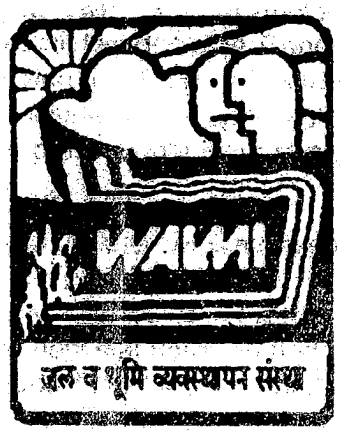
DESIGN OF CANALS

(REVISED DESIGN PROCEDURE)



Water And Land Management Institute,
AURANGABAD (Maharashtra) India

(Circular No. MIS 1094 / (156/94) [illegible] (A) Dated 18-2-95

Design of Canals - revised design procedures

GOVERNMENT OF MAHARASHTRA

Irrigation Department

Circular No. MIS 1094 (156/94) MP (A) Dated 18-2-95

Designs of canals during the last three decades are being carried out in accordance with the ciruculars issued from 1959 to 1962. Prior to the issue of these circulars only a few canals had been constructed in the State and the experience was limited. During the last 30-35 years we have constructed a number of canals. Many of them are in operation for more than two decades. General experience however is that canals are not capable of carrying full design discharge. There are several aspects leading to this situation. These include design, construction and maintenance. To begin with, it is necessary that more professional input is provided in the designs of the canals as also construction.

At the beginning of the plan era there was more emphasis on the construction of dams. Accordingly the Central Designs Organisation was formed and it mostly provided design assistance for head works of major and medium projects. Most of the design procedures for head works are now standardized and even computerised. They are on part with the All India Standards. In fact the Central Designs Organisation has come out with standard codes of practice for design of head works in Maharashtra.

The time has come for having a Central Designs Organisation for canal design. Accordingly, action is being taken for the formation of a separate Designs Circle for Canal Designs under Central Designs Organisation. It is expected that in years to come procedures for canal designs will be standardized in the same way as procedures for head works. However, pending such standardisation by the Central Designs Organisation, Government desires to issue instructions regarding revision of design parameters for canals.

CIRCULAR : Accordingly, guidelines were discussed in the conference of the Chief Engineers of Irrigation Department and based on their recommendations these revised guidelines are being issued.

1. Co-efficient of rugosity :

The canals are designed using manning's formula. Value of 'N' or the coefficient of rugosity in the Manning's formula will hereafter be adopted as under :

Table 1

(a) Lined Canals

Sr. No.	Type of Lining	Value of 'N'
1.	Cost in situ cement concrete lining 3 m^3/s. and more	0.020
2.	a) U.C.R. lining with pointing	0.024
	b) C.C. lining Q< 3 m^3/s	0.024

U.C.R. masonry with plaster will not be provided.

Table 2

b) Unlined Canals

Sr. No.	Type of Canals	Value of 'N'	
		Soil	Rock
1.	Discharge above 3.0 m^3/s	0.03	0.035
2.	Discharge between 3.0 and 0.60 m^3/s	0.035	0.04
3.	Discharge below 0.60 m^3/s	0.04	0.04

The Superintending Engineers are also directed to review the canal sections as constructed on going / completed projects in their charge with 'N' values as above. after review, if it is found necessary to increase the carrying capacity, attempts should be made to enhance the capacity suitably by raising the TBL (Top of Bank Level) in consultation with Central Designs Organisation Canals.

2. Lining :

As a rule there will be no concrete lining to all canals. But in the case of canals with a capacity of more than 3 cumecs, lining may be provided in selective reaches,

not exceeding 5 percent of the length of the canal, as per Government orders in Government Circular Memorandum No. MISC/1092/(120/92) - MP (A) of 17.2.1994. This excludes the canals under MCIP III projects.

