Drawings of Rural Water Supply and Sanitation Modules
LOW COST RURAL WATER SUPPLIES AND SANITATION

DRAWINGS

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NOTES

1. All drawings marked with * have associated Bending Schedules at the end of this volume.
2. All drawings should be read in conjunction with the accompanying Specification and Bills of Quantities.
2. In case of no electric power supply, the power board as per specification is still included in the pump house requirements, ready for future connection as and when supply is given.

3. In calculating the minimum floor dimensions of the pump house, provision has been made for the space required for standby or primary diesel drive.

4. For diesel installation the exhaust pipe is to be adequately capped and passed through an opening in the wall giving a clearance of 30 mm around the pipe.
NOTES

1. All dimensions are in millimetres unless otherwise stated.
2. The booster arrangement has no pressure control in the assumption that the pump will be manually energised at the start of the demand period and manually des-energised before demand drops to below 10% of peak. Under other conditions a pressure control switch should be incorporated.
3. Level control transformer voltage ratio to be selected to suit level relays.
4. For positioning of boards, refer to pump house drawing numbers 001 and 002.
5. The booster transformer is required for motors over 10 HP.
6. A separate transformer is required for motors over 10 HP.
7. Design on low circuit is replaced by Star/Delta circuit for motors over 5 HP, and vice versa.
8. For surface water schemes only refer to booster pump equipment submittal diagrams.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

PUMP HOUSE DETAILS
POWER BOARD AND MISC. DETAILS

DRAWING NO: 003
SCALE: Refer to set for scale
DATE: JUNE 1989

STRWILLIAM HAWORTH & Partners
Consulting Engineers and Architects
London ECW 1

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

PUMP HOUSE DETAILS
POWER BOARD AND MISC. DETAILS

DRAWING NO: 003
SCALE: Refer to set for scale
DATE: JUNE 1989

STRWILLIAM HAWORTH & Partners
Consulting Engineers and Architects
London ECW 1
Electric driven
Deep well turbine
Pump assembly

50 mm x 200 long sockets for pump holding down (both)
Dimensions according to pumps supplied

Cement plug adjacent to M.S. survey ring

500 mm Dia. Concrete post
200 mm Dia. Bar casting

SECTIONAL SIDE ELEVATION

PLAN VIEW

1. All dimensions are in millimetres unless otherwise stated.
2. On initial starting of the pump the self-water lubricating tank is opened for a short time in order to ensure adequate lubrication of the line shaft bearings located above the static water level of the borehole.
3. The size of the wall cavity for the pipe and temporary packing dia "X" to be not less than the flange diameter ± 20 mm tolerance.
4. Installation and commissioning of pumps to be carried out by pump manufacturer.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
PUMPING PLANT ASSEMBLY

NOTES

PLAN VIEW

SECTIONAL SIDE ELEVATION

PUMP ASSEMBLY P-1
ELECTRIC MOTOR COUPLING

PUMP ASSEMBLY P-2
DESEO ENGINE COUPLING
SIDE ELEVATION

Plan View

Pump Assembly P-3
Diesel Engine Direct Coupling

Typical Suction Line Detail

Typical Discharge Line Detail

Notes:
1. All dimensions are in millimeters unless otherwise stated.
2. Although pump assemblies feature flexible couplings, alternative arrangements with hardy straps or V-vee belt attachment may be used (Refer to Drg No 006).
3. Typical suction detail:
   a. The depth D from the pump discharge to the lowest water level shall be maximum 1.3 m unless NPSH is calculated for the actual installation.
   b. A saddle flange is used wherever the suction line passes through an RCC or masonry water retaining structure.
4. Typical discharge detail:
   a. The by-pass valve is advised to reduce the effect of pressure build up due to sudden valve closure.
   b. A short flanged pipe length accommodates convenient changing of site or defective fittings for replacement of differing dimensions, if also allowed for the suction discharge under conversion to double pump stand-by arrangement if required.
5. In the case of increasing the diameter of the pump or the discharge side to suit mains sizing, all fittings detailed are to be placed on the downstream side of the reducer, thus minimising head losses.
6. The size of the well cover for the pump and temporary piping is 2.4 m to be not less than, the flange diameter x 1.50 mm tolerance.

Low Cost Water Supply and Sanitation
Standard Design Modules
Suction pipework

55mm diameter (Refer to Drg No 007)

1. Dimensions are in millimeters unless otherwise stated.
2. Each booster pump assembly layout includes two multistage centrifugal pumps (one as stand by) on electric motor primary drive and a diesel stand by.
3. A blank storage is required to reduce the effect of pressure build up due to sudden closure of each valve.
4. By pass valve is required to reduce the effect of pressure build up due to sudden closure of each valve.
5. For ground level storage tank detail (Refer Drg No 007)
6. For clear well detail (Refer Drg No 037)
7. External pipes to be capped or painted a higher altitude.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

BOOSTER PUMP ASSEMBLY DETAILS
MULTI STAGE CENTRIFUGAL
**LOW COST WATER SUPPLY AND SANITATION**
**STANDARD DESIGN MODULES**

**GROUND LEVEL STORAGE TANK/BOOSTER PUMP BAY**

**GENERAL ARRANGEMENT**

**DRAWING NO: 007**
**SCALE: Refer to bar table**

**NOTES:**
1. All dimensions are given in millimetres unless otherwise stated.
2. The internal dimensions quoted are to the surfaces of the RCC. Live storage capacity is determined by allowing for the following volumetric reductions:
   - 10 mm thick water-proofing plaster rendering (see note 3).
   - 10 mm depth dead storage.
3. For further details of booster pump arrangements and alternative layouts, refer to Drg No 006.
4. For full RCC details and notes, refer to the range of storage tank sizes given in Table 1, refer to Drg Nos 008-019 and relevant bending schedules.
5. Selection of the required capacity storage tank for a set period is determined by the difference of water demand to be supplied for a required deep delivery period.
6. Storage tank volume is to be taken as 10% cement sand with 50% water mixing ratio.
7. Inlet position may be moved to either of the three other sides of the tank as per the convenience of topography. Refer to Drg No 020 and the instruction of the engineer-in-charge.

**LOW COST WATER SUPPLY AND SANITATION**
**STANDARD DESIGN MODULES**

**GROUND LEVEL STORAGE TANK/BOOSTER PUMP BAY**

**GENERAL ARRANGEMENT**

**DRAWING NO: 007**
**SCALE: Refer to bar table**

**NOTES:**
1. All dimensions are given in millimetres unless otherwise stated.
2. The internal dimensions quoted are to the surfaces of the RCC. Live storage capacity is determined by allowing for the following volumetric reductions:
   - 10 mm thick water-proofing plaster rendering (see note 3).
   - 10 mm depth dead storage.
3. For further details of booster pump arrangements and alternative layouts, refer to Drg No 006.
4. For full RCC details and notes, refer to the range of storage tank sizes given in Table 1, refer to Drg Nos 008-019 and relevant bending schedules.
5. Selection of the required capacity storage tank for a set period is determined by the difference of water demand to be supplied for a required deep delivery period.
6. Storage tank volume is to be taken as 10% cement sand with 50% water mixing ratio.
7. Inlet position may be moved to either of the three other sides of the tank as per the convenience of topography. Refer to Drg No 020 and the instruction of the engineer-in-charge.
1. This drawing to be read in conjunction with drawing numbers 007 & 009 and the relevant bending schedules.

2. Concrete mix to be 1:1:1.5 cement/sand/course aggregate by volume.

3. A minimum concrete strength to be 25 N/mm² (3625 lb/in²).

4. Maximum aggregate size to be 20mm (0.8in).

5. Minimum cover to all reinforcement to be 50mm (2in).

6. Laps to reinforcement to be 40 times the diameter of the smaller bar.

7. Reinforcement to be grade 250 N/mm² (36250 lb/in²) plain bars.

8. Reinforcement nomenclature:

   - (R) 16 T 200-4 EF: Position of bar (see note 9) Bar centres (mm) Bar mark (see Bending Schedules) Diameter of bar (mm) Type of steel (R: Reinforced steel) Number of bars

9. Abbreviations referring to positions of reinforcement:

   - EF = Each Face
   - NF = Near Face
   - FF = Far Face

10. Where reinforcement fouls pipes or openings, bars are either to be bent over or cut to suit and spliced with similar sized bars.

