



बिहार सरकार

नगर विकास एवं आवास विभाग

**Model Estimate of Water
Supply for 500 Households**
(QUALITY AFFECTED)

पटना, बिहार।

Report

Name of Work:- Construction of MODEL ESTIMATE for 500 households of Urban Water Supply Scheme in different ULBs of Bihar.

This Model estimate has been framed in compliance to the direction received from Urban Development and Housing Department, Bihar, Patna. To provide "Har Ghar Nal Ka Jal" through Tap water is one of the important part of MUKHYAMANTRI SEVEN NISCHAY YOJANA. It is mandatory to provide House Service Connection to each and every household.

Hence, in compliance to the Nischay yojana , this Model Estimate has been framed to provide water supply through Tap in urban area of Bihar.

DESIGN PERIOD:-

Following design period has been adopted while designing the project:-

| | |
|----------------------------|----------|
| Source: - | 15 Years |
| Electric Motor and Pump: - | 15 Years |
| Distribution Main: - | 30 Years |

Population Forecast:-

The population is forecasted @ 2% per annum for the year 2033 based on population of 2011 Census taking base year 2011.

Demand: -

As per the CPHEEO manual on water supply and treatment published by Government of India, Ministry of Urban development, the per Capita water demand is taken as 135 Liters per day excluding 15% NRW.

Source :-

Since the most of the area of Bihar has good aquifer layer, the provision of High Yielding Tubewell has been made in this Estimate.

Details of Provision :-

1. Provision of 200mm X150mm X150 M deep High Yielding Tubewell
2. Provision of 7.5 HP Submersible Pump discharging 8.74 lps with 37 m head.
3. Provision for laying of 63mm, 90mm, 110mm and 160mm H.D.P.E (PE100-PN8) Distribution network has been made.
4. Provision of House service connection for every household has been made.
5. Provision of iron removal plant (31500 LPH) has been made.

Rates :-

Schedule of rates effective from 17.10.2016 of Building Department and current Schedule Rate of PHED for scheduled items and prevailing market rates for non-scheduled items have been considered.

Specification :-

The standard specification of PWD & PHED will have to be followed during the execution of work.

This is a model estimate. Actual length of pipe line may vary substantially which has to be considered at the time of technical sanction after verification of actual site condition.

There may be some sites/habitations where high yielding tube well will not fruitful. For such sites/ habitations other source of water has to be considered necessitating separate water supply scheme.

For better planning and implementation of scheme, vetting from the nodal department of water supply field may be taken into consideration.

Life of HDPE pipes has been considered 30 years but for design purpose intermediate life (15 years) has been considered in this estimate.

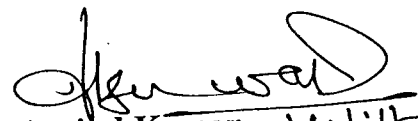
45,29,100.00

Estimated Cost:- The Estimated cost of this Estimate comes to Rs. 45,49,000.00
(Rs. Forty Five Lakh Twenty Nine thousand one hundred)
(Rupees ~~Forty eight Lakh Sixty three Thousand~~) only including 1.0% contingency.

Per Capita Cost:-

1812.00

The per capita cost comes to ~~Rs.1820.00~~ and per household cost comes to
9060.00
Rs.9100.00 based on the population of 2011 Census.



Arvind Kumar
(Chief Engineer)
Bihar Rajya Jal Parshad

Vetted & corrected for estimated cost as Rs. 45,29,100/-
(Rs. forty five lakh, twenty nine thousand one hundred) only.