3. Bed Gradient :

The longitudinal bottom slope (bed gradient) of a canal is generally governed by topography and the energy head required by the flow of water. If the bed gradient is too steep the command available will be less. But if the bed gradient is too flat the energy head available may not be adequate and the canal can become sluggish. Between the two ensuring carrying capacity is perhaps more important as learn from experience. General experience in Maharashtra of unlined canals with flat gradients is that they tend to become sluggish and have less that design carrying capacity. Since hereafter the canals will be designed without lining n the normal course. It is preferable to ensure a minimum gradient for the canals. In general the following norms may be followed.

Table 3

Bed Gradients

Sr. No.	Discharge in cumecs	Gradient 1 in	
		Flat country	Country with steep fall
1.	Canals, more than 7 Cumecs	5000 to 6000	Steepest gradient limited to permissible velocity
2.	Canals, branches and distributaries 0.6 to 7 cumecs	2500 to 3500	1500 to 2500
3.	Minor below 0.6 cumecs	1500 to 2500	500 to 1000

In the case of lined canals flatter gradient upto 1 in 10000 or as recommended by the BIS (Bureau of Indian Standards) may be accepted. However, the decision weather to design the canals as a lined canal throughout and what gradient to adopt should be taken by the Chief Engineer concerned on the advice of the Central Designs Organisation.

In case of unlined canals attempt should be made to go in for as steep gradient as possible to ensure adequate command according to the availability of water. In general so long as the CCA available (Culturable Command Area) under the canal is

not less than 90% of the IAC (Irrigable Command Area), the gradient may be steepened. it is necessary to bear in mind that inadequate bed gradient is one of the reasons for lack of carrying capacity of the canals. Percontra, availability of command should be considered on the basis of the above gradients.

4. Canal Cross Section :

Study and comparision of the canal cross section currently adopted in Maharashtra with those adopted in other states and recommandations of the BIS (Bureau of Indian Standards) through ISS (Indian Standards Specifications), Indicate that provisions for free board and top width of canal banks need to be revised upwards and dowels need to be provided. Accordintly, the following modified standards should be followed, hereafter.

4.1 Free Board :

The following free boards should be adopted for lined and unlined canals :

Table 4

Free Board

Sr. no.	Discharges	Present (m)	Revised (m)
1.	Above 30.0 cumecs	0.90	1.00
2.	7.0 to 30.0 cumecs	0.60	0.90
3.	3.0 to 7.0 cumecs	0.60	0.75
4.	0.6 to 3.0 cumecs	0.45	0.60
5.	Less than 0.60 cumecs	0.45	0.50

4.2 Dowel (Doula) :

If has been found that in areas of intense rainfall as in Bhandara District, water side slopes of the canals get damaged because of the rain water. There is a practice of providing dowels in such intense rainfall areas in States like M.P. Indian Standard also recommends such dowels,. It is, therefore, decided to provide dowels in areas where rainfall is intense.

For unlined canals located in areas with annual average rainfall more than 1000 mm. dowels should be provided on the inner side of the bank on the service road side of the canals carrying over 7.0 cumecs discharge. The top width of dowel should be

0.30m with side slopes 1.5:1. For lined canals in such areas dowels should be provided on both the banks. The height of the dowel should be 0.3 m and measured from top of service road.

4.3 Top Width of Bank :

It has been found that the top width of service road is not adequate with reference to modern standards. Similarly it is also found that on the inspection path side, the top width presently provided is not adequate for proper inspection etc. The Indian standards for top width of embankment, both on service road sides and inspection path side are quite rigorous. Where as we may aim to provide these widths in the future, for the time being, the following minimum top width should be provided instead of smaller top widths which are being provided as per the current practice in the state.

Table 5

Top Width of canal Banks

Sr. No.	Discharge	Minimum top width	
		Service Bank	Inspection Bank
1.	Above 7 cumecs	5 m + dowel	3.50 m + dowel
2.	3 to 7 cumecs	5 m + dowel	3.00 m + dowel
3.	0.6 to 3 cumecs	3.60 m	1.50 m

Notes : 1) "dowel" indicates the requirement of a dowel in areas of rainfall more than 1000 mm. Dowel will be outside the prescribed minimum top width.

