

**Farm Nutrient Management Scheme
(Northern Ireland) 2005**

**Specification Booklet
FNMS 5A**





Contents

Section 1

General Information	3
----------------------------	----------

Section 2

Specification for Items available at Standard Cost or Actual Cost	4
--	----------

Collection and transfer systems - clean and dirty water

1 Gutters & downpipes	4
2 Trapped rainwater gully	4
3 Fascia boarding	4
4 Effluent channel	5
5 Drainage	6
6 Inspection/manhole chamber	7
7 Diverter chamber	7
8 Catch pit/yard gully	8
9 Soakaway	8
10 Slurry transfer channel	8

Storage Facilities – slurry/effluent/dirty water

11 Excavation for below ground tank/lined lagoon	9
12 Base to below-ground tanks – installation	10
13 Backfill to below-ground tanks	10
14 Reinforced concrete floor/apron/pad	10
15 Safety fencing – lagoons/open tanks	11
16 Wheel-stop and safety barrier at lagoon agitation points	12
17 Safety gates (vehicular and pedestrian) – lagoons	12

Roofed Middens

18 Remove existing walls	13
19 Break out existing concrete slab	13

Miscellaneous

20 Excavation/backfilling for below-ground slurry pumping main	14
21 Excavation/backfilling for below-ground electric ducting	14
22 Conservation work	15



Section 3

Specification for Items available only at Actual Cost

16

Storage Facilities – slurry/effluent/dirty water

23	Below-ground in-situ RC tank (store or pit)	16
24	Below-ground PC tank (store or pit)	17
25	Below-ground plastic/GRP effluent tank	18
26	Solid/slatted RC cover slab & access cover	18
27	Above-ground slurry store – supply & erection	19
28	Earth-banked sheet-lined lagoon – installation of liner	20
29	Earth-banked sheet-lined lagoon – sloping agitation point	21
30	Earth-banked sheet-lined lagoon – vertical agitation point	22

Roofed Middens

31	Structural frame & cladding – existing midden	22
32	Structural frame & cladding – new midden	24
33	New walls to midden	24

Miscellaneous

34	Slurry pumps – provision & installation	25
35	Slurry separators – provision & installation	26
36	Other slurry mixing system	26
37	Below ground pumping main	27
38	Associated electrical wiring – new	27
39	Associated electrical wiring – 3-phase	28
40	Professional fees – Chartered Engineer	28

Section 4

Diagrams

29

Diagram 1	Effluent Channel – front/side of silo/midden	30
Diagram 2	Chambers: Diverter, Inspection & Catchpit/Yard Gully	32
Diagram 3	Slurry Transfer Channel	33
Diagram 4	Excavation Volume Calculations	34
Diagram 5	Backfill Volume - Typical Calculation	35
Diagram 6	Reinforced Concrete Slab	36



General Information

1. This booklet is to be read in conjunction with all other FNMS documentation.
2. Applicants are reminded that they must comply with The Health and Safety at Work (NI) Order 1978. There is a responsibility to ensure that any contractor, or person hired to do building work, provides and/or works in a safe environment during construction.
3. Where required, new works must comply with The Control of Pollution (Silage, Slurry & Agricultural Fuel Oil) Regulations (NI) 2003 herein referred to as SSAFO. Compliance includes:
 - i. Certain works will require certification by a Chartered Engineer;
 - ii. All items must have (with routine maintenance) a minimum 20 year design life;
 - iii. Concrete and steel walled slurry storage structures require 300mm minimum freeboard;
 - iv. Earth banked slurry storage structures require 750mm minimum freeboard;
 - v. Notification must be given to Environment & Heritage Service, EHS, (DOE) 28 days before the facility is first brought into use;
 - vi. Storage facilities must not be sited within 10m of a watercourse (unless supported by written approval from EHS).
4. Applicants should contact the Special Studies Unit of the Planning Service, DOE (Tel. 028 9041 6892) regarding permitted disposal of spoil from works where excess spoil is generated.
5. All materials used in this scheme shall be sourced as new. Second-hand materials are not permitted.
6. All non-SSAFO works to have (with routine maintenance) a minimum 10 year design life.
7. Certain items in this Specification require full or part certification by a Chartered Engineer or a Manufacturer/Installer (as indicated in each item's specification)
8. For the purposes of this scheme a Chartered Engineer will:
 - i. Be qualified in Civil or Structural Engineering;
 - ii. Be a corporate member of a recognised Engineering Institution;
 - iii. Be registered as a Chartered Engineer;
 - iv. Have appropriate Professional Indemnity/Insurance in place.

Minimum Specification for items available under Actual Costs or Standard Costs

Collection and Transfer Systems – Clean and Dirty Water

1. Gutters & down-pipes

Gutters sized in accordance with the roofed area should be laid to falls of 1 in 600. Rainwater down-pipes shall be a minimum of 75mm diameter and should generally be at the end of a run. Gutters and rainwater pipes shall be supported at not more than 2m centres and at all outlets and angles. Where a downpipe is within 10m of a slurry or effluent storage facility it must discharge into a trapped gully, which is sealed or raised above surrounding area. PVC gutters shall conform to BS 4576 and aluminium to BS 2997.

Down-pipes shall be protected against damage from vehicles and livestock to a height of 2m. Pipes shall discharge at ground level over a gully trap or preferably through a back inlet type gully trap, to the clean water disposal system.

Cast iron rainwater goods can be claimed at Actual Cost.

Measurement:

Rate includes installation complete with necessary brackets and secure fixing.

2. Trapped rainwater gully

Gullies for the disposal of clean surface water drainage from buildings shall be of glazed stoneware or uPVC. The gully shall be set in a 150mm thick concrete surround and connected to the drainage system. Outlet pipes shall be at least 100mm internal diameter. A cast iron or steel grating shall be provided and shall be at least 150mm diameter or at least 150mm square.

Measurement:

Rate is the same for glazed stoneware or uPVC.

3. Fascia boarding

Where replacement of fascia boarding is required the timbers should be fit for purpose having a minimum thickness of 19mm (planed). They shall be prime-coated with an oil-based painted finish or alternatively a wood preservative. The finished colour should match the existing surrounds.

Measurement:

Rate includes installation complete with necessary fixings and trims.

4. Effluent channel at front/side of midden/silo

This item must comply with SSAFO Regulations if the drain is designed to transfer slurry/effluent. It does not require a Chartered Engineer's signature on the EHS notification form.

The front of the midden shall have a recessed channel, 75mm by 75mm, to convey the effluent to an approved storage facility. The sides and back of a midden with pre-cast panel walls should have channels, on the outside of the walls, set at least 200mm in from the edge of the concrete base. A 200mm concrete verge shall have either a fall towards the channel or a 100mm by 125mm engineering brick bedded in cement at the edge of the concrete.

Where new channels are being introduced to existing slabs the side joints shall be saw-cut. Long and cross joints (not more than 6m apart) must be filled and sealed with materials appropriate to their use (resistant to acids/farmyard manures and other agricultural wastes).

In-situ concrete effluent channels shall have a characteristic 28-day crushing strength of 40N/mm². Minimum cement content shall be 350 kg/m³. The slump of unplastisised concrete shall not exceed 90mm. Maximum aggregate size shall be 20mm.

Channels should be reinforced with 8/10mm diameter bars at 250mm centres in each direction with sides and base no less than 150mm thick. See Diagram 1 (Page 30).

