

Umthlong (Kharmuti) Water Supply Scheme

Estimated Cost : ₹ 1,44,01,455.00

PROFORMA

1. Name of scheme : *Umthlong (Kharmuti) water supply scheme*
2. No. of villages to be covered : *1 (One) No.*
3. Name of villages : *Umthlong (Kharmuti)*
4. Name of district and state : *West Khasi Hills, Meghalaya*
5. Population of the villages reference to the 'Partially Covered' habitation : *500 souls*
6. Ultimate population of the villages reference to Sl.No.5 above. : *2205 souls*
7. Population of the villages with reference to the 'Partially Covered' habitation :
8. Ultimate population of the villages reference to Sl.No.7 above. :
9. Population of the village with reference to unlisted category. : *Nil*
10. Ultimate population of the villages reference to Sl.No.7. : *Nil*
11. Source of supply : *DTW*
12. Per capita rate of water demand : *40 Lpcd*
13. Type of treatment proposed : *Nil*
14. No. of platform proposed :
15. Estimated Cost : *₹ 1,44,01,455.00 lacs*
16. Per capita cost : *₹ 6,531.30*
17. Expenditure already incurred if any upto 31.03.2012 : *Nil*
18. Proposed mode of maintenance : *Phed till taken over by local committee*
19. One Plan accompanying the proforma : *Detailed estimate and plan attached.*
20. Pumping arrangement if any : *Yes.*

Annual Plan 2012-2013

1. **Sector** : *Rural water supply scheme*
2. **Title of the scheme** : *Umthlong (Kharmuti) water supply scheme*
3. **Budget Provision (2012-13) Page No. Clause**
 - (a) Head of Account
 - (b) Amount provided : *₹ In lacs.*
 - (c) New/continuing scheme : *New*
 - (d) If continuing scheme, sanction letter, date & amount (in the proceeding year) : *Nil*
4. **State level/district/level scheme** : *District Level*
5. **Objective of the scheme:**

*The proposal aims at providing coverage of potable water to 1 No. Partially Covered Habitation viz. **Umthlong (Kharmuti)** 25-50% as on 01.04.2011 whose supply are adversely affected on account of deterioration of the sources.*
6. **Cost components of the scheme:**
 - (a) Man power (salaries/T.A. etc.) : *Nil*
 - (b) Office expenses (stationery telephone etc.) : *Nil*
 - (c) POL/Maintenance of vehicles. : *Nil*
 - (d) Building (construction/maintenance) :
 - (e) Land (Cost of acquisition etc.) : *Nil*
 - (f) Wages (of casual/temporary labour etc.) : *Nil*
 - (g) Equipment : *Nil*
 - (h) Subsidy/grand-in-aid etc. : *Nil*
 - (i) Other elemented (specify details) : *Nil*
7. Performance in proceeding years (Indicate impact/response to the scheme) : *Nil*
8. Has the scheme been evaluated by any external agency ? If so, whatever the finding? : *Nil*
9. Is the scheme centrally-sponsored or central sector ? If so, has the central share of funds been received in full/part last year ? : *Nil*
10. Linkage with other schemes : *Nil*
11. Loan component, if any : *Nil*
12. Vehicles (if there is a proposal for acquisition of new vehicles, please add an inventory of existing vehicles) : *Nil*

I Aims & Objectives.

- 1.1 The proposal aims at providing qualitative and quantitative improvement of water supply coverage to Partial Coverage Habitations viz. **Umthlong (Kharmuti) 25-50%** as on 01.04.2011 in view of rapid growth of population, expansion and development.

II General report.

2.1 Location and population.

- 2.1.1 Umthlong Kharmuti is situated North west of Shillong in the West Khasi Hills District. The habitations are situated about 20 Kms away from Sohiong Village. Approach to the Habitations through an all season Mawmaram – Krang - Mawmih road. The average elevation of the habitations is about 1783m above mean sea level. The Habitations are under Mairang CR&D Block. The population of the habitations as per data re-alignment 2011 including educational institutions is indicated in Table 2.1.1.

Table 2.1.1

Sl. No.	Name of habitation	Population (2011)	Decadal growth (%)	Population (2012)	Population (2027)
1	2	3	4	5	6
1.	Umthlong (Kharmuti)	500	28.30	514	730
Total :		500		514	730

Table 2.1.1

Sl. No	Name of institution	Population (2012)	Decadal growth (%)	Population (2027)
1	2	3	4	5
1.	Area Sec. School, Umthlong Student : 150 Staff : 10	160	28.30	227
2.	Govt. Sec. School, Umthlong Student : 300 Staff : 20	320	28.30	454
3.	Presbyterian LP School Student : 30 Staff : 2	32	28.30	45
4.	Upp. Primary Eng. School, Umthlong Student : 70 Staff : 4	74	28.30	105
5.	Kharmuti LP School Student : 40 Staff : 2	42	28.30	60
6.	Govt. LP School Student : 60 Staff : 4	64	28.30	91
7.	ICDS, Umthlong Student : 100 Staff : 2	102	28.30	145

1	2	3	4	5
8.	ICDS, Kharmuti Student : 85 Staff : 2	87	28.30	124
9.	Mini Center ICDS, Student : 40 Staff : 1	41	28.30	58
10.	Umthlong ICDS Student : 90 Staff : 2	92	28.30	131
11.	Meghalaya Rural Bank, Umthlong Staff : 5	5	28.30	7
12.	CHC, Umthlong Staff : 20	20	28.30	28
			Total :	2205

2.1 Existing water supply system.

2.2.1 The existing scheme is a Pumping Scheme envisages pumping of water from the river source called **Wah Kyndong Kule**.

2.2.2 During the last decade, Umthlong Kharmuti has also expand considerably both in population and area. The rapid growth in population, expansion of the area including aging of the plant and machineries etc. rendering of the existing scheme incapable to meet the demand of the habitations intended to be serves by the scheme leave alone extending the supply to Partially Covered Habitations.

2.2 Proposed water supply system.

2.3.1 On account of the rapid growth in population beyond the designed population of the scheme, expansion of the area and aging of plant & machineries of the existing scheme and the need to extent supply to Partially Covered Habitations, it has become absolutely necessary to formulate a scheme to improve the water supply position to the habitations. The proposed scheme intended to construct an intake arrangement across the spring called **Wah Mih Tip**, located at a distant of 2.90 Kms from the village. The source where suitable and adequate land has been earmarked by the local authority for construction of different components viz. Intake arrangement, Laying of Conveyance Main, RCC Sump, Pump House, Laying of Rising Main, Zonal Reservoirs and Distribution System.

2.3.2 The proposed source having a winter discharge of 2,26,512 Lpd as measured on 04.03.2012.

2.4 Water requirement.

2.4.1 The daily water requirement of the habitations is assessed based on the supply rate of 40 Lpcd. The daily water requirement of the different institutions based on the recommended per capita water supply level of the manual on water supply and treatment, Govt. of India on institutional needs is also provided in addition to the daily requirement of the population of the habitations. The total daily water requirement also takes into consideration the unaccounted for water (UFW) @ 15% as recommended by the manual.

2.4.2 The daily water requirement of the habitations including the institutional needs is worked out in table 2.4.1.

Table 2.4.1

Sl. No.	Habitation/Institution	Ultimate population 2027	Rate of water supply (Lpcd.)	Daily water requirement (Lpd.)
A. Habitations:				
1.	Umthlong (Kharmuti)	1971	40	78,840
B. Institutions :				
1.	Area Sec. School, Umthlong	227	15	3405
2.	Govt. Sec. School, Umthlong	454	15	6810
3.	Presbyterian LP School	45	15	675
4.	Upp. Primary Eng. School, Umthlong	105	15	1575
5.	Kharmuti LP School	60	15	900
6.	Govt. LP School	91	15	1365
7.	ICDS, Umthlong	145	15	2175
8.	ICDS, Kharmuti	124	15	1860
9.	Mini Center ICDS.	58	15	870
10.	Umthlong ICDS	131	15	1965
11.	Meghalaya Rural Bank, Umthlong	7	15	105
12.	CHC, Umthlong	28	45	1260
Total :				1,01,805lpd.
Add UFW @ 15% (+)				15,271lpd.
Grand Total :				1,17,076lpd.

2.5 Land acquisition.

2.5.1 Land required for implementation of the scheme shall be made available free of cost by the locality. The proposal has therefore no provision for payment of compensation for acquisition of land.

2.6 Finance.

- 2.6.1 As the scheme is proposed to provide coverage of PC habitations, the scheme may qualify for finance under National Rural Drinking Water Programme (NRDWP). Financing of the scheme under NRDWP is proposed accordingly.

2.7 Socio – economic condition.

- 2.7.1 People of the area are mainly tribal and the main occupation ranges from farming, business and trading to govt. services. The socio – economic condition of the people of the area is comparatively better.

III Engineering report.

3.1 Intake arrangement.

- 3.1.1 An Intake arrangement is proposed to be constructed across the spring source to impound sufficient water for conveyance it to the RCC Sump.

3.2 Pump house & pumping system.

- 3.2.1 A pump house is proposed to be constructed to house the pumping machineries and motor control center. 2 nos. of pumps of appropriate capacity is proposed to be installed for lifting of water from the RCC Sump through a rising main of economical diameter to the main reservoir proposed to be constructed at the highest point of the village. Of the 2 pumps, 1 will be in operation and the other as standby unit.

3.3 Main Reservoir.

- 3.3.1 For storage of water lifted by the system, a main reservoir is proposed to be constructed at the highest point of the village. The capacity of the reservoir is considered at 1/3 of the total daily requirement.

3.4 Zonal Reservoir.

- 3.4.1 For equi-distribution of water to different parts of the village, zonal reservoirs are proposed to be constructed at location of the village. The capacity of the zonal reservoirs is considered at 1/3 of the total daily requirement.