Dr.
10/11/17

Dr.
10/11/17

3/10/17
10.01.17

Dr.
10.1.17

only
10/11/17
10.1.2017

Model Estimate for 500 HH Water Supply Scheme (Quality Affected)
Population as per 2011 :- 2500
Projected Population at Intermediate (2031) stage:- 3250

General Abstract of Cost

| S. N. | Particulars | Qty. | Unit | Rate | Amount |
|-------|--|-------|------|--------------|------------|
| 1 | High Yielding Tubewell | | | | |
| | Cost for construction of 200mm x 150mm x 150m deep high yielding drilled tube well all complete as per direction of E/I. as per Sub estimate 1 | 1 | Each | 293216.44 | 293216.44 |
| 2 | Pump motor with starter panel | | | | |
| | Supplying and installation of 7.5 HP Submersible pump and motor having discharge 8.74 lps against a total head of 37 m including doing power and light wiring S/F service wire extension of LT line (0.3Km) & suitable dia GI medium class column pipe, N/R Valve, flange etc all complete as per direction of E/I. as per Sub estimate 2 | 1 | Each | 110000.00 | 110000.00 |
| 3 | Distribution Network | | | | |
| | Providing laying and jointing distribution pipes as per IS specifications from 63 mm dia to 160 mm dia HDPE pipe for distribution net works etc all complete as per direction of E/I. Total length of Pipe- 4950 m. as per Sub estimate 3 | 1 | Each | 2713393.70 | 2713393.70 |
| 4 | House service connection | | | | |
| | House service connection with 15mm dia CPVC/MDPE pipe including fitting and fixing specials such as ferrule, bib cock etc all complete. as per Sub estimate 4 | 500 | Each | 1513.00 | 756500.00 |
| 5 | Quality Measure | | | | |
| | Supplying and Installation of Quality measure instrument such as iron removal plant etc. all complete job as per direction of E/I. | 31500 | LPH | 20.00 | 630000.00 |
| | Total | | | 44,84,234.75 | 4503110.14 |
| | Contingency @ 1.0% | | | 44,842.35 | 45031.10 |
| | Grand Total | | | 45,29,077.10 | 4548141.25 |
| | | | | Say | 4549000.00 |

Note:

- The length of distribution pipe may decrease or increase as per actual site condition. The carriage of materials is based on Patna town. It may decrease or increase as per the actual distance. The carriage may be calculated as per attached sheet. Road cutting cost may increase or decrease as per actuals. The technical sanction may be accorded after above consideration.
- Strongly advised that pipeline should be laid before construction of Naali-Gali
- This is a particular estimate, should not be universally adopted.

[Signature]
10/11/17

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10/11/2017

[Signature]
10/11/17

Technically approved for Rs. 45,49,000/- (Rs. forty five lakh forty nine thousand only)

