WORKING SHEET

1. LAND RECLAMATION / DEVELOPMENT BY WAY OF CONSTRUCTION OF DRAINAGE CHANNEL

Drainage channels are required to safe disposal of excess runoff water from the water logged area in agricultural field. This process of disposal of excess water develops the agricultural land and increase the land productivity also.

Let us consider for a standard case, where average /optimum depth of water to be drain out by a channel is 0.75m from an area of 100 ha in clay soil having draiage co-efficient of 5 cm (average)

Also considering a channel gradient of 0.4%. The total quantity of water to be drain in 24 hrs. i.e. discharge through the channel,

$$Q = \frac{100 \times 10000 \times 5}{100 \times 60 \times 60 \times 24} \; m^3/s$$

$$= 0.58 \; m^3/s$$

Considering S/slope = 1:1 (Clay soil)

b = 2d tan ∅/2 = 2 x 0.75 x tan 45°/2 = 0.62m

Top width = b + 2d
= 0.62 + 2 x 0.75
= 2.12m

Cross sectional area, a $= \frac{(0.62 + 2.12)}{2} \times 0.72 \; m^2$
$= 1.02 \; m^2$
Say $= 1.00 \; m^2$

Length of side, s $= \sqrt{(0.75)^2 + (0.75)^2}$

$= 1.06$ m

Wetted perimeter, p = 2 x s + b
= 2 x 1.06 + 0.62
= 2.74m

Hydralic Radious, R $= \frac{a}{P} = \frac{1}{2.74} = 0.36$m

Velocity through the channel by mennings formula

$$V = \frac{1}{n} R^{2/3} \; S^{1/2}$$ (manning n=0.04)

$$= \frac{1}{0.04} \times (0.36)^{2/3} \times (0.004)^{1/2}$$

= 0.81 m/s

Permissible velocity in clay soil is 1.2 m/s. Therefore, the calculated velocity of 0.81 m/s is safe against scouring.

Now, discharge through the design ditch,

Q = 1.00 m^2 x 0.81 m/s
= 0.81 m/s which is greater than required discharge of 0.58 m^3/s.

2. Land Development work by Construction of Earthen Embankment with Core Walling (concrete) /without Core Walling.

Generally land development works in the department is taken up to prevent entry of flood water to the agricultural field and silt along with to prevent erosion of agricultural land adjustance to the river bank or to guide surface runoff to a safe disposal point. Uniform distribution of water in cultivable land is also another purpose of it. To meet up the above purposes and for the point of conservation of soil and water and the stability of the embankment, core wall should be introduced, which is a centrally provided fairly impervious wall in the embankment, aspecially in the meandering portion of the river. It checks the flow of water in the section of the dam. Generally the core wall extends from the ground level up to High Flood Level (HFL). The core wall may be constructed of various materials, such as puddle clay, masonry or concrete.

Now, for a general condition considering height
of water up to HFL = 0.85m
Freeboard = $\frac{15 \times 0.85\text{m}}{100}$ = 0.13m
Total height = 0.98m Say = 1.00m
(Considering approx. 5% consolidation)
Top width = $\frac{H}{5} + 1.5$ = $\frac{1.00}{5} + 1.5$ = 1.70m
Considering side slope of 1:1
Bottom width = 3.70m
Therefore, cross section area = $\frac{(1.70 + 3.70)\text{m} \times 1.00\text{m}}{2}$ = 2.70 m^2
Considering core trench of bottom width = 0.075m
Top width = 0.10m
Depth = 0.20m
Thus, top width of core wall = 0.075m
With height up to HFL i.e. = 1.00m

3. Contour Bunding (with core embankment of hard soil) :

The determination of cross-section of the bund base on selection of the vertical or horizontal intenval is the prime criteria of designing of a contour bund. In the absence of better information, the spacing of bunds may be based on standard recommendations as per the suitability of local condition.

The height of bund should provide sufficient storage above the bund to handle the exected runoff. The proper capacity of bund for an area can be obtained by estimating the maximum amount of runoff to be handled by the bund.

