Indian Standard

(Reaffirmed 1992)

GLOSSARY OF TERMS RELATING TO RIVER VALLEY PROJECTS

PART 21 FLOOD CONTROL

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PART 21 FLOOD CONTROL

0. FOREWORD

0.1 This Indian Standard (Part 21) was adopted by the Bureau of Indian Standards on 30 November 1987, 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 already 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, this standard is being published.

1. SCOPE

1.1 This standard covers the definitions of terms relating to flood control.

2. DEFINITIONS

2.1 Bank Stabilization Measures—These are the measures adopted to protect the banks from erosion and damage due to the action of river.

2.2 Bankful Channel Capacity—Maximum flow which a given channel is capable of carrying within the banks.

2.3 Bankful Stage—It is the stage or gauge height attained by a river or stream when flowing at capacity above which the banks are overflowed.

2.4 Base Flow—It is that portion of flow in the channel or stream which is not contributed by the current flood. The magnitude of base flow may vary before, during and after the flood.

2.5 Bore—A monoclinical wavefront advancing relatively to a channel flow in either direction or on a dry bed. It is also called a moving hydraulic jump or surge front. A bore caused by a tidal inflow into an estuarial stream is termed as 'eager'.

2.6 Broad-Crested Flood—A flood in which the high stage is maintained over a long period.

2.7 Catastrophic Flood — A flood due to an exceptional combination of meteorological and hydrological conditions with intense rainfall occurring for a period considerably longer than the time of concentration for the area. Surges or boreflow due to dam bursts are also called by the same name due to the suddeness of the water heights and the large surge front celeritics.

2.8 Channel Improvements — These are the actions to make the channel carry all the relevant discharges at levels lower than those obtaining prior to such actions.

2.9 Channel Phase — The phase of flow following the overland flow phase starting with the entry of surface run-off into stream channels.

2.10 Community Preparedness — These are the actions directed to provide for defensive response by the people to flood warnings with the objective to save lives and lessen the social and economic impact from flood hazards.

2.11 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 stipulated desired frequency of occurrence or hysterical or any other flood depending upon the standard of security to be provided consistent with its purpose.

2.12 Detention Reservoir — These are the reservoirs provided along or beside a river course to retard or delay flood run-off thereby reducing the flood volumes and hence also heights in the downstream. These may eventually release the stored water back into the stream.

2.13 Disaster Preparedness — These are actions designed in advance for any disaster (like floods) to minimize loss of life and property and to organize and facilitate timely and effective evacuation, rescue, relief and rehabilitation at the time in the close vicinity of a disaster.

2.14 Fmergency Flood Ways — These aim at reducing the flood discharge in the river by taking the excessive water away from the river channel and its flood plains through temporary diversions passing through and outside the flood plains to the other streams.

2.15 Extraordinary Flood — A flood with magnitude much higher/larger than the design flood.

2.16 Flood — Flood is a body of water which rises temporarily to overflow into land which is not normally submerged or, to flow in the riverchannel. Floods have two essential

characteristics: the inundating of land within or outside the flow channel is temporary, and the land is contiguous to the flood axis.

2.17 Flood Axis — General direction of flow of water of a flood.

2.18 Flood Control

a) Protecting land areas from flooding by one or more of the following means: levees and walls; channel improvement; detention or storage of flow of excess flood waters: watershed management.

b) Protection of land areas from overflow or minimization of damage by flooding.

2.19 Flood Crest — Highest elevation of water level at an identified place during flood flow in a channel.

2.20 Flood Damage—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 waters and the silt and debris they carry. It includes direct and indirect losses; tangible and intangible losses.

2.21 Flood Fighting — These are emergency measures, planned in advance to reduce the impact of flood by operation, repair, strengthening and raising of existing flood control works and building of emergency works.

2.22 Flood Forecasting — It is the process of estimating the future stages and or flows and time sequence of the same at a selected point along the river course during the floods.

2.23 Flood Frequency — Number of times, a flood above a given magnitude is likely to be equalled or exceeded in given number of years on the average.

2.24 Flood Insurance — This is the insurance directed to modify the burden of flood loss on any individual resident in a flood plain by spreading an uncertain but potentially large loss.

2.25 Flood Plain

a) It includes the water channel, the flood channel and that area of nearby low land susceptible to flood by inundation.

b) Adjoining land at the bottom of a valley of a stream flooded only when the stream flow exceeds the bankful stage.

2.26 Flood Plain Management — These are the measures to regulate the land use in the flood plains for reduction of the flood damages suffered during the periods when the river discharges are very high.

2.27 Flood Proofing — It is a combination of structural changes and emergency action and may be classified as either permanent measures which become integral part of the structures or standby measures which are used only during floods but made ready prior to the flood, or emergency measures which are carried out during a flood according to a pre-determined plan.