[Signature]
Chief Engineer

Bihar Rajya Jal Par

45,29,100/-

SUB-ESTIMATE 1

Estimate for construction of 200mm x 150mm x 150m Deep High Yeild Tubewell

| S.No. | Description | QTY | Unit | Rate | Amount |
|----------|---|-----|--------|---------|----------|
| 1 | Providing all materials, labour and equipment for drilling by Reverse Rotary rig Machine for following dia of bore hole in all kind of soil mixed with Kankar, sand stone including providing sample box and collection starta sample at every 3.0M depth of drilling for ascertaining proper aquifer for completing High Yielding Tube Well all complete as per IS:2800-1979 & PHED specification and direction of E/I | | | | |
| 24.1.1.3 | (a) 400mm dia bore from G.L to 30.0m below GL. | 30 | PM | 529.30 | 15879.00 |
| 24.1.1.2 | (b) 350mm dia bore from 30.0m to 90.0m and beyond Below GL. | 60 | PM | 413.50 | 24810.00 |
| 24.2.1.2 | (b) 350mm dia bore from 90.0m to 160.0m and beyond Below GL. | 70 | PM | 509.40 | 35658.00 |
| 2 | Supplying, assembling, lowering and fixing in vertical position in bore well, unplasticized PVC medium well casing (CM) pipe of required dia, conforming to IS:12818, including required hire and labour charges, fittings & accessories etc. all complete, for all depths, as per direction of Engineer-in-charge. | | | | |
| 24.3.3 | (a)200mm x 5mm thick pipe ISI mark. | 30 | PM | 921.70 | 27651.00 |
| 24.3.2 | (b)150mm x 5mm thick pipe ISI mark. | 90 | PM | 615.30 | 55377.00 |
| 3 | Supplying, assembling, lowering and fixing in vertical position in bore well unplasticized PVC medium well screen (RMS) pipes with ribs, conforming to IS: 12818, including hire & labour charges, fittings & accessories etc. all complete, for all depths, as per direction of Engineer-in-charge. | | | | |
| 24.4.2 | 150 mm dia and 1 mm slot. | 30 | PM | 554.30 | 16629.00 |
| 4 | Providing all tools and labour including supplying fitting & fixing the following accessories for aforesaid 150mm x 100mm T/W as per direction of E/I. | | | | |
| LS | (i) 200mm x 150mm dia M.S Reducer | 1 | Each | 500.00 | 500.00 |
| LS | (ii)200mm dia M.S well cap. | 1 | Each | 260.00 | 260.00 |
| 24.15.2 | (iii)150mm dia M.S well shoe plug | 1 | Each | 254.50 | 254.50 |
| LS | (iv)Centre guide suitable for 200mm dia pipe | 3 | Each | 150.00 | 450.00 |
| LS | (v)Centre guide suitable for 150mm dia pipe | 8 | Each | 100.00 | 800.00 |
| 24.14.3 | (vi)MS clamp 200mm | 1 | P.Pair | 1169.50 | 1169.50 |

| | | | | | |
|---------------|---|----|-----------------|----------|------------------|
| 5A/ 24.8 | Providing all materials, labour and tools for providing and placing around tube well double washed pea gravel confirming to IS:8419-1977 of size 4mm to 8mm from dalbhumgarh of east singhbhum (JH) inclusive of loading, carriage, unloading & stacking in proper shape for measurement at site. (Stock measurement of clean and washed gravel shall be taken 13" as 12" in height to count void) as per direction of E/I. | | | | |
| | | 12 | PM ³ | 990.10 | 11881.20 |
| 5B | Carriage of Pea Gravel from Dhalbhumigarh (taken av distance 500km.) | 12 | PM ³ | 5450.77 | 65409.24 |
| 6/24.12 | Development of tube well in accordance with IS : 2800 (part I) and IS: 11189, to establish maximum rate of usable water yield without sand content (beyond permissible limit), with required capacity air compressor, running the compressor for required time till well is fully developed, measuring yield of well by "V" notch method or any other approved method, measuring static level & draw down etc. by step draw down method, collecting water samples & getting tested in approved laboratory, i/c disinfection of tubewell, all complete, including hire & labour charges of air compressor, tools & accessories etc., all as per requirement and direction of Engineer-in-charge. | | | | |
| | | 20 | Per Hr | 649.40 | 12988.00 |
| 7 | Transportation and erection of drilling plants, developing equipments & all other required tools and M/C by and suitable mechanical means including all cost of loading, unloading, placing at work site and back after completion of work as per S/D of E/I. | | | | |
| | | 1 | Each | 3000.00 | 3000.00 |
| 8 | Supplying all materials and labours for arrangement for additional water required during the drilling period for 70 Hrs & site clearance & levelling etc and providing the soap duster etc to staff engaged in drilling etc all complete work as per specification & direction of E/I. | | | | |
| | | 1 | Each | 20000.00 | 20000.00 |
| 9 | Chemical and bacteriological testing of water sample including the cost of collection, carrying to designated PHE/other laboratories and submission of report in triplicate as per direction of E/I. | | | | |
| | | 1 | Each | 500.00 | 500.00 |
| Total- | | | | | 293216.44 |