In our condition for a general field slope of 0 to 5%, it is usual practice to provide 30cm design depth of impounding, 30cm depth of flow over the outlet and 20cm as free board, which makes the overall height of 80cm with top width of 0.50 and bottom width of 2.1m, side slope work out to 1:1. The cross section works out to be 1.00 Sqm. approximately.

Now, for a critical length of 100m per ha of area, the volume of earth work works to be 100 m3/ha

4. Boulder Spur :

Let as considered a standard with of stream optimum
width as per as the Soil Conseravation works concern) = 30.00m
Depth of the stream = 3.00m
Therefore, length of the Spur = $^1/_3$ of the stream width
= $^1/_3$ x 30.00m = 10.00m
Height of the Spur = 70% of depth of the Spur = $\frac{70}{100}$ x 3.0m = 2.10m
Considering base height of the Spur = 0.90m
(Below ground level)
Total height of the Spur = 2.10m + 0.90m = 3.00m
Top width of the Spur = 70% of the height of Spur
= $\frac{70}{100}$ x 2.10m= 1.47m Say = 1.50m
Therefore, bottom width (at 0.5 :1 slope) = (1.05 + 1.50+1.05)m
= 3.60m
Therefore base width = 4.60m (0.50m in each side)

Model Detail Estimate for Boulder Spur (As per APWD Schedule 2007-08)

Length of Spur = 10.00m
Height of Spur = 2.10m
(above bed level)
Depth of foundation = 0.90m

Item No. 1. Site clearance L.S.. Rs. 500.00

Item No. 2. Earth work in foundation bed portion
Bed portion = 4.60m x 0.90m x 10.0m
= 41.40 m^3
@ Rs. 47.00/m^3... Rs. 1,946.00

Item No. 3. Cost of boulder (As per schedule rate)
Providing & laying of boulder etc.
1. For base = 0.90m x 4.60m x 8.0m = 33.12 m^3
2. For Spur, with nose
(i) 2.10m x $\frac{(1.50+3.60)}{2}$ x 8.00m = 42.84 m^3
(ii) (3.60 +1.80)m x (2.10+1.00)m x 2.0m= 8.37 m^3

2 2

3. Nose cushion = 2.00m x 2.00m x 4.60m = 18.40 m^3

Total = 102.73 m^3

@ Rs. 1,029.00/m^3.. Rs. 1,05,709.00

Item No.4. Supplying, fitting, fixing with H/wire net

Quantity :

1.	For base	
(i)	0.90m x 8.00m x 2 sides	= 14.40 m^2
(ii)	4.60m x 8.00m x 2 sides	= 73.60 m^2
(iii)	0.90m x 4.60m x 2 sides	= 8.28 m^2
2.	Spur	
(i)	2.96m x 8.00m x 2 sides	= 47.36 m^2
(ii)	1.50m x 8.00m x 1 side	= 12.00 m^2
(iii)	$\left(\frac{1.50 + 3.60}{2}\right)$ x 2.10m x 2 sides	= 10.71 m^2
3.	Nose	
(i)	$\left(\frac{3.60 + 1.80}{2}\right)$ x 2.0m x 1 No	= 5.40 m^2
(ii)	1.80m x 1.00m x 1 No	= 1.80 m^2
(iii)	3.60m x 2.10m x 1 No	= 7.56 m^2
(iv)	$\left(\frac{2.53 + 1.41}{2}\right)$ x 2.0m x 2 sides	= 7.88 m^2
(v)	2.28m x 3.60m x 1 No	= 8.20 m^2
4.	Nose Cushion :	
(i)	2.0m x 4.60m x 2 sides	= 18.40 m^2
(ii)	4.60m x 2.00m x 2 sides	= 18.40 m^2
(iii)	2.0m x 2.0m x 2 sides	= 8.00 m^2
	Total	= 241.99 m^2
	Adding 10% extra for lapping	= (241.99 + 24.199) m^2
		= 266.189 m^2

Rate Analysis of Hexagonal wire :

Rate for 1 (one) roll of 15.24 rm x 3.66 rm size of Hexagonal wire netting made of 8 SWG triply twisted 152mm mesh is Rs. 6350/- (average rate of ASIDC for all district w.e.f. 03.07.2008).

