STANDARD NOTATIONS
of
TECHNICAL TERMS
관개 배수사업의 부호 및 기술용어
COMMONLY USED IN IRRIGATION AND DRAINAGE
PART Ⅱ

註 : 지금까지 學會誌 原稿에 記述하여오던 灌漑排水에 관한 技術用語 및 符號가 구구 하였으나 앞으로는 統一性을 期하기 爲하여 國際灌漑排水 委員會에서 發刊되는 책자(Standard notations of Technical Terms) 3권중 1권은 第13卷 第2號에 소개하였으며 나머지 Ⅱ. Ⅲ권을 소개 하오니 學會誌 原稿作成에 널리 利用하여 주시기 바랍니다.

CONTENTS

PREFACE

Part Ⅰ of the Standard Notations of technical terms commonly used irrigation and drainage was issued in January 1969. Part Ⅱ containing notations and symbols pertaining to the basic general terms and methods of irrigation, was issued in February 1970.

Part Ⅲ being issued now relates to standard nomenclature and symbols for elements of drainage systems. This subject was taken up by the Council on a proposal from Mr. G.E. Papadopoulos, President of the Commission. Mr. Papadopoulos has been mostly responsible in working up this standardization on the basis of somewhat similar system in numeration proposed by him and applied in Greece.

As decided by the International Executive Council at its meeting held in Ankara in 1970, the draft nomenclature and symbols were circulated to the National Committees for their comments. The comments received have been reviewedby a small Working Group comprising President Papadopoulos and Messrs, P.A. Scott, G.Drouhinand K.K. Framji. The nomenclature and symbolsas finalised by this small Working Group have been printed as Part of Ⅲ the Standard Notations.

The National Committees are enjoined that authors of papers and reports (written in English) submitted for the ICID Congresses, Special Sessions, Symposia, Bulletin and other publications of the ICID should conform, so far as possible, to the nomenclature and notations given in this part. The corresponding French nomenclature and notations are under preparation and will be circulated to the National Committees for adoption in papers written in French.

The Secretary-General sincerely thanks the members of the Working Groupand the small Working Group for the hard workput in by them, and the National Committees fortheir whole-hearted co-operation in finalising Part of the notations.

In accordance with the decision of the Council, further notations will be prepared on "Methods of Drainage," and "Flood control and river regulation".

K.K.Framji

Dated February 1, 1971 *General-Secretary*

STANDARD NOMENCLATURE AND SYMBOLS FOR ELEMENTS OF DRAINAGE SYSTEMS

Ⅰ. GENERAL

The elemens of a drainage system essentially comprise:

(1) Drainage network or network of drainage channels or drainage pipelines of different categories and degrees.

(2) Hydraulic structures on drainage networks.

(3) Areas to be served by the drainage networks.

Ⅱ. DEFINITIONS

1. DRAINAGE SYSTEMS

(a) GENERAL

Drainage systems are classified according to the number and the location of their extreme outlets. In regardto the number of the extreme outlets, the drainage systems are divided into independent (single) or dependent (combined) drainage systems. (For definitions see 1.3 and 1.4).

In regard to the location of the extreme outlets (within or outlets (within or outside of the project served areas), the drainage systems are divided into direct and

indirect discharge drainage systems (see Figure 1 and definitions 1.5 and 1.6).

(b) DEFINITIONS

1.1. Drainage system. The system as a whole by which surplus waters (surface and/subsurface or ground) are collected, carried over, lemoved from the served area and discharged into the extreme outlets. It includes some or all of the following: drainage networks for diversion, interception, discharge, relief and conducting, and outlet works; removal, regulation and protective structures, miscellaneous structures, such as bridges, desilting basins, measuring devices; drainage pumping plants and accessories necessary to operate, maintain and exercise control over the systems; areas to be served or areas drained; and soil and water management on the fields with regard to the drainage facilities.

1.2. Drainage network. A part of the drainagesystem pertaining to all the watercourses (channels, streams, drains, or drains, or drainage channels or pipelines, etc.) of a drainage network serving the area within the drainage project perimeter and including the hydraulic structures thereon. The drainage network may be wholly of drainage channels or of pipelines or of various combinations of both. The drainage network is in fact the collecting, the removing and discharging network of the excess surface and ground waters in the served area.

1.3. Independent (single) drainage system. A drainage system discharging into an affluent channel (indirect discharge system) or into an extreme outlet channel (direct discharge system). See definition 2.1 and 2.2.

1.4. Dependent (combined) drainage system. An element of internal drainage network having as outlet an element of internal drainage system.

1.5. Direct drainage dischargesystem. A drainage system with drainage network discharging direct into the extreme outfall (without external affluent channels due to the absence of a non served area).

1.6. Indirect drainage discharge system. A drainage system with drainage network having external affluent channel(s).

1.7. Project drainage system, One or more drainage systems of any category (in respect of the number bnd location of the extreme outlets) serving the whole project area.

1.8. Internal drainage networks. Drainage networks located totally within the drainage project perimeter.

1.9. External drainage networks. Drainage networks located totally or partially outside the project perimeter and serving as outlets for the internal drainage networks.

1.10. Outlet. 1. A drainage channel (artificial or natural) body of water (sea, lakes, etc.) to which water conducted by part or whole of a drainage system is discharged.

2. The mouth or vent of a river, drainage channel, pipeline, etc.

3. The outfall work(s) constructed at the end of a drainage channel or pipeline.

1.11. Drains. All watercourses (drainage channels, drainage pipelines, etc.) which relieve the drainage area of the excess waters (surface and/or subsurface) by collecting, carrying over and discharging it into the extreme (project) outlets directly or through

external channels (See definitions2.1 and 2.2)

2. DRAINAGE NETWORKS

(a) GENERAL

Drainage networks are divided into the following three funtional categories:

(*a*) Collecting

(*b*) Carier, and

(*c*) External outlet channel or pipeline.

The collecting networks comprise drains whose main purpose is to relieve the adjacent area from the surface and/or subsurface or ground water by collecting it through superficial discharge or see page. The collecting ditches or pipelines are ordered usually parallel to the contour lines. Their effect is local chiefly (surface or subsurface drainage of the adjacent area). Thus the collecting networks are considered as local ditch or pipeline networks composed of tertiary and quartenary (if any) networks.

The carrier networks are composed of drainage channels or open or close-joint pipelines whose main purpose is to carry over the served area the excess water collected by the local network. The carrier drainage channels or pipelines serve as outlets to the collecting ditches or pipelines. They may transport also external waters. The effect of the carrier drainage channels or pipelines on the drainage facilities of the whole network is wider compared to those of the relief draines. The efficacy of the collecting network bepends in a great part on the operational ability of the outlet ditches or pipelines. For thisreason the carrier drainage networks (internal and external) are considered as basic drainage networks. The carrier drainage networks are disposed usually perpendicularly to the contour lines, comprising the main, primary and secondary drainage networks.