3.5 Gravity feeder main.

- 3.5.1 3 Nos. of Gravity Feeder Main are proposed to be laid from the main reservoir located at different locations to the zonal reservoirs located at different locations where water shall then be allowed to distribute to the location of the habitation.

3.6 Distribution system.

- 3.6.1 Water from the service reservoirs is proposed to be distributed to the habitation and by gravitational flow through a network of distribution system. The distribution networks is designed using the computer software viz. **Branched water distribution design programme – (C) The world bank.**

3.7 Power.

- 3.7.1 An 11Kv line is proposed to be utilized from the existing MeSEB line to the proposed site. The 11Kv power line shall be stepped down to 0.433Kv through a step down transformer at the receiving end for energizing the pumping machineries.

3.8 Operation & Maintenance.

- 3.8.1 Operation & maintenance of the scheme will be the responsibility of the department till such time the Scheme is taken over by the local authority.

3.9 Staff Quarter.

- 3.9.1 As the operators are required to stay at the site to look after the water works, and day to day operation & maintenance, construction of staff quarters is found highly necessary. The proposal therefore has a provision for construction of staff quarters.

IV Per capita cost.

- 4.1 The per capita cost of the Scheme ₹ **6,531.30**

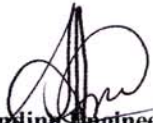
V Abstract of the Estimated Cost :


5.1 Abstract of cost of the proposal as worked out is indicated in table 5.1.

Table 5.1.


Sl. No.	Descriptions	Amount (₹)
4.1	RCC Weir	20,58,202.00
4.2	Conveyance Main	8,54,942.00
4.3	RCC Sump	2,40,000.00
4.4	RCC Pump House & Staff Quarters	8,86,043.00
4.5	Pumping Machineries	14,00,000.00
4.6	Rising Main	20,83,010.00
4.7	Main Reservoir	8,00,000.00
4.8	Gravity Feeder Main	20,01,230.00
4.9	Zonal Reservoirs	3,80,000.00
5.0	Distribution System	18,30,823.00
5.1	Power Supply	7,15,501.00
5.2	Security Fencing	4,65,920.00
	Total :	1,37,15,671.00
	Add contingency @ 5% (+)	7,85,783.55
	Total :	1,44,01,454.55
	Say :	1,44,01,455.00

Countersigned


Superintending Engineer (PHE)
Electrical Circle, Shillong


Executive Engineer (PHE)
Electrical Division
Mawphlang

Approved


Addl. Chief Engineer, PHE.,
Zone-I, Meghalaya, Shillong.

VI Cost Estimation :

- 6.1 Estimation on the probable cost of each water supply components of the scheme was arrived at based on the current PHE schedule of rates 2007-2008 for pipe line works, Plinth area rate of State PWD 2010-2011 for building works, and prevailing markets rates for pumping sets.

VII Detail estimate.

7.1 RCC Weir.

- 7.1.1 Estimate on construction of RCC Weir is indicated in table 7.1.1

Table 7.1.1

Sl. No.	Descriptions	Rate (₹)	Qty.	Amount (₹)
1	2	3	4	5
1	Earthwork in excavation to the proper level and grade including light dressing and stacking of serviceable stone as directed and removal of spoils upto 30metres and all lifted. Hard shale or medium rock. 10.00x3.80x0.70 = 26.60m ³ 2x5.00x3.80x0.70 = <u>26.60m³</u> = 53.20 m ³	104.00	53.20	5,532.80
2	Providing 100mm thick soling with approved quality of stones including local carriage of stone, including ramming, consolidation and filling the interstice with stone aggregate all complete. 10.00x3.80x0.10 = 3.80m ³ 2x5.00x3.80x0.10 = <u>3.80m³</u> = 7.60m ³	110.00	7.60	836.00
3	Providing and laying cement concrete in prop 1:3:6 with 40mm downgraded including necessary location carriage of stone aggregate and sand within 200m and curing (excluding shuttering). 10.00x3.80x0.10 = 3.80m ³ 2x5.00x3.80x0.10 = <u>3.80m³</u> = 7.60m ³	2679.00	7.60	20,360.40
4	Providing and laying cement concrete in prop 1:2:4 corresponding to M15 with stone aggregates 20mm downgraded including carriage of aggregates and sand within 200metres (excluding shuttering and reinforcement) complete as directed. 10.00x3.80x0.20 = 7.60m ³ 2x5.00x3.80x0.20 = <u>7.60m³</u> = 15.20m ³	3221.00	15.20	48,959.20

1	2	3	4	5	
5	Providing and laying cement concrete in prop 1:1½:3 corresponding to M20 with stone aggregates 20mm downgraded including carriage of aggregates and sand within 200metres (excluding shuttering and reinforcement) complete as directed. $10.00 \times 3.80 \times 0.30 = 11.40\text{m}^3$ $10.00 \times \frac{(1.20+0.30)}{2} \times 3.00 = 22.50\text{m}^3$ $2 \times 5.00 \times 3.80 \times 0.30 = 11.40\text{m}^3$ $2 \times 5.00 \times \frac{(1.20+0.30)}{2} \times 3.00 = 22.50\text{m}^3$ $= 67.80\text{m}^3$	3965.00	67.80	2,68,827.00	
6	Providing shuttering with dressed planks not less than 25mm thick properly joined including batten props to the proper level and removing the same after the concrete hardens as directed. $10.00 \times 3.00 = 30.00\text{m}^2$ $10.00 \times 3.08 = 30.80\text{m}^2$ $2 \times 5.00 \times 3.00 = 30.00\text{m}^2$ $2 \times 5.00 \times 3.08 = 30.80\text{m}^2$ $= 121.60\text{m}^2$	257.00	121.60	31,251.20	
7	Supplying, fitting, fixing including binding cranking to the design torsteel reinforcement including supplying of tying wire 20G complete. @ 1.5% of M150 conc. Vol ^m $1.5/100 \times 7850 \times 15.20 = 17.90\text{Qtl.}$ @2% of M200 conc. Vol ^m $2/100 \times 7850 \times 67.80 = 106.64\text{Qtl.}$ $= 124.54\text{Qtl.}$	5806.00	124.54	8,47,619.24	
8	Providing cement plaster including clearing the surface and curing complete. I) 12mm thick. Prop-1:2 Shuttering Area = 121.60m ² $10.00 \times 2.60 = 26.00\text{m}^2$ $2 \times 5.00 \times 2.60 = 26.00\text{m}^2$ $10.00 \times 0.30 = 3.00\text{m}^2$ $2 \times 5.00 \times 0.30 = 3.00\text{m}^2$ $= 179.60\text{m}^2$	106.00	179.60	19,037.60	
9	Extra for carriage of earth sand and stone aggregates stones beyond the initial lead of 200m including loading and unloading. I On surface or metalled road. A. 1 st Km: per kilo meter or part thereof B. In subsequent Km: Per Km or part thereof. Stone = 40Km Qty. = 78.96m ³ @ ₹ (99+64x39.00) = ₹ 2595.00 Sand = 55Km Qty. = 38.23m ³ @ ₹ (99+64x54.00) = ₹ 3555.00	2595.00 3555.00	78.96 38.23	2,04,901.20 1,35,907.65	
				Total :	15,83,232.29
				Add price escalation 6% p.a. :	4,74,969.69
				Total :	20,58,201.98
				Say :	20,58,202.00

7.2 Conveyance Main

7.2.1 Estimate on laying of conveyance main is indicated in table 7.2.1

Table 7.2.1

Sl. No.	Description of Works	Rate (₹)	Qty.	Amount (₹)
1	2	4	5	6
1 b)	Earthwork in excavation to the proper level and grade including in light dressing and stacking of serviceable stone as directed and removal of spoils upto 30 metres and all lift.			
a)	0.30x0.80x1200 In ordinary soil 50% of above	39.00	144	5,616.00
e)	Hard shale or medium rock of the hardness of the building stone, laterite and the like. 50% of above	104.00	144	14,976.00
2.	Supplying, including carriage within 8km. And laying in trenches including fitting and fixing GI Pipe complete with all GI Fitting such as socket bend, elbow, cross union socket threaded nipple, reducing tees including cutting threading etc. with all jointing materials completed excluding trenching and refilling of earth which will be paid extra applicable as per current schedule of rate the fitting will be paid extra except socket joints. 65mm dia.	416.96	1200	5,00,352.00
5.	Adding 20% for cost of GI specials.	-	-	10,00,070.40
6.	Supplying, fitting and fixing gun metal brass full way wheel valve superior quality including jointing materials and carriage of materials within 8km all complete and as directed. 65mm dia.	3873.81	3	11,621.43
7.	Supplying including carriage within a distance of 8km. Carrying laying fitting and fixing C.I. Double Air Valve screwed type including all jointing material complete as directed. 40mm dia.	4263.80	2 Nos.	8,527.60
8.	Construction of Valve Chamber with GI Pipe with 150mm thick cement concrete wall in prop 1:2:4 with 6mm thick M.S. Plate cover with hinges and locking arrangement including earthwork in excavation in foundation and 75mm thick RCC in prop 1:3:6 in foundation all complete as per drawing and direction.			
b)	For upto 50mm to 150mm dia. G.I. pipe inside dimension (0.60x0.60x0.50m)	3015.00	3 Nos.	9,045.00

