Trout Creek Project
Forest Service
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Set posts well back from edge of bank.

Fill with stone and trash.
Man's encroachment and disturbance of Nature's balance, both in the mountain and plains area is evidenced by the excessive erosion taking place in many of the lateral tributaries to our main river systems. Excessive rains in local areas, when approaching cloud burst proportions, result in rapid run-off and the streamlets joining to form still greater volumes erode the soil surface deeply, largely because of the steep gradient and accumulated flow. The dynamic force of the water is great and further because, in the mountain areas, the soil is quite sandy and contains little or no clay or other cementing elements, the washing and cutting in many places is becoming a very serious problem. The grazing of the lands and the cutting of timber has resulted in the exposure of the soil surface to erosion. The construction of barriers to check the velocity of flood flows is quite secondary. It appears that the primary and foremost consideration should be given to the matter of quickly restoring the forest cover, thus checking the excessive run-off. It is observed that there is little or no erosion in a thickly timbered area. From the standpoint of the present conditions engineering principles will need be applied until some form of vegetation can be provided to act as a natural protection.

An inspection of the Trout Creek soil erosion project was made on July 28th., in company with Forest Supervisor Charles Mack. Two days previous, a heavy rain storm struck in this area, of cloud burst proportions, and was largely concentrated in McGee Gulch, a tributary to Trout Creek. There had been previously constructed various types of barriers along this gulch, over a
Memorandum Relating to the Emergency Conservation Soil Erosion and Flood Control Project in Front Creek Area

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Regarding the need for special soil conservation practices in the area of Front Creek, it is recommended that a special study be made of the area for the purpose of identifying and recommending measures to control soil erosion and flood control. The study should include an evaluation of the current practices and the potential for improvement. It is suggested that a special committee be formed to oversee the implementation of these recommendations.
distance of a mile or more, together with work done on the
small lateral channels leading into this main water course.
These structures were largely built of heavy logs, salvaged
from the mountain sides. These logs, twelve to eighteen inches
in diameter, were cut to suitable lengths and placed transverse
to the channel where the ends were set well back in the sides
or banks. Loose rocks were hand placed both above and below
the log. Other barriers were made of rock, these however,
were of small sizes. A wire net obstruction was erected in
the main gulch at a point downstream from the log and rock
barriers. The grade of the gulch is quite steep and possibly
a flow of 300 second-feet was reached as a maximum in the
recent flood. An inspection was made of the structures in
McGee Gulch after the flood, many of the log barriers were
washed out, generally cutting under the log or else around one
end. The loose-rock-fill up stream from the log appeared to
be insufficient in many instances. The barriers built of rock
were damaged or carried away. Also the wire net obstruction
was inadequate to stem the current. (See Figure 2). It was
rather unfortunate that this new work was subjected to a
maximum load before the structures were well settled.

At the head waters of Trout Creek is now being completed the
main project. Many substantial and well built barriers are to
be found along the bed of the main channel. Every lateral
channel has been given attention, these being followed to their
very source. Logs, rocks and brush have been used in this
construction. Galvanized wire to tie the various members of the
structures is also used.
It is believed that for the most efficient construction of barriers in mountain areas the
purpose of barriers is in the reduction of the velocity of flood flow, thus reducing the scour and causing a deposition of the bed load. It is believed that for the mountain areas these barriers can be most efficiently constructed in the use of timber and stone in combination along simple lines. The height and distance apart of these obstructions will depend upon the grade of the channel and character of the material being eroded. It is believed that the better practice will be found in building low barriers, closer together rather than higher ones more removed from one another. The underlying principle being to drop the flowing water vertically over the barrier in such a way as to reduce to a minimum the scour below the structure and further to have the stream retarded in velocity upon reaching the next barrier next downstream. The reduction of the momentum of the stream is one of the main features to be considered. The ideal combination being found in so constructing these barriers that the height and spacing will be such as to cause the
Flowing stream to be lowered in elevation over these drops with moderate velocity between obstructions. In this it is very essential that substantial barriers be constructed and provided with ample protection against damage due to cutting around the ends or washing out beneath the foundation.