Drainage channels or pipelines of dual function, or ditches or pipelines operating as relief and carrier drains may belong to one of the above two network categories (local or basic) according to their main function. Thusa drainage channel or pipeline which acts chiefly as a collecting one although serving also as an outlet channel or pipeline to another local ditch or pipeline is classified as a relief (tertiary drain). On the other hand, a drain serving chiefly as an outlet to external waters or to several relief drains, is considered as a carrier drain despite the fact of its simultaneous discharge function.

The outlet function prevails over the relief one for network elements classification. Thus in the case of a dual function of a drain (local relief and removal) of equal importance the drain is classified as a carrier.

The external outlet channel or pipeline networks are composed of the affuent channels (local, regional outlet watercourses, natural or artificial) and pipelines carrying over surplus water outside the project area and discharging it into the extreme outlet.

In respect to the served area the drainage networks are classified as internal and external. The internal networks are composed of drainage channels or pipelines of any categories and grades, located totally within the project served area. The external systems comprise the natural or artificial watercourses (ditches, channels, etc.) and pipelines located, partially or totally, outside the project served area. *Example* a natural stream crossing the served area or located downstream of it and serving as an outlet to the

internal drainage networks.

(b) **DEFINITIONS**(See Table I)

2.1. **Extreme outlet for a project.** Natural or artificial stream, lake, etc; receiving lastly the water of a drainage network. It does not constitute an element of the network and is not numbered consequently.

TABLE I

Characteristics of drainage networks and drains

Type of network and network classification	Main network function	Drain classification	Drain main function
External			
Affluent channel network	External carrying network	Affluent channel Sub-affluent "	Removing excess water outside of area served
Internal			
(1) Carrier drainage network	Internal carryin network	Main drain Branch drain Sub-branch drain	Removing excess water within the area served
(2) Collecting drainage network	Local discharge and seepage network	Minor drain Sub-minor drain	Colllecting local excess surface and ground water

NOTE : The affluent channels and main drains constitute major networks; the branch drains—the primary; the sub-branch drains—the secondary; the minor drains—the tertiary and the sub-minor drains—the quaternary networks.

2.2. **Exteranl affluent channel.** Natural or artificial watercourse located outside the served area and serving as an outlet to the internal drainage network. It discharges directly into the project extreme outlet.

2.3. **External sub-affluent channel.** A branch of the affluent channel located outside the served area.

2.4. **Interceptor.** A special carrier drain or a combination of channels and dyke whose main and often the only purpose is to carry acoss the drainage area (at a higher level) the surface water collected from the external natural channels.

2.5. **Main drainage channel or Main drainage pipeline or Main drain.** A major carrier brain with outfall either into an affluent (or sub-affluent, if any) or directly into the extreme outlet.

2.6. **Branch drainage channel (or close-joint pipeline) or Branch drain.** A primary carrier drain discharging into a main drainage channel or pipeline. Serves as an outfall to a sub-branch (if any) or minor drains.

2.7. **Sub-branch drainage channel (or open-joint pipeline) or Sub-branch drain.** Asecondary carrier ditch discharging intoa branch drain serves as an outlet to sub-branch drains of lower grade (if any) or minor drains. Sub-branch drains are intermediary carrier drains between branch and minor drains.

2.8. **Minor drainage channel (or open-joint pipeline) or Minor drain.** A (single or combined) relief drain with outlet to a carrier drain of any grade. Minor drains

belong to the tertiary drainage networks.

2.9. **Sub-minor drainage channel (or open-joint pipeline) or Subminor drain.** A relief drain with outlet to a minor drainage channel or pipeline. Sub-minor channels or pipelines belong to the quaternary drainage systems.

3. AREAS SERVED

(a) PERIMETERS

3.1. **Drainage project perimeter.** The enclosing line of the extreme boundaries of an area set for the whole project drainage system.

3.2. **Drainage perimeter.** The enclosing line of the extreme boundary limits of an area set for an element of drainage project network.

(b) AREAS (See Table & Figure)

TABLE II

Elements of drainage project area

Sub-division of project area	Elements of a drainage project system
Region	Single extreme project outlet.
Sub-region	Group of affluents and or main drains.
Zone	Type of discharge; by gravity (high drainage zone) or by pumping (low drainage zone).
Sub-zone	Outlet works within a zone emptying into independent (single) drainage systems (*i.e.*, pumping stations within a low zone; affluents or main drains within a high zone) .
Major sector	Served by a main drain.
Sector	Served by a branch and/or a sub-branch drain.
Minor sector	Served by a minor and/or a sub-minor

3.3. **Drainage project zone.** Tract of land within the project perimeter drained under particular conditions (for example by gravity or pumping).

3.4. **Drainage project sub-zone.** Tract of land within the perimeter of adr ainage zone supplied by important outlet works (*i.e.*, pumping station; or a group of a group of affluents or main drains).

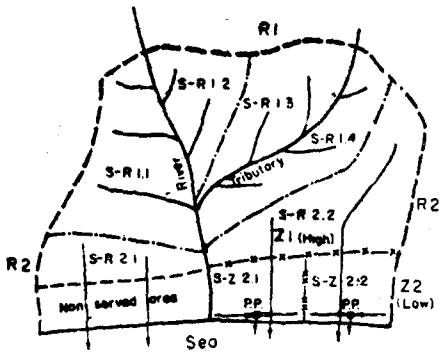
3.5. **Drainage project region.** Tract of land within a drainage perimeter served by a single extreme system outlet (river, lake, sea, etc.)

3.6. **Drainage project sub-region.** Tract of land within a drainage region served by a specific group of outlet drainage channels or pipelines (external affluents or main drains).

3.7. **Drainage project area.** Gross area within the perimeter of a drainage project. It may consist of a number of regions and/or zones.

3.8. **Non-served area.** Tract of land outside the project drained areas. Usually this area is located between the project system outlets and the boundaries of the project served area.

3.9. **Gross area.** The total area within the extreme limits set for drainage by a project system, or an outlet system. or a drain.