1	2	4	5	6
9.	Construction of Air Valve Chamber with stone masonry 25cm thick wall prop 1:6 over 7.5cm thick RCC in foundation in prop 1:3:6 including earthwork in excavation and 12mm thick cement plaster inside the chamber in prop 1:3 finished with neat cement including 10cm thick RCC slab cover in prop 1:2:4 with 12mm rod 150mm c/c both ways and keeping 4 Nos. 25cm dia hole on the cover and providing 25mm dia. GI pipe 1m length leading to the nearest drain to escape the water all complete as per drawing and design.	3720.00	2 Nos.	7,440.00
Total :				6,57,648.03
Add price escalation 6% p.a.				1,97,294.41
Total :				8,54,942.44
Say :				8,54,942.00

7.3 RCC Sump

7.3.1 Estimate on construction of RCC sump is indicated in table 7.3.1

Table 7.3.1

Sl. No.	Description	Rate/Ltr (₹)	Capacity (ltrs)	Amount (₹)
1	2	3	4	5
1.	Construction of RCC sump of	20.00	12,000.00	2,40,000.00
Total :				2,40,000.00

7.4 Pump House

7.4.1 Estimate on construction of pump house is indicated in table 7.4.1

Table 7.4.1

Sl No	Description	Amount (₹)
1	2	3
1.	Construction of pump house with (RCC frame and roof construction) normal specification. Plinth area : 24m ² @ ₹ 13,286/m ²	3,18,864.00
Add 7% sanitary fitting (+)		22,320.48
Add 10% electrification (+)		31,886.40
Total :		3,73,071.88

8.5 Operator's Quarter.

8.5.1 Estimate on construction of operator's quarter is indicated in table 8.5.1

Table 8.5.1

Sl No	Description	Amount (₹)
1	2	3
1.	Construction of Type 'VI' quarters (RCC frame and roof construction) normal specification. Plinth Area : 33m ² x 1 = 33m ² @ ₹ 13,286/m ²	4,38,438.00
	Add 7% sanitary fitting (+)	30,690.66
	Add 10% electrification (+)	43,843.80
	Total :	5,12,972.46

8.5.2 *Cost Estimation of Pumps* : The cost estimation for supply, installation, testing and commissioning of pumps including motor control center etc. is indicated in table. 8.5.2

Table 8.5.2

Sl No.	Description	Amount (₹)
1	2	3
1.	Supply, installation, testing and commissioning of pumps capable of delivery 244 Lpm of water against a head of 190m complete with accessories comprising of non-return valves, sluice valves with hand wheel pressure gauges in the delivery manifold etc.. @ ₹ 13,000.00/Hp for 2x25Hp.	6,50,000.00
2.	Supply installation, testing and commissioning of motor control center comprising of 1 incoming and 2 outgoing panel fitted with necessary switch gears like ACB/MCB, voltmeter, ammeter, pilot lamp on both incoming and outgoing panel including star delta starting and water level gauge with automatic trip. @ ₹ 7,50,000.00/set	7,50,000.00
	Total :	14,00,000.00

8.6 Rising Main

8.6.1 Estimate on laying of Rising Main is indicated in table 8.6.1

Table 8.6.1

Sl No.	Descriptions	Rate (₹)	Qty	Amount (₹)
1	2	3	4	5
1.	Earthwork in excavation to the proper level and grade including light dressing and stacking of serviceable stone as directed and removal of spoils upto 30 metres and all lift. (0.30x0.80x2500.00)			

1	2	3	4	5
a)	In ordinary soil 50% of above	39.00	300	11,700.00
e)	Hard shale or medium rock of the hardness of the building stone, laterite and the like. 50% of above	104.00	300	31,200.00
2.	Supplying, laying in trenches including fitting, fixing of GI Pipe complete with all GI fittings such as socket bend, elbow, cross union socket, threaded nipple, reducing socket, reducing tees including cutting, threading etc. with all jointing materials complete as directed excluding trenching and refilling of earth which will be paid extra as applicable as per current schedule of rates. The fittings will be paid extra except socket joints (Medium quality pipes). 80mm dia	545.61	2500	13,64,025.00
3.	Adding 10% for cost of GI Specials	-	-	1,36,402.00
4.	Supplying, fitting and fixing gun metal brass full way wheel valve superior quality including jointing materials and carriage of materials within 8km all complete and as directed. 80mm dia	5639.63	2	11,279.26
5.	Supplying including carriage within a distance of 8km, carrying laying fitting and fixing CI Double air valve (flanged end) including supplying bolts, nuts rubber washers and air blank flanged making required holes etc. all complete including other jointing materials complete as directed. 40mm dia	4263.80	4	17,055.20
6.	Construction of valve chamber with GI pipe with 150mm thick cement concrete wall in prop 1:2 with 6mm thick MS plate cover with hinges and locking arrangement including earthwork in excavation in foundation and 75mm thick RCC in prop 1:3:6 in foundation all complete as direction. For 50mm to 150mm dia inside dimension(0.60x0.60x0.50)m	3015.00	4	12,060.00
7.	Construction of air valve chamber with stone masonry 25cm thick wall prop 1:6 over 7.5cm thick RCC in foundation in prop 1:3:6 including earthwork in excavation and 12mm thick cement plaster inside the chamber in prop 1:3 finished with neat cement including 10cm thick RCC slab cover in prop 1:2:4 with 12mm rod 150 c/c both ways and keeping 4 Nos. 25mm dia hole on the cover and providing 25mm dia GI pipe 1m length leading to the nearest drain to escape the water all complete as per drawing and design. For 80mm to 200mm dia inside dimension(0.80x0.80x0.50)m	3720.00	4	14,880.00

1	2	3	4	5
8.	Supplying, laying, fitting CI Double flange non-return valve including supplying bolts, nuts and 3mm rubber insertion and carriage of materials within 8km all complete as directed (The tail pieces if required will be paid extra) IS 5312. 80mm dia	1856.72	2	3,713.44
Total :				16,02,315.40
Add price escalation 6% p.a. :				4,80,694.62
Total :				20,83,010.02
Say :				20,83,010.00

8.7 Main reservoir.

8.7.1 Estimate on construction of main reservoir is indicated in 8.7.1.

Table 8.7.1

Sl. No.	Description	Amount (₹)
1	2	3
1.	Construction of main reservoir on ground location with capacity of 40,000 ltrs. @ ₹ 20.00/ltrs.	8,00,000.00
Total :		8,00,000.00

8.8 Gravity feeder main.

8.8.1 Estimate on laying of gravity feeder main is indicated in table 8.8.1.

Table 8.8.1

Sl. No.	Description of Works	Rate (₹)	Qty.	Amount (₹)
1	2	3	4	5
1 b)	Earthwork in excavation to the proper level and grade including in light dressing and stacking of serviceable stone as directed and removal of spoils upto 30 metres and all lift. 0.30x0.80x4000 In ordinary soil			
a)	50% of above	39.00	480	18,720.00
e)	Hard shale or medium rock of the hardness of the building stone, laterite and the like. 50% of above	104.00	480	49,920.00
2.	Supplying, including carriage within 8km. And laying in trenches including fitting and fixing GI Pipe complete with all GI Fitting such as socket bend, elbow, cross union socket threaded nipple, reducing tees including cutting threading etc. with all jointing materials completed excluding trenching and refilling of earth which will			

1	2	3	4	5
	be paid extra applicable as per current schedule of rate the fitting will be paid extra except socket joints. 65mm dia. 50mm dia.	416.96 237.11	700 3300	2,91,872.00 7,82,463.00
5.	Adding 20% for cost of GI specials.	-	-	2,14,867.00
6.	Supplying, fitting and fixing gun metal brass full way wheel valve superior quality including jointing materials and carriage of materials within 8km all complete and as directed. 65mm dia. 50mm dia.	3873.81 2315.69	4 Nos. 2 Nos.	15,495.24 4,631.38
7.	Supplying including carriage within a distance of 8km. Carrying laying fitting and fixing C.I. Double Air Valve screwed type including all jointing material complete as directed. 40mm dia.	4263.80	6 Nos.	25,582.80
8.	Construction of Valve Chamber with GI Pipe with 150mm thick cement concrete wall in prop 1:2:4 with 6mm thick M.S. Plate cover with hinges and locking arrangement including earthwork in excavation in foundation and 75mm thick RCC in prop 1:3:6 in foundation all complete as per drawing and direction. b) For upto 50mm to 150mm dia. G.I. pipe inside dimension (0.60x0.60x0.50m)	3015.00	6 Nos.	18,090.00
9.	Construction of Air Valve Chamber with stone masonry 25cm thick wall prop 1:6 over 7.5cm thick RCC in foundation in prop 1:3:6 including earthwork in excavation and 12mm thick cement plaster inside the chamber in prop 1:3 finished with neat cement including 10cm thick RCC slab cover in prop 1:2:4 with 12mm rod 150mm c/c both ways and keeping 4 Nos. 25cm dia hole on the cover and providing 25mm dia. GI pipe 1m length leading to the nearest drain to escape the water all complete as per drawing and design.	3720.00	6 Nos.	22,320.00
Total :				14,43,961.42
Add price escalation 6% p.a. :				4,33,188.43
Total :				18,77,149.85
Say :				18,77,150.00
10.	Add PWD compensation Black topped Side berm	60 500	1018 126	61,080.00 63,000.00
Total :				29,01,230.00
Say :				29,01,230.00

8.9 Zonal reservoirs.

8.9.1 Estimate on construction of zonal reservoirs is indicated in table 8.9.1.

Table 8.9.1

Sl. No.	Location	Rate/ltrs (₹)	Capacity Ltrs.	Amount (₹)
1	2	3	4	5
1.	Kharmuti 'A'	20.00	6,000	1,20,000.00
2.	Kharmuti 'B'	20.00	7,000	1,40,000.00
3.	Kharmuti 'C'	20.00	6,000	1,20,000.00
Total :				3,80,000.00