Adding 8% VAT, Total = Rs. 6350.00 + Rs. 508.00 = 6858.00

Therefroe, rate per Sqm. = $\frac{\text{Rs. } 6858.00}{15.24 \text{ rm} \times 3.66 \text{rm}}$ = Rs. 122.95/m^2

Carring cost @ Rs. 500/- roll to work site = $\frac{\text{Rs. } 500.00}{15.24 \times 3.66 \text{ m}^2}$ = Rs. 8.96/m^2

= Rs. 131.91 m^2

@ Rs. 131.91/m^2.. Rs. 35,112.00

Item No. 5. Fitting, Fixing of H/wire net for the spur, nose,cushion and base.

L.S. = 3 Dls @ Rs. 97.00/Dl............................ Rs. 291.00

1 Dl as black smith .... Rs. 150.00

Item No. 6. Planting of soil conservation species in between spurs, area = 60m x 3.00m = 180.00 m2
@ Rs. 5.00/m2.. Rs. 900.00

Total Rs. 1,44,608.00

Now considering straight reach where specing between the spurs varies 4 to 6 times the projected length of the spur, the average length of spur that can project stream bank is = $\frac{(4+6)}{2}$ x 10m = 50.00m

Therefore, cost of spur per unit stream length is = Rs. $\frac{1,44,608.00}{50}$

= Rs. 2892.16

Say = Rs. 2,900.00/m length

5. Boulder Pitching with Rivetment :

Depth of the stream = 3.00m
Therefore bank slope length = (at 45° optimum slope of pitching)

Therefore pitching length = $\sqrt{3^2 + 3^2}$
= $\sqrt{18}$ = 4.24 Say = 4.25m

Pitching thickness = 45 cm
Considering the Rivetment dimension = 1.00m x 1.00m

Model Estimate for Boulder Pitching with Rivetment :
(As per APWD Schedule (2007-08)
(Unit per RM of River Bank)

Item No. 1. Earth work in bank easing, volume
= ½ x 3.00 x 3.00 x 1.00 m^3 = 4.50 m^3
@ Rs. 47.00/m^3.. Rs. 212.00

Item No. 2. Providing & laying of boulder etc
(i) For pitching = 4.25m x 0.45m x 1.00m = 1.912 m^3
(ii) For Rivetment = 1.00m x 1.00m x 1.00m = 1.00 m^3
= 2.912 m^3

@ Rs. 1029.00/m^3... Rs. 2,996.00

Item No. 3. Supplying, fitting, fixing with H/wire net
Quantity for pitching,
= 4.25m x 1.00m x 2 sides = 8.50 m^2
= 4.25m x 0.45m x 2 sides = 3.82 m^2
= 0.45m x 1.00m x 2 sides = 0.90 m^2
For Rivetment,
= 1.00m x 1.00m x 2 sides = 2.00 m^2
= 1.00m x 1.00m x 2 sides = 2.00 m^2
= 1.00m x 1.00m x 2 sides = 2.00 m^2

Total = 19.22 m^2

Adding 10% for lapping = 19.22 m^2 x 1.922 m^2

= 21.142 m^2

@ Rs. 132.91/m^2 (Analysis as in boulder spur)... Rs. 2,810.00

Item No.4. Fitting, fixing of H/wire net for the revetment and pitching.

Total = 1 Dl @ Rs. 97.00/Dl....... Rs. 97.00

1 Dl as black smith @ Rs. 150.00 Rs. 150.00

Rs. 247.00 Rs. 247.00

Total Rs. 6,265.00

Say Rs. 6,250.00

6. Model Design and Estimate for a Water Distribution Channel (For a critical length of 125m per hectare of area)

Design :

Considering Principal crop as paddy water requirement = 120 cm

Consider this irrigation required is 45 days. i.e. irrigation required in 24 hrs.