2.28 Flood Protection — The protection from flood damage offered by a given programme of flood control.

2.29 Flood Routing — The process of determining progressively the timing and shape (in terms of levels and discharges) of the flood wave at successive points along a river or through a reservoir.

2.30 Flood Storage Basin — A basin or reservoir into which a part of the flood water can be passed and held until the flood flow has subsided where it can be released back into the stream.

2.31 Flood Walls — Walls constructed for protection against floods.

2.32 Flood Warning — It is the process of giving advance notice of the incoming flood flow to the public and to the concerned engineering and civil authorities to take appropriate flood fighting and relief measures.

2.33 Flood Wave

a) A rise in stream flow to a crest consequent to run-off, generated by precipitation, and its subsequent recession constitute a flood wave.

b) A rise in stream flow to a crest and its subsequent recession caused by precipitation or a period of snow melt upstream and uphill the respective site or by dam failure or short duration high volume releases on the upstream.

2.34 Flood Zones — The area which is required to carry the flow of a given magnitude of flood.

2.35 Flooding — Overflowing by water of the normal confines of a stream or other body of water or accumulation of water by drainage over areas which are not normally submerged.

2.36 Lag (Time)

a) Referring to discharge or water level, it is the time elapsed between the occurrence or corresponding change in discharge or water level at two points in a river.

b) Referring to the run-off or rainfall, it is the time between the centre of mass of rainfall excess to the centre of mass of the resulting run-off.

c) Referring to unit hydrographs, it is the time between the centre of a unit storm and the peak discharge of the corresponding unit hydrograph.

d) Referring to snow melting, it is the time between the beginning of snow melt and the start of the resulting run-off.

2.37 Land Management — All activities of man that effect the land; as a flood control technique, it includes conservation practices on agricultural land, grazing, regulation and forest-utilization on a sustained yield basis.

2.38 Land Phase of Flood — The initial phase in flood generation when water running over

the surface of the ground collects to tiny hills to evacuate eventually into the stream channels. Also called over land flows.

2.39 Maximum 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.

2.40 Percentage Frequency of a Given Flood — The percentage of observed floods that were equal to or larger than a given flood within the period of observation or the percent of flood that will be equal to or larger than a given flood.

2.41 Period or Time for Concentration — The time taken by the run-off from the farthest point of the catchment to reach the outlet of the catchment.

2.42 Probable Maximum Flood (PMF) — It is the flood that may be expected from the most severe combination of critical meteorological and hydrological conditions that are reasonably possible in the region and is computed by using the probable maximum storm which is an estimate of the physical upper limit to maximum precipitation for the basin. This is obtained from transportation studies of the storms that have occurred over the region and maximizing them for the most critical atmospheric conditions.

2.43 Regulating Reservoir — A reservoir formed in a river valley or other basin by a barrier or dam having controlled outlets.

2.44 Retarding Basin — A basin for reducing peak flood flows of stream through temporary storage.

2.45 Return Period Flood — A flood with a return period of 'T' year and ('T' year flood) is defined as a flood that is expected, on the average, to be equalled or exceeded once, in T years. Thus the probability of occurrence of a flood equalling or exceeding the 'T' year flood is $1/T$.

NOTE — The 'T' year flood should specify the flood element (for example, peak discharge volume, volume above threshold, etc) which is considered in the probability analysis. While using this concept in application, the flood element to be used in the analysis is to be decided with reference to the engineering design requirements.

2.46 River Diversions — These aim at lowering the water levels in the river by diverting all or a part of the discharge into a natural or artificially constructed channel lying within or in some cases outside the flood plains.

2.47 Sheet Flood — A flood which spreads as a thin sheet of water over a large area and is not concentrated in channels.

2.48 Standard Project Flood — It is the flood that may be expected from the most severe combination of hydrological and meteorological factors that are considered reasonably characteristic of the region and is computed by using the Standard Project Storm (SPS). While transposition of storms from outside the basin is permissible, very rare storms which are not characteristic of the region concerned are excluded in arriving at SPS rainfall for the basin.

2.49 Stream Routing — The flood routing along a stream when the only storage is that furnished by the stream channel and bank valley.

2.50 Structural Changes — These aim at reduction in flood damage susceptibility by undertaking measures such as construction of walls of buildings with impervious materials, closure of low level windows, construction of buildings on stilts.

2.51 Underground Storage Reservoirs — These are measures designed to augment the underground water storage with surplus flow during the monsoon season and to use it in the post monsoon season for irrigation and other purposes.

2.52 Valley Storage — Volume of water stored within any two specified longitudinally displaced cross-sections along the stream including both the channel and flood plain.

2.53 Watershed Management — These are the measures which aim at an overall management of the watershed to help in reducing the rate of run-off and sediment discharge apart from minimizing the effects of skewness in space and time in the rainfall distribution.

2.54 Weather Modifications — These are the measures which attempt to modify any of the weather elements. However, in general, it is defined as the measures which attempt to redistribute the precipitation by cloud seeding in respect of both time and space.

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