8.10 Distribution system.

8.10.1 Estimate on laying of distribution system is indicated in table 8.10.1.

Table 8.10.1

Sl. No.	Description of Works	Rate (₹)	Qty.	Amount (₹)
1	2	3	4	5
1.	Earthwork in excavation to the proper level and grade including in light dressing and stacking of serviceable stone as directed and removal of spoils upto 30 metres and all lift. (0.30x0.50x4700) = 531.75m ²			
b)				
a)	In ordinary soil 50% of above = 352.50m ²	39.00	352.50	13,747.50
e)	Hard shale or medium rock of the hardness of the building stone, laterite and the like. 50% of above = 352.50m ²	104	352.50	36,660.00
2.	Supplying, including carriage within 8km. and laying in trenches including fitting and fixing GI Pipe complete with all GI Fitting such as socket bend, elbow, cross union socket threaded nipple, reducing tees including cutting threading etc. with all jointing materials completed excluding trenching and refilling of earth which will be paid extra applicable as per current schedule of rate the fitting will be paid extra except socket joints. 50mm dia. 40mm dia. 25mm dia. 15mm dia.	326.27 257.11 159.61 88.66	600 2000 1800 300	195762.00 514220.00 287298.00 26598.00
3.	Adding 15% for cost of GI specials.	-	-	1,53,581.70
4.	Supplying, fitting and fixing gun metal brass full way wheel valve superior quality including jointing materials and carriage of materials within 8km all complete and as directed. 50mm dia. 40mm dia. 25mm dia.	2315.69 1544.57 831.95	4 10 5	9262.76 15445.70 4159.75

1	2	3	4	5
5.	Construction of valve chamber with GI Pipe with 150mm thick cement concrete wall in prop 1:2:4 with 6mm thick M.S. plate cover with hinges and locking arrangement including earthwork in excavation in foundation and 75mm thick RCC in prop 1:3:6 in foundation all complete as per drawing and direction. a) Upto 40mm dia. b) For upto 50 to 150mm dia.	2657.00 3015.00	15 .4	39855.00 12060.00
6.	Construction of 65mm thick cement concrete platform 1.00mx1.00m size over 100mm thick stone soling with 80mm x150mm c/c drain leading to 0.45 m in prop 1:3:6 and 1.00m Higher RCC stand post 125mm in size in prop 1:2:4 dia. stirrups @ 150mm c/c including earthwork inside filling with 12mm thick cement plaster prop 1:3 including shuttering curing etc..	1635.00	25	40875.00
7.	Fabrication, supplying, fitting, fixing MS tank not less than 3mm thick including inlet outlet pipe and 1m stone masonry 1:6 cement mortar staging including earthwork foundation and plastering all complete..	11760.00	5	58800.00
Total :				14,08,325.41
Add price escalation 6% p.a. :				4,22,497.62
Total :				18,30,823.03
Say :				18,30,823.03

8.11 Power line.

8.11.1 Estimate on drawal of power line is indicated in table 8.11.1.

Table 8.11.1

Sl No.	Descriptions	Unit	Rate (₹)	Qty	Amount (₹)
1	2	3	4	5	6
1.	Transformer 11/0.433Kv, 63Kva	Each	1,19,188.80	1	1,19,188.80
2.	Supply, fitting & fixing of HT Lightning Arrestor expulsion type complete with all fittings, transmission class discharge capacity 63Ka 11 Kv (Line Type)	Set	4552.52	1	4552.52
3.	Supplying, laying and jointing PVC isolated armoured heavy duty electric cable with aluminium conductor 1100 volts Grade IS 1554 from Sub:station to Pump House 70mm ²	Rm	678.05	30	20341.50

1	2	3	4	5	6
4.	Supplying, laying and jointing XLPE 3Core LT Cable 35mm ²	Rm	2805.92	10	280592.00
5.	Supplying & laying of earthing complete with copper plate 60x60x3.15mm thick electrode and 20x3mm copper strip earthing lead.	Set	6393.74	1	6393.74
6.	Supply, installation fitting and fixing MCCB 200Amp.	Each	33776.93	1	33776.93
7.	Supply, fitting & fixing of 11Kv DO Fuse unit 3 Phase	Set	13539.70	1	13539.70
Total :					5,50,385.19
Add price escalation @ 6% pa:					1,65,115.56
Total :					7,15,500.75
Say:					7,15,501.00

8.12 Security fencing.

8.12.1 Estimate on providing security fencing is indicated in table 8.12.1.

Table 10.12.1.

Sl No.	Descriptions	Unit	Rate (₹)	Qty	Amount (₹)
1	2	3	4	5	6
1.	Supplying, fitting, fixing chain link security fencing 1.83 gate with 7.50cm mesh of 10SWG G.I wire quality as per IS:2721 1061 with 3 stirrups of double plug 12SWG GI B/wire onward moreover portion in the top with M.S. angle intermediate post of 50x50x6mm x 2.73m long including 45cm onward lineable on top 2.3cm c.c. with corner post, straining post of MS Angle 65mmx65mmx6mm x2.73m with necessary staged. The straining post is to be provided at 10m c.c corner post at every corner including digging foundation for MS Angle post & filling up the sides after completed of work with 0.45x0.45x0.60m c.c. base for corner straining starting and end post in c.c. in prop 1:2:4 complete as directed.	Rm	896.00	400.00	3,58,400.00
Total :					3,58,400.00

IX Designs.

9.1 Design & estimate of Conveyance Main.

Length of the line	:	1200Rm
Daily demand of water	:	117076 Lpd.
Average demand	:	17.91 Gpm
Peak demand	:	35.82 Gpm
Considering diameter of the pipe	:	65mm
Frictional loss per 100m	:	3.17mm
Total frictional loss	:	38.06mm
R.L. at point Intake Point	:	1731.00
R.L. at Pump House	:	<u>1670.00m</u>
Difference in level	:	19.79m
Available Head	:	22.94m

Hence gravity flow is possible

9.2 Design of RCC sump

As the scheme envisages 1 stage pumping, i.e. water pumping system; operation of water pumps. As such, capacity of the clear water reservoir/sump should be designed to have minimum storage capacity to ensure either of the pumping system continue in operation in the event of occurrence of local tripping in any of the pumping system.

Daily demand	:	1,17,076 Lpd
Consider detention time	:	60 min
Discharge of Pump	:	244 Lpm
Capacity of Sump	:	7,024.56 Ltrs.
	Say	8,000 Ltrs.
Assuming height of sump	h	1.50m
Area of sump	L	<u>8.00</u>
		1.50
		2.31m
	Say	2.50m
Keeping free board as 0.30m	L	2.50m
Actual size of clear water sump	B	2.50
	H	1.08m
Actual capacity	:	11.25 Ltrs.
	Say	12000 Ltrs.

9.3 Design of Pumps.

Ultimate demand of water	:	1,17,076 ltrs.
Now, considering pumping hours	:	8 hrs.
Discharge	:	$\frac{1,17,076}{8 \times 60}$
	:	244 Lpm.
Considering economical diameter of pumping main	d	$1.22 \sqrt[4]{4.07 \times 10^{-3} \text{ m}^3/\text{Sec.}}$
	:	0.08m
	:	80 mm
Length of pumping main	:	2500Rm
Frictional Head Loss	H_f	$\frac{fLQ^3}{3d^5}$
	f	$0.005 \frac{(1+L)}{12d}$
	:	0.01
	H_f	$\frac{0.01 \times 2500 (4.07 \times 10^{-3})^2}{3 \times (0.08)^5}$
	:	42.13m
	Say	42.00m
R.L of Main Reservoir	:	1800.00m
R.L of Pump House	:	<u>1670.00m</u>
Difference	:	1.30m
Add Frictional Loss	(+)	3.00m
Add. Margin between duty head & shut-off head	:	6.00m
Total delivery Head	H	181.00m
Input power to pump	:	$\frac{w \times H \times Q}{75 \times \eta}$
Where	w	discharge of water
	H	total delivery head
	Q	discharge
	η	efficiency of pump
	:	$\frac{10^3 \times 181 \times 4.07 \times 10^{-3}}{75 \times 0.6}$
	:	16.37x1.20
	:	19.64 Hp
	Say	20Hp.

Since the rating of the Motor is to be higher than the maximum pump input power, considering the market availability of Motor Pumps with respect to Head and Discharge, the Pumping System specifications would be :

Total Head	H	:	181.00 m
Volume rate of flow	Q	:	244 Lpm
Dia of Pumping main	d	:	80 mm
Capacity of motor pumps	N	:	25 Hp

Provide 2 Nos. of Pumps where 1 set will be in operation and the other as standby Unit

9.4 Design of Main Reservoir.

Maximum demand including 15% UFW	:	1,17,076.00Ltrs.
Capacity of reservoir	:	1/3x1,17,076.00 ltrs.
	:	39,025.00 ltrs
Say	:	40,000.00 ltrs.