$= \frac{120}{45} = 2.66\text{cm/day}$

Discharge required for command area of 1.0 hectare,

$$Q = \frac{1 \times 10{,}000 \times 2.66}{100 \times 60 \times 60 \times 24} = 0.003\ m^3/S$$

Considering depth of the channel = 0.60m and side slope = 1:1 (Sandy clay soil) and field gradent of 1.0m in 2500m (0-3% slope area)

b= 2d tan $\varnothing/_2$ = 2 x 0.60 x tan $^{45}/_2$ = 0.50m

Top width = b + 2d

= 0.50 + 2 x 0.60

= 1.70m

Cross section area, a $= \frac{(0.50 + 1.70)}{2} \times 0.60\ m^2$

= 0.66 m^2

Length of side, s $= \sqrt{(0.60)^2 + (0.60)^2}$

= 0.84m

Wetted perimeter, p = 2 x s + b

= 2 x 0.84 + 0.50

= 2.18m

Hydralic Radious, R $= \frac{a}{P} = \frac{0.66}{2.18} = 0.30$

Velocity through the channel,

$$V = \tfrac{1}{2}\ R^{2/3}\ S^{1/2}$$

$$= \frac{1}{\quad} \times (0.30)^{2/3} \times \left(\frac{1}{\quad}\right)^{1/2}$$

$$0.04 \qquad\qquad 2500$$
$= 0.22$ m/s

i.e. within permissible velocity in clay soil against scouring.
Now, discharge through the design channel.

$Q = 0.66\ m^2 \times 0.22\ ^{m}/_{s}$
$= 0.145\ m^3/s$ >than required discharge

7. GULLY CONTROL / DROP SPILLWAY

Re-presentative Field Data :

1. Drainage area of Micro Watershed = 70 ha
2. Drop / Average depth of the Gully/Juri = 2.00m
3. Agricultural land with average land slope = 0-3%
4. Maximum length of travel L = 1100m and difference of elevation at outlet from origin = 7.00m

Using Rational Formula,

Peak Discharge, $Q = \frac{CIA}{360}$……………….(A)

Intensity of Rainfall,

$I = \frac{KT^a}{(t+b)^n}$ cm/hr……………………(B)

Where, T = Recurrance interval

t = time of concentration in hrs; k,a,b,n are parameters, may be considered from Intensity-return period relationship table for 30 years of recurrence interval.

k = 7.60
a = 0.1557
b = 0.55
n = 0.9401

Time of concentration

$t = 0.01947 \times (K)^{0.77}$ minutes, where

$k = \sqrt{\frac{L^3}{H}} = \sqrt{\frac{(1100)^3}{7}} = 13789$

Therefore, $t = 0.01947 \times (13789)^{0.77}$
$= 30.0$ minutes
$= \frac{30}{60}$ Hr $= ½$ hr.

Thus, $I = \frac{7.60 \times (30)^{0.1557}}{(^4/_2 + 0.55)^{0.9401}}$
$= 12.40$ cm /hr $= 124$ mm/hr.

Therefore, $Q = \frac{CIA}{360}$, C= 0.50 (runoff co-efficient)
$= \frac{0.50 \times 124 \times 70}{360}\ m^3/s$
$= 12.05\ m^3/s$

Adding 20% for peak discharge,

Q max $= 12.05\ m^3/s + 12.05 \times \frac{20}{100}\ m^3/s$

$= 14.46\ m^3/s$

Model Design of Water Harvesting Structure cum Water Distribution Network (Uttar Amloga Area, Balipara Development Block, Sonitpur District)

(A) Re-prentative Field Data :

1. Drainage area of watershed = 70 ha
2. Average width of the juri = 7.0m
3. Average depth of the juri = 2.0m
4. Agricultural land with average land slope = 0-3%
5. Surface velocity of the gully /juri water = 1.1 m/s

(B) Hydrological Design :

Cross section area of the gully /juri, A $= 7.0 \times 2.0\ m^2$

$= 14.00\ m^2$

Mean velocity = 1.0 x 0.86 m/s (Average velocity = 0.86 m/s)

= 0.86 m/s

Therefore, discharge, Q $= A \times V\ m^3/s$

$= 14 \times 0.86\ m^3/s$

$= 12.04\ m^3/s$

Increasing 20% for peak flood season, Q max $= 12.04\ m^3/s + 12.04 \times \frac{20}{100}\ m^3/s$