11. Safe soil bearing pressure should not be less than 50kN/m² (10000 lb/ft²).

12. This drawing is schematic only. Do not scale.

13. The contractor to provide to the Engineer for testing, 3 No. concrete test cubes for each concrete pour.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

11.4 CUBIC METRE (2500 GALLON) GROUND LEVEL STORAGE TANK
REINFORCEMENT DETAILS (SHEET 1 OF 2)

DRAWING NO 008
SCALE: 1/10 OF DRAWING

DATE: MAY 1988

The contractor is responsible for ensuring the correct execution of the reinforcement details.
1. For position of sections see drawing number 008.
2. Reinforcement nomenclature:
   - B: Bar mark C5
   - Position of end of bar
3. For bar positions, spacing, and diameters refer to plans and schedules on drawing number 008.
4. For bar shapes and lengths refer to relevant bending schedules.
5. The notes on drawing number 008 also apply.
6. This drawing is schematic only; do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

11-4 CUBIC METRE (2,500 GALLON)
GROUND LEVEL STORAGE TANK
REINFORCEMENT DETAILS (SHEET 2 OF 2)
NOTES

1. This drawing to be read in connection with drawing numbers 007 & 011 and the relevant bending schedules.

2. Concrete mix to be 1:3 cement:sand:course aggregate by volume.

3. Minimum cement strength to be 25 kN/mm² (3625 Ib/in²) at 28 days.

4. Maximum aggregate size to be 20mm (0.787 in).

5. Minimum cover to reinforcement to be 50mm (2 in).

6. Bars to be bent to reinforcement to be 40 times the diameter of the smaller bar.

7. Reinforcement to be grade 250 N/mm² (36250 lb/in²) mild steel bars.

Reinforcement nomenclature:

- Position of bar (see note 9):
  - EF = Each face
  - NF = Net face
  - FF = Few face
  - B = Bottom
  - T = Top

8. Bar centres (mm)

9. Number of bars:

10. Where reinforcement fouls pipes or openings, bars are to be bent aside or are to be cut to suit and spliced with similar grade bars.

11. The contractor to provide to the Engineer for testing, 3 No. concrete test cubes for each concrete pour.

12. Safe bearing pressure should not be less than 50 kN/m² (4.5 tons/sq ft).

13. This drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

22.8 CUBIC METRE (5000 GALLON)
GROUND LEVEL STORAGE TANK
REINFORCEMENT DETAILS (SHEET 1 OF 2)

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

22.8 CUBIC METRE (5000 GALLON)
GROUND LEVEL STORAGE TANK
REINFORCEMENT DETAILS (SHEET 1 OF 2)
NOTES

1. For position of sections see drawing number 010.

2. Reinforcement nomenclature:

   - Bar mark 05
   - Position of end of bar

3. For bar position spacings and diameters refer to drawing No. 010.

4. For shapes and lengths refer to relevant bending schedules.

5. The notes on drawing number 010 also apply.

6. The drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

22.8 CUBIC METRE (5000 GALLON)
GROUND LEVEL STORAGE TANK
REINFORCEMENT DETAILS (SHEET 2 OF 2)
NOTES:

1. This drawing to be read in conjunction with drawing numbers 007 & 013, and the relevant bending schedules.
2. Concrete mix to be 1:1:3 cement/sand/course aggregate by volume.
3. Minimum concrete strength to be 25 N/mm² (3625 psi).
4. Maximum aggregate size to be 20mm (3/4 in).
5. Minimum cover to all reinforcement to be 50mm (2 in).
6. Lap in reinforcement to be 40 times the diameter of the smaller bar.
7. Reinforcement to be grade 250 N/mm² (36250 lb/in²) bars.
8. Reinforcement nomenclature:
   - EF = Each face
   - NF = Near face
   - FF = For face
   - B = Bottom
   - T = Top

9. The contractor to provide to the Engineer for testing, 3 No. concrete test cubes for each concrete pour.
10. Safe soil bearing pressure should not be less than 50KN/m² (0.45 ton/ft²).
11. This drawing is schematic only. Do not scale.
NOTES
1 For position of sections see drawing number 012
2 Reinforcement nomenclature:
   05 Bar mark 05
   --- Position of end of bar
3 For bar positions, spacings, and diameters refer to plans and elevations on drawing number 012
4 For bar shapes and lengths refer to relevant bending schedules.
5 The notes on drawing number 012 also apply
6 This drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

34.1 CUBIC METRE (7500 GALLON)
GROUND LEVEL STORAGE TANK
REINFORCEMENT DETAILS (SHEET 2 OF 2)
NOTES
1. The drawing is to be read in conjunction with drawing numbers 007 & 015 and the relevant bending schedules.
2. Concrete mix to be 1 part cement / 3 parts sand / course aggregate by volume.
3. Minimum concrete strength to be 25 N/mm² (3625 lb/ft²).
4. Maximum aggregate size to be 20mm (0.79 in).
5. Maximum cover to all reinforcement to be 50mm (2 in).
6. Laps to reinforcement to be 40 times the diameter of the smaller bar.
7. Reinforcement to be grade 250 N/mm² (36250 lb/in²) plain bars.
8. Reinforcement nomenclature:
   • 3- R 16 - 39 - 200 - T
     • Position of bar (see note 9)
     • Bar centres (mm)
     • Diameter of bar in millimetres
     • Type of steel (R = R-mesh steel)
     • Number of bars
9. Abbreviations referring to position of reinforcement:
   • EF = Each face
   • NF = Near face
   • FF = Far face
   • B = Bottom
   • T = Top
10. Where reinforcement foul pipes or openings, bars are either to be bent aside or to be cut to suit and spliced with similar sized bars.
11. The contractor to provide to the Engineer for testing:
   • No concrete test cubes for each concrete pour.
12. Safe soil bearing pressure should not be less than 50KN/m² (4.5 ton/ft²).
13. This drawing is schematic only. Do not scale.
NOTES
1. For position of sections see drawing number 014.
2. Reinforcement nomenclature:
   - 05 = Bar mark 05
   - Position of end of bar
3. For bar positions, spacings, and diameters refer to plans and sections in drawing number 014.
4. For bar shapes and lengths refer to relevant bending schedules.
5. The notes on drawing number 014 also apply.
6. This drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

45.5 CUBIC METRE (10,000 GALLON)
GROUND LEVEL STORAGE TANK
REINFORCEMENT DETAILS (SHEET 2 OF 2)

DRAWMG NO. 015
SCALE: 1" = 1 M.

DATE: JUNE 1988
NOTES:
1. Top drawing to be read in conjunction with drawing numbers 007 & 008 and the relevant bending schedules.
2. Concrete mix to be 1:3:6 cement:sand:course aggregate by volume.
3. Minimum concrete strength to be 25 N/mm² (3625 Ib/in²).
4. Maximum aggregate size to be 20mm (3/4 in).
5. Minimum cover to all reinforcement to be 50mm (2 in).
6. Loss to reinforcement to be 40 times the diameter of the smaller bar.
7. Reinforcement to be grade 250 N/mm² (3625 Ib/in²) plain bars.
8. Reinforcement nomenclature:
   - EF = Each face
   - NF = Near face
   - FF = Far face
   - B = Bottom
   - T = Top
9. Abbreviations referring to position of reinforcement:
   - EF = Each face
   - B = Bottom
   - NF = Near face
   - FF = Far face
   - B = Bottom
   - T = Top
10. Where reinforcement fouls pipes or openings, bars are to be bent aside or cut to suit and spliced with similar sized bars.
11. The contractor to provide to the Engineer for testing:
    - 3 No. concrete test cubes for each concrete pour.
12. Safe soil bearing pressure should not be less than 50kN/m² (45 psi).
13. This drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
68.3 CUBIC METRE (15,000 GALLON)
GROUND LEVEL STORAGE TANK
REINFORCEMENT DETAILS (SHEET 1 OF 2)

DRAWING NO 016
SCALE 1:100

DATE: JUNE 1984
NOTES

1. For position of sections see drawing number 016.
2. Reinforcement nomenclature:
   - Bar mark 05
   - Position of end of bar
3. For bar shapes and diameters refer to plan and details on drawing number 016.
4. For bar shapes and diameters refer to relevant bending schedules.
5. The notes on drawing number 016 also apply.
6. This drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