2) Dowel on inspection bank side will be provided as for lined canals.

Service road is generally provided on the left hand side of a ridge canal. In the case of a countour canal where the command area is normally on one side, the service road should be constructed on the side of command area.

For canals carrying less than 0.6 cumes discharge a service road 3 m. wide should be provided at 0.3 m above ground level near the toe.

Where turning space is not available necessary turning platforms may be provided at an interval of about 1000 m for turning the vehicle.

The services road should be given an out-ward cross slope of 1:20 to 1:40 to drain away the rain water.

In the case of canal in full cutting, the service road should be 0.30 m above the ground level.

4.4 Side Slopes

4.4.1 Inner side slopes

The side slopes of canal depend on the soil formations. The following slopes are recommended :

Table 6
Side Slopes

Sr. No.	Particulars	Inner side slopes
1.	In cutting below 3.0 M depth	
	a) Black cotton soil	2:1
	b) Soft murum / soil	1.5 : 1
	c) Hard murum	1:1
	d) Rock	0.5 : 1 to 0.25 : 1
2.	In embankment below 3.0 m height	
	a) Available useful excavated stuff	1.5 : 1 to 2:1
	b) Hard clay and gravel	1.5 : 1 to 2 : 1
	c) Black cotton soil	2 : 1 to 3:1

The above slopes are recommended for depth of height of embankment upto 3m. For height of embankment in excess of 3m and cutting in black cotton soil of more than 3 m., special studies for the stability of slopes are necessary. For reaches of black cotton soil (expansive soil) procedures for treatment have been prescribed separately (under Government Circular No. MIS1094 / (143/94) MP (A), Dated 18.2.1995.

Uniform slope should be maintained over the entire full supply depth (FSD). As far as possible this inner side slope below Freeboard level (FBL) should not be changed in short reaches (of less than 300 m) in an abrupt manner. If it is necessary to change the slope due to long reach of cutting in hard rock, smooth transitions of 1 in 20 on both sides shall be provided. This is a very important requirement. With changes in side slopes, the flow get affected and value of "N" increases.

4.4.2 Outlet side slopes :

The canal in embankment will have outer slopes as follows :

i) Canal embankment upto 3.00 m. height :

The outer slope for canal embankment upto 3.00 m. height should be normally 2:1 from top and will be flattened to provided a minimum cover of 1.00 m over the saturation gradient of 4:1.

ii) Canal embankment above 3.00 m. height and upto 10 m. height.

For the canal banks above 3.00 m. height and upto 10 m. height sections given in M.I. Manual would generally be sufficient.

iii) Canal embankment above 10.00 m. height.

For bank above 10 m. height, the slopes will necessarily be disigned on the basis of properties of soil and stability analysis in consultation with C.D.O. Canals.

4.5 COT (Cut off Trench) for embankments :

Proper stripping should be done and the base should be scarified or ploughed and properly watered and compacted before any bank is laid thereon. Even where the canal is in partial cutting and partial bank, cut-off should be provided below the bank a little on the water side toe. Depth should be at least about half the water depth, above the ground level. Base width of COT should be 3.5 m. Deletion of COT may be permitted only with the approval of the Chief Engineer.

For full banks above 3.00 m. height and upto 6.00 m. the depth of out-off may be kept as 0.60 m. or half the depth of water above ground whichever is more and with a bottom width of 3.50 m.

In full embankments exceeding 6.00 m. in height, a cut-off trench of 2.5 m. depth with BW (Bed Width) of 3.50 m. and side slopes of 1/2:1 should be provided. In cases where the soil is very pervious, the depth may have to be increased depending on the site condition.