C
SUB-ESTIMATE 2

| Installation of Pump & Motor with Panel | | | | | |
|--|--|-----|------|-----------|------------------|
| S.No. | Description | QTY | Unit | Rate | Amount |
| 1 | Supplying, installation, Testing and commissioning of 7.5 HP Submersible pump and motor having discharge 8.74 lps against a total head of 37 m including three phase connection with service wire extension of LT line (0.3Km) & suitable dia GI medium class column pipe, suitable dia N/R Valve, suitable dia flange, submersible flat cable, LT connection from control panel to starter etc all complete with floor mounted outdoor type L.T feeder pillar, three phase starter controll pannel operated on 440 V, 3 phase , 50 c/s made of MS sheet (minimum 2 mm thick) duly spray power coated painting with all accessories as per direction of E/I | | | | |
| | | 1 | Each | 110000.00 | 110000.00 |
| | Total : | | | | 110000.00 |

SUB-ESTIMATE 3

Water Supply Distribution System

| S.No. | Description | Qty | Unit | Rate | Amount |
|------------------|--|--------|------|-------------------|-----------|
| 1/2.8 | Earth work in excavation in foundation trenches or drains(not exceeding 1.5 m in width or 10 sqm on plan) including dressing of sides and ramming of bottoms, lift upto 1.5 m. including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m. | | | | |
| | 63mm | 3450.0 | 0.46 | 0.5 | 798.68 |
| | 90mm | 900.0 | 0.49 | 1.0 | 441.00 |
| | 110mm | 400.0 | 0.51 | 1.0 | 204.00 |
| | 160mm | 200.0 | 0.56 | 1.0 | 112.00 |
| | 5 % extra | | | | 77.8 |
| Total- | | 1633.5 | PM³ | 230.50 | 376512.24 |
| 2/2.26 | Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm in depth: consolidating each deposited layer by ramming and watering lead | | | | |
| 90% of item no 1 | | 1470.1 | PM³ | 74.50 | 109523.41 |
| 3 | Providing and supplying High Density Polyethylene pipe (HDPE pipe) of 20 mm to 225 mm OD and pressure 6.0 Kg/cm2 and 10 Kg/cm2 suitable for water supply which is available in all standard, like ISI-4984, ISO - 4427 DIN-8074 and various grades like PE-63, PE-80, PE-100 and newly invented PE 100+ materials | | | | |
| | HDPE pipe of materials grade PE100- PN8 (dia in mm) | | | 119.39 | |
| | 63 mm dia | 3450.0 | PM | 121.70 | 419874.36 |
| | 90 mm dia | 900.0 | PM | 249.82 | 224834.12 |
| | 110 mm dia | 400.0 | PM | 370.99 | 148395.22 |
| | 160 mm dia | 200.0 | PM | 603.69 | 120738.87 |
| 4 | Supplying labours and tools for lowering in trenches, laying and jointing H.D.P.E. pipes in trenches and making butt welded joint, supplying heating mirror, jack etc. including hydraulic testing and providing night guard, barrier and red light to safe guard against accident, all complete as per specification and direction of E/I | | | 592.22 | |
| | HDPE pipe of materials grade PE100- PN8 (dia in mm) | | | | |