Some thought has been given to the possibility of building loose rock barriers across a channel where the stone used in the construction are of great size. This porous dam, so to speak, would sooner or later become filled with sand and rock material where such filling might be expected to absorb a portion of the flood flow and later this water be returned to the stream in a more or less uniform flow. Such loose rock barriers will act as a regulator to the stream flow. A series of such obstructions along a water course will eventually create areas of moderate slope which can be made available for the planting of trees and shrubs and grasses which in turn will be the natural protection against erosion.

When considering the
For this present work the barriers appear to be well constructed with a fair degree of rock riprapping both upstream and downstream as a means of protection. A light or moderate flood to test this work would no doubt be very beneficial in proving the structures and giving valuable data for future planning.

It is believed that for the most efficient construction in mountain areas, timbe and stone is the most practical. The main purpose of barriers is the reduction of velocity, thus reducing the scours and causing a deposition of the bed load. Areas of moderate slope along the stream will provide good places for protective vegetation, such as grass, willows or other suitable growth.

Where the drainage area is of some extent it will be the better plan to start at the head of the water courses and build the protective structure downstream. By this method the work highest up is tending to relieve the pressure on the lower or downstream structures. For the construction of permanent barriers it is recommended to first build one or two feet high and as the area upstream fills in another stage may be added. One of the main features, as far as failure of the structure is concerned, is the scour downstream due to the over pour of the water. In this case protection must be provided in some form of apron. The transverse log with an overpouring stream on a sandy bottom appears to be destructive to the barrier. A wire net filled with stone, securely anchored downstream from the log barrier will tend to correct this fault of washing out beneath the structure. Where it is expected to raise the barrier two or three times, a suggestion is offered in Sketch A.
There is a possibility that the wire net barrier can be successfully used where the gradient is not too steep. In such construction it is suggested that this type be not too high. Further, that the net be set about 45° to the vertical and in plan be curved downstream. Two reasons may be offered as to the failure of the net barrier on McGee Gulch as shown in Figure 2. First it appeared to be too high and second was set vertical. It is likely that this type of barrier will be somewhat more expensive and more care must be used in the construction. For a width of channel 20 to 25 feet, the net should be of two pieces, 60 inches of heavy wire fencing, these pieces laced together at the edge thus giving a width of about ten feet. The lower edge of the top piece should be folded back to shorten this side before splicing the pieces together, and likewise, the lower side of the second piece should be shortened by folding. For relative dimensions, see Sketch B. Wire cables as indicated should support this net and attached as shown. Because of the impact and dynamic pressure of the flood flow, very stable anchorage is necessary. For this it is recommended to provide ample dead men, somewhat removed from the bank for attaching the cables. The cable supporting the bottom of the net should be anchored at a point some distance upstream. Such a barrier should not be more than about three feet high at the crest. A substantial wire net filled with stone should be placed downstream and anchored to the middle cable as a protection against scour. For a 100 second-foot flow on a 4° grade this mat should be 12 to 15 feet long. To construct this mat the bottom pieces should be laced together and laid on a fairly smooth prepared
bed, in place. At eighteen inches, both ways, should be
fastened looped tie wires thirty inches long. The stone
used to fill this mattress should be larger than the opening
or mesh of the net. The layer of stone should be about two
feet thick. After the filling is completed the top net should
be set in place and securely fastened by the vertical loop
wires previously fixed to the bottom net. The four sides
should be formed by bringing up the sides and ends of the bottom
net. It is suggested that in placing the stone these be
laid together as firmly as possible in order to reduce to a
minimum the movement within the mattress when subjected to the
action of the water. For subsequent raising in height of this
type of barrier a similar construction may be made at some
distance up stream. For an extended series of such barriers
each lower one will provide protection for the next one upstream.
The grade of the channel will dictate as to the proper spacing.

It is believed that effective rock barriers may be constructed
but the individual stones must be large size. In placing
these stones a derrick may be necessary for handling. The
principle involved would be to provide a porous rock filled
dam which will tend to regulate the flow and should the structure
be over topped the slope of the downstream face be rather moderate
and as rough as it is possible to construct. This type of
construction would imply the impounding of considerable volume of
water, an absorption in the banks and bottom of the basin and the
leakage through the barrier as a regulator to the flow.