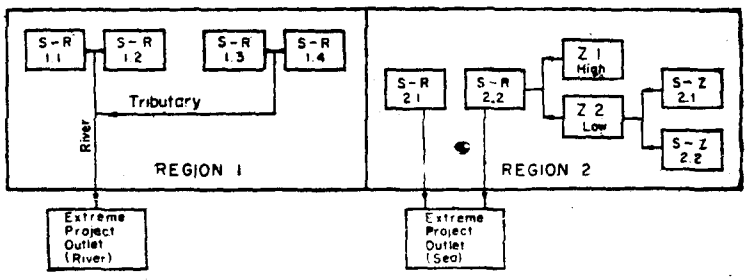


Two Regions	R1.R2
Six Sub-Regions	S-R1.1-t-S-R1.4
	S-R2.1-S-R2.2
Two Zones	Z1,Z2
Two Sub-Zones	S-Z2.1-S-Z2.2

Legend

Boundaries of Project area	— — —
Drainage Region	—·—·—
Drainage Sub-Region	— · · —
Drainage Zone	—×—×—
Drainige Sub-Zone.	—××—×
Outlets	⟶
Pumping Plants	p.p

(a) Sub-division of a drairage project area in drainageRegions, Sub-Regions, Zones and Sub-Zones.



Region 1 Extreme project outlet: River
Region 2 Extreme project outlet: Sea
Sub-Region 1.1 project outlet: River
Sub-Region 1.2 project outlet: River
Sub-Region 1.3 project outlet: Tributary
Sub-Region 1.4 project outlet: Tributary
Sub-Region 2.1 project outlet: Sea Indirect discharge system
Sub-Region 2.2 project outlet: Seb Z1-indirect discharge system by gravity; Z_2-direct system
Sub-Zone 2.1 project outlet: Sea Direct discharge system by pumping (through P.P)
Sub-Zone 2.2 project outlet: Sea Direct discharge system by pumping (through P.P)

(b) Schematic representation of the project area elements

Figure 1: Example of sub-division and inter-independence of drainage project area elements.

3.10. **Gross drained area.** The gross area less such areas as are excluded from the project by reasons of their being unsuitable for drainage, either on account of the nature of soil, or because the ground is too low to be drained by gravity or economically by pumps or other lifting devices.

3.11. **Gross drained project area.** The portion of the gross drained area which may be served by gravity drainage.

3.12. **Gross lift drained area.** The portion of the gross drained area which may be served only by pumping of the excess water.

3.13 **Culturable drained area.** The gross drained area less the area not available for cultivation, *e.g.*, village areas, roads and isolated patches of unculturable lands.

3.14. Culturable gravity drained area. That portion of the culturable area which may be drained by gravity.

3.15. Gross sub-surfac drained area. The portion of the gross drained area which may be served by sub-surface drainage.

3.16. Gross surface drained area. The portion of the gross drained area which may be drained by surface drainage channels).

3.17. Gross irrigated area drained. The portion of the gross irrigated area provided with drainage facilities.

3.18. Major drainage sector Gross area drained by a network depending on amain drain.

3.19. Drainage sector. Gross area drainedby a network depending on a branch or sub-branch drain.

3.20. Drainage sub-sector. Gross area drained by a network depending on a sub-branch drain.

3.21. Minor drainage sector. Gross area drained by a minor or sub-minor drain.

3.22. Sub-minor sector. Area drained by a sub-minor drain.

Ⅱ. SYMBOLS

1. DRAIN NETWORKS (See Figures 2 and 3)

(a) GENERAL

The elements of a drainage project network, affluent channels and drains are symbolised as follows:

1.1. Each element of the network is symbolised by a spcific letter and a certain indicative number to specify the particular channel, pipeline, or drain.

1.2. The affluent channels are symbolized by the letters AD (for affluent drainage channel) and each drain by the letter D for drainage channel, and by D_p for drainage pipeline.

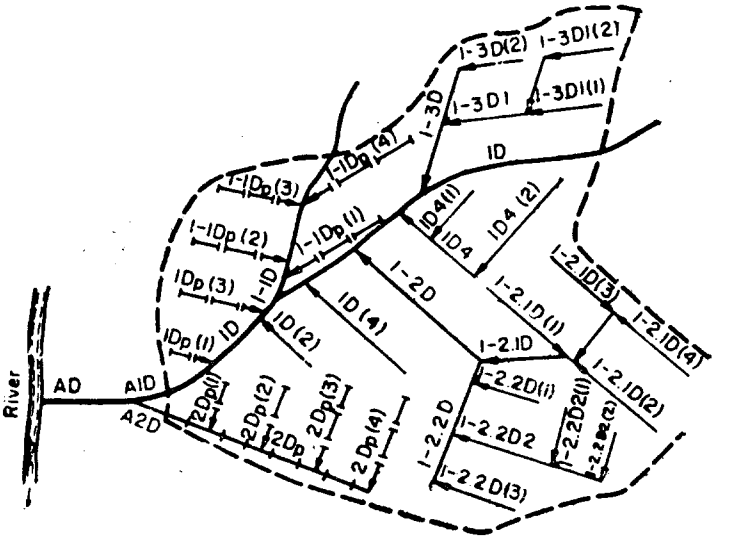
(b) NUMBERING

1.3. The numering of the elements of the drainge networks is adopted to the decimal system, following the successive path of the network from the downstream to the upstream direction.

1.4. The indicative numbers of the affluents and carrier drains (main, branch and sub branch) precede the symbol letter (D or D_p) while the indicative numbers of the collecting drains (minor and sub minor) follow it.

1.5. In case of more than one main drainage channel or pipeline the indicative numeral of the main is followedby a dash. For example 1-D means main drainage channel one; and 2-D_p indicates main drainage pipeline two.

1.6. The indicative number(s) of the branch and sub-branch drains are grouped



Legend

	Affluent channels	AD
	Sub-Affluent	A1D, A2D
Basic	Main drains	1D, 2Dp
Networks	Branch drains	1-1D, 1-2D, 1-3D
	Sub-Branch drains	1-2.1D, 1-2.2D
Locol	Minor drains	1-1Dp(1)-(4), 1-21D(1)-(4) etc
Networks	Sub-Minor drains	1-2.2D2(1)-(2), 1-3D1(1)-(2)
	Project perimeter	—— —— ——
	Drainage outlets	——————→
	Drainage channel	D
	Drainage pipeline	Dp
	Open joint pipelines	⊢—⊣ ⊢—⊣ ⊢—⊣
	Closed joint pipelines	⊢—⊣⊢—⊣⊢—⊣

Figure 2: Nomenclature of an independent (single) drainage network.

between the indicative numeral of the main drain and the symbol D or D_p. For example 1-2D means, branch drain two on main drain one ; 1-3.1 D means sub-branch one on branch drain three of the main drain one, etc.