4.6 Berms :

At present there is no uniformity in providing berms in deep cutting. Experience of operation of canals shows that falling debris from the sides has been causing problems in deep cuts. therefore, berms are found necessary.

Wherever the depth of canal above FBL is more than 5 m. a berm should necessarily be provided at the level of free board. The width of the berm on either side should be 3 m.

Where the depth of cutting above FBL is more than 8 m., there can be two situations:

i) Where the depth of soil is more than 3 m. In this case an additional berm will be required at the top of rock, width 1.5 m. with a small parapet wall 0.75m. high.

ii) Depth of soil is less than 3m. In this case a second berm may not be required but a parapet should be provided on the berm at the FBL.

The lower berm will be at one level. The upper berm should run along at a level or with a small slope, preferably a little below the top of rock.

Where the depth of cutting above FBL is more than 10 m. more number of berms will be required, The section will have to be properly designed and specially treated.

4. 7 Ramps :

In the portion of deep cutting of more than 10 m. depth at least one ramp in every one K.M. reach should be provided for easy maintenance like desilting and removal of slips during irrigation season. Drains may be provided along the inside face of the berms.

4.8 Borrow Pits :

Where canal excavation does not furnish sufficient suitable material for embankments, additional material required may be procured from the borrow pits. the location of borrow pits will depend on the material that is being sought, which in turn depends on the design consideration. It is necessary to survey the soil by means of auger boring or trial pits to determine the extent and nature of the deposits in the borrow area.

No borrow pit shall be dug

i) Within 5 m. of the toe of embankment, if borrow pit depth is less 0.5 m, and 10 m.

ii) Within 10 m. if borrow pit depth is more than 0.5 m.

iii) Within such a distance from the toe of the bank where 4:1 hydraulic gradient line cuts the ground surface whichever is more. Borrow pits shall not be more than 1.5 m. depth and 25 m. in length. A clear distance of 1 m. shall be left between the pits. The bed of borrow pits shall be left reasonably smooth with a gently uniform slope for smooth flow of water.

The borrow pits shall be drained to avoid stagnation of water. The bottom level of borrow pits should be fixed with reference to the prevailing ground slope towards the

natural drainage course and should invariably be 0.5 m. above the lower most level of natural drainage course. Pits shall be connected together by a drain to suit the bed level of the pits it connects.

4.9 Spoil Banks :

If there is excess of material from excavation than need for construction of embankment of canal, it should be as far as possible deposited outside the embankment on non-command side of canal in layers not exceeding 0.30 m. in the form of spoil banks.

Necessary catch water drain between the service road and the toe of the spoil bank should be provided.

A 3.00 m. wide gap may be left in spoil banks at 150 m. interval for purpose of drainage. However, in the case of contour canals, the gap may be so left that water from side long ground is collected in catch water drain and is discharged into the natural valleys.

The side slope of spoil bank shall be generally 2:1. The top width of spoil bank will be about 3 m. and height of spoil bank will be restricted to 6 m.

All spoil banks should be neatly reshaped to present a good land scape. A separate item should be provided in the estimate for this work.

4.10 Embankment :

All embankments shall be properly compacted. banks of more than 3.00 m. height are required to be constructed as per specification of earthen dam. Typical section for the representative reaches that is fill, cut and partial cut and fill of the canals for the various soils met with along the alignment shall be got approved from Central Designs Organisation.

For banks above 10 m. height, pucca out-fall drain may be provided on the outer slope to drain away the rain water from the top of the bank without causing rain cuts. These will have a spacing of about 200 m.

I.S. code 4701-1968 practice for earth work on canals should be referred to.

4.11 Shrinkage Allowance :

Canal embankments will always be compacted as mentioned earlier. A shrinkage allowance of 10% of heights should be provided to allow for settlement latter. The top of bank should be raised vertically by the amount of this shrinkage allowance. The points so obtained shall be joined starting from the original base width.