9.5 Design & estimate of Gravity Feeder Main.

➤ Location	:	<i>Kharmut 'A'</i>
Ref: Line Mr-NI in the drawing/plan		
Length of the line	:	1900Rm
Daily demand of water	:	15385 Lpd.
Average demand	:	2.35 Gpm
Peak demand	:	4.70 Gpm
Considering diameter of the pipe	:	50mm
Frictional loss per 100m	:	0.29mm
Total frictional loss	:	5.51mm
R.L. at point Mr	:	1800.00
R.L. at point NI	:	<u>1783.00m</u>
Difference in level	:	17.00m
Available Head	:	11.49m

Hence gravity flow is possible

➤ Location	:	<i>Kharmuti 'B'</i>
Ref: Line Mr-Np in the drawing/plan		
Length of the line	:	700Rm
Daily demand of water	:	20280 Lpd.
Average demand	:	3.10 Gpm
Peak demand	:	6.20 Gpm
Considering diameter of the pipe	:	65mm
Frictional loss per 100m	:	0.13mm
Total frictional loss	:	1.27mm
R.L. at point Mr	:	1800.00
R.L. at point Np	:	<u>1781.00m</u>
Difference in level	:	19.00m
Available Head	:	12.80m

Hence gravity flow is possible

➤ Location	:	<i>Kharmuti 'C'</i>
Ref: Line NI-Ma in the drawing/plan		
Length of the line	:	1400 Rm
Daily demand of water	:	15660 Lpd.
Average demand	:	2.40 Gpm

Peak demand	:	4.80 Gpm
Considering diameter of the pipe	:	50mm
Frictional loss per 100m	:	0.21mm
Total frictional loss	:	4.06mm
R.L. at point Nl	:	1800.00m
R.L. at point Ma	:	<u>1756.00m</u>
Difference in level	:	44.00m
Available Head	:	39.94m

Hence gravity flow is possible

9.6 Design of Zonal reservoirs.

➤	Location	:	<i>Kharmuti 'A'</i>
	Present population to be benefited	:	15660 Lpd
	Ultimate daily requirement of water	:	1/3x15660 ltrs.
	Capacity of reservoir	:	5,220.00 ltrs
	Say	:	6,000.00 ltrs.
➤	Location	:	<i>Kharmuti 'B'</i>
	Present population to be benefited	:	
	Ultimate daily requirement of water	:	20280
	Capacity of reservoir	:	1/3x20280
		:	6,760.00 ltrs
	Say	:	7,000 ltrs.
➤	Location	:	<i>Kharmuti 'C'</i>
	Ultimate daily requirement of water	:	15,385 lpd
	Capacity of reservoir	:	1/3x20280
		:	5,128 ltrs
	Say	:	6,000 ltrs.

9.7 Design of distribution system.

9.7.1 Design of the distribution system is indicated in Appendix I.

APPENDIX - I

Design of Distribution System

**Software used : Branched Water Distribution Design Program –
(C) The World Bank**

Design of Distribution System

Kharmuti Area I

B R A N C H

Version 3.0

Branched Water Distribution Network Design Program

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Echoing Input Variables

```

-----
Title of the Project           : Kharmuti area i
Name of the User              : PHED
Number of Pipes               : 12
Number of Nodes               : 13
Number of Commercial Diameters : 16
Peak Design Factor            : 2
Minimum Headloss in          m/km : .1
Maximum Headloss in          m/km : 5
Minimum Residual Pressure    m    : 5
Type of Formula               : Hazen's

```

Pipe Data

```

=====
Pipe From To Length Diameter Hazen's Status
No. Node Node m mm Const (E/P)
-----
1 1 2 0.50
2 2 3 200.00
3 3 4 360.00
4 3 5 200.00
5 5 6 100.00
6 5 7 70.00
7 2 8 150.00
8 8 9 80.00
9 8 10 70.00
10 2 11 100.00
11 11 12 90.00
12 11 13 85.00
=====

```

Node Data

```

=====
Node Peak Flow Elevation Res. Press Meet Res.
No. Factor lps m m Pres (Y/N)?
-----
1 2.00 0.000 1783.00 7.00 Y
2 2.00 0.000 1775.00 7.00 Y
3 2.00 0.000 1774.00 7.00 Y
4 2.00 -0.035 1772.00 7.00 Y
5 2.00 0.000 1771.00 7.00 Y

```

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Node Data cont`d

```

=====
Node   Peak   Flow   Elevation  Res. Press  Meet Res.
No.   Factor   lps      m           m           Pres (Y/N)?
-----
   6   2.00   -0.035  1768.00    7.00        Y
   7   2.00   -0.035  1768.00    7.00        Y
   8   2.00    0.000  1773.00    7.00        Y
   9   2.00   -0.035  1770.00    7.00        Y
  10   2.00   -0.035  1768.00    7.00        Y
  11   2.00    0.000  1775.00    7.00        Y
  12   2.00   -0.035  1770.00    7.00        Y
  13   2.00   -0.035  1769.00    7.00        Y
=====

```

Reference Node Data

```

=====
Node   Grade Line
No.      m
-----
   1    1783.00
=====

```

Commercial Diameter Data

```

=====
Pipe Dia.  Hazen's  Unit Cost
Int. (mm)  Const   rs /m  length
-----
  15.0    100.00000    88.66
  20.0    100.00000   112.51
  25.0    100.00000   159.91
  40.0    100.00000   237.11
  50.0    100.00000   326.27
  65.0    100.00000   416.96
  80.0    100.00000   545.62
 100.0    100.00000   793.57
 150.0    100.00000  1236.65
 200.0    100.00000  2089.29
 250.0    100.00000  2789.93
 300.0    100.00000  3567.05
 350.0    100.00000  4445.31
 400.0    100.00000  5456.17
 500.0    100.00000  7736.98
 750.0    100.00000 14662.31
=====

```

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Branched Water Distribution Network Design OutPut

Pipe Details

Pipe No.	From Node	To Node	Peak Flow (lps)	Diam (mm)	Hazen's Const	HL (m)	HL/1000 (m)	Length (m)	Status (E/P)
1	1	2	0.490	50.0	100.00000	0.00	0.00	0.50	
2	2	3	0.210	40.0	100.00000	0.43	2.15	200.00	
3	3	4	0.070	25.0	100.00000	1.00	2.78	360.00	
4	3	5	0.140	40.0	100.00000	0.20	1.00	200.00	
5	5	6	0.070	25.0	100.00000	0.28	2.80	100.00	
6	5	7	0.070	25.0	100.00000	0.19	2.71	70.00	
7	2	8	0.140	40.0	100.00000	0.15	1.00	150.00	
8	8	9	0.070	25.0	100.00000	0.22	2.75	80.00	
9	8	10	0.070	25.0	100.00000	0.19	2.71	70.00	
10	2	11	0.140	40.0	100.00000	0.10	1.00	100.00	
11	11	12	0.070	25.0	100.00000	0.25	2.78	90.00	
12	11	13	0.070	25.0	100.00000	0.24	2.82	85.00	

Node Details

Node No.	Peak Flow (lps)	Elevation (m)	H G L (m)	Cal Pres (m)	Spc Pres (m)	Meet Res Pres.
1 S	0.490	1783.00	1783.00	0.00	7.00	Y
2	0.000	1775.00	1783.00	8.00	7.00	Y
3	0.000	1774.00	1782.57	8.57	7.00	Y
4 T	-0.070	1772.00	1781.57	9.57	7.00	Y
5	0.000	1771.00	1782.37	11.37	7.00	Y
6 T	-0.070	1768.00	1782.09	14.09	7.00	Y
7 T	-0.070	1768.00	1782.17	14.17	7.00	Y
8	0.000	1773.00	1782.85	9.85	7.00	Y
9 T	-0.070	1770.00	1782.62	12.62	7.00	Y
10 T	-0.070	1768.00	1782.65	14.65	7.00	Y
11	0.000	1775.00	1782.90	7.90	7.00	Y
12 T	-0.070	1770.00	1782.65	12.65	7.00	Y
13 T	-0.070	1769.00	1782.66	13.66	7.00	Y

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Cost Summary

```

=====
Diameter      Length      Cost      Cum. Cost
(mm)          (m )       (1000 rs ) (1000 rs )
-----
    25.0      855.00      136.72      136.72
    40.0      650.00      154.12      290.84
    50.0         0.50         0.16      291.01
=====

```

Pipe-wise Cost Summary

```

=====
Pipe No       Diameter      Length      Cost      Cum. Cost
              (mm)          (m )       (1000 rs ) (1000 rs )
-----
    1          50.0          0.50         0.16         0.16
    2          40.0         200.00        47.42         47.59
    3          25.0         360.00        57.57        105.15
    4          40.0         200.00        47.42        152.57
    5          25.0         100.00        15.99        168.57
    6          25.0          70.00        11.19        179.76
    7          40.0         150.00        35.57        215.33
    8          25.0          80.00        12.79        228.12
    9          25.0          70.00        11.19        239.31
   10          40.0         100.00        23.71        263.02
   11          25.0          90.00        14.39        277.42
   12          25.0          85.00        13.59        291.01

```

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Design of Distribution System

Kharmuti Area II

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Echoing Input Variables

```

-----
Title of the Project           : Kharmuti Area II
Name of the User              : PHED
Number of Pipes               : 12
Number of Nodes               : 13
Number of Commercial Diameters : 16
Peak Design Factor            : 2
Minimum Headloss in          m/km : .1
Maximum Headloss in          m/km : 5
Minimum Residual Pressure    m     : 5
Type of Formula               : Hazen's

```

Pipe Data

```

=====
Pipe  From  To    Length  Diameter  Hazen's  Status
No.   Node  Node    m         mm         Const    (E/P)
-----
  1    1    2      0.50
  2    2    3      80.00
  3    2    4     100.00
  4    4    5      65.00
  5    4    6      90.00
  6    6    7      70.00
  7    6    8     100.00
  8    2    9     180.00
  9    9   10      60.00
 10    9   11     100.00
 11   11   12      75.00
 12   11   13      80.00
=====

```

Node Data

```

=====
Node  Peak  Flow  Elevation  Res. Press  Meet Res.
No.   Factor  lps   m           m           Pres (Y/N)?
-----
  1    2.00    0.000  1781.00    7.00        Y
  2    2.00    0.000  1773.00    7.00        Y
  3    2.00   -0.035  1772.00    7.00        Y
  4    2.00    0.000  1771.00    7.00        Y
  5    2.00   -0.035  1769.00    7.00        Y