1.7. Numerals in brackets are used for drains of third and fourth degree only (minor and sub-minor drains).

1.8. The affluent channel is indicated by the symbol AD if there is only one; in case of more than one affluent they are shown by 1-AD 2-AD, 3-AD, etc.

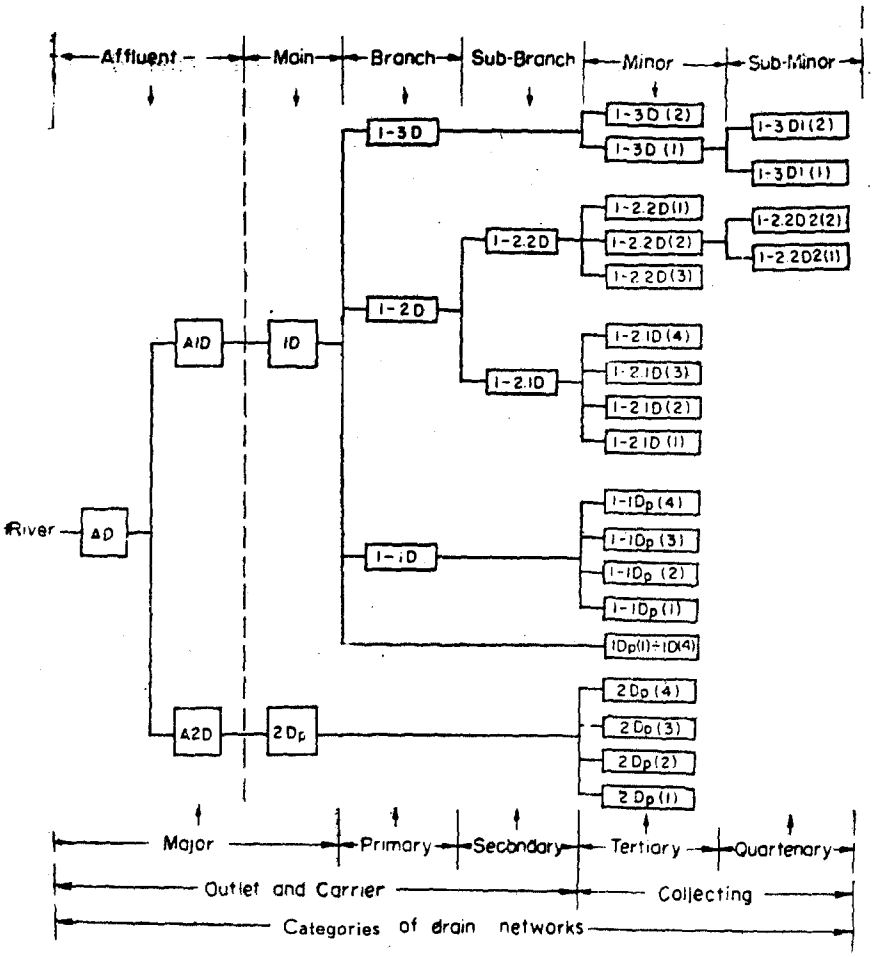


Figure 3: Schematic flow discharge chart of the drainage network of Figure 2

1.9. The sub-affluent channels are, in turn, denoted by A1D, A2 D in case of a single main affluentand 1-A1D, 1-A2D, or 2-A1D, 2-A2D, in case of more than one main affluent.

1.10. The indicative numbers of main drain for simplification and caseof use is not preceded by the indicative number of the affluenn or/and sub-affluent.

1.11. If there is only one main drain in a network covering a drainage region it is indicated by D or D_p, otherwise according to 1.5.

1.12. The indicative number of the branch drain is placed on the right side of the indicative number (if any) of the main drain.

Example : 1D means branch drainage channel or brach main drain one of the single main drainage channel or main drain of the network; 2-1D means branch drainage channel or branch drainone on the main drain two. 2-3D_p means branch drainage pipeline or branch drain three on the main drain pipeline two.

1.13. The indicative number(s) of sub-branch drain is placed after the number

of the branch drain. *Example*: 2-3.2D indicates the second drainage channel ramification of the third ramification of the main drainage channel two.

1.14. The indicative number of collecting drains is placed after the symbol D. Thus, 1-2D(1) indicates a minor (tertiary) drain and 1-2D2(1) a sub-minor drain (quaternary); 2D_p(2) indicates a minor drainage pipeline two on the branch drain two.

1.15. The indicative number in bracketsplaced after the symbol D(or DD) after it shows a minor or a sub-minor drain, the extreme elements of the network.

1.16 The symbol D_p or D refers to the category of each drain, [drainage bhannel (D) or drainage pipeline (D_p)], indicated by the last cipher of the drain number, *e.g.*: 1-1D indicates that the branch drain is a drainage channeland 1-1DP(1) indicates that the minor drain is a drainage pipeline (discharging into 1-1D).

2. HYDRAULIC STRUCTURES ON A DRAINAGE SYSTEM

The symbols for the general type of hydraulic structures are proposed to be denoted as in the case of irrigation systems, by double capital letters so as not to cause confusic with the symbols of the "General Terms" already approved

Adit	AD
Bulkhead	BU
Bridges	BR
Backwater	BG
Culvert	CU
Check	CH
Drop or Fall	DR
Escapes	ES
Flumes	FL
Gauging Site	GS
Inlets	IN
Levee sluice	LS
Level crossing	LC
Outfall	OU
Pumping Station	PS
Relief Well	RW
Syphons	SY
Silt-excluding works	SE
Spillways	SP
Under inlet	UI
Water Gate	WG

3. AREAS SERVED

Symbol "A" has already been approved as the notationfor area. So. notations for different types of areas may be as under:

Project area	A(pj)
Gross area	A(g)
Gross drainage area	A(g.dr)

Cultivable drainage area	A(c.dr)
Gross lift area	A(gl)
Lift drained area	A(l.dr)
Drainage zone area	A(dr.z)
Drainage region area	A(dr.r)

PART III

PREFACE

Part I of the Standard Notations of technical terms commonly used in irrrigation and drainage was issued in January 1969. This part contains notations and symbols ertaining to the basic general terms and methods of irrigation

Part II being issued now relates to standard nomenclature and symbols for elements of irrigation canals network systems. This subject was taken up by the Council on a proposal from Mr. G.E. Papadopoulos, the then Vice-President but at present President of the Commission. Mr. Papadopoulos has been mostly responsible in working up this standardization on the basis of somewhat similar system in numeration proposed byhim and applied in Greece.

As decided by the International Executive Council at its meeting held in Mexico in April 1969,. the draft nomenclature and symbols were circulated to the National Committees for their comments. The comments received have been reviewed by a small Working Group comprising President Papadopoulos and Messrs. P.A. Scott, G. Drouhin and K.K. Framji. The nomenclature and symbols as finalised by this small Working Gro ıp have been printed as Part of the Standard Notations.

