Rock Check Dam
(SUDAS Specifications Figure 9040.107)



2. **Manufactured Devices:** Triangular-shaped manufactured products should be designed and installed according to their manufacturer's recommendations. These products require anchoring to the ground to keep them in place and may require the installation of a blanket of engineering fabric below them.

3. **Gravel Bag Berms:** Gravel bag berms should be placed and spaced in the same manner as rock check dams. The berms should be placed on a layer of engineering fabric, and be limited to a height of 24 inches. The crest of the check dam should be 6 inches lower than the sides to prevent flows from going around the dam, and eroding the sides of the channel.

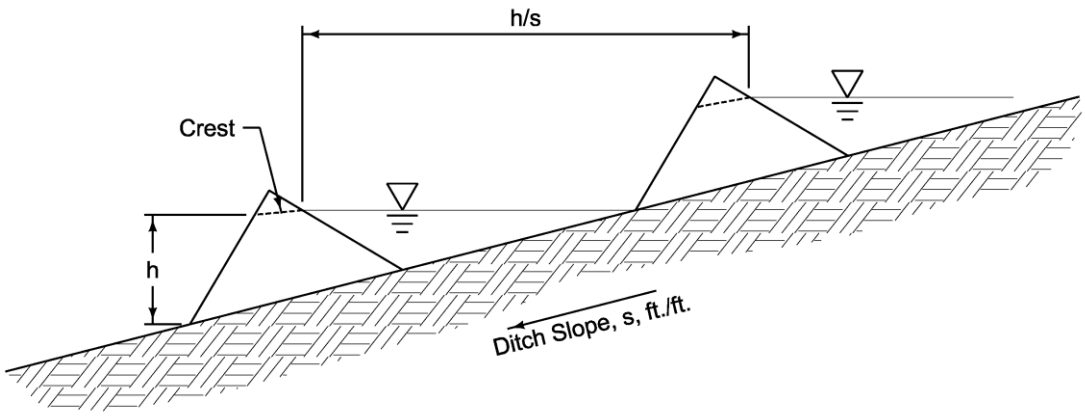
4. **Silt Fence:** Silt fence may be used as a ditch check device for very low flow applications. See Section 7E-14 for additional information on this application.

C. Application

Achieving the proper spacing is the most important aspect of check dam design. The spacing between structures is dependent on the height of the check dam, and the grade of the waterway. In order to protect the channel between the check dams, the devices should be spaced such that the elevation of the toe of the upstream check dam is equal to the elevation of the crest of the downstream check dam. This allows the water between the check dams to pond, resulting in a greatly reduced flow velocity.

As a rule, check dams should not be spaced closer than 20 feet in order to allow for proper maintenance. If slopes and check dam height call for a spacing closer than 20 feet, a Rolled Erosion Control Product or Turf Reinforcement Mat should be considered as an alternative.

Figure 7E-7.02: Typical Check Dam Spacing
(From SUDAS Specifications Figure 9040.106)



MANUFACTURED CHECK DAM
(Synthetic Permeable and Triangular Foam Check Dam)

D. Maintenance

Check dams should be inspected for damage every seven days and after any 1/2 inch or greater rainfall until final stabilization is achieved. Sediment should be removed when it reaches one-half of the original dam height. Upon final stabilization of the site, the check dams should be removed, including any stone that has been washed downstream, and any bare spots stabilized.

E. Time of Year

Check dams function on a year-round basis.

F. Regional Location

Check dams should be designed to account for the individual characteristics of each site.