68.3 CUBIC METRE (15,000 GALLON)
GROUND LEVEL STORAGE TANK
REINFORCEMENT DETAILS (SHEET 2 OF 2)

DRAWING NO 017
SCALE

Sir Robert McAlpine & Partners Ltd
55 Great Russell Street
London WC1B 3LA

DRAFTSPECS TO 1:50,000

DATE: JUNE 1998

SOUTHERN WATER, SWG 602
NOTES
1. The drawing to be read in conjunction with drawing numbers 007 to 019 and the relevant bending schedules.
2. Concrete mix to be 1:2:3 cement : sand : coarse aggregate by volume.
3. Minimum concrete strength to be 25 N/mm² (3625 lb/in²).
4. Maximum aggregate size to be 20mm (l/4 in).
5. Minimum cover to all reinforcement to be 50mm (2 in).
6. Laps to reinforcement to be 40 times the diameter of the smaller bar.
7. Reinforcement to be grade 250 N/mm² (36250 lb/in²) plain bars.
8. Reinforcement designation:
   - Position of bar (see note 9)
   - Bar centres (mm)
   - Bar mark (see bending schedules)
   - Diameter of bar in millimetres
   - Type of steel (R=mild steel)

9. Abbreviations referring to position of reinforcement:
   - EF = Each face
   - B = Bottom
   - T = Top
   - FF = Far face

10. Where reinforcement passes pipes or openings, bars are to be cut to suit and spliced with similar sized bars.
11. The contractor to provide to the Engineer for testing,
    3 No concrete test cubes for each concrete batch.
12. Safe soil bearing pressure should not be less than 50kN/m² (0.45 ton/ft²).
13. This drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
91.0 CUBIC METRE (20,000 GALLON)
GROUND LEVEL STORAGE TANK
REINFORCEMENT DETAILS (SHEET 1 OF 2)

DRAWING NO: 018
SCALE: 1/50
DATE: JUNE 1986
LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

INFILTRATION GALLERY

DRAWING NO. 022

SCALe: Refer to note (b) of sheet b.p.l. and 1

INSTRUCTIONS TO DRAWER:

1 All dimensions are in millimetres unless otherwise specified.
2 The collector pipe intercepts ground water flow within the same bed of river.
3 The infiltration gallery must be located away from any possible source of pollution.
4 For seasonal variations in water levels in excess of the pump net positive suction head (NPSH) (Approx 4.5), a two tier pumps setting arrangement is required.
5 For lowering/raising pump assembly staging, simple procedure involves:

   a) Loosen hook bolts (1) to (4).
   b) Loosen slide bolts move supporting angles aside ond raise/lower pump assembly.

NPSH:

Transfer pump to lower tier staging (2) follows:

a) Disconnect at points (A) and (B): Seal with Wank plug and gasket.
   b) Disconnect discharge suction assemblies to interconnected tee portions (C) and (D) if necessary.
   c) Gate valve (T) closed, (7) open.

SECTION BB
SECTION AA

SECTIONAL ELEVATION

GALLERY DETAIL G1
LWL WITHIN THE NPSH OF PUMP

SCALE: a)

NOTES:

1. All dimensions are in millimeters unless otherwise specified.
2. The collector pipe intercepts ground water flow within the same bed of river.
3. The infiltration gallery must be located away from any possible source of pollution.
4. For seasonal variations in water levels in excess of the pump net positive suction head (NPSH) (Approx 4.5), a two tier pumps setting arrangement is required.
5. For lowering/raising pump assembly staging, simple procedure involves:

   a) Loosen hook bolts (1) to (4).
   b) Loosen slide bolts move supporting angles aside ond raise/lower pump assembly.

NPSH:

Transfer pump to lower tier staging (2) follows:

a) Disconnect at points (A) and (B): Seal with Wank plug and gasket.
   b) Disconnect discharge suction assemblies to interconnected tee portions (C) and (D) if necessary.
   c) Gate valve (T) closed, (7) open.

For lowering/raising pump assembly staging, simple procedure involves:

   a) Loosen hook bolts (1) to (4).
   b) Loosen slide bolts move supporting angles aside ond raise/lower pump assembly.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

INFILTRATION GALLERY

DRAWING NO. 022

SCALE: Refer to note (b) of sheet b.p.l. and 1

INSTRUCTIONS TO DRAWER:

1 All dimensions are in millimetres unless otherwise specified.
2 The collector pipe intercepts ground water flow within the same bed of river.
3 The infiltration gallery must be located away from any possible source of pollution.
4 For seasonal variations in water levels in excess of the pump net positive suction head (NPSH) (Approx 4.5), a two tier pumps setting arrangement is required.
5 For lowering/raising pump assembly staging, simple procedure involves:

   a) Loosen hook bolts (1) to (4).
   b) Loosen slide bolts move supporting angles aside ond raise/lower pump assembly.

NPSH:

Transfer pump to lower tier staging (2) follows:

a) Disconnect at points (A) and (B): Seal with Wank plug and gasket.
   b) Disconnect discharge suction assemblies to interconnected tee portions (C) and (D) if necessary.
   c) Gate valve (T) closed, (7) open.

For lowering/raising pump assembly staging, simple procedure involves:

   a) Loosen hook bolts (1) to (4).
   b) Loosen slide bolts move supporting angles aside ond raise/lower pump assembly.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

INFILTRATION GALLERY

DRAWING NO. 022

SCALE: Refer to note (b) of sheet b.p.l. and 1

INSTRUCTIONS TO DRAWER:

1 All dimensions are in millimetres unless otherwise specified.
2 The collector pipe intercepts ground water flow within the same bed of river.
3 The infiltration gallery must be located away from any possible source of pollution.
4 For seasonal variations in water levels in excess of the pump net positive suction head (NPSH) (Approx 4.5), a two tier pumps setting arrangement is required.
5 For lowering/raising pump assembly staging, simple procedure involves:

   a) Loosen hook bolts (1) to (4).
   b) Loosen slide bolts move supporting angles aside ond raise/lower pump assembly.

NPSH:

Transfer pump to lower tier staging (2) follows:

a) Disconnect at points (A) and (B): Seal with Wank plug and gasket.
   b) Disconnect discharge suction assemblies to interconnected tee portions (C) and (D) if necessary.
   c) Gate valve (T) closed, (7) open.

For lowering/raising pump assembly staging, simple procedure involves:

   a) Loosen hook bolts (1) to (4).
   b) Loosen slide bolts move supporting angles aside ond raise/lower pump assembly.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

INFILTRATION GALLERY

DRAWING NO. 022

SCALE: Refer to note (b) of sheet b.p.l. and 1

INSTRUCTIONS TO DRAWER:

1 All dimensions are in millimetres unless otherwise specified.
2 The collector pipe intercepts ground water flow within the same bed of river.
3 The infiltration gallery must be located away from any possible source of pollution.
4 For seasonal variations in water levels in excess of the pump net positive suction head (NPSH) (Approx 4.5), a two tier pumps setting arrangement is required.
5 For lowering/raising pump assembly staging, simple procedure involves:

   a) Loosen hook bolts (1) to (4).
   b) Loosen slide bolts move supporting angles aside ond raise/lower pump assembly.

NPSH:

Transfer pump to lower tier staging (2) follows:

a) Disconnect at points (A) and (B): Seal with Wank plug and gasket.
   b) Disconnect discharge suction assemblies to interconnected tee portions (C) and (D) if necessary.
   c) Gate valve (T) closed, (7) open.

