

*Indian Standard*

GLOSSARY OF TERMS RELATING TO  
RIVER VALLEY PROJECTS

**PART XI HYDROLOGY**

**Section 5 Floods**

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*Indian Standard*GLOSSARY OF TERMS RELATING TO  
RIVER VALLEY PROJECTS

## PART XI HYDROLOGY

## Section 5 Floods

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## *Indian Standard*

# GLOSSARY OF TERMS RELATING TO RIVER VALLEY PROJECTS

## PART XI HYDROLOGY

### Section 5 Floods

## 0. FOREWORD

**0.1** This Indian Standard ( Part XI/Sec 5 ) was adopted by the Indian Standards Institution on 31 March 1977, after the draft finalized by the Terminology Relating to River Valley Projects Sectional Committee had been approved by the Civil Engineering Division Council.

**0.2** A number of Indian Standards have been published covering various aspects of river valley projects and a large number of similar standards are in the process of formulation. These standards include technical terms, the precise definitions of which are required to avoid ambiguity in their interpretation. To achieve this end, the Institution is bringing out this glossary of terms relating to river valley projects ( IS : 4410 ) which is being published in parts. Part XI covers the important field of hydrology which is a separate science by itself. In view of the vastness of this subject, this is being covered in different sections. This section covers terms relating to floods. Other sections will be the following:

- Section 1 General terms
- Section 2 Precipitation and runoff
- Section 3 Infiltration and water losses
- Section 4 Hydrographs
- Section 6 Ground water
- Section 7 Discharge measurements
- Section 8 Quality of waters

**0.2.1** A complete list of parts published in this series is given on P 10.

**0.3** In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in

this country. This has been met by deriving assistance from the following publications:

United Nations. Economic Commission for Asia and the Far East.  
Glossary of hydrologic terms used in Asia and the Far East.  
1956.

India. International Commission on Irrigation and Drainage.  
Multilingual technical dictionary on irrigation and drainage. 1967.

India. Central Board of Irrigation and Power. Glossary of irrigation  
and hydro-electric terms and standard notations used in India.  
1954. Manager of Publications. Delhi.

ASCE. American Society of Civil Engineers. Nomenclature for  
hydraulics. 1962. New York.

**0.3.1** All the definitions taken from ' Multilingual technical dictionary on  
irrigation and drainage ' are marked with asterisk ( \* ) in the standard.

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## **1. SCOPE**

**1.1** This standard ( Part XI/Sec 5 ) covers the definitions of terms relating  
to floods.

## **2. FLOODS**

**2.1 Annual Flood** — The highest peak discharge in a water year.

**2.2 Average Annual Flood** — A flood equal to the average of the annual  
floods during the period of record.

**2.3 Bank-Storage** — Water absorbed and stored in the banks of a stream,  
lake or reservoir, and returned in whole or in part as the level of the surface  
water body falls.

**2.4 Basic-Stage Flood** — An arbitrary selected rate of flow of a stream  
used as the lower limit in selecting floods to be analysed, sometimes taken  
as the minimum annual flood.

**2.5 Channel Routing/Stream Routing** — The routing of a flood wave  
in a stream when the only storage is the valley storage.

**2.6 Channel Storage** — The quantity of water within the main channel.

**2.7 Depression Storage (Pocket Storage)** — The volume of water,  
usually expressed as depth on the drainage area, which is required to fill  
natural depressions, large or small, to their overflow levels.

**2.8 Design Flood** — The flood adopted for design purposes. It may be the probable maximum flood or the standard project flood or a flood corresponding to some desired frequency of occurrence depending upon the standard of security to be provided.

**2.9 Design Storm** — It is the estimate of heavy rainfall, its amount, duration and distribution over a particular drainage area, which is accepted for use in determining the design flood.

**2.10 Direct Damage or Direct Losses** — All losses resulting from inundation or directly from the action of flood water.

**2.11 Envelope ( Enveloping Curve )**

- a) A smooth curve which envelops all the plotted points representing maximum recorded flood peaks and volumes for hydro-meteorologically comparable areas.
- b) A smooth curve covering either all peak values or all trough values of certain quantities ( for example rainfall, runoff ), plotted against other factors such as area and time. In general none of the peak values goes above the curve in the former case, called the 'maximum envelope' and none of the minimum points fall below in the latter case called the 'minimum envelope'.

**2.12 Falling Limb** — It is the descending portion of a hydrograph.

**2.13 Flash Flood** — A flood of short duration and abrupt rise with a relatively high peak rate of flow, usually resulting from a high intensity of rainfall.