4,11,895.50
 2,20,563.40
 1,65,572.40
 1,18,444.60

| | | | | | |
|-------------|--|--------|------|----------|-----------|
| | 63 mm dia | | | | |
| | 90 mm dia | 3450.0 | PM | 21.32 | 73554.00 |
| | 110 mm dia | 900.0 | PM | 38.16 | 34344.00 |
| | 160 mm dia | 400.0 | PM | 53.33 | 21332.00 |
| | Providing all materials labours tools and tackles for fitting, jointing and testing to HDPE Standard specials confirming to IS specifications etc all complete. | 200.0 | PM | 84.09 | 16818.00 |
| 5 | 10% of item No-3 | | | | 77,803.00 |
| 6/ 18.31 | Providing and fixing CI Sluice valves (with cap) Complete with bolts, nuts, rubber insertions etc. | | | | 79310.37 |
| 18.31.1.2 | 100mm dia Class II | | | | |
| 18.31.3.2 | 150mm dia Class II | 1 | Each | 4046.30 | 4046.30 |
| 7/ 18.59 | Providing and fixing CI double acting air valve of approved quality and bolts, nuts, rubber insertion etc. compete | 1 | Each | 5890.00 | 5890.00 |
| 18.59.2 | 80mm dia | | | | |
| 8/ 18.35 | Constructing masonry chamber 120 x 120 x 100cm inside in brick work in cement mortar 1:4 (1 Cement:4 coarse sand) for sluice valve, with CI Surface box 100mm top diameter, 160mm bottom diameter and 180mm deep (inside)with chained lid and RCC top slab 1:2:4 mix (1 Cement :2 Coarse sand: 4 graded stone aggregate 20mm nominal size), I/C necessary excavation foundation concrete 1:5:10 (1 Cement:5 fine sand : 10 graded stone aggregate 40mm nominal size) and inside plastering with cement mortar 1:3 (1 Cement:3 Coars sand) 12mm thick, finished with a floating coat of neat cement complete as per standard design. | 1 | Each | 6371.70 | 6371.70 |
| | | 2 | Each | 14598.40 | 29196.80 |

| | | | | | | | | |
|-------------------------------------|--|-----|------|---------|--------|-----------------|----------|-----------|
| | Constructing masonry chamber 60 x 60 x 75cm inside in brick work in cement mortar 1:4 (1 Cement:4 coarse sand) for sluice valve, with CI Surface box 350x350mm top, 165mm bottom diameter and 180mm deep (inside)with chained lid and RCC top slab | | | | | | | |
| 9/ 18.36 | 1:2:4 mix (1 Cement :2 Coarse sand: 4 graded stone aggregate 20mm nominal size), I/C necessary excavtion foundation concrete 1:5:10 (1 Cement:5 fine sand : 10 graded stone aggregate 40mm nominal size) and inside plastering with cement mortar 1:3 (1 Cement:3 Coars sand) 12mm thick, finished with a floating coat of neat cement complete as per standard design. | | | | | | | |
| | | 1 | Each | 5917.10 | | | 5917.10 | |
| Road cutting and restoration | | | | | | | | |
| 10/ 15.24 | Dismantling brick on edge soling in road including stacking serviceable materials in countable stacks within 15m lead and disposal of unserviceable materials with all leads etc all complete as per direction of E/I. | | | | | | | |
| | 63mm dia | 345 | 0.46 | 0.125 | 19.97 | | | |
| | 90 mm dia | 90 | 0.49 | 0.125 | 5.51 | | | |
| | 110 mm dia | 40 | 0.51 | 0.125 | 2.55 | | | |
| | 160 mm dia | 20 | 0.56 | 0.125 | 1.40 | | | |
| | Total- | | | | 29.43 | PM ³ | 321.80 | 9470.37 |
| 11/ 11.73 | Providing designation 100A one brick on edge soiling joints filled with local sand including cost of watering, taxes, royalty etc all complete as per building specification and direction of E/I. | | | | | | | |
| | 63mm dia | 345 | 0.46 | | 159.74 | | | |
| | 90 mm dia | 90 | 0.49 | | 44.10 | | | |
| | 110 mm dia | 40 | 0.51 | | 20.40 | | | |
| | 160 mm dia | 20 | 0.56 | | 11.20 | | | |
| | Total- | | | | 235.44 | PM ² | 407.00 | 95822.05 |
| | Deduction for 80% Brick which are taken out during dismentaing work will be reused | | | | 11.54 | P1000 | -7019.25 | -81015.94 |
| 12/ 15.2.1 | Demolishing Cement concrete manually or by mechanical means including disposal of materials within 50m lead as per direction of E/I. | | | | | | | |
| | 63mm dia | 690 | 0.46 | 0.25 | 79.87 | | | |
| | 90 mm dia | 180 | 0.49 | 0.25 | 22.05 | | | |