For lowering/raising pump assembly staging, simple procedure involves:

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LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

INFILTRATION GALLERY

DRAWING NO. 022

SCALE: Refer to note (b) of sheet b.p.l. and 1

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For lowering/raising pump assembly staging, simple procedure involves:

   a) Loosen hook bolts (1) to (4).
   b) Loosen slide bolts move supporting angles aside ond raise/lower pump assembly.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

INFILTRATION GALLERY

DRAWING NO. 022

SCALE: Refer to note (b) of sheet b.p.l. and 1

INSTRUCTIONS TO DRAWER:

1 All dimensions are in millimetres unless otherwise specified.
2 The collector pipe intercepts ground water flow within the same bed of river.
3 The infiltration gallery must be located away from any possible source of pollution.
4 For seasonal variations in water levels in excess of the pump net positive suction head (NPSH) (Approx 4.5), a two tier pumps setting arrangement is required.
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a) Disconnect at points (A) and (B): Seal with Wank plug and gasket.
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For lowering/raising pump assembly staging, simple procedure involves:

   a) Loosen hook bolts (1) to (4).
   b) Loosen slide bolts move supporting angles aside ond raise/lower pump assembly.
SECTIONAL ELEVATION DIRECT INTAKE DETAIL I - 1

SECTIONAL ELEVATION INDIRECT INTAKE DETAIL I - 2

PLAN DETAIL I - 2

SCREEN DETAIL

NOTES
1. All dimensions are in millimetres unless otherwise stated.
2. The intake discharges water into the pre-sedimentation basins via intermediate pumping or by gravity flow, as per site conditions.
3. Minimum cover to all reinforced concrete to be not less than 50 mm.
4. Brick masonry to have mortar of 1:4 cement sand mix.
5. 20 mm internal render with 5% water proofing additive 12 mm to external brickwork surfaces.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

CANAL INTAKE STRUCTURES
LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
HORIZONTAL ROUGHING FILTER
GENERAL ARRANGEMENT

PART CUT SECTIONAL PLAN (For dimensions L1, L2, L3 see Table 1)

PART CUT SECTIONAL ELEVATION

SECTIONAL END ELEVATION

NOTES
1. All dimensions are in millimetres, unless otherwise stated.
2. The filter, using 50 mm Dia PVC piping, and 25 mm mortar joints gives the following design requirements:
   - Inlet partition wall - 15% opening (top and bottom 300mm are sealed in order to retain scum and settled deposits respectively).
   - Intermediate walls - 15% opening for inter-chamber flows.
3. Refer to Table 1 for the various dimensions of filters for the different population sizes.

The layout of the horizontal roughing filter is designed for the water consumption demand for the present population. Additional units may be given against increased future demand, as per the direction of the Engineer-in-Charge.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
HORIZONTAL ROUGHING FILTER
GENERAL ARRANGEMENT

PART CUT SECTIONAL PLAN (For dimensions L1, L2, L3 see Table 1)

PART CUT SECTIONAL ELEVATION

SECTIONAL END ELEVATION

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LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
HORIZONTAL ROUGHING FILTER
GENERAL ARRANGEMENT

PART CUT SECTIONAL PLAN (For dimensions L1, L2, L3 see Table 1)

PART CUT SECTIONAL ELEVATION

SECTIONAL END ELEVATION

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 LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
HORIZONTAL ROUGHING FILTER
GENERAL ARRANGEMENT

PART CUT SECTIONAL PLAN (For dimensions L1, L2, L3 see Table 1)

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SECTIONAL END ELEVATION

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 LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
HORIZONTAL ROUGHING FILTER
GENERAL ARRANGEMENT

PART CUT SECTIONAL PLAN (For dimensions L1, L2, L3 see Table 1)

PART CUT SECTIONAL ELEVATION

SECTIONAL END ELEVATION

NOTES
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   - Intermediate walls - 15% opening for inter-chamber flows.
3. Refer to Table 1 for the various dimensions of filters for the different population sizes.

The layout of the horizontal roughing filter is designed for the water consumption demand for the present population. Additional units may be given against increased future demand, as per the direction of the Engineer-in-Charge.

 LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
HORIZONTAL ROUGHING FILTER
GENERAL ARRANGEMENT

PART CUT SECTIONAL PLAN (For dimensions L1, L2, L3 see Table 1)

PART CUT SECTIONAL ELEVATION

SECTIONAL END ELEVATION

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 LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
HORIZONTAL ROUGHING FILTER
GENERAL ARRANGEMENT

PART CUT SECTIONAL PLAN (For dimensions L1, L2, L3 see Table 1)

PART CUT SECTIONAL ELEVATION

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 LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
HORIZONTAL ROUGHING FILTER
GENERAL ARRANGEMENT

PART CUT SECTIONAL PLAN (For dimensions L1, L2, L3 see Table 1)

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**LOW COST WATER SUPPLY AND SANITATION**

**STANDARD DESIGN MODULES**

**PRE-SEDIMENTATION BASIN PLAN AND SECTIONAL VIEWS**

**DRAWING NO. 025**

**SCALE** Refer to bar scale

**DATE** March 1980

**ARCHITECTS** SNJ Associates

**Note:** All dimensions are in metres unless otherwise stated.

1. Present population

2. Maximum water depth, excluding extra fall given to the base of the tank for sludge, is 2.5 metres. (See table I)

3. Dimensions (inside) are calculated to give a balance in cut and fill earthworks.

4. Embankment in hatched detail denotes earthworks in fill and requires full compaction in horizontal layers of 225 mm as per specification.

5. The sedimentation basins are designed for a storage capacity of 30 days and a water consumption of 45 litres per person per day. This allows for a closure period of the irrigation canal for maintenance purposes. (See table I)

6. Slopes to the basin sides are given for silty clay soils only. The following slopes for the respective soil conditions are given:

   - Soil type: Silty clay
     - Downstream: 1:3
     - Upstream: 1:2
   - Loose sandy soil: 1:5

7. For sections C-C and D-D refer to drawing no. 026

**NOTES:**

<table>
<thead>
<tr>
<th>Present population (PN)</th>
<th>Max. water depth (D)</th>
<th>Cut-off depth (Dc)</th>
<th>Fill depth (Df)</th>
<th>Cut-off volume (Vc)</th>
<th>Overall length (L)</th>
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<tr>
<td>PN = 300</td>
<td>2.50</td>
<td>1.20</td>
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<td>0.20</td>
<td>1.02</td>
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<tr>
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<td>0.40</td>
<td>2.00</td>
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<tr>
<td>PN = 1000</td>
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<td>2.00</td>
<td>2.00</td>
<td>0.80</td>
<td>3.00</td>
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</table>

**SECTIONAL VIEW AA**

- Conical shaped spigot
- Pumping plant (up to 80 mm dia)
- Suction pipe (up to 150 mm dia)
- Overall width (W)
- Valve chamber type C2
- Compacted embankment
- Maximum water level
- Drainpipe 80 mm dia

**SECTIONAL VIEW BB**

- Conical shaped spigot
- Pumping plant (up to 80 mm dia)
- Suction pipe (up to 150 mm dia)
- Overall width (W)
- Valve chamber type C2
- Compacted embankment
- Maximum water level
- Drainpipe 80 mm dia

**PLAN VIEW**

- Present population
- Max. water depth (D)
- Cut-off depth (Dc)
- Fill depth (Df)
- Cut-off volume (Vc)
- Overall length (L)

**IMPORTANT**

- The balance of cut and fill volumes assumes a full compactive effort as per the specification.
PART CUT PLAN

(Refer to Fig No. 029)

SECTIONAL FRONT ELEVATION

(Refer to Fig No. 049)

SECTIONAL END ELEVATION

CUT PLAN

50mm DIA FLOWMETER DETAIL

SELECTED DETAIL

Table 2

<table>
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<tr>
<th>Value</th>
<th>Description</th>
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</thead>
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<tr>
<td>1</td>
<td>Supply water, sand and filter to weir</td>
</tr>
<tr>
<td>2</td>
<td>Supply water, sand and filter to weir</td>
</tr>
<tr>
<td>3</td>
<td>Supply water, sand and filter to weir</td>
</tr>
<tr>
<td>4</td>
<td>Refill isolation/unload capability</td>
</tr>
<tr>
<td>5</td>
<td>Drainage isolation/reload capability</td>
</tr>
<tr>
<td>6</td>
<td>Refill isolation/unload capability</td>
</tr>
<tr>
<td>7</td>
<td>Drainage isolation/reload capability</td>
</tr>
</tbody>
</table>

LOW COST WATER SUPPLY AND SANITATION

STANDARD DESIGN MODULES

SLOW SAND FILTER

GENERAL ARRANGEMENT:

25 SQUARE METRE PLAN AREA

DRAWING NO: 027

SCALE: 1:50

DATE: AUGUST 1987

By W. V. S. and Associates

Consulting Engineers and Architects

General Arrangement No. 027

1. As dimensions are in millimetres unless otherwise stated.
2. For further details of the components refer to Fig. No. 029 references Drg. Nos. 029, 030, and 031.
3. The drawing includes all the necessary details for the construction of the slow sand filter in accordance with the specifications provided.
4. The junctions provide for the connection of additional slow sand filters with existing development requirements.
5. The junctions are designed to accommodate different systems of slow sand filters, ensuring compatibility.
6. Table 2 provides the required fill levels and operational functions for the various components of the system.
SECTIONAL FRONT ELEVATION

The diagram illustrates the front elevation of a slow sand filter unit, showing various components and their interconnections. Key features include:

- **Water supply line**: Connects to the presedimentation basins and provides water to the filter unit.
- **Outlet weir chamber**: Prevents scouring of sand.
- **Removable boards**: Allow for receding sand levels.
- **Roughened surface**: Prevents short circuiting of water between the drainage system.
- **50mm DIA FLOWMETER**: For monitoring flow rates.
- **SECTIONAL END ELEVATION**: Provides a side view of the filter unit, showing internal components and connections.