Pre-cast concrete channels can be used where they achieve the same performance and structural specification as for in-situ channels. The joints must be filled and sealed with materials appropriate to their use (resistant to acids/farmyard manures and other agricultural wastes).

Channels shall be constructed to prevent clean surface yard water from entering the channel or the midden/silo.

Effluent pipes should discharge into a storage tank a distance at least 150mm from inside wall surface. These drains will normally be of 100mm internal diameter laid to falls of not less than 1 in 100.

5. Drainage

Lay 100mm internal diameter drains:

This item must comply with SSAFO Regulations if the drain is designed to transfer slurry/effluent. It does not require a Chartered Engineer's signature on the EHS notification form.

All pipes shall be uPVC with sealed joints and laid on a 100mm thick cushion of clay or sand. Trenches shall be excavated to proper gradients. All pipe jointing shall be in accordance with manufacturer's instructions. Excavated material (smooth stone/clay/sandy soil only) shall be returned and compacted after piping has been laid and any surplus material removed.

Dirty water drains will normally be of 100mm internal diameter, laid to a fall of not less than 1 in 60 to avoid settlement of solids or semi-solid material. The maximum distance between manholes in straight lines shall be 90m.

The minimum cover to drains shall be 600mm. Where this cover cannot be achieved or where cover within trafficked areas is less than 900mm, pipes should be wrapped in plastic sheeting and encased in 150mm of concrete.

Measurement:

The rate has been calculated for a trench width to be that of the pipe outside diameter plus 300mm.

Lay 150mm internal diameter drains:

This item must comply with SSAFO Regulations if the drain is designed to transfer slurry/effluent. It does not require a Chartered Engineer's signature on the EHS notification form.

Specification for 100mm internal diameter drains applies. Where 150mm internal diameter drains are laid, the fall shall be not less than 1 in 100.

Measurement:

The rate has been calculated for a trench width to be that of the pipe outside diameter plus 300mm.

6. Inspection manhole/chamber

These shall have a minimum internal area of 0.36m². Walls shall be constructed of;

- i. Solid concrete blocks not less than 200mm thick; or
- ii. Engineering brickwork not less than 200mm thick; or
- iii. Proprietary precast reinforced concrete; or
- iv. Proprietary plastic/uPVC liner with a 150mm minimum concrete surround

Whatever construction is used it shall be built on a concrete base at least 250mm thick. Block walls shall be rendered internally and externally. Proprietary items shall be installed to manufacturer's instructions and to suit applied traffic loads.

The inspection cover and frame shall be designed to carry the loading appropriate to its situation (within trafficked areas at least 10kN/m²) and should be securely embedded level with the surrounding surface. It should have an opening of minimum 600mm diameter.

The manhole channel shall be benched half round, equal in diameter to the largest inlet pipe, and extending the full length of the manhole. Side connections shall discharge in the direction of flow of the main channel.

Measurement:

The rate includes for all necessary traps, bends, channels, junctions and benching with fine concrete (sloped). The cover load rating shall suit the applied traffic loading.

7. Diverter chamber

These shall be as for Inspection/Manhole Chambers except that they will have the ability to divert flows to a storage facility. See Diagram 2 (page 32).

Diverter chambers are only permitted under SSAFO Regulation where the diverter has been designed to collect dirty water from a yard. SSAFO regulations do not permit a diverter to be installed to divert dirty water runoff/effluent from silo floor or slurry/farmyard manure seepage to a collection facility, where the alternative route is to a clean waterway drainage system.

8. Catch pit/yard gully

These shall have a minimum internal area of 0.36m². Walls shall be constructed of:

- i. Solid concrete blocks not less than 200mm thick; or
- ii. Engineering brickwork not less than 200mm thick; or
- iii. Proprietary precast reinforced concrete; or
- iv. Proprietary plastic/uPVC liner with a 150mm minimum concrete surround.

Whatever construction is used it shall be built on a concrete base at least 250mm thick. Block walls shall be rendered internally and externally. Proprietary items shall be installed to manufacturer's instructions and to suit applied traffic loads.

The cast iron or steel grating and frame shall be designed to carry the loading appropriate to its situation (within trafficked areas at least 10kN/m²) and should be securely embedded level or below the surrounding surface. It should have a minimum opening of at least 150mm by 150mm or diameter of 150mm. If this item has an open grating it must be sited a minimum of 10m from a silo or effluent or slurry storage facility.

The drainage system for the collection and disposal of clean water shall have a 'pluggable' catchpit/sump manhole at the point where it leaves the yard to allow the drainage water to be monitored for contamination. The catchpit shall be constructed with a facility to close-off ('plug') the outlet if required and a sump at least 450mm deep to allow the insertion of a submersible pump. This facilitates evacuation should effluent enter the clean water drainage system.

9. Soakaway (clean water only)

These shall have a minimum imported stone volume of 1m³ below the bottom of inlet discharging pipe.

10. Slurry transfer channel

This item must comply with SSAFO Regulations. It does not require a Chartered Engineer's signature on the EHS notification form.

A slurry transfer channel can be used to move slurry from one storage facility to another. It shall be no deeper than 1.0m from the top of the cover to the top of the floor. Channels should be laid without falls. A 150mm high (wedge-shaped) overflow lip should be installed in the channel floor at the discharging end. It is recommended that channels are constructed in in-situ reinforced concrete. See Diagram 3 (page 33).

In-situ concrete transfer channels shall have a characteristic 28 day crushing strength of 35N/mm². Minimum cement content shall be 300 kg/m³. The slump of unplastised concrete shall not exceed 90mm. Maximum aggregate size shall be 20mm.

Where new channels are being introduced to existing slabs the side joints shall be saw-cut. Long and cross joints (not more than 6m apart) must be sealed with materials appropriate to their use (resistant to acids/farmyard manures and other agricultural wastes).

Pre-cast concrete channels can be used where they achieve the same performance and structural specification as for in-situ channels. See Diagram 3 (page 33).

The cover slab/slats shall be designed to carry the loading appropriate to its situation or a minimum of 10kN/m². Where solid slabs are 'built-up/screeded' to increase carrying capacity, the applicant must submit a certificate from a Chartered Engineer to justify the proposed loading.

Storage Facilities – slurry/effluent/dirty water

11. Excavation for below-ground tank/earth-banked lined lagoon & disposal of spoil

Reference should be made to the HSE(NI) Publication 'Health & Safety in Construction in Northern Ireland' and the section therein called 'Groundwork – Excavations'.

For earth-banked lined lagoons the depth and side wall slope shall be excavated as instructed by the Lining Contractor.

If the excavation for the proposed tank is in close proximity to an existing structure a Chartered Engineer's design should be sought.

Measurement:

The rate includes for disposal of spoil.

For below-ground tanks the volume of excavated material that can be claimed shall be calculated as explained in Diagram 4 (page 34), i.e. the excavated length/width being a distance 1.0m past each external wall and the excavated depth being from average existing ground level to 0.25m below the underside of the tank.

12. Installation of stone base to below-ground tanks

The depth, grade and compaction of material used for the base shall be as instructed by the Chartered Engineer. In any case, excavations are to be free of ground-water while being compacted.

Measurement:

Payment will be made on not more than 250mm depth of crushed stone.

The rate for the volume of stone has been calculated as the approved excavated area (length (m) x breadth (m)) x 0.25m.

13. Backfill to below ground tanks

For below-ground tanks the volume of backfilled material that can be claimed shall be as calculated in Diagram 5 (page 35), i.e. the volume of excavated material less the external volume of the tank.