**2.14 Flood or Flood Event** — The flow pattern in a stream, constituting a distinct progressive rise culminating in a peak or summit together with the recession that follows the crest.

**2.15 Flood Abatement\*** — Any measure taken outside of stream channel with the effect of reducing the crest of flood flows or changing the debris load for a flood event.

**2.16 Flood Absorption** — The increase in storage of water in a reservoir, lake, valley or channel resulting in a reduction of stream flow.

**2.17 Flood Attenuation** — The reduction in discharge resulting from the storage of water in a reservoir, channel, lake or valley.

**2.18 Flood Crest, Flood Peak, Flood Summit** — The highest value of the stage or discharge attained during a flood.

**2.19 Flood Damage or Flood Losses** — The destruction or impairment, partial or complete, of human and animal lives, property, goods, services, flora and fauna or of health etc; resulting from the action of flood water and the silt and debris they carry. It includes 'direct' and 'indirect losses'; 'tangible' and 'intangible losses'.

**2.20 Flood Frequency**

a) The number of times a flood of a given magnitude is likely to be equalled or exceeded over a period of years on the average.

b) The number of years in which a flood of a given magnitude is likely to be equalled or exceeded once on the average over a period of years.

**2.21 Flood Mark, High Water Mark** — The trace of any kind left on the banks or flood-plain by a flood which may be used, after the flood, to determine the highest level attained by the water surface during the flood.

**2.22 Flood Plain** — Land adjoining the channel which is inundated only during floods.

**2.23 Flood Routing** — The process of determining progressively the timing and shape of a flood wave at successive points along a river.

**2.24 Flood Series** — A list of flood events, which occurred during a specified period of time.

**2.25 Flood Stage** — The elevation of water surface during a flood relative to a datum, local or national.

**2.26 Flood Volume** — The total runoff passing at a particular site during a flood event.

**2.27 Flood Way** — The channel of a river or stream and those portions of the flood plains adjoining the channel, which are required to carry and discharge the flood water.

**2.28 Indirect Damage or Indirect Losses\*** — Losses resulting from floods but not from direct action of flood water; for example, losses resulting from interruption of the production of goods and services.

**2.29 Initial Abstraction** — The sum of interception and depression storage.

**2.30 Initial Detention** — The part of precipitation which does not appear either as infiltration or as surface runoff during period of precipitation or immediately thereafter; includes interception by vegetal cover, depression storage and evaporation during precipitation; does not include surface detention.

**2.31 Intangible Losses\*** — Flood damage that is not susceptible to assessment in terms of money.

**2.32 Interflow** — It is that portion of precipitation which has not passed down the water table but is discharged from the area as subsurface flow into the stream channels; also known as subsurface runoff.

**2.33 Lateral Storage** — The quantity of water which has overflowed the banks.

**2.34 Linear Channel** — An imaginary channel in which the rating curve between discharge and area is a straight line such that at any point, the velocity of flow is constant for all discharges, but may vary from point to point along the channel. The rating curve for such a channel is given by:

$$A = CQ$$

where  $A$  is the area,  $Q$  is the discharge at any instant and  $C$  is the reciprocal of constant velocity of flow.

**2.35 Linear Reservoir** — A linear reservoir is an imaginary reservoir in which the storage  $S$ , is directly proportional to the outflow,  $Q$ :

$$S = KQ$$

where the constant  $K$  is known as storage coefficient and has the dimension of time and is equal to the average time imposed on an inflow by the reservoir.

**2.36 Maximum Intensity of Flood or Momentary Flood Peak** — The maximum instantaneous rate of flow during a flood.

**2.37 Maximum Known Flood** — The highest flood which has occurred within the memory of the inhabitants of a region.

**2.38 Maximum Observed Flood** — The highest of the recorded floods, at a section of a stream, during a specified period, the period may be a week, a month, a year or even the entire period of record.