**NOTES:**
1. All dimensions are in millimetres unless otherwise stated.
2. For further details on the components of the slow sand filter unit and RCC details, refer to Figures 021, 029, 032, and 033.
3. Mean drainage line interconnects slow sand filters of the system to a two-nested outlet arrangement, as per prevailing site conditions.
4. Overflow line interconnects slow sand filters of the system and is connected to the pre-precipitation basins.
5. The water supply line interconnects slow sand filters of the system from the pre-precipitation basins via pump assembly P5. Refer to Figures 029, 032, and 033.
6. The outlet weir provides for the connection of additional slow sand filter units and is designed to prevent water from overtopping the weir system.
7. The drainage system is designed to prevent short circuiting of water between the drainage system and to maintain a consistent flow rate.
8. The roughened surface prevents short circuiting of water between the drainage system and to maintain a consistent flow rate.
9. The removal of the terram and scraping of the top 25mm of sand layer is necessary for the required filtration rate to be maintained.
10. The required depth to be decided by the engineer-in-charge.
11. The roughened surface prevents short circuiting of water between the drainage system and to maintain a consistent flow rate.
SAND, GRAVEL AND UNDERDRAINAGE DETAIL

NOTE:

1. All dimensions are in millimetres unless otherwise stated.

2. Commissioning of the filter is achieved by filling water, initially from the bottom up until the sand base is wetted, then drawing from top down without air or entrapping an air gap.

3. Maintenance period takes 2-3 weeks, before the newly commissioned filter becomes effective in purifying the water. During the period the filter is not in use, the intake pipe from the main supply is closed, and the filter is allowed to run using the effluent water from the sand bed without air entrapment. After the filter is flushed, the sand bed is left to mature. The frequency of cleaning will vary from 20-40 days, less with high filtration rates and more with large volumes of raw water.

4. Cleaning procedure:

   - Drain supernatant to about 300mm below sand level and remove the top 25 - 0 mm of sand, scraping and removing the sand. After the scraping, the filter is flushed and allowed to stand until the level is just below the sand base.
   - Return water to the sand bed at a rate of 200 mm/hour for a minimum of 6 hours, until the sand bed is cleared.
   - The filter is refilled with water (see note 2), and returned to full operation once the schmutzdecke, a reddish brown sticky coating, becomes effective in purifying the water. During this period, the filter is not in use, and the intake pipe from the main supply is closed.

5. Resanding (see detail) is required once the sand level reaches a minimum depth of 650 mm, after successive resandings. After the resanding, the filter will take a minimum of one week to reach full operation.

6. The water should be thoroughly mixed (see cleaning key detail), and protected against dust and pollution by adequately storing and protecting it.

7. Resanding (see detail) is required once the sand level reaches a minimum depth of 650 mm, after successive resandings. After the resanding, the filter will take a minimum of one week to reach full operation.
Notes:
1. This drawing to be read in conjunction with drawing numbers 027, 029, 031 and the relevant bending schedules.
2. Concrete mix to be 1:1.3 cement/sand/course aggregate by volume.
3. Minimum concrete strength to be 25 N/mm² (3625 lb/in²).
4. Maximum aggregate size to be 20mm (3/4 in).
5. Minimum cover to all reinforcement to be 50mm (2 in).
6. Laps to reinforcement to be 40 times the diameter of the smaller bar.
7. Reinforcement to be grade 250 N/mm² (36250 lb/in²) plain bars.
8. Reinforcement nomenclature:
   - EF = Each face
   - NF = Near face
   - FF = Far face
   - B = Bottom
   - T = Top
9. Abbreviations referring to positions of reinforcement:
   - EF = Each face
   - NF = Near face
   - FF = Far face
   - B = Bottom
   - T = Top
10. Where reinforcement fouls pipes or openings, bars are to be bent aside or cut to suit and spliced with similar sized bars.
11. Safe soil bearing pressure should not be less than 75 kN/m² (0.7 ton/ft²).
12. The contractor to provide to the Engineer for testing:
   - 3 200mm concrete test cubes for each concrete pour.
13. This drawing is schematic only. Do not scale.

Typical Wall Elevation (Scale a)

Base Plan (Scale a)

Section C-C (Scale b)
NOTES
1. For position of sections see drawing number 030.
2. Reinforcement nomenclature:
   05 Bar mark 05
   — Position of end of bar
3. For bar positions, spacings, and diameters refer to plans and elevations on drawing number 030.
4. For bar shapes and lengths refer to relevant bending schedules.
5. The notes on drawing number 030 also apply.
6. This drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

25 SQUARE METRE SLOW SAND FILTER
REINFORCEMENT DETAILS (SHEET 2 OF 2)
NOTES

1. This drawing to be read in conjunction with drawing numbers 028, 029, 033 and the relevant bending schedules.

2. Concrete mix to be 1:1:3 cement/sand/course aggregate by volume.

3. Minimum concrete strength to be 25N/m² (3625 Ib/in²).

4. Maximum aggregate size to be 20mm (3/4 in).

5. Minimum cover to all reinforcement to be 50mm (2 in).

6. Loads on reinforcement to be 40 times the diameter of the smaller bar.

7. Reinforcement to be grade 250 N/mm² (36250 Ib/in²) plain bars.

8. Reinforcement nomenclature:
   - EF = Each face
   - NF = Near face
   - FF = Far face
   - T = Top
   - B = Bottom

9. Abbreviations referring to positions of reinforcement:
   - EF = Each face
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   - T = Top
   - B = Bottom

10. Where reinforcement fouls pipes or openings, bars are either to be bent aside or cut to suit and spliced with similar sized bars.

11. Scale and bearing pressure should not be less than 715 kN/m² (0.7 ton/ft²).

12. This drawing is schematic only. Do not scale.

13. The contractor to provide to the Engineer for testing, 3 No. concrete test cubes for each concrete pour.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

50 SQUARE METRE SLOW SAND FILTER
REINFORCEMENT DETAILS (SHEET 1 OF 2)
SECTION A-A

SECTION B-B

SECTION C-C

NOTES
1. For position of sections see drawing number 032.
2. Reinforcement nomenclature:
   - OS: Bar mark OS
   - Position of bar mark OS
3. For bar positions, spacings, and diameters refer to plans and elevations on drawing number 032.
4. For bar shapes and lengths refer to relevant bending schedules.
5. The notes on drawing number 032 also apply.
6. This drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
50 SQUARE METRE SLOW SAND FILTER
REINFORCEMENT DETAILS (SHEET 2 OF 2)
DRAWING NO 033
SCALE Refer to OS05

Date: June 1988

Low Cost Water Supply and Sanitation
Standard Design Modules
50 Square Metre Slow Sand Filter
Reinforcement Details (Sheet 2 of 2)
Drawing No 033
Scale Refer to OS05

Date: June 1988
LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

11.4 CUBIC METRE (2500 GALLON)
CLEAR WELL

REINFORCEMENT DETAILS (SHEET 1 OF 2)

NOTES
1. This drawing to be read in conjunction with drawing Nos. O34 B O36 and the relevant bending schedules.
2. Concrete mix to be 1:9:3 cement/sand/aggregate by volume.
3. Minimum cover to bars to be 25 mm (1 in).
4. Maximum aggregate size to be 20 mm (0.8 in).
5. Minimum cover to all reinforcement to be 50 mm (2 in).
6. Loss in reinforcement to be 40 times the diameter of the smaller bar.
7. Reinforcement to be grade 250 N/mm² (36250 lb/in²) plain bars.
8. Reinforcement nomenclature:
   - Position of bar centres (mm)
   - Bar mark (see Bending Schedules)
   - Diameter of bar in millimetres
   - Type of steel (R = mild steel)
   - Number of bars

9. Abbreviations referring to position of reinforcement:
   - EF = Each face
   - NF = Near face
   - FF = Far face
   - B = Bottom
   - T = Top

10. Where reinforcement fouls pipes or openings, bars are either to be bent aside or are to be cut to suit and spliced with similar sized bars.