Measurement:

Payment will be made on the volume of material to fill not more than 1.0m width around the complete tank.

14. Reinforced concrete midden floor / reinforced concrete apron

Concrete midden floor slabs and concrete aprons shall be 150mm deep with monofilament polypropylene fibres; with top reinforcing mesh; placed on a waterproof membrane; on a well compacted and stable stone base, see Diagram 6 (page 36).

Concrete aprons shall not extend more than 6m from:

- i. The edge of a below ground/reception tank and be no wider than the tank itself.
- ii. The wheel stops of a lagoon agitation pad and are no wider than the gate opening width.
- iii. The opening to a roofed midden – this is limited to a maximum of one opening for the full length of the longer side or two openings in the shorter sides.

Existing surfacing material shall be excavated to a minimum depth of 250mm, or down to solid ground.

The base must consist of thoroughly compacted stone and shall extend a minimum of 300mm in each direction beyond the edge of the finished slab. Hardcore placed in excavated soft areas or on made-up ground shall be compacted in layers not exceeding 150mm using a suitable vibrating or heavy roller.

The blinding material shall be clean dry sand, fine gravel or other appropriate fine material.

The waterproof/slip membrane shall be polythene sheeting not less than 1000 gauge (250 microns) thick laid on a suitably prepared and blinded surface. The sheeting shall be overlapped a minimum of 150mm at all joints.

Concrete to have a characteristic 28 day crushing strength of 35N/mm². Minimum cement content shall be 300 kg/m³. Slump of unplasticised concrete shall not exceed 90mm, and maximum aggregate size shall be 20mm. The concrete must be compacted by appropriate mechanical vibration.

Reinforcing square mesh fabric to be A142 and should be placed with 40mm cover from the **top** of the slab. Monofilament fibres shall be added only at the concrete plant.

Contraction joints shall be at a maximum of 6m spacing. Suitable expansion joints shall be incorporated at every third joint and at new/existing structures. They must be filled and sealed with materials appropriate to their use (resistant to acids/farmyard manures and other agricultural wastes). Additionally in midden floors waterbars are required. These shall be 200mm uPVC, as per Diagram 3 (page 33).

All concrete slabs shall be cured for first seven days by ensuring the surface remains damp. All traffic must remain off the new concrete slab for a period of 28 days.

15. Safety fencing – Lagoons/open tanks

A permanent stock-proof and childproof fence, 1.8m high, shall be provided around all open slurry/effluent lagoons.

Upright posts/strainers shall be a minimum 2.3m long of either:

- i. Reinforced concrete 125mm x 125mm at butt end;
- ii. Galvanised angle iron 60mm x 60mm x 6mm;
- iii. Galvanised tubular steel, 75mm outside diameter x 3.2mm.

Upright posts and strainers shall be embedded at least 400mm into 500mm x 500mm x 500mm deep concrete bases, not more than 3.0m apart. Four strands of 3.2mm plain galvanised wire shall be strained, and stapled or tied to the uprights with tying wire.

Chain-link woven wire galvanised fencing, 2.5mm, (BS 1722 part 1 and BS 4102), 1.8m high, shall be secured to the outside of the line wires over entire fence. One strand of 2.5mm barbed wire shall be placed along the top of the fence.

Measurement:

The rate is the same for all types of upright post/strainer.

16. Wheel stop and safety barrier at lagoon agitation points

Close to the top agitation pad edge there shall be a raised kerb (wheel stop), at least 300mm high and 600mm wide, across the whole access point (a gap, maximum 1m wide, may be positioned in the centre of the wheel stop to facilitate the use of agitation equipment). The wheel stop shall also be cast into the excavated ground at least 500mm deep.

A galvanised steel safety barrier of 50mm x 50mm, 3.2mm box section supported by galvanised 100mm x 100mm, 4.0mm box section upright posts, at least 1.2m high shall be installed around the agitation pad. The barrier at the top edge of the lagoon may be moveable to allow the use of agitation equipment.

A suitable permanent method of emergency escape from the lagoon pit (e.g. safety ladder/knotted rope) must be installed close to the agitation point.

17. Safety gates (vehicular and pedestrian) – earth-banked lagoons

The top of all gates shall be a minimum of 1.8m off the ground. The tractor access opening shall not be greater than 4.0m wide. The pedestrian gate opening shall be 1m wide.

The vehicular entrance gate shall be a galvanised heavy duty tubular farm gate or a gate of 50mm x 50mm x 3.2mm box section steel construction. The hanging post for the opening shall be galvanised, 200mm x 125mm, x 5mm box section or of similar strength. The closing post shall be galvanised, 100mm x 100mm x 4mm box section or of similar strength. The only horizontal bars shall be at the top and bottom of the gate. The gate shall be covered with galvanised chain-link fencing (specification as item 15) attached to the outside to prevent climbing of gate. The gate shall be designed to ensure that it can be locked when closed and neither persons or livestock can gain access.

The pedestrian entrance gate shall be of a galvanised heavy-duty tubular farm gate or a gate 40mm x 40mm x 3.2mm box section steel construction. The hanging post for the opening shall be galvanised, 100mm

x 100mm x 4mm box section or of similar strength. The closing post shall be same as fencing posts (specification as item 15). The only horizontal bars shall be at the top and bottom of the gate. The gate shall be covered with galvanised chain-link fencing (specification as item 15) attached to the outside to prevent climbing of gate. The gate shall be designed to ensure that it can be locked when closed and neither persons or livestock can gain access.

Warning signs with black writing (100mm high) on a yellow background shall be erected at all entrances to the store, stating 'SLURRY STORE: DANGER OF DROWNING'.

Measurement:

The rate is for one full width vehicular gate for the width of the entrance. The rate is the same if two half-width gates are used.

Roofed Middens

18. Remove existing walls

This item includes the removal of existing walls and removal of the rubble.

Demolition work which exceeds a total of 30 days work or 500 man-hours requires prior notification to the Health & Safety Executive (NI), 83 Ladas Drive, Belfast BT6 9FR.

Care should be taken to locate and protect existing services particularly electricity supply routes.

Measurement:

The rate has been calculated as the volume of wall to be removed in cubic metres. This is calculated as total length of wall (m) x the depth (m) x the thickness (m).

19. Break-out existing slab/apron

This item includes the breaking up and removal of concrete from existing midden floors.

Demolition work which exceeds a total of 30 days work or 500 man-hours requires prior notification to the Health & Safety Executive (NI), 83 Ladas Drive, Belfast BT6 9FR.

Care should be taken to locate and protect existing services particularly electricity supply routes.

Measurement:

The rate has been calculated as the area of floor to be removed in square metres. This is calculated as total length of wall (m) x the breadth (m).

Miscellaneous

20. Excavation and backfilling for below-ground slurry/effluent pumping main

The pumping main (below-ground pipe) must comply with SSAFO Regulations. It does not require a Chartered Engineer's signature on the EHS notification form.

Trenches shall be excavated to allow a minimum cover of 900mm. Where this cover cannot be achieved, pipes should be wrapped in plastic sheeting and encased in 150mm of concrete. Otherwise pipes shall be laid on a 100mm thick cushion of smooth stone, clay or sand.

Excavated material (smooth stone/clay/sandy soil only) shall be returned and compacted after piping has been laid and any surplus material removed.

A warning/safety marker tape is recommended at 300mm above the main.