The National Committees are enjoined that authors of papers and reports(written in English) submitted for the ICID Congresses, Special Sessions, Symposia, Bulleti ı and other publications of the ICID should conform, so far as possible, to the nomenclature and notations given in this part. The corresponding French nomenclature and notations are under preparation and will be circulated to the National Committees for adoption in papers written in French.

The Secretary-Genral sincerely thanks the members of the Working Group aud the small Working Group for the hard work putin by them, and the National Committees for their whole-hearted co operation in finalising Part of the notations.

In accordance with the decision of the Council, Part II of the Notations will contain Nomenclature and Notaions of terms pertaining to "Elements of Drainage System."

K.K. FRAMJI

Dated February 1, 1970 *General-Secretary*

CONTENTS

STANDARD NOMENCLATURE AND SYMBOLSFOR ELEMENTS OF IRRIGATION CANAL NETWORK SYSTEMS

A. GENERAN

The elements of an irrigation canal network system (excluding dam structures at the source of supply) and the areas served by them essentially comprise:

(1) Network of canals of different categories and degrees.

(2) Hydraulic structures on networks of canals.

(3) Areas to be served by the canal networks.

The terminology for these elements and also the system of classification of their nomenclature and their symbols vary from country to country. It is the objective of this Paper of the Working Group on Standardization of Nomenclature and Symbols to propose, as far as possible, a standard system of nomenclature and symbols for the elements of an irrigation system with a wiew to its being tried for adoption universally, so that the works in one county aremore properly understood and more fully appreciated in other countries. These nomenclature apply to open canal systems having their supplies either from surface water or ground water or both.

B. DEFINITIONS

1. IRRIGATION SYSTEMS (*for definition see 1.1*)

(*a*) General

Irrigation canal network systems are classified according to the number and the location of water supply headworks.

In regard to the number of supply headworks, the irrigation canal networks are divided into independent (single) and dependent (combined) irrigation canal nework systems.

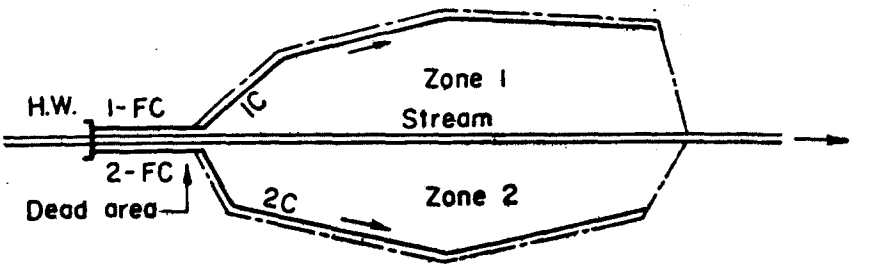
In regard to the location of the supply headworks (within or outside of the

irrigable area), the irrigation systems are divided into direct and indirect systems (see Figure 1)

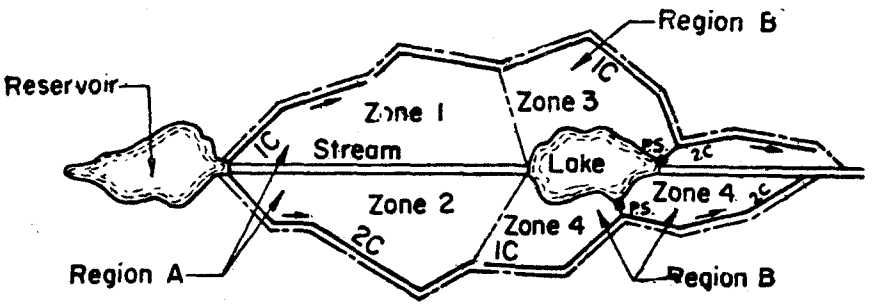
(*b*) **Definitions**

1.1. **Irrigation system**: Pertaids to all elements by which water and areas, irrigated or to be irrigated, aremade available for irrigation.

1.2. **Irrigation network system** pertains to all the canals of an irrigation canal network up to the farm gates including the hydraulic structures thereon, but doesnot include other features of an irrigation system. The canal network is, in fact, the conveyance and distribution system of an irrigation system.



Case(a): Project area supplied by two indepndent networks Indirect supply.
(Two Irrigation Zones. One Irrigation Region).



Cose (b): Project area with two supply sources and four independent networks-Direct supply.
(Two Irrigation Regions. Four Irrigation Zones).

Legent

Project area perimeter..... — · —
Irrigation region boundaries ..... — · · —
Headwors ..... H.W.
Pumping statin ..... P.S.
Main canals.....1C, 2C
Feeder canals.....1-FC, 2-FC

FINGER 1 : Showing the layout of irrigation zones and regions

1.3. **Indepedent irrigation system:** An irrigation system having its source of water supply from a single headworks(*i.e.*, outlet or intake structure at reservoir, or a diversion dam, or a pumping station, etc.)

1.4. **Dependent irrigation system:** An irrigation system supplied by more than one headworks (*i.e.*, intake structure at a reservoir and different springs located within

the irrigable area, from another irrigation system, etc.)

1.5. Direct supply system: An irrigation system without a feeder canal due to the absence of dead area.

1.6. Indirect supply system: An irrigation system with a feeder canal.

1.7. Project supply system: One of more irrigation canal networks of any category (irrespective of the number and the location of headworks) serving the project area.

2. CANAL NETWORKS

(*a*) **General**

Irrigation canal networks are divided into the following three functional categories:

(*a*) Feeder,

(*b*) Conveyance, and

(*c*) Distribution.

In the category of Feeder Canals are the canals located outside the irrigable perimeter of an indirect irrigations system (due to the presence of dead areas). The Conveyance and Distribution canal networks are located within the irrigable perimeter.

Conveyance networks (first degree canals) carry water either from the headworks directly (direct supply system) or from feeders (indirect supply system) up to the distribution canal networks.

The distribution systems of canals are composed of secondary, tertiary and quartenary (if any) networks. The secondary canals (canals of 2nd degree), taking off from canals of higher degree, feed canals of lower degrees (third and fourth, if any) which have direct outlets to the farm gates or fields (farm outlets or farm turnouts).

Canal networks of first degrees (Main canal, Branches and Sub-Branches) are composed of canals generally with no direct irrigation as in the case of the secondary, tertiary and quarternary systems. However, in exceptional cases all categorice of canalsmay have direct farm outlets and farm turnouts. A canal of the second or third degree may take off from a Main canal: or the Branches or Sub-Branches may have cenals of the third degree taking off from them.