$= 14.40\ m^3/s$

(C) Hydranlic Design :

Let us considered,

F = Net drop (drop from crest to top of transverse sill)

= 2.0m

h = Depth of wire (including freeboard)

= 1.20m

Therefore, h/F $= \frac{1.20}{2} = 0.60$

i.e. within 0.50 to 0.75

Now, L = Crest length $= Q \left(\frac{1.10 + 0.01\ F}{1.71 \times h^{3/2}}\right)$

$= 14.45 \left(\frac{1.10 + 0.01 \times 2.0}{1.71 \times (1.20)^{3/2}}\right)$

= 7.20m, i.e. L = 7.20m

(D) Structural Design :

The dimensions of the components of the structure are determined as below.

(i) Minimum head wall extension,

E = (3h + 0.60) or 1.50 F, whichever is greater

= (3 x 1.20 + 0.60)m or 1.50 x 2.0m

= 4.20m or 3.00m

Adopt, E = 4.00m

(ii) Length of apron or basin, L_B $= F\,(2.28\ ^h/_F + 0.54)m$
$= 2\,(2.28 \times \frac{1.20}{2} + 0.54)m$
$= 3.816m$
Adopt $L_B = 4.00m$

(iii) Height of Transverse sill, Ts = $^h/_3 = \frac{1.20}{3}$ m = 0.40m

(iv) Height of Longitudinal sill, Ls = $^h/_4 = \frac{1.20}{4}$ m = 0.30m

(v) Height of wing wall and side wall at junction, J = 2h or $(F+h+Ts-(L_B + 0.10)/_2)$
Whichever is greater
$= 2 \times 1.20$ or $(2+1.20+0.40- (4.00+0.10)/_2)$
= 2.40m or 1.55m Adopt, J = 2.40m

(vi) Slopping portion length of side wall, M = 2 (F + 1.33h-J)
= 2 (2.0 + 1.33 x 1.20-2.40)
= 2.392m, Adopt, M = 2.50m

(vii) Straight portion length of side wall, K = L_B - M
= (4.00-2.50)m = 1.50m

(viii) Length of wing wall, W = 2.83 (J-Ts-0.30)
= 2.83 (2-0.40-0.30)m
= 3.679m, Adopt, E = 4.00m

(ix) Free end height of wing wall, W_F = (Ts + 0.30)m
= (0.40 + 0.30)m
= 0.70m

(x) Depth of Toe wall & cut off wall, d = 1.50 x NSD
$= 1.50 \times 0.473 \times (^Q/_5)^{1/3}$
Q = discharge
f = silt factor
$= 1.50 \times 0.473 \times \left(\frac{14.45}{1.20}\right)^{1/3}$
= 1.612m Adopt, d = 1.65m

(E) Structural Details :

(i) All walls, i.e. head wall, H.W. Extension, side wall, wing wall, cutoff & toe wall, transverse & longitudinal sill, buttress etc are taken 30cm thick.
(ii) Apron & heal slab thickness is taken as 35cm.
(iii) Re-inforcement in all walls and apron are taken as 12mm ∅ rods placed at 25cm C/C and 16mm ∅ bar at buttress.
(iv) Total reinforcement approximately considered as 60 Kg per cubic meter of RCC work.

L = 7.20m	M = 2.50m
E = 4.00m	K = 1.50m
L_B = 4.00m	W = 4.00m
Ts = 0.40m	W_F = 0.70m
Ls = 0.30m	d = 1.65m
J = 2.40m	

Details estimate for RCC Water Harvesting Structure / Drop Spillway
(As per APWD (R & B) Schedule of rates 2007-08)

Item No. 1. Site preparation inclding debries, clearance, uprooting etc if any L.S.................................. Rs. 2,500.00

Item No. 2. 3.13/304 Earth work in excavation in ordinary soi for foundation of structures as per drawing and technical specification including de-watering of water etc.

