TECHNICAL NOTES

USDA-Natural Resources Conservation Service
Boise, Idaho

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HYDROLOGY – CALCULATED RISK

The attached figure, obtained from a technical paper[1], illustrates a principle of which we should all be cognizant when selecting a design frequency for certain structures.

This figure shows how the relationship between the design return period, desired lifetime and calculated risk. It gives the probability of no occurrence in N future years. Observed probabilities are plotted along with the theoretical probability lines.

As an example of its use, if the desired lifetime of a structure is 10 years and the design engineer wants to be approximately 90 percent certain that the structure does not fail before 10 years, the structure should be designed for a 100-year return period. If the desired lifetime is 25 years and the design return period is 25 years, we can be only 40 percent certain that the design flow will not be exceeded within the lifetime of the structure.

Recognition of the principles used to develop this diagram should be an argument to keep design return periods as large as is practicable.

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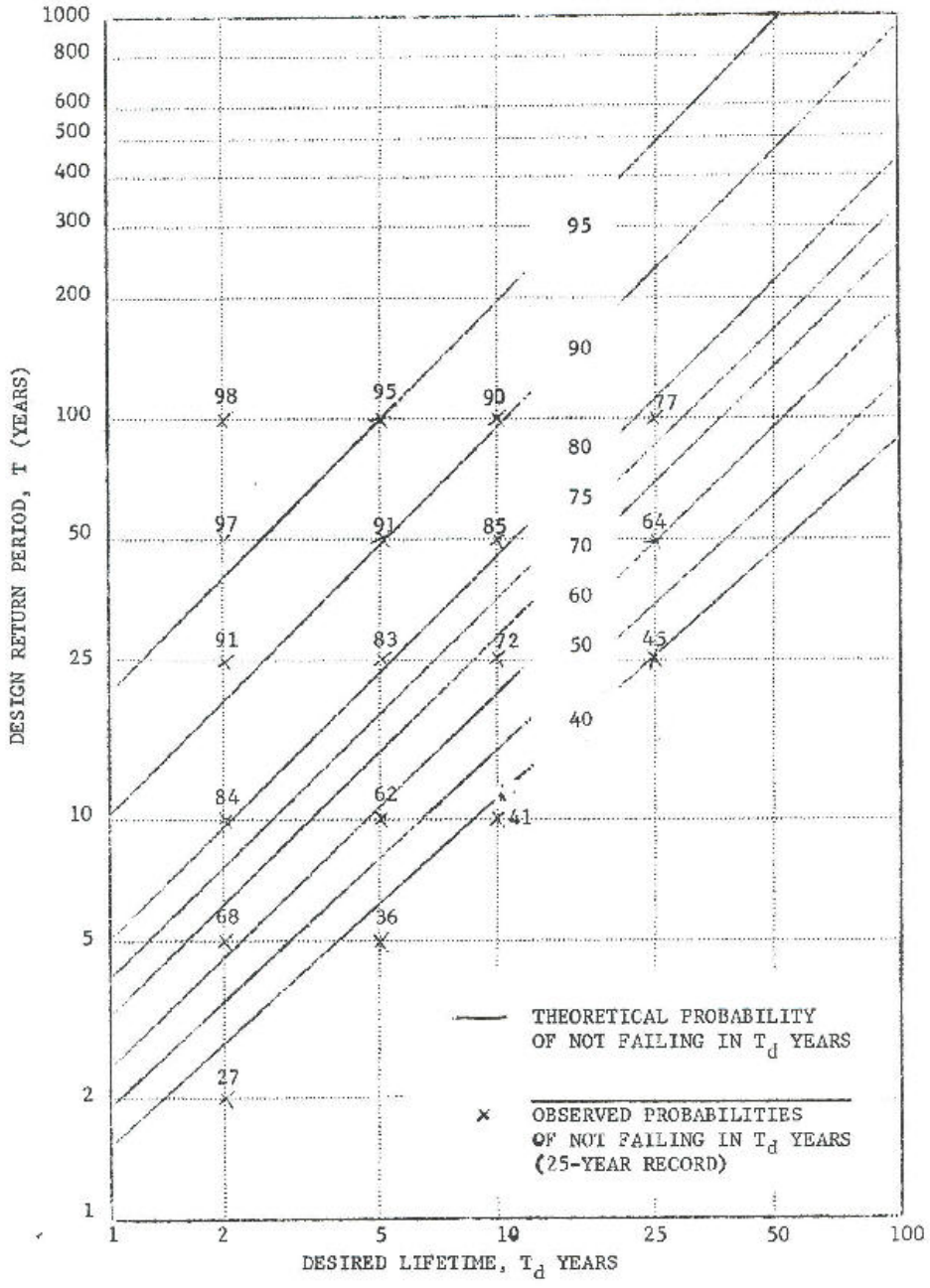
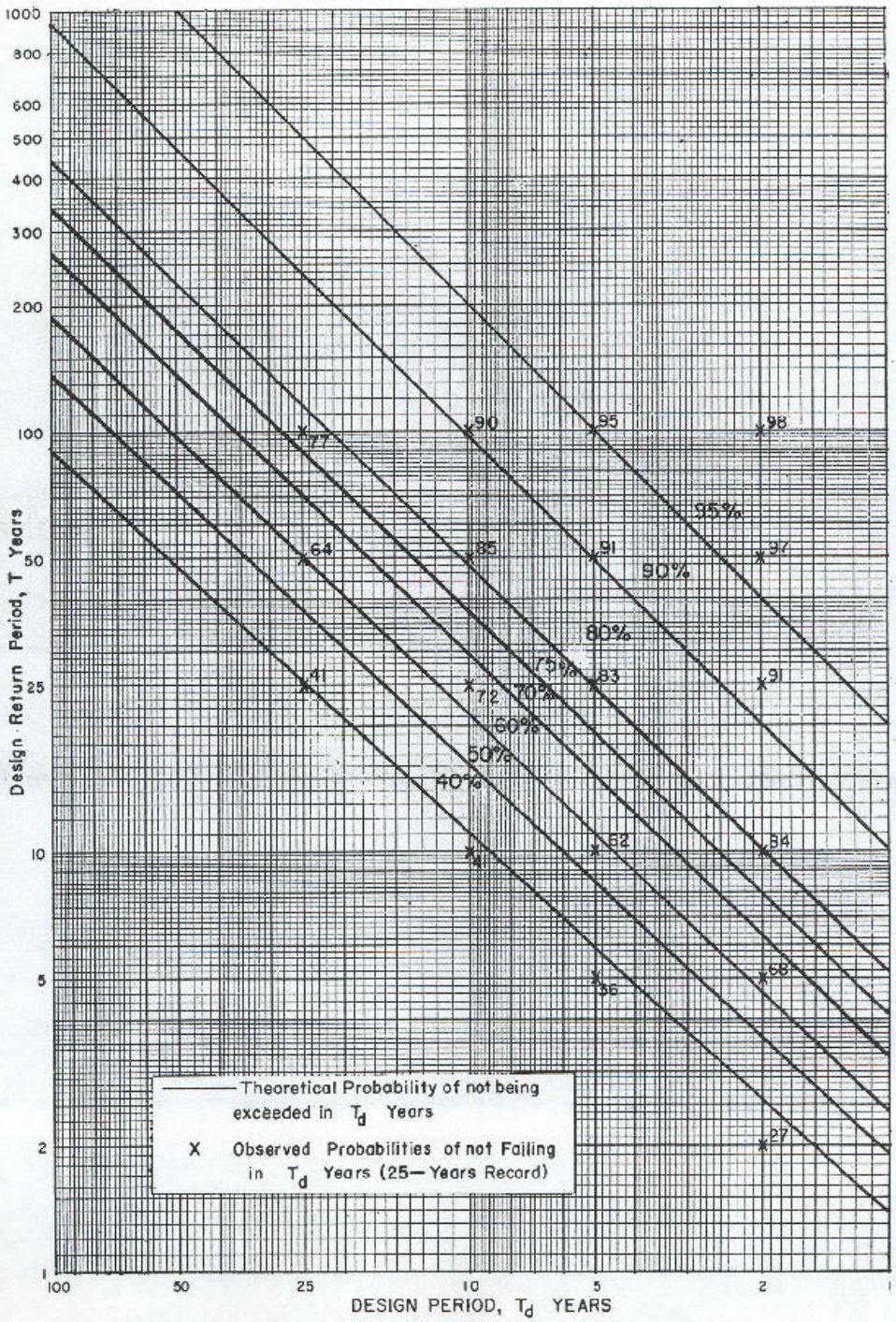
[1] An Empirical Appraisal of the Gumbel Extreme-Value Procedure. D. M. Hershfield, M. A. Kohler – Journal of Geophysical Research. Vol. 65, #6, June, 1960, pp. 1737 – 1746.

CALCULATED RISK DIAGRAM





Calculated risk of chance event, with a given recurrence period, recurring in any given span of future years

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