11. Safe soil bearing pressure should not be less than 50 kN/m² (0.45 ton/ft²).

12. This drawing is schematic only. Do not scale.

13. The contractor to provide to the Engineer for testing, 3 No concrete test cubes for each concrete pour.

scale 1:50

DATE: JUNE 1988

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NOTES
1. For position of sections see drawing number OSB.
2. Reinforcement nomenclature:
   05 — Bar size 05
   06 — Position of end of bar
3. For bar location see drawing number OSB.
4. For sizes and lengths refer to relevant bending schedules.
5. The notes on drawing number OSB also apply.
6. The drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

11.4 CUBIC METRE (2500 GALLON)
CLEAR WELL
REINFORCEMENT DETAILS (SHEET 2 OF 2)
NOTES
1. This drawing to be read in conjunction with drawing numbers 43A & 038 and the relevant bending schedules.
2. Concrete mix to be 1:3 cement/sand/course aggregate by volume.
3. Minimum concrete strength to be 25 N/mm² (3625 lb/in²) at 28 days.
4. Maximum aggregate size to be 20mm (0.79").
5. Minimum cover to all reinforcement to be 50mm (2in).
6. Lint to reinforcement to be 40 times the diameter of the smaller bar.
7. Reinforcement to be Grade 250 N/mm² (36250 lb/in²) plain bars.
8. Reinforcement nomenclature:
   - Position of bar (see note 9).
   - Bar centres (mm).
   - Bar mark (M, M, etc.).
   - Type of steel (R = mild steel).
   - Number of bars.
9. Abbreviations referring to positions of reinforcement:
   - EF = Each face.
   - NF = Near face.
   - FF = Far face.
   - B = Bottom.
   - T = Top.
10. Where reinforcement fouls pipes or openings, bars to be bent or cut to suit and spliced with same sized bars.
11. The contractor to provide to the Engineer for testing, 3 No concrete test cubes for each concrete pour.
12. Safety working pressure should not be less than 50 kN/m² (0.45 ton/ft²).
13. The drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
22.8 CUBIC METRE (5000 GALLON)
CLEAR WELL
REINFORCEMENT DETAIL (Sheet 1 of 2)

SCALE 1:50

DATE JUNE 1986
William Hume & Partners Ltd
Consulting Engineers and Town Planners
Sydney, Australia
SECTION A-A

SECTION B-B

SECTION C-C

NOTES:
1. For position of sections see drawing number 037.
2. Reinforcement nomenclature:
   - Bar mark O5
   - Number of end of bar
3. For bar position spacings and diameters refer to drawing No. 037.
4. For shapes and lengths refer to relevant bending schedules.
5. The notes on drawing number 037 also apply.
6. The drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
22.8 CUBIC METRE (5000 GALLON)
CLEAR WELL
REINFORCEMENT DETAILS (SHEET 2 OF 2)

DRAWING NO 038
SCALE Refer to bar scale

DATE JUNE 1988
NOTES:
1. The drawing is to be read in conjunction with drawing numbers 034 & 035 and the relevant bending schedules.
2. Concrete mix to be 1:1.5:3 cement/sand/course aggregate by volume.
3. Minimum concrete strength to be 25 N/mm² (3625 psi) at 28 days.
4. Maximum aggregate size to be 20 mm (3/4 inch).
5. Minimum cover to all reinforcement to be 50 mm (2 inches).
6. Loss to reinforcement to be 40 times the diameter of the smaller bar.
7. Reinforcement to be grade 250 N/mm² (36250 psi) mild steel bars.
8. Reinforcement nomenclature:
   - B = Bottom
   - T = Top
   - EF = Each face
   - NF = Near face
   - FF = Far face
9. Abbreviations referring to positions of reinforcement:
   - EF = Each face
   - NF = Near face
   - FF = Far face
10. Where reinforcement fronts come up against bars, they are to be bent back or cut to suit and spaced with similar sized bars.
11. All dimensions are in millimeters.
12. The contractor to provide for the Engineer's testing, 3 No concrete test cubes for each concrete pour.
13. The drawings are schematic only. Do not scale.
NOTES

1. For position of sections see drawing number 039.
2. Reinforcement nomenclature:
   - Bar mark 05
   - Number of end of bar
3. For shape and angles, refer to relevant bending schedules.
4. The notes on drawing number 039 also apply.
5. The drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

34.1 CUBIC METRE (7500 GALLON)
CLEAR WELL
REINFORCEMENT DETAIL (SHEET 2 OF 2)
NOTES:
1. The drawing to be read in conjunction with drawing numbers 034 & 042 and the relevant bending schedules.
2. Concrete mix to be 1:1:2.5 cement:sand:course aggregate by volume.
3. Minimum concrete strength to be 25 N/mm² (3625 lb/in²) at 28 days.
4. Maximum aggregate size to be 20mm (0.78 in).
5. Minimum cover to all reinforcement to be 50 mm (2 in).
6. Laps in reinforcement to be 4 times the diameter of the smaller bar.
7. Reinforcement to be grade 250 N/mm² (36250 lb/in²) mild steel plain bars.
8. Reinforcement nomenclature:
   3 - R 16 - 39-200-T
   Position of bar (See note 9)
   Bar centres (mm)
   Bar mark (See bending schedules)
   Diameter of bar in millimetres
   Type of steel (R-mild steel)
   Number of bars
9. Abbreviations referring to position of reinforcement:
   EF = Each face
   B = Bottom
   NB = Near face
   T = Top
   FF = Far face
10. Where reinforcement fouls pipes or openings, bars are either to be bent aside or to be cut to suit and spliced with similar sized bars.
11. The contractor to provide to the Engineer for testing 3 no concrete test cubes for each concrete pour.
12. Safe wall bearing pressure should not be less than 50 KN/m² (45 ton/ft²).
13. The drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES
455 CUBIC METRE (10,000 GALLONS)
CLEAR WELL
REINFORCEMENT DETAILS SHEET 1 of 2

DRAWN BY:
CHECKED BY:
DATE: JUNE 1986

SCALE: 1/4 in = 1 ft

455 CUBIC METRE (10,000 GALLONS)
CLEAR WELL
REINFORCEMENT DETAILS SHEET 1 of 2

DRAWN BY:
CHECKED BY:
DATE: JUNE 1986

SCALE: 1/4 in = 1 ft
SECTION A-A

SECTION B-B

SECTION C-C

NOTES:
1. For position of sections see drawing number 041.
2. Reinforcement nomenclature:
   • 04 - Bar mark 05
   • 07 - Position of end of bar
3. For bar positions, spacings and diameters refer to plans and details on drawing number 041.
4. For bar shapes and lengths refer to relevant bending schedule.
5. The notes in drawing number 041 also apply.
6. The drawing is schematic only. Do not scale.
NOTES
1. This drawing to be read in conjunction with drawing numbers 034 B. 444 and the relevant bending schedules.
2. Concrete mix to be 1:3:2 cement/concrete aggregate proportions by volume.
3. Maximum aggregate size to be 20 mm (3/4 inch).
4. Minimum cover to all reinforcement to be 50 mm (2 inches).
5. Lapse to reinforcement to be 40 times the diameter of the smaller size.
6. Minimum concrete strength to be 25 N/mm² (3625 lb/in²).
7. Reinforcement to be grade 250 N/mm² (36250 lb/in²). - See bars.
8. Reinforcement temperatures.
9. Abbreviations referring to positions of reinforcement:

| EF | Each face |
| NF | Near face |
| FF | Far face |
| B  | Bottom |
| T  | Top |

10. Where reinforcement bars pass or overlap, bars are to be bent over or to be cut out and spliced with similar sized bars.
11. Safe bearing pressure should not be less than 50 kN/m² (1045 lb/sq in).
12. The drawings in schematic only. Do not scale.
13. The contractor to provide to the Engineer for testing, 3 no. concrete test cubes for each concrete pour.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

68.3 CUBIC METRE (15000 GALLON)
CLEAR WELL
REINFORCEMENT DETAILS SHEET 1 of 2

DRAWING NO 043
SCALE 1:50 TO BAR SHEET

DATE AUGUST 1988
NOTES:
1. For position of sections see drawing number 042.
2. Reinforcement nomenclature:
   "C" Bar mark
3. For bar positions, spacing, and diameters refer to drawing number 044.
4. For bar shapes and lengths refer to reinforcement bending schedules.
5. The notes on drawing number 043 also apply.
6. This drawing is schematic only. Do not scale.