(*b*) **Definitions**

2.1. Link canal: A canal meant primarily to convey water from one source of supply or system to another, or within the same system; for example from one river to another river; or from spring(s) or a canal of any degree of the same or another irrigation system, or a storage reservoir or pumped ground water to another canal.

2.2. Feeder canal: Canal taking off from a headworks and feeding a Main canal directly or through a Sub-Feedr or through a regualting reservoir into which it empties. It passes through the dead area.

2.3. Sub-Feeder canals: A branch taking off from the Feeder canal and feeding directly a Main canal. It also passes through the dead area.

2.4. Main canal: A canal taking off direct from the source of supply, from the Feeder or Sub-Feeder; generally with no direct supply of distribution networ.

2.5. Branch canal, or Lateral canal: A canal taking off from the Main canal and feeding either a Sub-Branch canal (if any) or a Distributary canal.

2.6. **Sub-Branch canal, or Sub-Lateral canal:** A canal taking off from the Branch canal and feeding Distributaries. Sub-Branch canals are intermediary canals between Branch and Distributary canals. They may be of differement order (steps) according to the number of ramifications of the primary (1st degree) system.

2.7. **Distributary canal**: A canal taking off from a first degree canal and feeding canals of the third degree (or fourth, if any) and also farm outlets or farm turnouts.

2.8. **Minor canal**: A canal taking off from a Distributary (or exceptionally from a higher degree canal) with direct irrigation.

2.9. **Sub-Minor canal**: A canal taking off from a Minor canal for direct irrigation.

3. AREAS SERVED

(*a*) **Perimeters**

3.1. **Irrigation project perimeter**: The enclosing line of the extreme boundary limits of an area set for the whole irrigation project system.

3.2. **Irrigation perimeter**: The enclosing line of the extreme boundary limits of an area set for an element of irrigation project system(a canal or a farm outlet).

Table 1 and Figure 2 show the principles on which definitions (3.3 to 3.6 and 3.16 to 3.18 given below) are based.

3.3. **Irrigation projct Region**: Tract of land within the rrigation project perimeter fed either by a single water supply source or by a number of water supply sources with dependent irrigation canal networks. An irrigation project Region may comprise a number of irrigation project Zones according to the number of individual (independent and/or dependent) canal networks (see definitions 1.3 and 1.4).

3.4. **Irrigation project Zone**: Tract of land within the irrigation perimeter of an independent (starting from a single headworks) or a dependent irrigation canal network.

3.5. **Irrigation project Sub-Zone:** Tract of land within the irrigation perimeter of a Zone fed by a Main canal.

TABLE I

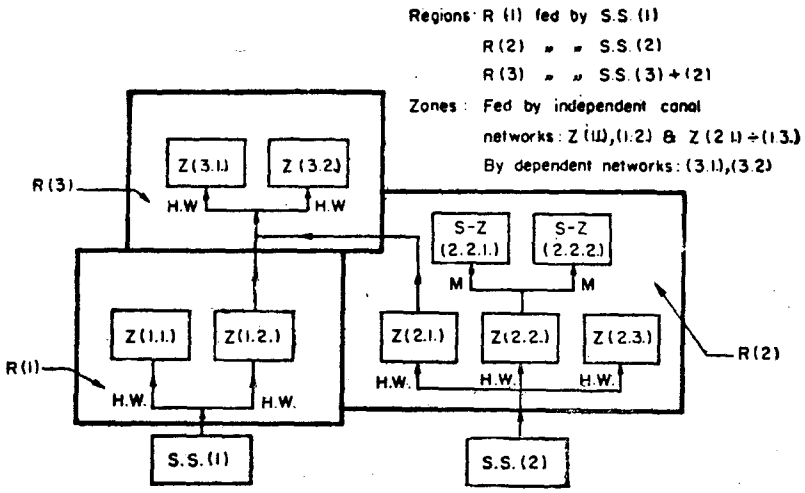
Areas	*Supply features*
Region*	Case(*a*) : Single water supply source with headworks feeding independent irrigation canal networks.
	Case(*b*) : Several water supply sources (*i.e.* rivers, lakes, etc.) feeding Independent irrigation canal networks.
Zone	Single headworks feeding indpendent irrigation canal network.
Sub-Zone	Main canal, if more than one in the same Zone.
Major Sector	Branch or/and Sub-Branch canals.
Sector	Distributary canal.
Minor Sector	Minor or/and Sub-Minor canals.

* A Region may be subdivided into Sub-Regions according to the location or kind of the headworks within. For example, a Region supplied by a river may be sub-divided in two Sub-Regions each of which is supplied by a set of headworks located on the right (Sub-Region 1) and the left (Sub-Region 2) banks of the river

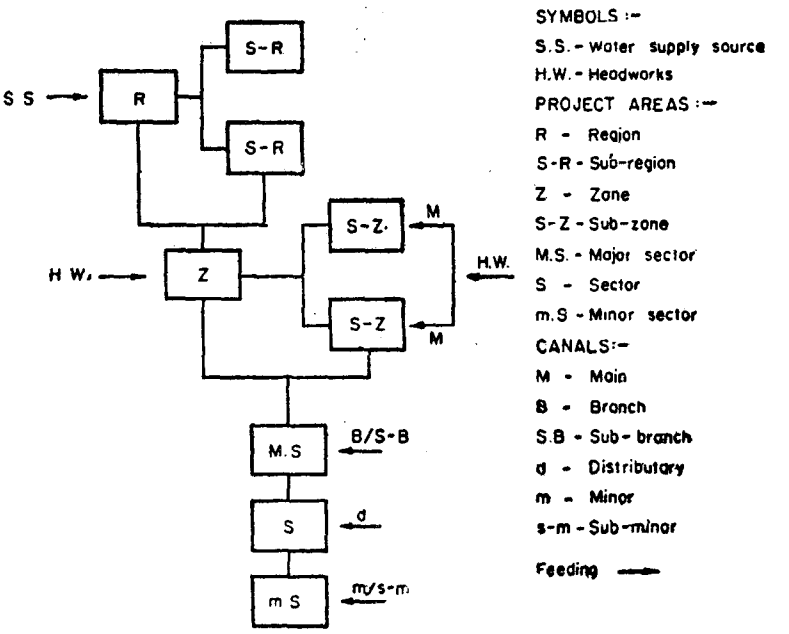
3.6. Irrigation project area: Gross area within the perimeter of an irrigation project. It may consist of a number of Regions (see definition 3.5) and/or project Zones (see definition 3.3).