| | | | | | | | | |
|-----------------------------|--|-----|------|------|--------|------------------|---------|------------|
| | 110 mm dia | 80 | 0.51 | 0.25 | 10.20 | | | |
| | 160 mm dia | 40 | 0.56 | 0.25 | 5.60 | | | |
| | Total- | | | | 117.72 | PM ³ | 578.30 | 68076.03 |
| 13/ 4.5.2 | Providing and laying in position cement concrete 1:2:4(1cement:2coarse sand:4 graded stone chips 20mm nomina size)etc. all complete as per standard specification and direction of E/I. | | | | | | | |
| | Quantity as per item no.13 | | | | 117.72 | P.M ³ | 3850.50 | 453271.23 |
| 14/ 2.28 | Providing local clean sand in filling in foundation trenches and in plinth including ramming and water in layers not exceeding 150mm thick with all leads and lifts including cost of all materials labours royalty and taxes all complete as per building specification and direction of E/I. | | | | | | | |
| | 63mm dia | 690 | 0.46 | 0.15 | 47.92 | | | |
| | 90 mm dia | 180 | 0.49 | 0.15 | 13.23 | | | |
| | 110 mm dia | 80 | 0.51 | 0.15 | 6.12 | | | |
| | 160 mm dia | 40 | 0.56 | 0.15 | 3.36 | | | |
| | Total- | | | | 70.63 | PM ³ | 204.40 | 14436.87 |
| 15/ 11.72 | Providing designation 100A brick one brick flat soling joints filled with local sand and as per direction of E/I. | | | | | | | |
| | 63mm dia | 690 | 0.46 | | 319.47 | | | |
| | 90 mm dia | 180 | 0.49 | | 88.20 | | | |
| | 110 mm dia | 80 | 0.51 | | 40.80 | | | |
| | 160 mm dia | 40 | 0.56 | | 22.40 | | | |
| | Total- | | | | 470.87 | PM ² | 253.80 | 119506.81 |
| 16/ Analysis attached | Carriage of the following materials from quarry to work site including loading, unloading and staking at work site as per specification & direction of E/I. | | | | | | | |
| | (a). Bricks | | | | 17.94 | P1000 | 607.00 | 10889.67 |
| | (b). Coarse sand | | | | 52.97 | PM ³ | 485.81 | 25734.75 |
| | (C). Stone chips | | | | 105.95 | PM ³ | 2796.69 | 296297.42 |
| | (d). Local sand | | | | 70.63 | PM ³ | 343.28 | 24245.95 |
| | Total | | | | | | | 2713393.70 |

26,94,518.31

House to House Service connection

| S.N. | Particulars | Quantity | Unit | Rate | Amount |
|---------------|---|-------------------------|-----------------|------------------|---------------------------|
| 1A/ 2.8 | Earth work in excavation in foundation trenches or drains(not exceeding 1.5 m in width or 10 sqm on plan) including dressing of sides and ramming of bottoms, lift upto 1.5 m. including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m. For Pipe Laying (6 m X .3 m X 0.6m deep) | | | | |
| 1B/2.26 | Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm in depth: consolidating each deposited layer by ramming and watering lead | 1.08 | PM ³ | 230.50 | 248.94 |
| | | 1.08 1.06 | PM ³ | 74.50 | 78.85 76.44 |
| 2/ PHED | Providing and fixing MDPE pipe (PE80) conforming IS: 15801/2008 and ISO 4427 with latest amendment PN12.5 (OD 20mm) | | | 16.94 | 101.64 |
| | | 6 | P/M | 17.27 | 103.62 |
| 3/ PHED | Lowering, laying and jointing M.D.P.E. pipes in proper position including all specials by compression fitting/electrofusion and butt fusion jointing procedure including hydraulic testing as per relevant IS code complete with all materials for jointing procedures like Electrofusion machine, Electric mirror/heater, Butt fusion welding machine with hydraulic jack, top loading clamp, etc, pump and accessories for hydraulic testing and all labour as directed by Engineer-in-charge as per IS-7634 Part II 2012 (amended up to date) Including Contractor's profit & Over head, water charge, labour cess but excluding trenching & refilling, road cutting and restoration the same. | | | | |
| | 20mm dia | 6 | P/M | 3.03 | 18.18 |
| 4/ 18.7.1 | Providing and fixing chlorinated polyvinyl chloride (CPVC) pipes, having thermal stability for hot and cold water supply, including all CPVC plain and brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes and fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge. Internal work (Exposed on wall) 15 mm nominal outer dia pipes. | | | | |
| 5/ 18.20.1 | Providing and fixing 15 mm brass ferrule with CI mouth cover including boring and tapping the main etc. all complete job. | 1 | P/M | 138.70 | 138.70 |
| 6/ LS | Providing and fixing HDPE electrufusion service saddle including all complete job as per direction of E/I. | 1 | Each | 254.10 | 254.10 |
| 7/ 18.15.1 | Providing and fixing brass bib cock of approved quality 15 mm nominal bore | 1 | Each | 400.00 | 400.00 |
| | | 1 | Each | 273.00 | 273.00 |
| | Total: | | | | 1512.98 |
| | Say Rs.: | | | | 1513.41 |
| | | | | | 1513.00 |