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

68.3 CUBIC METRE (15,000 GALLON)
CLEAR WELL

REINFORCEMENT DETAILS SHEET 2 of 2

DRAWING NO: 044
SCALE: 1" = 200'0"

DATE: AUGUST 1988
Notes:
1. This drawing to be read in conjunction with drawing numbers 034 & 046 and the relevant bending schedules.
2. Concrete mix to be 1:1.5:3 cement:sand:coarse aggregate by volume.
3. Minimum concrete strength to be 25 N/mm² (3625 Ib/in²).
4. Maximum aggregate size to be 20mm (1 in).
5. Maximum cover to all reinforcement to be 50mm (2 in).
6. Loss in reinforcement by one plane to be (diameter of the smaller bar) x (250 mm²/m²) x (200 m/m²).
7. Reinforcement to be grade 250 N/mm² (36250 Ib/in²) plain bars.
8. Reinforcement nomenclature:
   S = 6RF - 39RF - 200TF
   B = Bottom
   T = Top
9. Abbreviations referring to position of reinforcement:
   EF = Each face
   BF = Both faces
10. Where reinforcement fouls pipes or openings, bars are either to be bent aside or are to be cut to suit and spliced with similar sized bars.
11. The contractor to provide to the Engineer for testing:
    3 No. concrete test cubes for each concrete pour.
12. Safe soil bearing pressure should not be less than 50kN/m² (0.45 ton/ft²).
13. This drawing is schematic only. Do not scale.

Low cost water supply and sanitation standard design modules.
9.0 cubic metre (20,000 gallon) clear well.

Reinforcement details (Sheet 1 of 2)
COMMUNITY TANK DETAIL

SECTIONAL ELEVATION

Scale 1:1

LOW COST WATER SUPPLY AND SANITATION
STANDARD DESIGN MODULES

COMMUNITY TANK AND STANDPOST DETAIL

DRAWING NO. D017

SCALE Refer to each detail scale.

DATE: AUGUST 1986
NOTES

1. All dimensions are in millimetres, unless otherwise stated.

2. Vertical alignment of pipeline in order to collect air at high points, one foot at low points, the pipeline should not be laid completely level. Minimum recommended slope is:
   - Rise over run: 0.003 for maximum distance of 900 m.
   - Rise over run: 0.006 for maximum distance of 400 m.
   See drawing 049 for details of air valve and washout value chambers.

3. Normal dimensions of the pipeline to be as follows:
   - Depth: 600 mm to soffit of pipe.
   - Width: 600 mm for manually excavated trenches.

4. Materials for backfilling, given only on completion of the standard pressure testing procedure, to be of the following type:
   - NORMAL BACKFILL: Placement of remaining excavated material and mounded above EGL by a minimum of 100 mm height to accommodate consolidation.
   - SAND: Imported if necessary, for backfill of trenches of nominal depth crossings.

5. The trench bed to be levelled to remove all high spots and protruding stones. Low spots to be made up with compacted selected material. Soft spots to be removed and made up with compacted selected material (see note 4).

6. Thrust block required for pipe diameter 80 mm and greater.

7. Sizes of pipes are determined from optimization runs using the regime computer programme.

8. Thrust block required for pipe diameter 50 mm and greater.

9. Low cost water supply and sanitation standard design modules.
**SECTIONAL ELEVATION C1**

**SECTIONAL PLAN DETAIL C1**

**SINGLE VALVE CHAMBER**

**SECTIONAL PLAN DETAIL C2**

**DOUBLE VALVE CHAMBER**

**SECTIONAL ELEVATION DETAIL C6**

**SINGLE AIR VALVE CHAMBER**

**PLAN DETAIL C6**

**LOW COST WATER SUPPLY AND SANITATION**

**STANDARD DESIGN MODULES**

**VALVE AND CHAMBER DETAILS**

**FURTHER CHAMBER ARRANGEMENTS**

1. All dimensions are in millimeters, unless otherwise stated.
2. For valve requirements at pump assembly plant refer to drawing numbers 004-006.
3. For changes in vertical alignment:
   - Air release valve chambers are required at high points along the mains or where water levels drop significantly.
   - Washout valve chambers are required at all low points along the mains, especially for periodic flushing and preventing stagnant water.
4. In long pipelines, valve chambers are required at intervals to isolate sections for inspection and repairs.
5. A short flanged pipe length accommodates convenient changing of fittings by different manufacturers.

**NOTE**

- Dotted line details alternative arrangements under increased mains depth.
- Consult Engineers and Architects.
- Washington, DC 20052.
2 Number Afridev Hond pump assemblies (see det. no 022)

600 mm x 600 mm square section

75 mm thick

600 mm minimum

Foundation slope

Minimum 125 mm depth Foundation sheet

Platform slab

2500

6000 mm minimum (see note 4)

12 mm thick rendering (see note 6)

专项设计模块

改进的掘井

双手泵组件
Afridev hand pump

Handle length varies depending on depth of pump

Cement concrete pedestal

1000mm O.D. PVC screen

Suction pipe

Nylon rope

i00 mm O.D. PVC screen

Low cost water supply and sanitation

Standard design modules

Hand pump assembly on tube well
Afndcv Hona pump assembly

600x600 mm concrete block

Notch cut at base by hand and jigsaw. A brush

and knife are needed.

75 mm base cement grout

(1:3 ratio mix)

Afndcv Hona pump assembly

600x500 mm construction

Cover secured in place by

Hasp and pod lock & hinge

Tea detail (see note 007

75 mm thick

Cement concrete

(see note 6)

Plugged with oak or

Puddled cement (mm

Thickness 150 mm)

Riser main clamp

SECTIONAL FRONT ELEVATION

STONE MASONRY FEATURE (SEE INSERT)

SECTIONAL SIDE ELEVATION

ALTERNATIVE DETAIL

BRICKWORK LINING

PLAN VIEW

APRON AND PLATFORM

SETTING OUT DATA (SEE NOTES)

RISER MAIN CLAMP DETAIL

NOTES

1. All dimensions are in millimeters unless otherwise stated.

2. Important: The setting out data is provided in order to assist in ensuring that all the required slopes to the apron and platform are followed correctly.

3. Level L1 is taken as the arbitrary datum O.O0.

4. Base stone placed under conditions of loose sandy soils to protect against potential sloughing or undercutting as indicated by the broken line detoii.

5. Minimum length of drain given as 6 meters from the well point and to drain out to local nullah or field drainage systems.

6. A cement polish finish on 12 mm rendering is to be given to platform and apron surfaces.

LOW COST WATER SUPPLY AND SANITATION

STANDARD DESIGN MODULES

IMPROVED DUG WELL

SINGLE HAND PUMP ASSEMBLY

DATE: JUNE 1999
**NOTES**

1. All dimensions are in millimeters unless otherwise stated.

2. In order to safeguard against possible pollution of the spring water, the following precautions are to be taken:
   - Place suitable clay in outer excavated trenches and above gravel pack (see elevation detail).
   - Attach screens to the air vent and the drainage/overflow outlet.
   - Construct a diversion ditch to bypass surface water as shown in typical layout detail. It is good practice to plant hedges/trees and grass on slopes to prevent soil erosion.
   - Fence off areas from unauthorized persons and wandering animals.