(*b*) **Areas**

3.7. Dead area, or External area: Non-irrigable area outside the irrigable project perimeter. Area between the project supply sources and the boundary of the irrigation



1. Example of layout of project area elements



2 General interdependence of Project area elements

FINGER 2: Schematic representatation of layout and inter-dependece of elements of irrigation project areas

project perimete.

3.8. **Gross irrigable area**: The gross area less such areas as are excluded from the projectby reasons of their being unsuitable for irrigation either on account of the nature of the soil, or because the ground is too high to be irrigatedby gravity flow or economically by pumps or orother water lifting devices (as in the Basic Multilingual Technical Dictionary, No. 4202).

3,9. **Gross area**: The total area within the extreme limits set for irrigation by a project system, or a supply system, or a canal (as in the Basic Multilingual Technical Dictionary, No. 4201).

3.10. **Gross commanded area**: The portion of the gross irrigable area which can be commanded by gravity irrigation. In special cases, *e.g.*, in India and Pakistan, gross commanded area also includes area irrigated by pumping or lifting the water by orther devices (as in the Basic Multilingal Technical Dictionary, Nn. 4203).

3.11. **Culturable irrigable area**: The gross irrigable area less the area not avaiable for cultivation, *e.g.*, village areas, roads and isolated patches of uncultural lands (as in the Basic Multilingual Technical Dictionary, No. 4204).

3.12. **Culturable commanded area:** That portion of the culturable area which is commanded by flow irrigation (as in the Basic Multilingual Technical Dictionary No. 4205).

3.13. **Lift area**: Area interspersed between gravity flow areas of which the levels are too high to permit irrigation by gravity flow from the source, but which can be irrigated economically by water raised by pumps or other water lifting devices to the necessary level at some point in the supply system (as in the Basic Multilingual Technical Dictionary, No. 4207).

3.14. **Gross lift area:** The portion of the gross irrigable area which can be irrigated only by pumping or lifting the water by other devices. Gross commanded area plus gross lift area equals gross irrigable area. The source of water may be subsoil water reservoir, pumping from a river, pumping or lifting water from a gravity flow canal (as in the Basic Multilingual Technical Dictionary, No. 4206).

3.15. **Permissiblc area:** That portion of area served by an outlet which is intended to be irrigated in a given period is known as the permissible area for that period. *e.g.*, 'annual permissible area' (as in the Basic Multilingual Technical Dictionary, No. 4208).

3.16. **Major sector**: Gross area within the irrigation perimeter of a Branch or/ and Sub-Branch Canal.

3.17. **Sector**: Gross area within the irrigation perimeter of a Distributary.

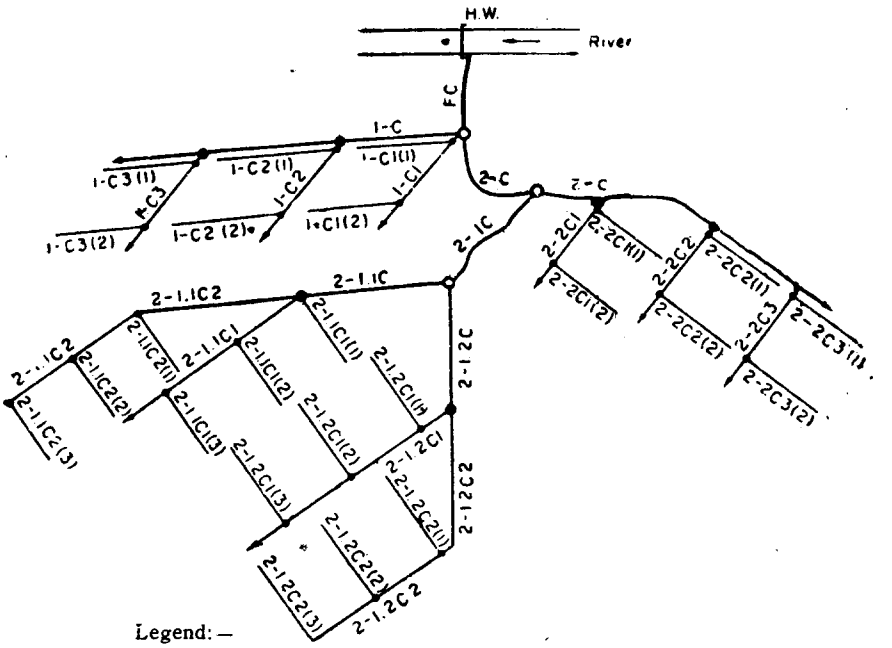
3.18. **Minor sector:** Gross area within the irrigation perimeter of a Minor or Sub-Minor canal.

(*c*) **Hydraulic structures**

For terms mentioned in section C. 2 see the definitions of the Basic Multilingual Technical Dictionary.

C. SYMBOLS

1. CANAL NETWORKS



Legend:—
Feeder canal=FC
Main canals=1-C, 1-2
Branch canals=2-1C, 2-2C
Sub-branch canals=2-11C, 2-1.2C
Distributary canals=1-C1., 2-1. 1C1., 2-1, 2C1., 2-2C3
Minor canals=1-C(1), 1-C2(1), 1-C3(1)., 2-1.1C(1), 2-1.1C2(1) 2-1.2C1(1)., 2-1.2C2(1), 2-2C1(1), 2-2C2(1), 2-2C3(1)

FIGURE 3 : Nomenclature of an independent irrigation system

1.1. Each canal is symbolized by the letter "C" (C for irrigation canal)* and a certain indicative number to specify the particular canal. (See Figures 3 and 4).

1.2. The numbering of canals is adapted to the decimal system, following the successive path of the network from the upstream to downstream direction.

1.3. The indicative numbers of the feeding (Feeders and Sub-Feeders) and primary (Branches and Sub-Branches) canals precede the letter "C" while the indicative numbers of the distribution canals (secondary and tertiary systems) follow it.

1.4. In case of more than one Main canal the indicative numeral of the Main is followed by a dash. For example, 1-C means: Main canal one.

1.5. The indicative number(s) of the branch and sub-branch canals are grouped between the indicative numeral of the Main canal and the symbol "C".

For example, 1-2C means branch canal two on main canal one; 1-2.1 C means: sub-branch one on branch canal two of the main canal one, etc.

1.6. Numeral(s) in brackets are used for canals of third and fourth degree only.

* For distinction of the elements of drainage systems which are symbolized by the letter "D" (D for drainage canal).