```

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Node Data cont`d

```

=====
Node   Peak   Flow   Elevation   Res. Press   Meet Res.
No.   Factor   lps     m           m           Pres (Y/N)?
-----
   6   2.00    0.000   1768.00    7.00        Y
   7   2.00   -0.035   1764.00    7.00        Y
   8   2.00   -0.035   1768.00    7.00        Y
   9   2.00    0.000   1770.00    7.00        Y
  10   2.00   -0.035   1767.00    7.00        Y
  11   2.00    0.000   1768.00    7.00        Y
  12   2.00   -0.035   1769.00    7.00        Y
  13   2.00   -0.035   1764.00    7.00        Y
=====
    
```

Reference Node Data

```

=====
Node   Grade Line
No.     m
-----
   1    1781.00
=====
    
```

Commercial Diameter Data

```

=====
Pipe Dia.   Hazen's   Unit Cost
Int. (mm)   Const    rs /m   length
-----
  15.0    100.00000    88.66
  20.0    100.00000   112.51
  25.0    100.00000   159.91
  40.0    100.00000   237.11
  50.0    100.00000   326.27
  65.0    100.00000   416.96
  80.0    100.00000   545.62
 100.0    100.00000   793.57
 150.0    100.00000  1236.65
 200.0    100.00000  2089.29
 250.0    100.00000  2789.93
 300.0    100.00000  3567.05
 350.0    100.00000  4445.31
 400.0    100.00000  5456.17
 500.0    100.00000  7736.98
 750.0    100.00000 14662.31
=====
    
```

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Branched Water Distribution Network Design OutPut

Pipe Details

Pipe No.	From Node	To Node	Peak Flow (lps)	Diam (mm)	Hazen's Const	HL (m)	HL/1000 (m)	Length (m)	Status (E/P)
1	1	2	0.490	50.0	100.00000	0.00	0.00	0.50	
2	2	3	0.070	25.0	100.00000	0.22	2.75	80.00	
3	2	4	0.210	40.0	100.00000	0.21	2.10	100.00	
4	4	5	0.070	25.0	100.00000	0.18	2.77	65.00	
5	4	6	0.140	40.0	100.00000	0.09	1.00	90.00	
6	6	7	0.070	25.0	100.00000	0.19	2.71	70.00	
7	6	8	0.070	25.0	100.00000	0.28	2.80	100.00	
8	2	9	0.210	40.0	100.00000	0.39	2.17	180.00	
9	9	10	0.070	25.0	100.00000	0.17	2.83	60.00	
10	9	11	0.140	40.0	100.00000	0.10	1.00	100.00	
11	11	12	0.070	25.0	100.00000	0.21	2.80	75.00	
12	11	13	0.070	25.0	100.00000	0.22	2.75	80.00	

Node Details

Node No.	Peak Flow (lps)	Elevation (m)	H G L (m)	Cal Pres (m)	Spc Pres (m)	Meet Res Pres.
1 S	0.490	1781.00	1781.00	0.00	7.00	Y
2	0.000	1773.00	1781.00	8.00	7.00	Y
3 T	-0.070	1772.00	1780.78	8.78	7.00	Y
4	0.000	1771.00	1780.78	9.78	7.00	Y
5 T	-0.070	1769.00	1780.60	11.60	7.00	Y
6	0.000	1768.00	1780.69	12.69	7.00	Y
7 T	-0.070	1764.00	1780.50	16.50	7.00	Y
8 T	-0.070	1768.00	1780.42	12.42	7.00	Y
9	0.000	1770.00	1780.61	10.61	7.00	Y
10 T	-0.070	1767.00	1780.45	13.45	7.00	Y
11	0.000	1768.00	1780.51	12.51	7.00	Y
12 T	-0.070	1769.00	1780.30	11.30	7.00	Y
13 T	-0.070	1764.00	1780.29	16.29	7.00	Y

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Cost Summary

Diameter (mm)	Length (m)	Cost (1000 rs)	Cum. Cost (1000 rs)
25.0	530.00	84.75	84.75
40.0	470.00	111.44	196.19
50.0	0.50	0.16	196.36

Pipe-wise Cost Summary

Pipe No	Diameter (mm)	Length (m)	Cost (1000 rs)	Cum. Cost (1000 rs)
1	50.0	0.50	0.16	0.16
2	25.0	80.00	12.79	12.96
3	40.0	100.00	23.71	36.67
4	25.0	65.00	10.39	47.06
5	40.0	90.00	21.34	68.40
6	25.0	70.00	11.19	79.59
7	25.0	100.00	15.99	95.59
8	40.0	180.00	42.68	138.27
9	25.0	60.00	9.59	147.86
10	40.0	100.00	23.71	171.57
11	25.0	75.00	11.99	183.56
12	25.0	80.00	12.79	196.36

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Design of Distribution System

Kharmuti Area III

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Echoing Input Variables

```

-----
Title of the Project           : Kharmuti areaiii
Name of the User               : PHED
Number of Pipes                : 14
Number of Nodes                : 15
Number of Commercial Diameters : 16
Peak Design Factor             : 2
Minimum Headloss in           m/km : .1
Maximum Headloss in           m/km : 5
Minimum Residual Pressure     m    : 5
Type of Formula                : Hazen's

```

Pipe Data

```

=====
Pipe  From  To    Length  Diameter  Hazen's  Status
No.  Node  Node    m        mm        Const    (E/P)
-----
  1    1    2      0.50
  2    2    3     190.00
  3    3    4      60.00
  4    3    5      90.00
  5    5    6      70.00
  6    5    7      90.00
  7    2    8     100.00
  8    8    9      90.00
  9    8   10      90.00
 10    2   11     200.00
 11   11   12      90.00
 12   11   13     100.00
 13   13   14      70.00
 14   13   15      80.00
=====

```

Node Data

```

=====
Node  Peak    Flow    Elevation  Res. Press  Meet Res.
No.   Factor   lps      m           m           Pres (Y/N)?
-----
  1    2.00     0.000    1756.00     7.00        Y
  2    2.00     0.000    1748.00     7.00        Y
  3    2.00     0.000    1748.00     7.00        Y

```

Node Data cont`d

```

=====
Node   Peak   Flow   Elevation   Res. Press   Meet Res.
No.   Factor   lps      m           m           Pres (Y/N)?
-----
  4   2.00   -0.035   1746.00     7.00        Y
  5   2.00    0.000   1745.00     7.00        Y
  6   2.00   -0.035   1743.00     7.00        Y
  7   2.00   -0.035   1743.00     7.00        Y
  8   2.00    0.000   1747.00     7.00        Y
  9   2.00   -0.035   1745.00     7.00        Y
 10   2.00   -0.035   1744.00     7.00        Y
 11   2.00    0.000   1745.00     7.00        Y
 12   2.00   -0.035   1742.00     7.00        Y
 13   2.00    0.000   1741.00     7.00        Y
 14   2.00   -0.035   1740.00     7.00        Y
 15   2.00   -0.035   1739.00     7.00        Y
=====
    
```

Reference Node Data

```

=====
Node   Grade Line
No.      m
-----
  1     1756.00
=====
    
```

Commercial Diameter Data

```

=====
Pipe Dia.   Hazen's   Unit Cost
Int. (mm)   Const    rs /m   length
-----
  15.0     100.00000    88.66
  20.0     100.00000   112.51
  25.0     100.00000   159.91
  40.0     100.00000   237.11
  50.0     100.00000   326.27
  65.0     100.00000   416.96
  80.0     100.00000   545.62
 100.0     100.00000   793.57
 150.0     100.00000  1236.65
 200.0     100.00000  2089.29
 250.0     100.00000  2789.93
 300.0     100.00000  3567.05
    
```


Commercial Diameter Data cont`d

```

=====
Pipe Dia.      Hazen's      Unit Cost
Int. (mm)     Const       rs /m   length
-----
350.0         100.00000   4445.31
400.0         100.00000   5456.17
500.0         100.00000   7736.98
750.0         100.00000   14662.31
=====
    
```

Branched Water Distribution Network Design OutPut

Pipe Details

```

=====
Pipe From To   Peak Flow   Diam   Hazen's   HL   HL/1000   Length Status
No.  Node Node     (lps)   (mm)   Const    (m )   (m )   (m )   (E/P)
-----
1    1    2         0.560   50.0 100.00000 0.00   0.00   0.50
2    2    3         0.210   40.0 100.00000 0.41   2.16  190.00
3    3    4         0.070   25.0 100.00000 0.17   2.83   60.00
4    3    5         0.140   40.0 100.00000 0.09   1.00   90.00
5    5    6         0.070   25.0 100.00000 0.19   2.71   70.00
6    5    7         0.070   25.0 100.00000 0.25   2.78   90.00
7    2    8         0.140   40.0 100.00000 0.10   1.00  100.00
8    8    9         0.070   25.0 100.00000 0.25   2.78   90.00
9    8   10         0.070   25.0 100.00000 0.25   2.78   90.00
10   2   11         0.210   40.0 100.00000 0.43   2.15  200.00
11  11  12         0.070   25.0 100.00000 0.25   2.78   90.00
12  11  13         0.140   40.0 100.00000 0.10   1.00  100.00
13  13  14         0.070   25.0 100.00000 0.19   2.71   70.00
14  13  15         0.070   25.0 100.00000 0.22   2.75   80.00
=====
    
```

Node Details

```

=====
Node   Peak Flow   Elevation   H G L   Cal Pres   Spc Pres   Meet Res
No.    (lps)       (m )       (m )    (m )       (m )       Pres.
(Y)
-----
1 S    0.560       1756.00    1756.00  0.00       7.00       Y
2      0.000       1748.00    1756.00  8.00       7.00       Y
    
```