Measurement:

The rate has been calculated for a trench width to be outside pipe diameter plus 300mm. The rate does not include supply and jointing of the pipe itself (see Item 37).

21. Excavation, installation and backfilling for below-ground ducting (electrical)

Trenches shall be excavated to allow a minimum cover of 600mm. Where this cover cannot be achieved, ducting should be wrapped in plastic sheeting and encased in 150mm of concrete. Otherwise ducting shall be laid on a 100mm thick cushion of smooth stone, clay or sand.

Excavated material (smooth stone/clay/sandy soil only) shall be returned and compacted after piping has been laid and any surplus material removed.

A warning/safety 'electric' marker tape shall be installed at least 300mm above the duct.

Measurement:

The rate has been calculated for a trench width to be outside pipe diameter plus 300mm. The rate includes for the supply and jointing of the ducting as well as drawropes.

22. Conservation work

Grant is available to cover the cost of any conservation or amenity work in connection with grant-aided facilities, for example, landscaping a new slurry store by planting appropriately sited suitable trees. Trees or shrubs must not be planted within 10m of a storage facility, slurry channel or underground pipe used to transfer slurry, dirty water or effluent. Conservation work will be limited to a maximum of 5% of total grant aided eligible expenditure.

Minimum specification for items available under Actual Costs only

Storage Facilities – slurry/effluent/dirty water

23. Below-ground in-situ reinforced concrete tank / reception pit

If storing slurry/effluent this item must comply with SSAFO Regulations. A Chartered Engineer will be required to complete part of the EHS notification form.

The structural design, detailing and completed construction of this item requires certification by a Chartered Engineer.

The walls and floors of the tank must satisfy the requirements of BS 5502: Part 50:1993. This Standard requires that impermeable concrete construction complies with BS 8007 (as modified by BS 5502:Part 22). The characteristic loads as described in paragraph 5 of Part 50 should be used to calculate internal slurry/effluent pressure, external earth pressures, groundwater pressure and cover slab loads (Design Class 2). Concrete in contact with slurry/effluent should be designed in accordance with BS 8007 and BS 8110. The tank should not rely on any self-sealing properties of slurry.

The minimum characteristic 28-day crushing strength of concrete for slurry storage/reception tanks should be 35N/mm². Minimum cement content shall be 300kg/m³. Slump of unplastised concrete shall not exceed 90mm, and maximum aggregate size shall be 20mm.

Where instructed by the Chartered Engineer, an appropriate method of anti-floatation should be installed. It should be noted that if land drains are used they cannot be discharged directly to a watercourse without prior written approval from EHS.

Tanks, less than 12.5m long, constructed inside buildings, must extend a minimum of 1.50m outside the building at one end. Tanks, greater than 12.5m long, constructed inside buildings, must extend a minimum of 1.50 metres outside the building at both ends. The area of the tank outside the building must incorporate a means for mixer pump access, or an equivalent system, to enable contents to be mixed and drawn off from that position. Exterior-mixing points must have a load bearing solid or slatted cover, complete with access manhole and safety grid, with opening not exceeding 150mm, suitable for the purpose of supporting anticipated loads imposed by tractors or machinery.

Silage effluent is acidic and is classified as 'very severe exposure' for concrete design purposes. When dry, the inside of the tank should be treated with a penetrating sealant to prevent surface corrosion.

The minimum characteristic 28-day crushing strength of concrete for silage effluent tanks should be 40N/mm². Minimum cement content shall be 350 kg/m³. The slump of unplastised concrete shall not exceed 90mm. Maximum aggregate size shall be 20mm.

Signs warning of dangerous gases, no smoking and no naked flames, should be placed near all access points of the tank.

Access manhole covers – See 'Slatted/Solid reinforced concrete cover slab & access manhole cover' (Item 26).

24. Below-ground pre-cast concrete tank / reception pit

If storing slurry/effluent this item must comply with SSAFO Regulations. The manufacturer must supply all relevant documentation to be forwarded by the applicant to EHS with the notification form.

The foundation design and completed construction (according to the manufacturer's recommendations) of this item requires certification by a Chartered Engineer. The tank must be impermeable, with no reliance on any self-sealing properties of slurry.

The tank manufacturer/supplier must supply the applicant/end-user with a handbook covering correct use, safety and maintenance. It should include information to allow the product to satisfy a 20-year durability life, with simple routine maintenance.

Access manhole covers – See 'Slatted/Solid reinforced concrete cover slab & access manhole cover' (Item 26).

Materials and components – See 'Below-ground in-situ reinforced concrete tank' (Item 23).

Safety and warning notices – See 'Below-ground in-situ reinforced concrete tank' (Item 23).

Other design considerations should include:

- i. Resistance to flotation induced by groundwater when empty;
- ii. Proximity of existing structures;
- iii. Impermeability/design-life of jointing materials (especially for silage effluent tanks);
- iv. Lifting/setting in place large single pre-cast units.

25. Below-ground plastic/GRP/metal panel slurry/effluent tank

If storing slurry/effluent this item must comply with SSAFO Regulations. The manufacturer must supply all relevant documentation to be forwarded by the applicant to EHS with the notification form.

The foundation design and completed construction (according to the manufacturer's recommendations) of this item requires certification by a Chartered Engineer.

Access manhole covers – See 'Slatted/Solid reinforced concrete cover slab & access manhole cover' (Item 26).

Materials and components – See 'Below-ground in-situ reinforced concrete tank'(Item 23).

Safety and warning notices - See 'Below-ground in-situ reinforced concrete tank' (Item 23).

Handbook – See 'Below-ground pre-cast concrete tank' (Item 24).

Other design considerations should include:

- i. Resistance to flotation induced by groundwater when empty
- ii. Proximity of existing structures
- iii. Design life and material used for silage effluent tanks
- iv. Concrete surround to tank / structural strength
- v. Limited depth of proprietary access shaft

26. Solid/slatted reinforced concrete cover slab and access manhole cover

The applicant must supply, from the manufacturer, a certificate indicating the following:

Solid slab:

- i. Load/span properties;
- ii. Minimum end bearing requirements;
- iii. Compliance with current editions of BS8110: Part 1 (1997).

Slatted slab:

- i. Load/span properties;
- ii. Minimum end bearing requirements;
- iii. Compliance with current editions of BS 8110: Part 1 (1997), BS 5502: Part 22 (2003) and BS 5502: Part 51 (1991).

Slats should be free from sharp edges and projections.

Where solid slabs are 'built-up/screeded' to increase carrying capacity, the applicant must submit a certificate from a Chartered Engineer to specify the proposed loading.

Where tanks are situated in enclosed buildings the mixing points must be located externally. If necessary, internal mixing points should also be positioned to ensure adequate mixing for the size and shape of the tank. Adequate natural ventilation must be provided for the dispersion of gases during the slurry mixing process.

Access manhole covers: Where trafficked, access manhole covers should be designed for a minimum imposed vehicle loading of 10kN/m². In any case, the cover must be adequately secured in position (and level with the surrounding finishes) to prevent opening by a child.

A metal grid should be securely fixed below the cover as a precaution against persons/livestock falling into the tank when the cover is removed. The metal grid should be made of either 16mm mild steel bars (galvanised) or 20mm mild steel bars forming a lattice with a spacing not exceeding 150mm x 150mm. This grid should be either fixed in position or permanently hinged at one side.

27. Above-ground slurry store – supply and erection

If storing slurry/effluent this item must comply with SSAFO Regulations. The manufacturer must supply all relevant documentation to be forwarded by the applicant to EHS with the notification form. A Chartered Engineer will be required to complete part of the EHS notification form.