Rate Analysis Per Meter

| S.N# | Particulars | Dia. Of Pipe | Rate including Excise Duty & CST | Cost without VAT | Amount of VAT | CP & Overhead Charges @ 15% | Total Cost including 1% Labour Cess |
|------|---|--------------|----------------------------------|------------------|---------------|-----------------------------|-------------------------------------|
| 1 | 2 | 3 | 4 | 5 (4/1.06) | 6(4-5) | 7 (5*0.15) | 8(1.01*(4+7)) |
| 1 | HDPE Pipe (PE100) PN8 conforming to IS 4984/1995 with latest amendment | 63mm | 105.56 | 99.58 | 5.98 | 14.94 | 121.70 |
| 2 | | 75mm | 150.82 | 142.28 | 8.54 | 21.34 | 173.88 |
| 3 | | 90mm | 216.68 | 204.42 | 12.26 | 30.66 | 249.82 |
| 4 | | 110mm | 321.78 | 303.57 | 18.21 | 45.53 | 370.99 |
| 5 | | 125mm | 417.95 | 394.29 | 23.66 | 59.14 | 481.86 |
| 6 | | 140mm | 523.62 | 493.98 | 29.64 | 74.10 | 603.69 |
| 7 | | 160mm | 523.62 | 493.98 | 29.64 | 74.10 | 603.69 |
| 8 | | 180mm | 682.28 | 643.66 | 38.62 | 96.55 | 786.62 |
| 9 | | 200mm | 861.66 | 812.89 | 48.77 | 121.93 | 993.43 |
| 10 | | 225mm | 1061.90 | 1001.79 | 60.11 | 150.27 | 1224.29 |
| 11 | | 250mm | 1345.32 | 1269.17 | 76.15 | 190.38 | 1551.05 |
| 12 | HDPE Pipe (PE100) PN10 conforming to IS 4984/1995 with latest amendment | 63mm | 128.04 | 120.79 | 7.25 | 18.12 | 147.62 |
| 13 | | 75mm | 183.6 | 173.21 | 10.39 | 25.98 | 211.68 |
| 14 | | 90mm | 262.84 | 247.96 | 14.88 | 37.19 | 303.03 |
| 15 | | 110mm | 388.52 | 366.53 | 21.99 | 54.98 | 447.93 |
| 16 | | 125mm | 503.94 | 475.42 | 28.52 | 71.31 | 581.00 |
| 17 | | 140mm | 630.78 | 595.08 | 35.70 | 89.26 | 727.24 |
| 18 | | 160mm | 822.14 | 775.60 | 46.54 | 116.34 | 947.87 |
| 19 | | 180mm | 1044.44 | 985.32 | 59.12 | 147.80 | 1204.16 |
| 20 | | 200mm | 1288.04 | 1215.13 | 72.91 | 182.27 | 1485.01 |
| 21 | | 225mm | 1625.63 | 1533.61 | 92.02 | 230.04 | 1874.23 |
| 22 | 250mm | 2001.26 | 1887.98 | 113.28 | 283.20 | 2307.30 | |
| 23 | MDPE Pipe (PE80) PN 12.5 confirming to IS 15801/2008 and IS 4427 with latest amendment | 20mm | 14.98 | 14.13 | 0.85 | 2.12 | 17.27 |
| 24 | | 25mm | 20.16 | 19.02 | 1.14 | 2.85 | 23.24 |
| 25 | | 32mm | 32.48 | 30.64 | 1.84 | 4.60 | 37.45 |