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Node Details cont`d

Node No.	Peak Flow (lps)	Elevation (m)	H G L (m)	Cal Pres (m)	Spc Pres (m)	Meet Res Pres.
3	0.000	1748.00	1755.59	7.59	7.00	Y
4 T	-0.070	1746.00	1755.42	9.42	7.00	Y
5	0.000	1745.00	1755.50	10.50	7.00	Y
6 T	-0.070	1743.00	1755.31	12.31	7.00	Y
7 T	-0.070	1743.00	1755.25	12.25	7.00	Y
8	0.000	1747.00	1755.90	8.90	7.00	Y
9 T	-0.070	1745.00	1755.65	10.65	7.00	Y
10 T	-0.070	1744.00	1755.65	11.65	7.00	Y
11	0.000	1745.00	1755.57	10.57	7.00	Y
12 T	-0.070	1742.00	1755.32	13.32	7.00	Y
13	0.000	1741.00	1755.47	14.47	7.00	Y
14 T	-0.070	1740.00	1755.27	15.27	7.00	Y
15 T	-0.070	1739.00	1755.25	16.25	7.00	Y

Cost Summary

Diameter (mm)	Length (m)	Cost (1000 rs)	Cum. Cost (1000 rs)
25.0	640.00	102.34	102.34
40.0	680.00	161.23	263.58
50.0	0.50	0.16	263.74

Pipe-wise Cost Summary

Pipe No	Diameter (mm)	Length (m)	Cost (1000 rs)	Cum. Cost (1000 rs)
1	50.0	0.50	0.16	0.16
2	40.0	190.00	45.05	45.21
3	25.0	60.00	9.59	54.81
4	40.0	90.00	21.34	76.15
5	25.0	70.00	11.19	87.34
6	25.0	90.00	14.39	101.73
7	40.0	100.00	23.71	125.45
8	25.0	90.00	14.39	139.84
9	25.0	90.00	14.39	154.23

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Pipe-wise Cost Summary cont`d

```
=====
```

Pipe No	Diameter (mm)	Length (m)	Cost (1000 rs)	Cum. Cost (1000 rs)
10	40.0	200.00	47.42	201.65
11	25.0	90.00	14.39	216.04
12	40.0	100.00	23.71	239.75
13	25.0	70.00	11.19	250.95
14	25.0	80.00	12.79	263.74

```
-----
```

X Phasing of the Scheme.

- 10.1 Implementation of the scheme is expected to be completed within a period of 2 (Two) years starting from 2012-2013.

XI Scheme implementation.

- 11.1 The difference components of the scheme would be implemented by the existing organization machineries available with the department/division and for the operational efficiencies, additional manpower may be deployed on requirement.
- 11.2 The department in Public Health Engineering/PHE Electrical Division will be responsible for implementation of the scheme.
- 11.3 The Department/Division will utilize its own resources for supervision etc..

XII Conclusion.

- 12.1 Completion of the scheme will not only benefit the villagers with an organized water supply system but also will facilitate economic growth of the villages.

FORMAT : I**Sectoral Outlay for Annual Plan 2012-2013**

Name of Sector :

₹ In lakh

Sl. No.	Name of Schemes	Expenditure as on 31.3.2012	Outlay conveyed vide planning Department's Letter No.PLR/8/2002/118, Dt.02.07.2002	Of which earmarked for		New schemes 2012-13		
				Ongoing/Continuing/Spill over schemes		Capital	Revenue	Total
				Capital	Revenue			
1	2	3	4	5	6	7	8	9
1.	<i>Umthlong (Kharmuti) Water Supply Scheme</i>							

FORMAT : II**Ongoing/Spill-over schemes for the 11th Plan Capital works**

Name of Sector : Phed

Sl. No	Name of schemes	Administrative Approval Accorded		Total Expenditure as on 31.3.2012 in lakh (₹)	Outlay earmarked 2012-13	Year wise Phasing of Expenditure till completion		Target date of Completion
		Sanctioning Letter No.	Amount in lakh (₹)			2012-13	2013-2014	
1	2	3	4	5	6	7	8	9
1.	<i>Umthlong (Kharmuti) Water Supply Scheme</i>							

FORMAT : II (A)**Ongoing/Continuing/Spill-over schemes for the 11th Plan Revenue**

Name of Sector :

₹ in lakh

Sl. No	Name of schemes	Administrative Approval Accorded		Total expenditure as on 31.3.2012	Outlay earmarked 2012-13	Yearwise phasing of expenditure till completion		Target date of completion
		Sanctioning letter No.	Amount (₹)			2012-13	2013-14	
1	2	3	4	5	6	7	8	9
1.	<i>Umthlong (Kharmuti) Water Supply Scheme</i>							

FORMAT : III**Summary statement of new schemes of 2012-2013 Capital**

Name of Sector : Phed

₹ in lakh

Sl. No	Name of schemes	Estimated Cost	Outlay earmarked during 2012-13	Proposed current year's 2012-13 expenditure	Phasing Yearwise Expenditure till completed	
					2012-13	2013-14
1	2	3	4	5	6	7
1.	<i>Umthlong (Kharmuti) Water Supply Scheme</i>	₹ 144.02				

FORMAT : III(A)**Summary statement of new schemes of 2012-2013 Revenue**

Name of Sector : Phed
₹ in lakh

Sl. No	Name of schemes	Estimated Cost	Outlay earmarked during 2012-13	Proposed current year's 2012-13 expenditure	Phasing Year wise Expenditure till completed	
					2012-13	2013-14
1	2	3	4	5	6	7
1.	<i>Umthlong (Kharmuti) Water Supply Scheme</i>	₹ 144.02			72.01	72.01

Annexure : I

Umthlong (Kharmuti) Water Supply Scheme

Estimated Cost

Unit : ₹In lakh

Sl. No.	Description of works	Estimated cost (₹)
1	2	3
1.	<i>Umthlong (Kharmuti) Water Supply Scheme</i>	144.02
	<i>Total :</i>	144.02