**2.39 Minimum Annual Flood\*** — The smallest of the annual floods during the period of record.

**2.40 Monthly Flood** — The maximum flood occurring in a stream during a calendar month.

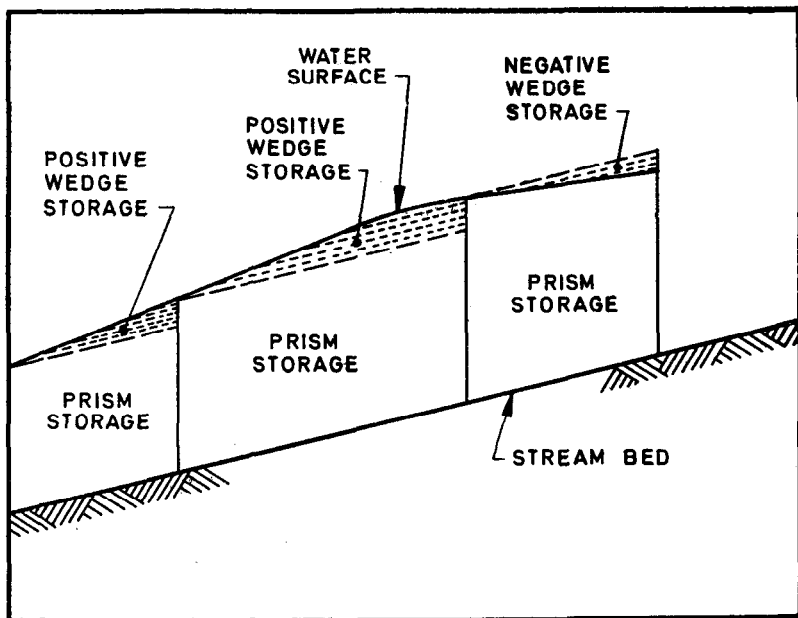
**2.41  $N$ -Year Flood\*** — A flood which has a probability of being equalled or exceeded once in  $N$ -years or has one chance in  $N$  of occurring in any one year.

**2.42 Overbank Flow** — The portion of stream flows which exceed the carrying capacity of the normal channel and overflow the adjoining flood plain(s).



**2.43 Overland Flow** — The flow of water over the ground before it becomes channelized.

**2.44 Prism and Wedge Storage** — It is that portion of the total channel storage during a flood which corresponds to a condition of steady flow that is when inflow and outflow are equal. Wedge storage is the difference between the total channel storage and the prism storage. Wedge storage would be positive when inflow exceeds outflow and negative when outflow exceeds inflow ( see Fig. 1 ).



NOTE — Lines of long dashes are parallel to stream bed.

FIG. 1 EXPLANATORY SKETCH FOR STORAGES, PRISM AND WEDGE

**2.45 Probable Maximum Flood** — It is defined as that flood estimated to result if the most critical combination of severe meteorological and hydrologic conditions considered reasonably possible in the region were to occur.

**2.46 Recession Curve** — The falling limb, after the point of contraflexure, of a hydrograph after a flood event. This represents withdrawal of water from storage in the valley, stream channel and the subsurface runoff.

**2.47 Reservoir Routing** — The routing of a flood wave through a reservoir.

**2.48 Retarding Reservoir, Detention Reservoir** — A reservoir wherein water is stored for a relatively brief period of time, part of it being retained until the stream can safely carry the ordinary flow plus the released water. Such reservoirs usually have outlets without control gates and are used for flood regulation. Also called 'flood control reservoirs' or 'retarding reservoirs'.

**2.49 Rising Limb** — The ascending portion of a hydrograph.

**2.50 Standard Project Flood** — The flood resulting from the most severe combinations of meteorological and hydrologic conditions considered reasonably characteristic of the region.

**2.51 Storage** — The impounding of water either in surface or in underground reservoirs.

**2.52 Surface Detention** — That part of precipitation which stands as thin sheet of water over soil surface when overland flow takes place; does not include depression storage which does not contribute to surface runoff. Detention depth increases until discharge reaches equilibrium with rate of supply to surface runoff.

**2.53 Tangible Losses\*** — Flood damage that is susceptible to assessment in terms of money.

**2.54 Unit Hydrograph** — A hydrograph of direct runoff at a given point on a stream resulting from one unit of effective rainfall ( rainfall excess ) of specified ( unit ) duration generated uniformly over the contributing drainage area at a uniform rate.

### **2.55 Valley Storage**

- a) The volume below the water surface profile.
- b) The natural storage capacity or volume occupied by a stream in flood after it has overflowed its banks. It includes the channel storage and lateral storage ( see 2.6 and 2.33 ).

**2.56 Warning Stage** — The river stage at which it is necessary to begin issuing warnings or river forecasts to enable adequate precautionary measures to be taken to avoid damage or inconvenience due to flooding.

**2.57 Water ( Hydrological ) Year** — A continuous twelve month period selected for maintaining or presenting records of flow, and/or use of water or any river system.

# **INDIAN STANDARDS**

**ON**

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