4.12 Protection to outer slopes of strategic banks :

In areas of rainfall more than 2000 mm. specific protection to strategic banks particularly of height more than 5 m. would be provided, by pitching an outer side slope and providing ravine protection near outer toes of bank etc. in other areas and other cases, turfing of outer slope should be provided as a part of protective measures for high banks.

4.13 Cot below canal bank adjacent to major Drainage Crossings :

Where a nalla is trained and diverted to an adjoining one, the canal banks which cross such nalla, should be provided with a COT as per earthen dam specification. Individual cases will have to be dealt with in detail as per actual field conditions.

4.14 Drainage :

Provision for draining the entire upstream catchment has to be made. Where a cross drainage work is not provided, it will be in the form of a catch water drain on the hill side bank of the canal. Drainage should be properly designed and got approved from the superietending Engineer concerned for each individual catchment.

For a lined canal, where the ground water level is higher or likely to become higher than the water level inside the canal, lining can get damaged because of differential pressure. In such cases Pressure relief arrangement for under drainage shall be provided in accordance with IS 4558-1968 that is "code of practice for under drainage of lined canals".

4.15 Profile walls :

UCR profile walls at every 200 m. interval should be constructed on unlined canals so as maintain the canal profiles.

5. Bed width to depth ratio :

At present canals are being designed on the basis of ratio of designed velocity to critical velocity. This approach is based on the experience of canals in alluvial soils. It leads to wider canals with shallow depth. Then there are difficulties in obtaining adequate driving head for the off taking channels.

Firstly since most of the soils in Maharashtra are non-alluvial, the approach of ratio of v/vo is not relevant. Secondly, it leads to larger width and smaller depth resulting into problem of driving head. Experience of the canals in operation indicates that there is a need to change over to a design based on permissible velocity rather than on critical velocity. Improvements should therefore be possible in this approach of bed width to depth ratio. In the near future Central design Organisation is expected to come out with guidelines for deciding the cross sections of canals for optimising the carrying

capacity. Presently the B/D ratio is provided as per Table No.7 . Till the Central Design organisation comes out with the guidelines as mentioned above, ratio to be adopted on the canals should be on the lower side of the ratios indicated in the table as to ensure the required depth.

Table 7
B/d Ratio Currently followed,

For Unlined canals		For lined Canals	
Discharge (cumecs)	B/d ratio	Discharge (cumecs)	B/d ratio
0.30	2.90	Upto 10	1.0 to 1.25
0.45	3.00	10 to 25	1.25 to 1.50
0.60	3.20	25 to 50	1.50 to 1.75
0.90	3.40	50 to 100	2.00
1.00	3.50	Above 100	2.50
1.20	3.60		
1.50	3.70		
1.80	3.80		
2.00	3.90		
2.30	4.00		
2.60	4.10		
2.85	4.20		
5.70	4.60		
7.00	4.80		
8.50	5.00		
11.40	5.30		
14.00	5.70		

At present in the design of canals ultimate regime side slope are considered as 0.5:1 This practise should continue.

In view of the change in approach, the cross section of canals should be designed on the basis of permissible velocity. For unlined canals it can be in the range of 0.45 to 0.9 m/s and for lined canals upto 2 m/s.

6.0 Transitions :

The function of a transition is to avoid excessive energy loss to eliminate cross flow and other turbulence and to provide safely to structure and waterway.

The optimum maximum angle between canal axis and line connecting the canal side will be 12.5°.

The canals banks near structures need to be raised where velocity is obstructed because of observed higher head loss and afflux near these structures.

Whenever the canal section changes, appropriate transitions are necessary. These transitions shall be along the length and where necessary also along the side slopes. As far as possible the transition angle between the axis of two slopes should be kept less than 12.5°.

