APPROXIMATE METHOD FOR DETERMINING DANGER REACH LENGTH*

This method is based on information contained in the Soil Conservation Service TSC - Technical Note – Engineering-UD-16, which was issued on July 3, 1969.

This method is based on the following:

1. The dam is assumed to fail when the water depth is at the top of the dam.

2. The peak rate of the breached hydrograph is based on data supplied by the Bureau of Reclamation for actual dam failures.

3. The method is based upon a valley flood routing method taken from the Journal of the Proceedings of the ASCE, Hydraulics Division, May 1964, "Hydrology of Spillway Design", by Franklin F. Snyder.

The graph, as shown in as plotted has the width of the valley below the dam in feet versus the length of reach per acre foot of storage behind the dam for a depth (above bank full stage) at the lower end equal to one (1) foot. Actual storage is to be calculated from the top of dam and the width of the valley would normally be the 100-year frequency storm floodplain.

Some examples of how to use this graph are as follows:

Example 1

A developer wishes to build a lake for stormwater management and recreation. It has been determined that the height of the dam will be ten (10) feet, and that there would be approximately eight (8) acre-feet of storage behind the dam. From visual observation, it is noted that there are some homes located on the flood plain 1,500 feet below the dam site. It has also been determined that the average width of the valley is 400 feet. An analysis must be made to determine if there would be a danger to these homes if the dam failed.

Using the above information, enter the left side of the graph with a valley width of 400 feet, move horizontally to the curve labeled H = ten (10) feet, go down vertically and read 160 feet at the bottom of the graph. This value is for one (1) acrefoot of storage. It is determined that there are eight (8) acre-feet of storage, so multiply 160 feet by eight (8) and obtain 1,280 feet. This is the distance below the dam where the depth of flow in the flood plain would be one (1) foot if the dam would fail.

Since the homes were located 1,500 feet downstream from the dam, this would indicate that there would be little, if any, damage to these homes as a result of a sudden breach of the dam. This would indicate that the dam would be a low hazard, and that Class "a" design criteria could be used in the design of the dam if the flood plain is to remain in flood tolerant usage.

Example 2

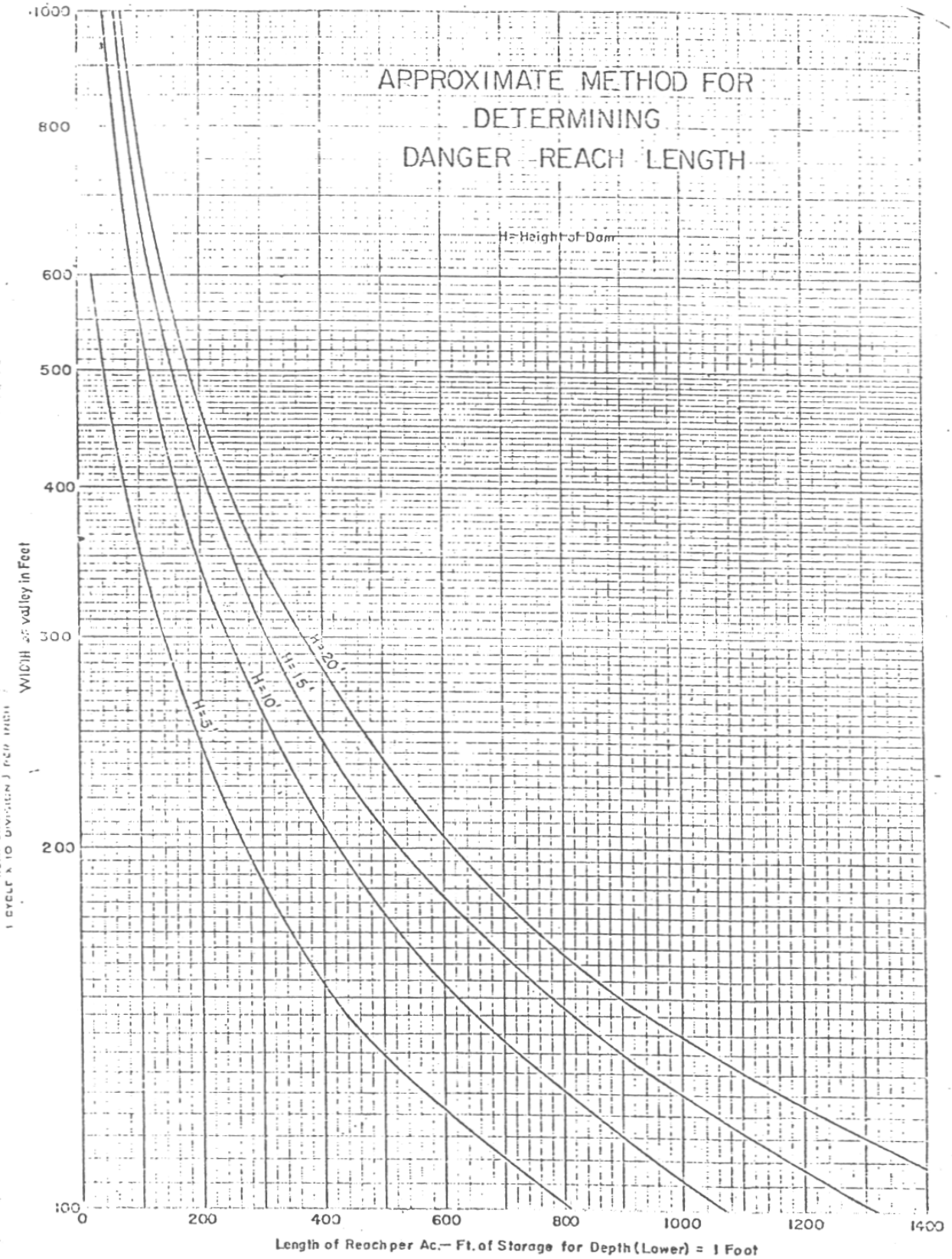
Same as Example 1, except that the height of the dam is fifteen (15) feet.

Entering the graph again with a valley width of 400 feet and going across to the curve labeled H = 15 feet and then going vertically down, you would read the length of reach equal to 210 feet for one (1) acre-foot of storage for depth (lower) = one foot. You have 8 acre-feet of storage so multiply 210 times eight and obtain 1,680 feet. This is the distance below the dam where the depth of flow in the flood plain would be one (1) foot if the dam would fail.

Since the homes were located 1,500 feet downstream from the dam, this would indicate that the depth of flow at the homes would be greater than one foot and would probably cause serious damage to these homes. This would indicate that the dam would be a higher hazard structure than Class "a".

This is an approximate method and more detailed valley routings will give more precise answers. This method should not be used if there is not a uniform valley width, or if there is any downstream obstruction, such as a road fill, an undersized pipe, etc.

*-Reproduced from the “Storm Water Management Pond Design Manual”, Md. Assoc. of SCD’s, 12/1987


APPROXIMATE METHOD FOR
DETERMINING
DANGER REACH LENGTH
H= Height of Dam
H=20'
H=15'
H=10'
H=5'
WIDTH of valley in Feet
1600
800
600
500
400
300
200
100
0
200
400
600
800
1000
1200
1400
Length of Reach per Ac.-Ft. of Storage for Depth (Lower) = 1 Foot