Carriage Analysis for Patna Town

| S.No. | Items | Rate (Rs.) | Remarks |
|-------|---|------------|--------------|
| 1 | Pea gravel | | |
| | Carriage from Dalbhumgadh to work site (500 Km pakka and 5 Km unsurface road) | | |
| | $8/5 (500 \times 6.50 + 5 \times 7.90) + 133.60$ | 5396.80 | |
| | Including 1% Labour Cess | 5450.77 | per cum |
| 2 | Local Sand {Lead - 15 Km (14P + 1K)} | | |
| | $8/5 (14 \times 6.50 + 1 \times 15.80)$ | 170.88 | BCD SOR 2016 |
| | Loading & Unloading | 169.00 | |
| | Including 1% Labour Cess | 339.88 | |
| | | 343.28 | per cum |
| 3 | Bricks {Lead - 8 Km (7P + 1K)} | | |
| | $8/2 (7 \times 6.50 + 1 \times 15.80)$ | 245.2 | |
| | Loading & Unloading | 355.79 | |
| | Including 1% Labour Cess | 600.99 | |
| | | 607.00 | per 1000 nos |
| 4 | Coarse Sand (Lead - 30 Km) | | |
| | $8/5 (30 \times 6.50)$ | 312 | |
| | Loading & Unloading | 169.00 | |
| | Including 1% Labour Cess | 481.00 | |
| | | 485.81 | per cum |
| 5 | Stone chips (Lead 250 Km) | | |
| | $8/5 (250 \times 6.5)$ | 2600.00 | |
| | Loading & Unloading | 169.00 | |
| | Including 1% Labour Cess | 2769.00 | |
| | | 2796.69 | Per cum |

Design Parameter

1. No. of Households :- 500
2. Present Population Taking 5 Person per Households :- 2500
3. Projected Population (2033) taking 2% growth rate per annum :- 3250
4. Pumping hour :- 16 hours
5. Water Demand :-135 lpcd +15% UFW
6. Total Water Demand :- $3575 \times 155 = 554125$ Litre per day
7. Rate of Pumping :- $554125 / (16 \times 3600) = 8.74$ LPS
8. Head of Pump-motor:-

| | |
|------------------------------|-------|
| (a) Sub soil water level - | 18 m |
| (b) Drawdown- | 4.5 m |
| (c) Friction loss in pipes - | 7.5 m |
| (d) Tail End pressure - | 7 m |
| Total:- | 37 m |
9. Tubewell :-
 - (a) Discharge of tubewell is kept 1.5 times of the discharge of pump- $1.5 \times 8.74 = 13.11$ LPS
 $= 0.01311 \text{ m}^3/\text{s}$
 - (b) Velocity of flow in tubewell - 1.2 m/s
 - (c) Area of tubewell - $0.01311 / 1.2 = 0.0109 \text{ m}^2$
 - (d) Diameter of tubewell - $\text{sqrt}(4 \times 0.0109 / 3.14) = 0.118 \text{ m}$, Say 150 mm
Hence provide 200mm x 150mm x 150m deep tubewell with 30 m screen pipe.
10. Distribution :- Total 4950 M distribution network has been assumed to cover 500 households.