(i) Adove GBL = $\frac{(17.5+15.5)}{2}$m x 10.00m x 2.15m
= 354.75 m^3
Deducting gully section volume, = (-) 10.0m x 7.0m x 2.15m
= (-) 150.50 m^3
Total = 204.25 m^3

(A) Manual means (depth up to 3.0m)
(without dewatering) @ Rs. 99.00/m^3............... Rs. 20,220.00

(ii) Below GBL
(i) H/W & H/W extension, W/W & Toe wall
= 2 x $\frac{(17.5+15.5)}{2}$m x 1.50m x 2.25m^3
= 111.38 m^3
(ii) Apron, = 7.80 x 0.95 x 4.00 m3 = 29.64 m^3
= 141.02 m^3
(A) Manual means (depth up to 3.0m)
(with dewatering) @ Rs. 108.00/m^3..................... Rs. 15,230.00

Item No. 3. Collection cost of stone chips machine broken materials for solling in H/W, H/W extension, W/W, T/W etc and apron before RCC work.

(i) H/W & H/W extension, W/W & Toe wall,
2 x 15.20 x 0.75 x 0.20 = 4.56 m^3
(ii) Apron = 7.80 x 4.00 x 0.20 = 6.24 m^3
= 10.80 m^3
For 40mm chips, @ Rs. 451.00/m^3.................. Rs. 4,871.00

Item No. 4. 13.5 (A) 1500,1700 &2200 RCC work in sub structure complete as per drawing and technical specification and steel shuttering form work.
Volume of RCC works :
(a) Head wall & cut-off wall 7.20m x 4.05m x 0.30m = 8.75 m^3
(b) H/W extension = 2 x 4.00m x 5.25m x 0.30m = 12.60 m^3
(c) Side wall = 2 x 3.95m x 1.50m x 0.30m
+ 2 x $\frac{(3.95 + 2.75)}{2}$m x 2.50m x 0.30m = 8.58 m^3
(d) Apron = 7.20m x 4.00m x 0.35m = 10.08 m^3
(e) T. wall & Transverse sill = 2.05m x 7.20m x 0.30m= 4.43 m^3
(f) Wing wall= 2 x $\frac{(4.05 + 2.35)}{2}$m x 4.0m x 0.30m = 7.68 m^3

(g) Butress = 1 x $\frac{(0.30 + 1.50)}{2}$m x 2.40m x 0.30m = 0.65 m^3

(h) Sill beam = 1 x 0.30m x 0.30m x 2.50m = 0.23 m^3

(i) Heal slab = 7.20m x 0.35m x 0.30m = 0.76 m^3

(j) W/wall footings

2 x $\frac{(0.30 + 0.50+0.20)}{3}$m x 4.0m x 0.30m = 0.80 m^3

(k) H/W exten. footing = 2 Nox3.70mx0.35mx0.30m = 0.78 m3

(back side) Total = 55.34 m^3

(F) RCC grade M- 20,

@ Rs. 4,591.00/m^3................................ Rs. 2,54,066.00

Item No. 5. 13.6	Supplying, fitting and fixing of reinforcement in position including cost of cutting & bending reinforcement as per drawing and technical specification. Total volume of RCC = 54.56 m^3 M/s Rod required = 0.60 Qt/m^3 (As per analysis enclosed) i.e. 0.60 x 55.34 Qtls = 33.20 Qtls. = 3.32 MT @ Rs. 46,779.00/MT..................................	Rs. 1,55,306.00
Item No. 6.	Supply of river gravel 6.00m to 20mm size including laying in position for type A filter of the spillway. $\frac{(0.50 + 1.50)}{2}$m x 1.00m x 7.20m = 7.20 m^3 @ Rs. 571.00/m^3......................................	Rs. 4,111.00
Item No. 7.	Plastering with cement mortar (including cleaning surface etc) thickness of plaster = 12mm	

Area :