Grant is available on all above ground stores, which comply with BS 5502: Part 50 (1993).

The foundation design and completed construction (according to the manufacturer's recommendations) of this item requires certification by a Chartered Engineer.

Concrete structures in contact with slurry/effluent should be designed in accordance with BS 8007 and BS 8110 (as modified by BS 5502: Part 22). The foundations/tank should be impermeable, with no reliance on any self-sealing properties of slurry.

Access to an above-ground store by a portable ladder, or a combination of portable and fixed ladder, must have the lowest rung of the fixed ladder between 2.4 and 3.0m above the ground. Guardrails and working platforms must comply with BS 5502: Part 50. Jetter sets should have a minimum design life of 10 years.

For above-ground stores which have an associated below-ground reception tank, the connecting pipe must have two valves installed a minimum of one metre apart, each capable of being locked in the closed position when not in use.

Where a cover for above ground store is being installed it must fully comply with BS 5502: Part 50 (1993).

Materials and components – See ‘Below-ground in-situ reinforced concrete tank’ (Item 23), ‘Below ground pre-cast concrete tank’ (Item 24), ‘Below-ground plastic/GRP/steel sheet slurry/effluent tank’ (Item 25).

Safety and warning notices - See ‘Below-ground in-situ reinforced concrete tank’ (Item 23).

Handbook – See ‘Below-ground pre-cast concrete tank’ (Item 24).

Other design considerations should include:

- i. Proximity of existing structures;
- ii. Permeability of pipework if breaking into existing below ground tank;
- iii. Will the tank be extended in the future?
- iv. Will the tank be roofed in the future?

28. Earth-banked lined lagoon – installation of liner

If storing slurry/effluent this item must comply with SSAFO Regulations. The manufacturer must supply all relevant documentation to be forwarded by the applicant to EHS with the notification form. A Chartered Engineer will be required to complete part of the EHS notification form.

A certificate shall be required from the Lining Contractor to cover all aspects of the work (including ground preparation). The certificate shall state that all the welds have been examined and have passed all relevant tests. The Certificate shall also incorporate a guarantee that the lining shall remain impermeable for a minimum of 20 years.

It is recommended that the Lining Contractor has an ISO 9002 Quality Accreditation, and uses only materials from an ISO 9001 Quality Approved Manufacturer. As a minimum, the work shall be performed to a level accepted by a recognised European accreditation body.

All work is the responsibility of the Lining Contractor, who shall be a specialist in this form of construction. The full installation of the liner shall be carried out directly by the Lining Contractor. All other works can be completed either by the Lining Contractor, or in accordance with the Lining Contractor's instructions.

29. Earth-banked lined lagoon – agitation point, sloping slab

The structural design (including foundations design), detailing and completed construction of this item requires certification by a Chartered Engineer and a certificate/report submitted with the claim form.

All work (including impermeable joints at concrete interfaces) is the responsibility of the Lining Contractor.

Tractor access for agitating/emptying shall be through a gated opening in the surrounding fence; up to 4.0m wide.

The agitation point will consist of a standing area at the top of the bank, a sloping slab and an agitation pad on the lagoon floor. These concrete pads shall consist of the following continuous sections:

- i. Top standing slab. The tractor standing area shall either be level or shall slope moderately away from the lagoon edge. The minimum 150mm reinforced concrete slab may have a maximum width of 4m or the same width as the opening and a maximum distance from the top of the bank of 6m;
- ii. Sloping agitator slab. The minimum 150mm reinforced concrete slab may be at least 1m wide, extending from the tractor stand, down the slope to the near edge of the agitator footing;
- iii. Agitator footing slab. The minimum 150mm RC slab must be of sufficient size so that at its edges, turbulence will be dissipated to a level that will not endanger the liner.

For construction of wheel stop, safety barrier and emergency escape from the lagoon pit (Item 16).

30. Earth-banked lined lagoon – vertical platform agitation point

The structural design (including foundation design), detailing and completed construction of this item requires certification by a Chartered Engineer and a certificate/report shall be submitted with the claim form.

This item should be designed to allow a tractor and a mixing pump to be positioned on a platform extending into the lagoon to ensure no damage to the liner from the pump. The tractor standing area shall either be level or shall slope moderately away from the lagoon edge. The minimum 150mm RC slab can have a maximum width of 4m or the same width as the gate opening and a maximum distance from the edge of the wheel stop of 6m.

The footing slab at the base of the platform must be a minimum 150mm reinforced concrete slab. It must be of sufficient size so that at its edges, turbulence will be dissipated to a level that will not endanger the liner.

Tractor access for agitating/emptying shall be through a gated opening in the surrounding fence; up to 4m wide.

All work (including impermeable joints at concrete interfaces) is the responsibility of the Lining Contractor, who shall be a specialist in this form of construction. Certificates shall be required from the Lining Contractor to cover all aspects of the work i.e. ground preparation and leak tightness of liner.

For construction of wheel stop, safety barrier and emergency escape from the lagoon pit (Item 16).

Roofed Middens

31. Structural frame and cladding – existing midden

The structural design (including foundations, cladding and any included existing structure) detailing, and completed construction of this item requires certification by a Chartered Engineer and a certificate/report shall be submitted with the claim form.

Where an existing structure is to be included in the new design, a Chartered Engineer, **at application stage**, must certify this existing structure, as being;

- i. structurally suitable for purpose,
- ii. not leaking.

Building frames shall be designed to BS 5502 Buildings & Structures for Agriculture, and in particular Part 22 – Code of Practice for Design, Construction and Loading, (Design Class 3).

Materials and components should comply with relevant British Standards and should have a durability life of not less than 10 years (Design Class 3), if simple routine maintenance or non-structural component renewal is carried out.

The minimum finished floor/yard to eaves height must be 4.0m, with a maximum of 5.0m. When side cladding is omitted, the roof overhang can be up to 0.5m from the outside face of wall/stanchion.

Roof structures can be of either steel portal frame or steel round-roof truss construction.

Where structural steelwork is not hot dipped galvanised it should be shot-blasted, primed and painted to achieve the required design frame life. Non-structural steelwork shall be shot-blasted, primed and painted with two coats of long life lead-free paint.

Purlins and side rails can be of timber or steel.

Timber purlins/side rails shall be treated with an approved preservative. Pre-painted metal cladding sheets must be separated from timbers by a DPC strip the width of the purlin and fixed to the purlin with flat-headed galvanised nails.

Preformed steel purlins/side rails must be galvanised (minimum galvanised weight 275g/m²), painted, sized and installed as per the manufacturer's instructions. Galvanising to purlins must be factory-applied.

Roof cladding can be either proprietary pre-painted metal sheeting or reinforced corrugated fibre-cement sheets. Side cladding can be either proprietary pre-painted metal sheeting or spaced boarding. The colour on the outside must be environmentally acceptable.

Profiled or corrugated metal sheeting shall comply with BS 3083 (except for weights of coating and profile limitation). The sheets shall have an overall thickness, including metallic coatings but not organic coatings, of not less than 0.5mm or greater than 0.7mm mild steel. The minimum average weight of metallic/zinc coating to **each** side of sheeting must be 175g/m². The pre-painted coating should have a minimum of 25 microns on the underside. Metal cladding sheets must be indelibly stamped with the manufacturers/roll formers product identification mark that must include the sheet thickness.