3. Requirement for balancing storage is dependent upon the available head of spring and designed water demands.

4. Dimensions H and h are determined per site conditions and the instructions of the engineer-in-charge.

5. Spring box may be constructed using stone or common brick masonry to dimensions shown.

6. Typical contours are given arbitrary values for generalized layout detail.

---

**TYPICAL LAYOUT DETAIL**

**COLLECTOR WING WALL**

**SECTION A-A**

**PLAN**

**PART CUT SECTIONAL ELEVATION**

**SCALE a**
**SECTIONAL PLAN**

- Superstructure requires to be well enclosed. Stainless steel screening on all sides to ensure flies are excluded. 
- Vent pipe (50 mm dia or greater) is required to ensure odour elimination. 
- The height is critical in effecting a dark interior. Therefore needs to be placed in the highest part of the superstructure.

**NOTES**

- This option is used where it is important to encourage small children to use the latrine. They perceive that ceramic pan represents less danger of falling into the pit compared to the keyhole design.

**OPTIONAL FEATURE**

- VIP LATRINE WITH PAN

**KEYHOLE DETAIL**

- A typical site condition with latrine located by an adjacent boundary wall.

**VENT PIPE CLEARANCE DETAIL**

- Clearance height (h) - Minimum 500 mm above highest surrounding structure within close proximity of the latrine.

**IMPORTANT**

- All dimensions in millimetres unless otherwise stated.

**DOs and DONTs for VIP vent pipes**

- **DO** - Put the vent outside the superstructure.
- **DO** - Put at least 1 m away from walls.
- **DO** - Make it 100 mm dia or larger.
- **DO** - Make it as high as possible. (See inset clearance detail).
- **DO** - Place it directly over the pit.
- **DO** - Cover it with stainless steel gauze.

- **DONT** - Put it inside. (It gets in the way of the pan)
- **DONT** - Have holes or cracks in it. (Flies can escape)
- **DONT** - Cut it short. (Air will not flow).
- **DONT** - Cover the vent. (It excludes light and stops air flow).
- **DONT** - Have a superstructure without a roof. (Flies will not be attracted to the vent).

**Van Pari**

- The success of a latrine programme is as much dependent on good technology as it is on a good delivery system. Well-designed and made latrines will NOT work satisfactorily UNLESS they are introduced to communities in a way that makes them want to use them properly. Thus this drawing should be read together with the Manual for low-cost rural water supplies and sanitation. UNICEF, Quetta, 1986.

- Dimension is determined according to site conditions, as per site conditions and the decision of the Engineer-in-charge.
NOTE:

1. All dimensions are in millimetres unless otherwise stated.

2. Components of a twin pit pour flush latrine:
   - Superstructure
   - Pan and water seal
   - Y-Junction box
   - Twin leaching pits

3. Advantages of a twin pit pour flush latrine:
   - Pan and water seal are carefully designed for a low water requirement (1 litre/flush minimum) and flushing by hand.
   - The shallow water seal is effective in preventing the passage of flies and odours.
   - Offset facilitates easy periodic emptying of the leaching pit.
   - Twin leaching pits allow for alternate use and thereby allow for the drying of retained solids.

4. Low cost water supply and sanitation standard design modules

5. Sanitation

TWIN PIT POUR FLUSH LATRINE

DRAWING NO. 005

SCALE: 1:25 (A) 1:50 (B) 1:10 (C)
### PROJECT: \*LOW COST WATER SUPPLY AND SANITATION STANDARD DESIGN MODULES\*

**DRAWING TITLE:** 11.4 CUBIC METER (2500 GALLON) GROUND LEVEL STORAGE TANK

---

#### BENDING SCHEDULE

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#### BENDING SCHEDULE

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**PROJECT: \*LOW COST WATER SUPPLY AND SANITATION STANDARD DESIGN MODULES\* **

**DRAWING TITLE:** 22-8 CUBIC METER (5000 GALLON) GROUND LEVEL STORAGE TANK

---

**NOTE:** All dimensions are in accordance with BS 4566 unless otherwise stated.
## Project: Low Cost Water Supply and Sanitation Standard Design Modules

### Drawing Title: 34 Cubic Meter (7,500 Gallon) Ground Level Storage Tank

**BASE SLAB**

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**WALLS & B&B**

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**ROOF SLAB**

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### Bending Schedule

- **BASE SLAB**
  - Members 01 and 02:
    - Bar R12, Type 1, 128 mtrs, 128 mtrs, 5000 mm length.
- **WALLS & B&B**
  - Members 05 and 07:
    - Bar R12, Type 4, 68 mtrs, 272 mtrs, 1800 mm length.
  - Members 06 and 08:
    - Bar R12, Type 4, 34 mtrs, 136 mtrs, 5000 mm length.
- **ROOF SLAB**
  - Members 14:
    - Bar R12, Type 1, 120 mtrs, 120 mtrs, 5000 mm length.
### Bending Schedule

#### Project: Low Cost Water Supply and Sanitation Standard Design Modules

**Drawing Title:** 68.3 Cubic Metre (15,000 Gallon) Ground Level Storage Tank.

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| ROOF | 14 | R12 | 1 | 104 | 208 | 1950 |
|      |    |     |    |     |     |      |
| WALLS B B D | 06 | R12 | 2 | 34  | 68  | 1150 |

**Total**

- **Metric:**
  - **Bar Schedule:** No 01
  - **Drawing No:** 016, 017
  - **Date:** JUNE 88

### Bending Schedule

#### Project: Low Cost Water Supply and Sanitation Standard Design Modules

**Drawing Title:** 91.0 Cubic Metre (20,000 Gallon) Ground Level Storage Tank.

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| ROOF | 14 | R16 | 1 | 136 | 136 | 1850 |
|      |    |     |    |     |     |      |
| WALLS B B D | 06 | R12 | 2 | 34  | 68  | 1150 |

**Total**

- **Metric:**
  - **Bar Schedule:** No 01
  - **Drawing No:** 018, 019
  - **Date:** JUNE 88

*The above bending schedule is applied to the correct bar.*
**PROJECT:** LOW COST WATER SUPPLY AND SANITATION STANDARD DESIGN MODULES

**DRAWING TITLE:** 25 SQUARE METRE SLOW SAND FILTER REINFORCEMENT DETAILS

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**INLET CHAMBER**

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**BENDING SCHEDULE**

*Drawn to the nearest Bar*  
*No Bar Schedule*  
*Drawing dated June 88*
### PROJECT: LOW COST WATER SUPPLY AND SANITATION STANDARD DESIGN MODULES

#### DRAWING TITLE: 11.4 CUBIC METRE (2300 GALLON) CLEARWELL REINFORCEMENT DETAILS

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#### DRAWING TITLE: 22.8 CUBIC METRE (5000 GALLON) CLEARWELL REINFORCEMENT DETAILS

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*Bending Schedule*

*Drawn to the nearest 1mm*
### PROJECT: LOW COST WATER SUPPLY AND SANITATION STANDARD DESIGN MODULES

#### DRAWING TITLE: 34.1 CUBIC METRE (7500 GALLON) CLEARWELL REINFORCEMENT DETAILS

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### PROJECT: LOW COST WATER SUPPLY AND SANITATION STANDARD DESIGN MODULES

#### DRAWING TITLE: 45.5 CUBIC METRE (10,000 GALLON) CLEARWELL REINFORCEMENT DETAILS

#### BENDING SCHEDULE

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#### Notes:
- All dimensions are in accordance with BS 4466 unless otherwise stated.
- Unless otherwise stated, lengths are given in millimeters.
- Bars are indicated with B or R depending on their type.
- The table provides a bending schedule for the reinforcement details of the clearwell.
### DRAWING TITLE: 91.0 CUBIC METRE (20,000 GALLON) CLEAR WELL REINFORCEMENT DETAILS

**PROJECT: LOW COST WATER SUPPLY AND SANITATION STANDARD DESIGN MODULES**

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### DRAWING TITLE: 91.3 CUBIC METRE (20,000 GALLON) CLEAR WELL REINFORCEMENT DETAILS

**PROJECT: LOW COST WATER SUPPLY AND SANITATION STANDARD DESIGN MODULES**

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