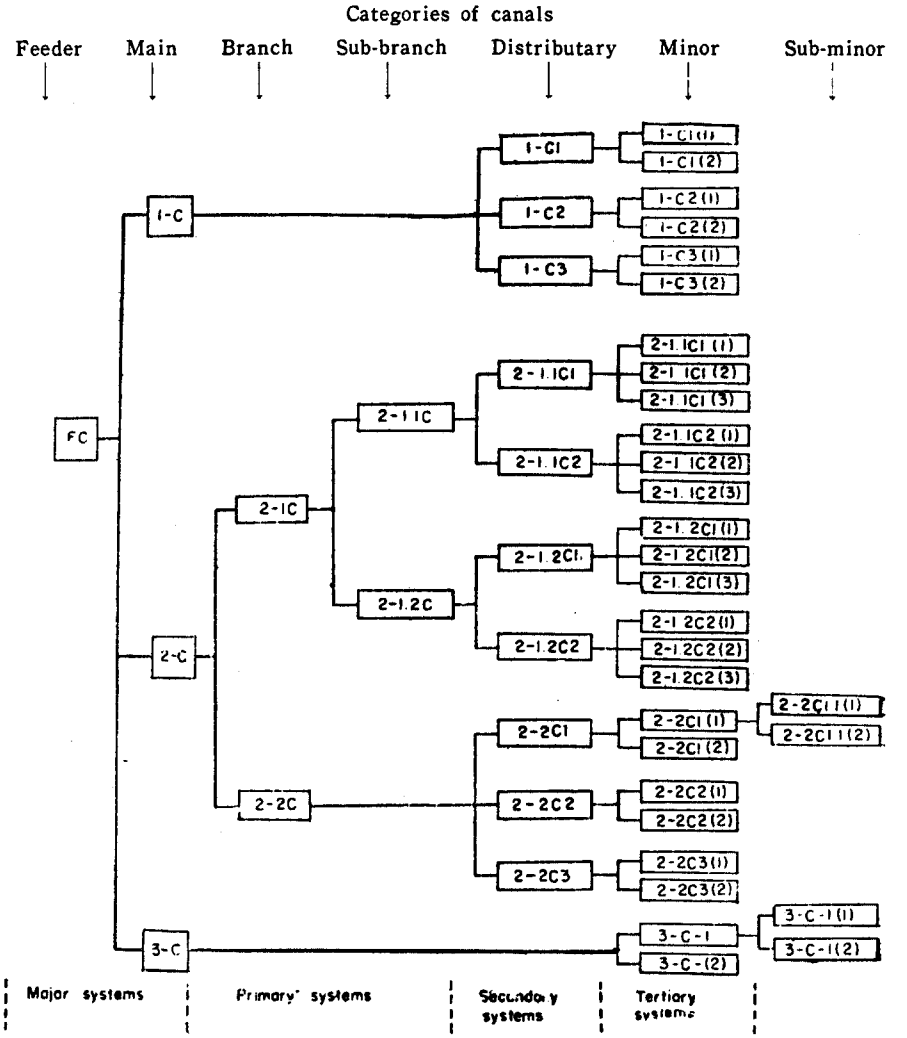
1.7. The Feeder canal is indicated by the symbol FC if there is only one; in case of more than one feeder canal, they are indicated by 1-FC, 2-FC, 3-FC.....

1.8. The Sub Feeder canals are, in turn, denoted by 1-FC, 2-FC in case of a single Feeder and 1-1FC, 1-2FC or 2-IFC, 2-2FC.....in case of more than one feeder.

1.9. The indicative number of the Main canal(s) for simplification and ease of use is not preceded by the indicative number of the feeder or sub-feeder.

1.10. If there is only one Main canal in a system covering a region, it is indicated by C; otherwise according to 1.4.

1.11. The indicative number of the Branch canal is placed on the right side of



Legend

Case 1 Main canal with distributaries taking off direct (1-C)
Case 2 Main canal with branch andsub-branch canals (2-1C)
Case 3 Main canal with branch but no sub-branch canals (2-2C)
Case 4 Main canal with minors taking off direct (3-C-1) etc

FIGURE 4 : Schematic flow chart of the irrigation system of Figure3

the indicative number, if any, of the main canal.

Examples: 1C means branch canal one of the Main canal canal which is only one of the irrigation system.

2-1C means branch one on Main canal namber two.

1.12 The indicative number of Sub-Branch canal is placed after the number of the Branch canal. Example 2-3.2C indicates the second taking off sub-branch from the third taking-off branch canal from the main canal two.

1.13 The indicative number of a Distributary is placed after the symbol C. Thus 1-2C1 indicates Distribuiary (canal of second degree) number one taking off from branch number two of Main Canal number one.

1.14 The indicative number in brackets, placed after the numeral of the distributary, or after the symbol C followed by dash—in the absence of distributary indicates either a Minor canal or a Sub-Minor, Example C2(1) and C1 (2) are Minor canals, and C1.2(1) a Sub-Minor (fed by C1.2). On the other hand, in the absence of a distributary, C-1 and C(2) show Minors and C-1(1) a sub-Minor.

(*b*) Figures 3 and 4 are examples of the use of the proposed system of symbols for the irrigation canal networks of any category (feeding, conveyance and distribution).

2. HYDRAULIC STRUCTURES* ON AN IRRIGATION SYSTEM

The symbols for the general type of hydraulic structures are proposed to be denoted by double capital letters so as not to cause confusion with the symbols of the "General Terms" already approved.

Structure	*Symbols*
Aqueducts	AQ
Bridges	BR
Culverts	CU
Drop or Falls	DR
Drops or Fall-cu Bridges	DB
Escapes	ES
Flumes	FL
Gauging Sites	GS
Head Regulators	HR
Head Regulator-cum-Fall (Drop)	HD
Head Regulator-cum-Bridge	HB
Headworks	HW
Inlets	IN
Locks	LO
Level crossings	LC
Farm outlets or turnouts	FO
Power Houses	PH

* For definitions of various hydraulic structures listed see "Multilingual Technical Dictionary on Irrigation and Drainage" ICID Publication, 1967.

Pumping Stations	PS
Syphons	SY
Silt-excluding works	SE
Spillways	SP
Weirs	WE
Waste Weirs	WW

3. AREA SERVED

3.1 Symbol 'A' has already been approved as the notation for area. So, notations for different types areas may be as under:

Project area	A(pj)
Gross area	A(g)
Gross irrigable area	A(g.ir)
Gross commanded area	A(gc)
Culturable irrigable area	A(c,ir)
Culturable commanded area	A(cc) or C.C.A.
Gross lift area	A(gl)
Lift irrigation area	A(l,ir)
Permissible area	Permissible A
Irrigation zone area	A(ir,z)
Irrigation region area	A(ir,r)