Reinforced corrugated fibre-cement sheets shall comply with the performance requirements for asbestos cement sheeting in BS 5247 and shall be laid and fixed with galvanised fixings in accordance with BS 5247:Part 14.

Spaced board cladding shall be not less than 18mm thick. The space between the boards shall form not more than 25% of the cladding area.

A NICEIC inspection certificate shall accompany all electrical installations.

32. Structural frame and cladding - new midden

The specifications for the structural frame, roof structure, height, purlins, roof and side cladding is detailed in item 31.

Access to a new midden can be from either end, both ends or one open side.

A NICEIC inspection certificate shall accompany all electrical installations.

33. New walls to midden

The structural design (including foundations) detailing, and completed construction of this item requires certification by a Chartered Engineer.

Walls for middens shall be designed for the purpose intended i.e. to retain farmyard manure and to resist the dynamic loads arising from the use of machinery. Block work midden walls are not accepted in this Scheme.

Walls to be designed to BS 5502 Buildings & Structures for Agriculture, and in particular Part 22 – Code of Practice for Design, Construction and Loading (Design Class 3).

The wall height should be a minimum of 1.8m and a maximum of 2.4m.

The internal faces of the walls and stanchions should be flush. All joints to be sealed with farmyard manure resistant sealants.

Materials and components should comply with relevant British Standards and should have a durability life of not less than 10 years, if simple routine maintenance or non-structural component renewal is carried out.

For in-situ concrete walls/foundations, the minimum characteristic 28-day crushing strength of concrete for middens should be 35N/mm². Minimum cement content shall be 300kg/m³. Slump of unplastised concrete shall not exceed 90mm, and maximum aggregate size shall be 20mm.

Pre-cast walls shall be permanently fixed in place. Foundations shall be constructed in strict accordance with supplier's instructions. Standard effluent channels shall be constructed outside the pre-cast walls in all cases – see Reinforced Concrete Effluent Channel at Front of Midden/Silo (Item 4).

Miscellaneous

34. Slurry pumps/mixers – provision & installation

Any slurry mixing system must be associated with an approved storage item grant aided through this Scheme, which requires a mixing system.

Slurry pumps/mixers can be either tractor driven or electrically operated and designed for the purpose of mixing and/or pumping slurry. The pump/mixer manufacturer/supplier must supply the applicant/end-user with a handbook covering correct use, safety and maintenance. All guarding must be in place to comply with relevant Health and Safety legislation and maintenance carried out according to manufacturers recommendations.

Grant will be limited to one new tractor driven slurry pump per application.

If the slurry pump is electrically operated an NICEIC completion certificate shall be required, signed by the Electrical Contractor(s) or a person duly authorised to act on his/her behalf, to certify that the electrical installation has been constructed and/or has been tested according to the National Rules of Electrical Installations and has been found to be satisfactory. Electrically operated slurry pumps must be permanently fixed.

All pumps must have a CE mark and a manufacturer's unique serial number. This unique serial number must be recorded on the claim form.

35. Slurry separators – provision & installation

Slurry separators must be permanently fixed. The separator manufacturer/supplier must supply the applicant/end-user with a handbook covering correct use, safety and maintenance. All guarding must be in place to comply with relevant Health and Safety legislation and maintenance carried out according to manufacturers recommendations. Where access is needed for maintenance of the separator, or its associated fittings, a platform/gantry with guard rails and an access ladder may be provided.

Access to the platform by a portable ladder, or a combination of portable and fixed ladder, must have the lowest rung of the fixed ladder between 2.4m and 3.0m above the ground. Guardrails and working platforms must comply with BS 5502: Part 50, Health and Safety regulations and the separator manufacturers' recommendations; be galvanised and have a minimum design life of 10 years. A Chartered Engineer and/or the manufacturer must certify these requirements.

An NICEIC completion certificate shall be required, signed by the Electrical Contractor(s) or a person duly authorised to act on his/her behalf to certify that the electrical installation has been constructed and/or has been tested according to the National Rules of Electrical Installations and has been found to be satisfactory.

All separators must have a CE mark and a manufacturer's unique serial number. This unique serial number must be recorded on the claim form.

36. Other Slurry mixing systems

Other methods for mixing slurry will be considered by DARD. These items shall be permanently fixed. Any mixing system must be associated with an approved storage item grant aided through this Scheme, which requires a mixing system. The mixer manufacturer/supplier must supply the applicant/end-user with a handbook covering correct use, safety and maintenance. All guarding must be in place to comply with relevant Health and Safety legislation and maintenance carried out according to manufacturers recommendations.

An NICEIC completion certificate shall be required, signed by the Electrical Contractor(s) or a person duly authorised to act on his/her behalf to certify that the electrical installation has been constructed and/or has been tested according to the National Rules of Electrical Installations and has been found to be satisfactory.

All systems must have a CE mark and a manufacturer's unique serial number. This unique serial number must be recorded on the claim form.

37. Below ground pumping main – provision & installation/jointing

If used to pump slurry/effluent this item must comply with the SSAFO Regulations. The pipe installer must supply all relevant documentation to be forwarded by the applicant to EHS with the notification form.

Slurry/effluent/dirty water may be pumped underground from one part of a farmyard to another for the purpose of additional storage/separation. The installation/jointing of the below-ground pumping main and its associated work shall be the responsibility of the pipe laying contractor, who shall be a specialist in this form of construction. All other works shall be completed either by the contractor, or in accordance with the contractor's instructions.

It is recommended that the Pipe Laying Contractor has an ISO 9002 Quality Accreditation, and uses only materials from an ISO 9001 Quality Approved Manufacturer. As a minimum, the work shall be performed to a level accepted by a recognised European accreditation body.

The Medium Density Polyethylene (MDPE) pipe will have a nominal bore of 150mm with a minimum pressure rating of 10 bar. Where joints are required they shall be fusion jointed and to BS 6572. The pipe shall have a minimum cover of 900mm.

Both ends of the pumping main shall be fitted with a quick-release coupler appropriately welded to the MDPE main.

Grant for the pumping main shall be limited to mains sited within the farmyard and used for pumping the materials listed above.

38. Associated electrical wiring – new

New electrical wiring and associated fittings must be taken from the nearest available supply and shall be installed in accordance with relevant regulations.

Roof lights and small power points can be installed to newly roofed middens associated with this scheme.

An NICEIC completion certificate shall be required, signed by the Electrical Contractor(s) to certify that the electrical installation has been constructed and/or has been tested according to the National Rules of Electrical Installations and has been found to be satisfactory.

39. Associated electrical wiring – 3-phase

If an approved item requires a 3-phase electricity supply the cost of the wiring and fittings will be limited to the distance from where the supply enters the mains distribution box to the approved item.

An NICEIC completion certificate shall be required, signed by the Electrical Contractor(s), or a person duly authorised to act on his/her behalf, to certify that the electrical installation has been constructed and/or has been tested according to the National Rules of Electrical Installations and has been found to be satisfactory.

40. Professional fees – Chartered Engineer

Grant aid will be available for professional fees at reasonable cost. The Chartered Engineer should consider the constructed item as a whole.

The elements of work are likely to include:

- i. Earthworks and excavation;
- ii. Foundations;
- iii. Earth and slurry/effluent retaining structures;
- iv. Surface and land drainage; inspection chambers; tanks;
- v. Structures in in-situ or pre-cast concrete; blockwork; metalwork; reinforced plastic;
- vi. Demolition of structures.