(i) H/Wall = 2 x 7.20m x 2.40m = 34.56 m^2

7.20m x 0.30m = 2.16 m^2

(ii) H/W = 2 x 2 x 4.0m x 1.50m = 24.00 m^2

2 x 4.0m x 0.30m = 2.40 m^2

(iii) S/wall= 2 x 3.60m x 1.50m = 10.80 m^2

2 x $\frac{(3.60+2.40)}{2}$m x 2.50m = 15.00 m^2

2 x 1.20m x 1.50m = 3.60 m^2

2 x $\frac{(1.0+0.50)}{2}$m x 2.50m = 3.75 m^2

2 x 4.0m x 0.30m = 2.40 m^2

(iv) W/wall = 2 x 2 x $\frac{(2.4+0.7)}{2}$m x 4.0m = 24.80 m^2

2 x 4.0m x 0.30m = 2.40 m^2

(v) Transverse sill = 2 x 0.40m x 7.20m = 5.76 m^2

1 x 7.20m x 0.30m = 2.16 m^2

(vi) Butress = 2 x 2.40mx (0.30+1.50)m = 4.32 m^2

2

(vii) Sill beam = 3 x 2.50m x 0.30m = 2.25 m^2

Total = 140.36 m^2

@ Rs. 72.00/m^2... Rs. 10,106.00

Item No. 8. 17/28 Earth work in local clay soil including necessary dressing watering etc.

1. U/S of structure = 7.20m x $\left(\frac{3.0m+9.0m}{2}\right)$ x 1.70m

= 73.44 m^3

2. Around H/W extension= 2 Nos x $\left(\frac{3.0m+9.0m}{2}\right)$ x 4.0m x 2.0m

= 96.00 m^3

3. Guide bund (1:1 slope)

= 2 Nos x 100 x $\left(\frac{1.5m \times 4.50m}{2}\right)$ x 1.50m

= 900.00 m^3

Total = 1069.44 m^3

@ Rs. 69.00/m^3.. Rs. 73,791.00

Item No. 9. Furnishing and laying of the live sods of perennial turf for guide bund sides

2 Nos x 2 sides x 100m x 2.12m = 848.00 m^2

@ Rs. 19.00/m^2.. Rs. 16,112.00

Item No. 10. 15.4 Collection, supplying and placing in position of man size boulder including payment of forest royalty.

1. U/S side of structure

(a) 7.20m x 2.0m x 0.30m = 4.32 m^3

(b) 2 sides x 4.50m x 2.0m x 0.30m = 5.40 m^3

2. D/S side of structure

$\left(\frac{7.20 + 12.84}{2}\right)$m x 2.82m x 0.60m = 16.95 m^3

Total = 26.67 m^3

@ Rs. 1,029.00/m^3....................................... Rs. 27,443.00

Item No. 11. Construction of a temporary shed with kitchen size 8.50m x 3.50m = 29.75 m^2

@ Rs. 534/m^2.. Rs. 15,887.00

Item No. 12. Errection of a tube well L.S.............................. Rs. 4,000.00

Item No. 13. Fitting, fixing of a signboard of permanent Nature. L.S……………………………………………….…. Rs. 3,500.00

Total	Rs. 6,07,143.00
Adding 1% contingency …………………………..	Rs. 6,071.00
Grand Total	Rs. 6,13,214.00
Say	Rs. 6,13,000.00

Therefore, Cost/Sqm. of Head wall works

$$= \frac{\text{Rs. } 6,13,000.00}{7.20\text{m} \times 2.40\text{m}}$$

= Rs. 35,474.53 Say = Rs. 35,500.00

(Rupees thirty five thousand five hundred) only.

Approved by

(R.K. Doley)
Director
Soil Conservation,Department Assam,
Pannyagar Bhawan, Guwahati-05

Committee for Revision of Departmental Norms

Scutinized by

(J.C. Gogoi)
Chairman & Joint Director of Soil Conservation,
(Head Quarter) S.C. Directorate,
Guwahati-05

(B.K. Bhattacharjya)
Member
&
Divisional Soil Conservation Officer (Engineering), Uzan Bazar, Guwahati-01

(P. Dutta)
Member
&
Divisional Soil Conservation Officer, Hamren Soil Conservation Division, Hamren

(P. Saikia)
Member Secretary
&
I/C Joint Director of Soil Conservation, Lower Assam Circle, Guwahati

(D. Gogoi)
Member
&
Assistant Soil Conservation Officer, S.C. Directorate,
Guwahati-05

(G. Kalita)
Member
&
Soil Conservation Overseer
O/O the Jt. DSC (RVP)
Guwahati-01

****