7.0 Curves :

I. S. 5968 - 1970 will be followed, relevant extracts are reproduced below :

Table 8

Unlined Canals

Sr. No.	Discharge	Minimum radius of curve
1.	80 m^3/Sec and above	1500 m.
2.	80 m^3/Sec to 30 m^3/Sec	1000 m.
3.	30 m^3/Sec to 15 m^3/Sec	600 m.
4.	15 m^3/Sec to 3 m^3/Sec	300 m.
5.	3 m^3/Sec and less	90 m.
	Lined canals	
1.	280 m^3/Sec and above	900 m.
2.	280 m^3/Sec to 200 m^3/Sec	760 m.
3.	200 m^3/Sec to 140 m^3/Sec	600 m.
4.	140 m^3/Sec to 70 m^3/Sec	450 m.
5.	70 m^3/Sec to 40 m^3/Sec	300 m.

Note : 1) The above radii are not applicable to unlined canals located in hilly reaches and in highly permeable soils.

2) Protective work / turfing shall be provided at every curve portion to overcome the problem of erosion.

3) On lined canals where the above radius cannot be provided, proper super elevantion shall be provided.

8.0 Measuring Devices :

Measuring devices should be provided on main canals at suitable distances and at head of all offtakes from main canals. For canal reaches with more than 25 cumecs discharge, there will be automatic gauging devices, also.

Table - 9

Sr. No.	Discharge	Type of Measuring Device
1.	Above 25 m^3/S	Automatic gauging devices
2.	25 cumecs to 1 cumec	SWF (Standing Wave Flume)
3.	1 cumec to 0.30 cumec	Parshall flume or SWF
4.	Below 0.30 cumec.	Cut-Throat flume.

All the important structures on canals are to be calibrated to measure discharges at various locations to know the canal capacity and seepage losses. For lined canals, a guage along the sloping portion must be provided at every 1.00 km, measuring devices should be provided at all talukas boundaries, also.

9.0 Driving Head :

The following driving head should be provided which will help in the determination of FSL in the canal.

1) Head over field should be 0.15 to 0.30 m, depending on the condition in each minor.

2) In addition Minimum working head at outlet should be 0.15 m.

3) The distributary will be so designed that it is able to draw full designed discharge when the main canal is running at 2/3rd the designed FSD. This would mean that FSL of the distributary will be fixed 0.30 m lower than the 2/3 FSD of the main canal.

4) Minimum Driving head of 0.15m. would be adopted from distributary to minor and from minor to sub minor.

5) As far as possible the sill level of the distributary or other off take will be at the bed level of the canal.

10. Cross Regulator :

It is known that provision of cross regulator generally disturbs the regime of the canal, by causing scour immediately on the down stream and depositing slit on the upstream. But advantages exceed the disadvantages. In the stages of irrigation development, when the discharges are low, cross regulator will play in important function in feeding distributaries, though at the same time this may encourage the growth of the weeds. Adequate provision should be made for loss of head due to cross regulators.

The cross regulators should be provided at an upstream of interval of about 10 kms. and also upstream of major aquaducts. In addition, the location should be so chosen that it is just after the major offtake or before very high banks.

In future it is proposed to provide structures like duckbill weirs, etc. which automatically control the upstream water level. These designs will be developed by Central designs Organisation. Till then, the present practice of CR gates shall continues.

11. Escapes ;

An escape would usually be provided in the main canal in the initial reaches i.e. just downstream of Head regulator itself along with a suitable escape channel. Efforts may be made to provided the first escape with the same discharging capacity as for the main canal at the head.

Escape should also be provided on the main canal at every 10 km. up steam of strategic and vulnerable reaches. (Heavy bank, costly structures, tunnels etc.)

An escape must essentially be combined with a cross regulator. He discharge capacity of such an escape except the first one should be equal to 1/2 the full supply discharge at its location.

The nalla into which the escape discharges needs to be regraded to carry the full discharge to the main nalla. Enough attention needs to be paid to this aspect.

12. Other Structures :

The design of canal structures and Central Designs Works above 1 cumec capacity of canal should be done by Central Designs Organisation.