The Engineers duties will include:

- i. Site investigation;
- ii. Design & detailing (including foundations);
- iii. Site supervision;
- iv. Certification;
- v. Health & safety responsibilities (including CDM regs).

For the purposes of this scheme a Chartered Engineer will:

- i. Be qualified in Civil or Structural Engineering;
- ii. Be a corporate member of a recognised Engineering Institution;
- iii. Be registered as a Chartered Engineer;
- iv. Have appropriate Professional Indemnity/Insurance in place.

Diagrams

Diagram 1 – Effluent Channel – front/side of silo/midden

**Diagram 2 – Chambers: Diverter, Inspection & Catch
pit/Yard Gully**

Diagram 3 – Slurry Transfer Channel

Diagram 4 – Excavation Volume – Typical Calculations

Diagram 5 – Backfill Volume – Typical Calculations

Diagram 6 – Reinforced Concrete Slab

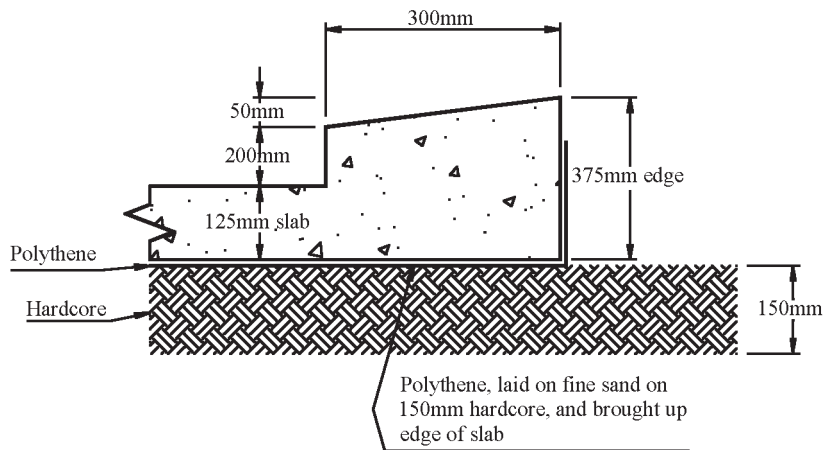
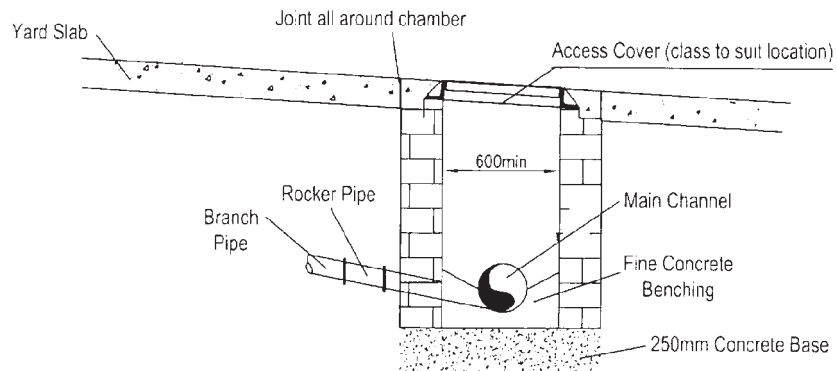
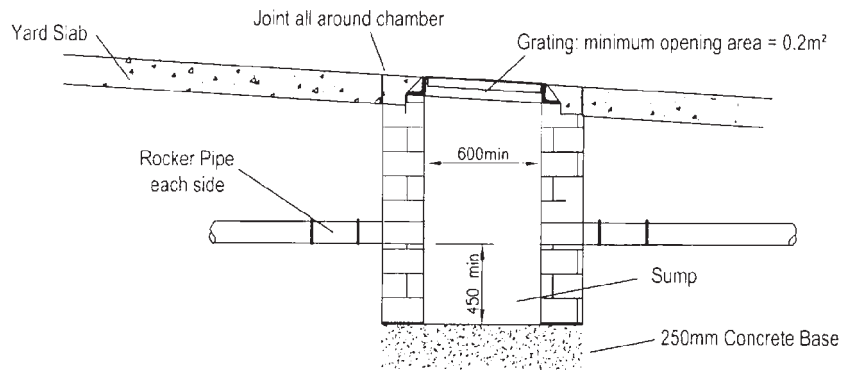
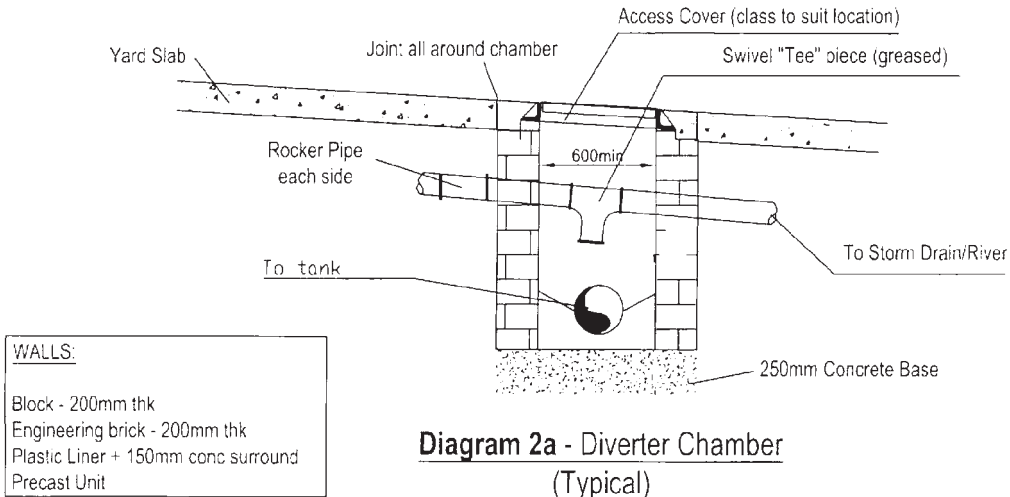


Diagram 1c – Side-Edge or Back-Edge (Type 2)

Diagram 2 – Chambers: Diverter, Inspection & Catch pit/Yard Gully



Section **4** **Diagram 3 – Slurry Transfer Channel**

WALLS:
Reinforced Concrete - 250mm thk
Precast Unit to suit appropriate traffic loads

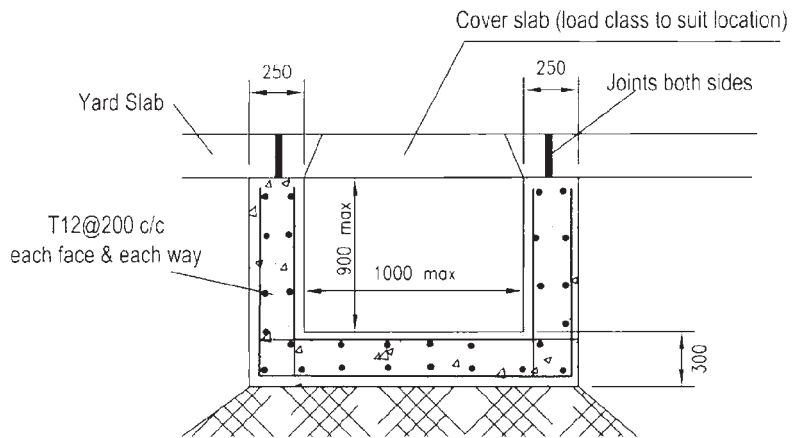
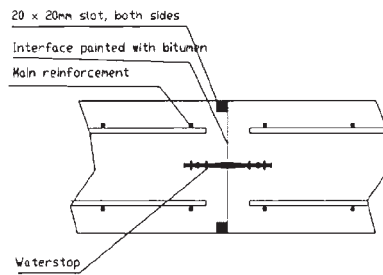
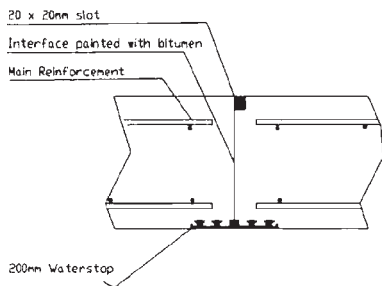