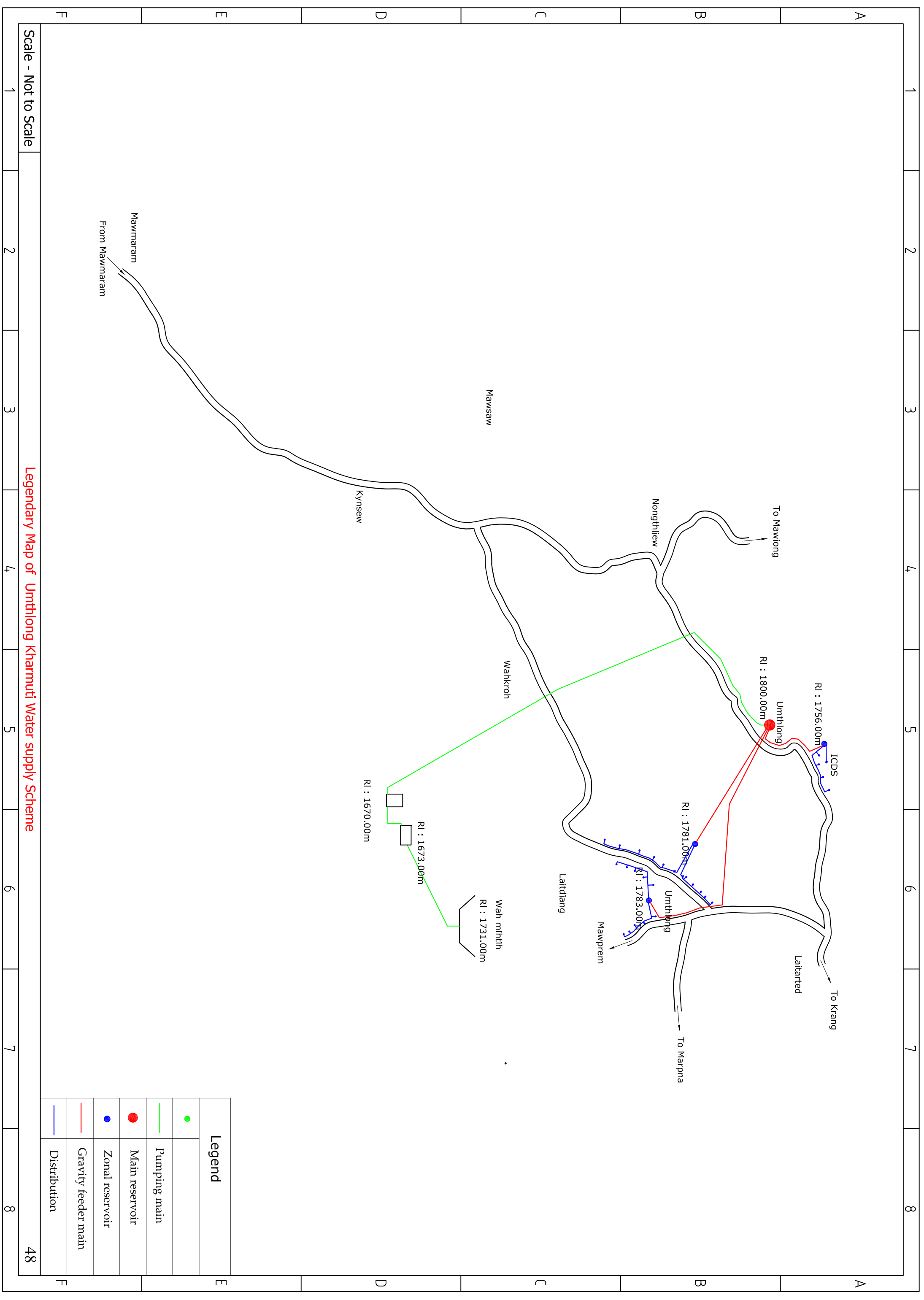
Annexure : II

Umthlong (Kharmuti) Water Supply Scheme

Statement on phasing of the scheme and year wise financial requirement

Unit : ₹ In lakhs

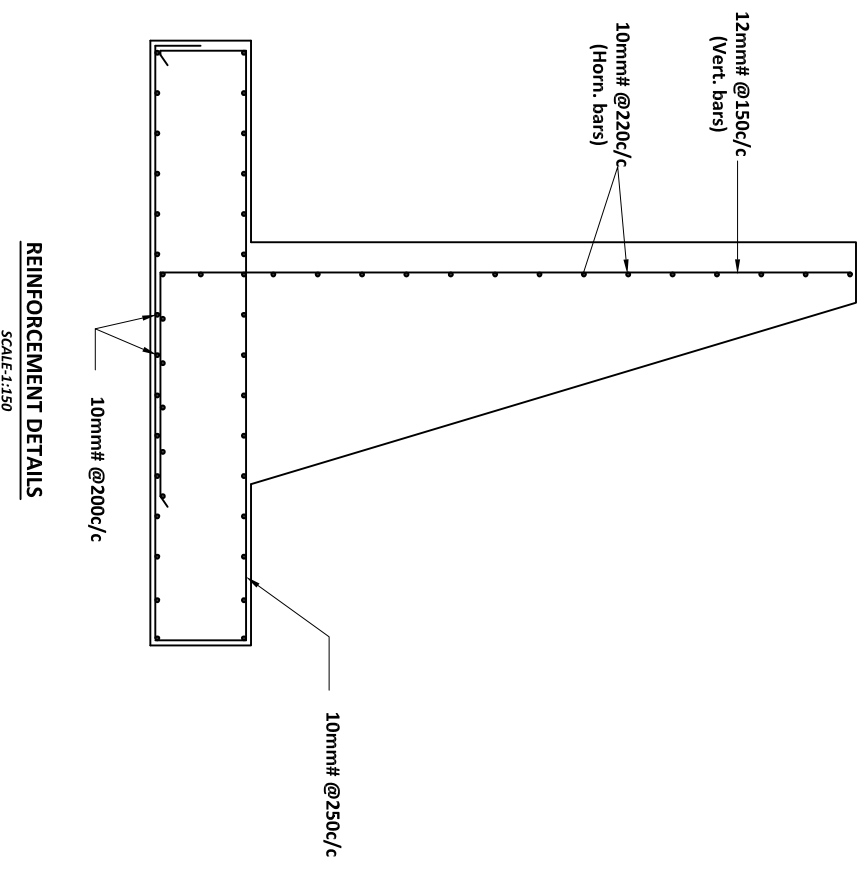
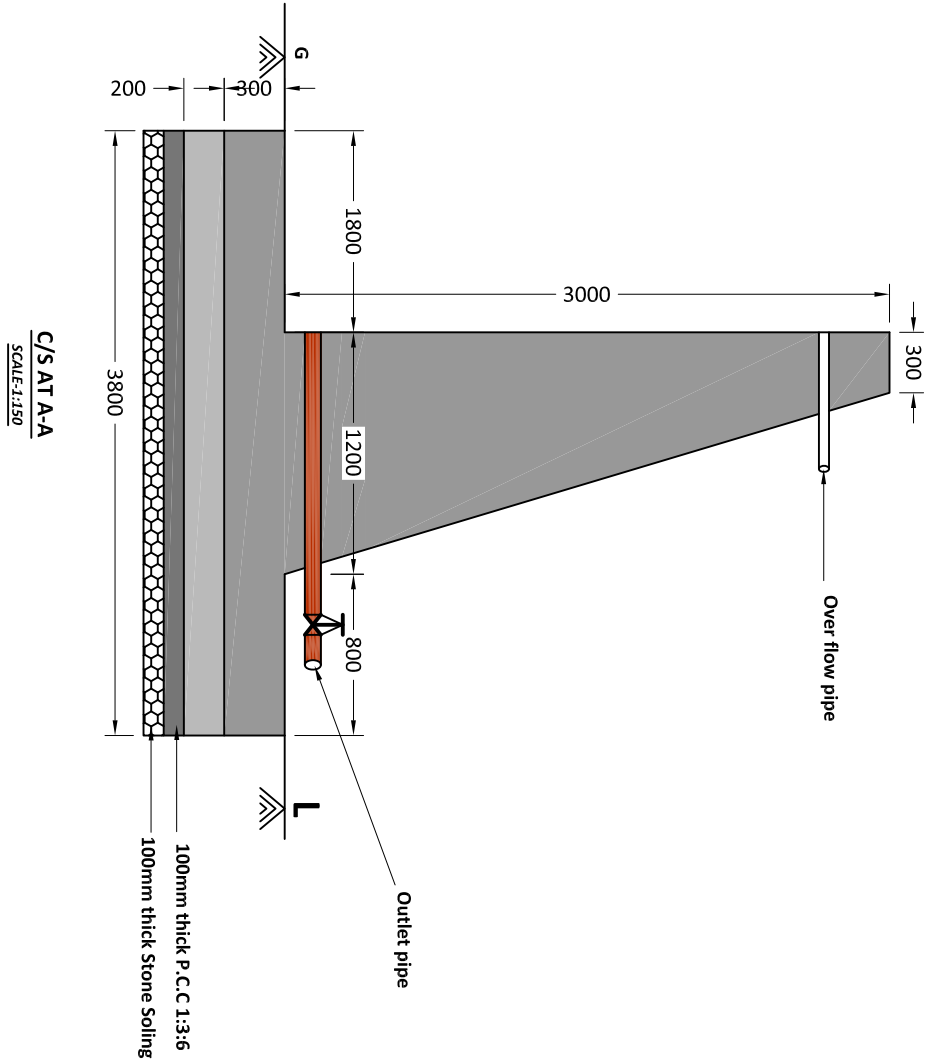
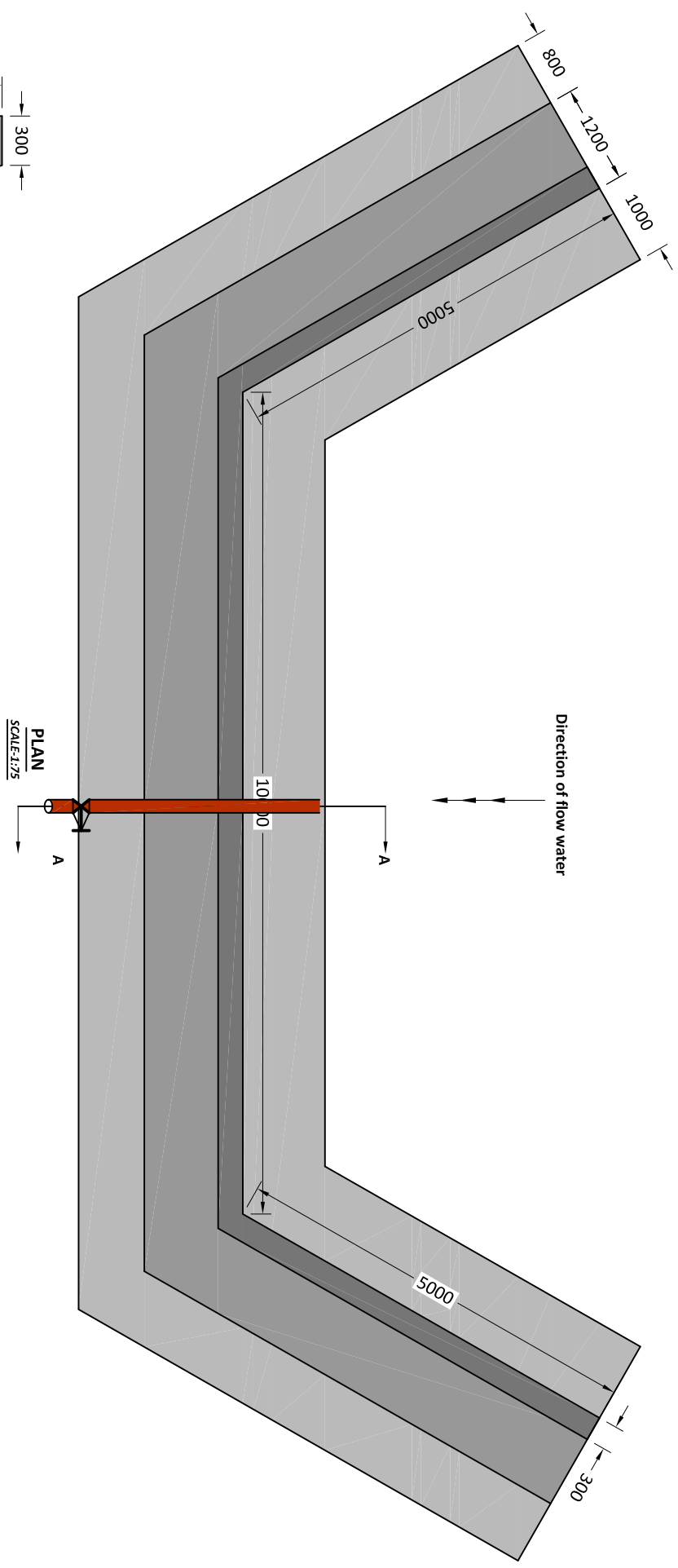
Sl. No.	Description of works	Fund requirement		Total (₹)
		2012-13	2013-14	
1	2	3	4	5
1.	<i>Umthlong (Kharmuti) Water Supply Scheme</i>	72.01	72.01	144.02



Scale - Not to Scale

Legendary Map of Umthlong Kharmuti Water supply Scheme

Legend	
●	Pumping main
●	Main reservoir
●	Zonal reservoir
—	Gravity feeder main
—	Distribution



Scale - As indicated

RCC Weir at Wah Mithip of Umthlong (Kharnut) watersupply scheme

Dimension : mm