The experience of the canals in operation show that actual loss of head at

structures is more than what is accounted for in design. It is necessary to ensure that as constructed the canal will not have a loss of head more than as indicated in the design. Following guidelines may be followed :-

It is desirable to design the entire canal in one go to account for losses of head in various structures. This may not always be possible. In that case the minimum length be designed would be 10 kms. from CR to CR.

In the design of canal, while fixing the alignment, a tentative loss of head is assumed over the entire length, Where topography permits, this loss of head should be considered on a higher side than indicated by traditional values.

During detailed design, attempt should be made to restrict the loss of head to 90% of what was allowed while fixing the alignment of canals. For this purpose following methods are available.

i) Culverts should be provided without any fluming

ii) Reducing / deleting pipe culverts. (canal water through pipe)

iii) Removing the obstruction of road bridge to the waterway by deleting piers and setting back the abutments away from the waterway.

iv) Reducing the fluming at aqueduct.

After all these measures if the total head loss cannot be accommodated within 90% of the original provision, it will be necessary to raise the embankment whereever afflux is caused.

As far as possible canal syphon should be avoided. Similarly as far as possible canals will not be designed to carry the canal water through pipes under a bridge or over a nalla.

13. Ghats and cattle ramps :

Properly planned ghats and cattle ramps should be provided near villages. These cattle ramps should also be provided near bridges where there is a heavy traffic. But they should not obstruct the waterway.

Canal Testing

14. Specifications :

Specification for E/W and lining of canal shall be generally in accordance with the specifications laid down by IS codes as mentioned above :-

i)	IS Code 1860 - 1966	Specification of precast cement concrete slab for canal lining.
ii)	IS Code 4558 - 1968	Under drainage of lined canal
iii)	IS code 4791 - 1968	Earth works of canals.
iv)	IS code 5331 - 1969	Guide for specification and type of lining for canals.
v)	IS code 3872 - 1966 :	Lining of canal with burnt clay tiles.
vi)	IS code 3873 - 1978 (I revision)	Laying in situ cement concrete lining of canals.
vii)	IS code 4745 - 1968 :	Design of C/s of lined canal.
viii)	IS Code 4969 - 1969 :	Method of test for determining flexure strength of precast cement slab for canal lining.
ix)	IS code 5256 - 1968 :	Ceiling joints in concrete lining on canals.

15. Effect :

15.1 These guidelines are in supersession of the existing guidelines wherever they are at variance. Modification in the guidelines will be only with the prior approval of Chief Engineer of the concerned region and such modifications shall have to be incorporated while according approval.

15.2 These guidelines will apply to all new stretches of canals Adoption of these guidelines for canals which are partially constructed will be examined by the Chief Engineer concerned. Where it is proposed to apply these guidelines in the case of ongoing contracts, proposals will be submitted to the Government alongwith financial implications, for approval.

15.3 Where the Chief Engineer considers that changeover to new guidelines is not necessary detailed review report should be submitted mentioning reasons why changes are not considered necessary. In the mean time work can continue as originally designed.

15.4 These guidelines will be firmed up/modified by Central Designs Organisation in due course. Thereafter they will be reviewed by Central Designs Organisation every 5 years.

15.5 Aspect which are not covered in these guidelines will continue to be as per the current orders until modified instructions are issued.

15.6 Cases of doubt should be referred to Government for orders.

By order and in the name of Governor of Maharashtra.

(T. D. Dalal)

Deputy Secretary to Government of Maharashtra.

Irrigation Department

D. A. : Nil

Copy to :-

All Chief Engineers under Irrigation Department, Chief Administrator & Chief Engineer, Command Area Development, Aurangabad.

All Superintending Engineers under Irrigation Department.

All Administrators, Command Area Development Authority.

All Technical Officers in Irrigation Department, Mantralaya

All Technical Desks in Irrigation Department, Mantralaya

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