Diagram 3 - Slurry Transfer Channel
(Typical)

nts

Over flow lip



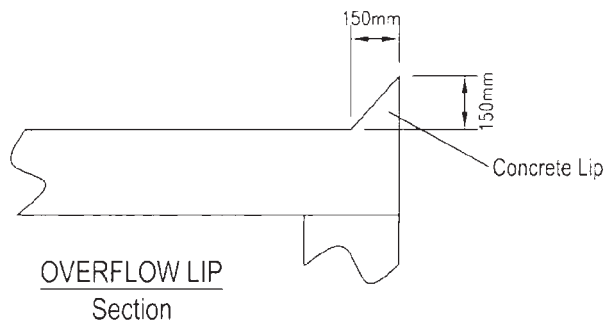
Cross Joints @ 6m c/c

FLOOR SLAB JOINT

nts

VERTICAL WALL JOINT

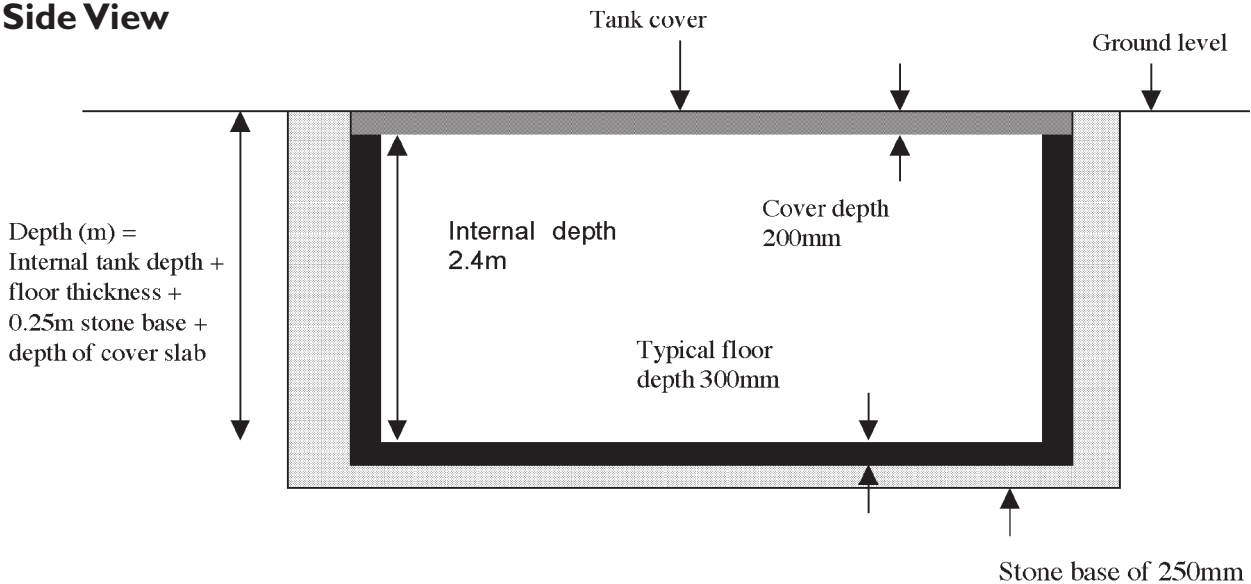
nts



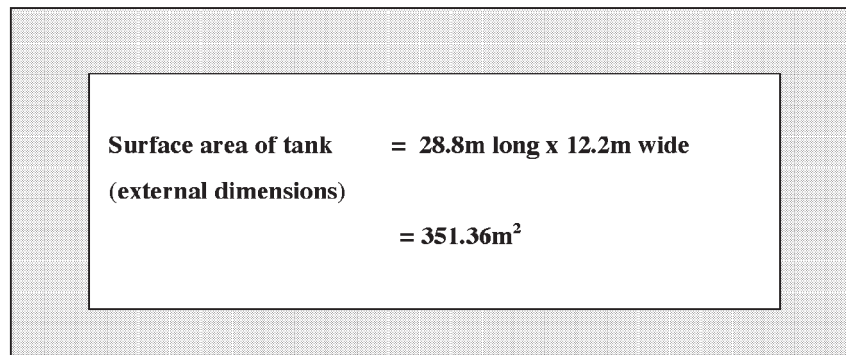
OVERFLOW LIP
Section

Diagram 4 – Excavation Volume – Typical Calculations

Side View



Top View



Calculation

Calculation of volume of material to be excavated

Length 28.8m + 2m = 30.8m

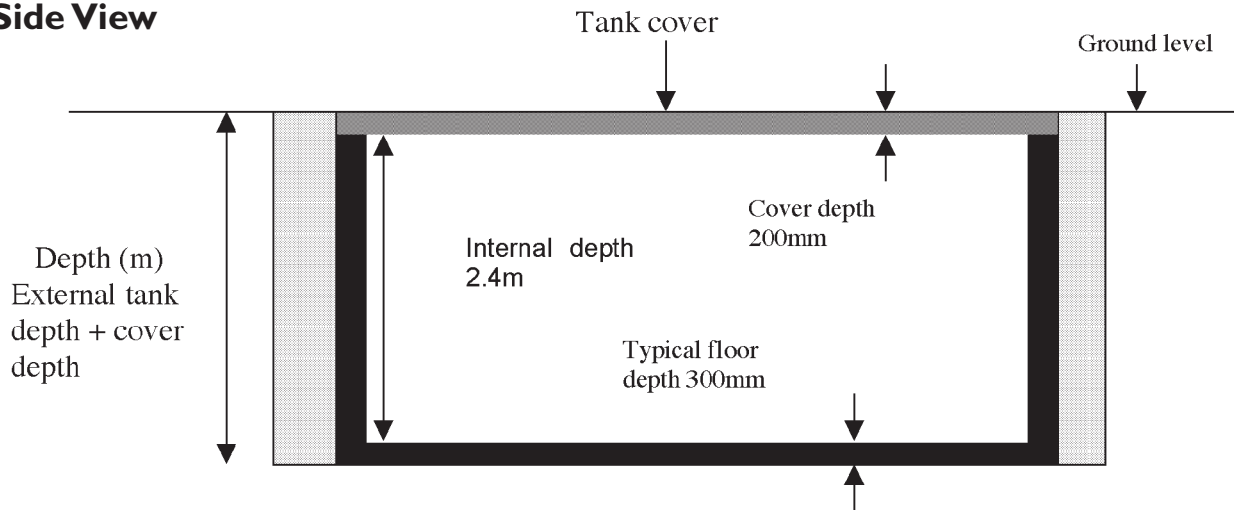
Breadth 12.2m + 2m = 14.2m

Depth 2.4m + 0.55m + 0.2m = 3.15m

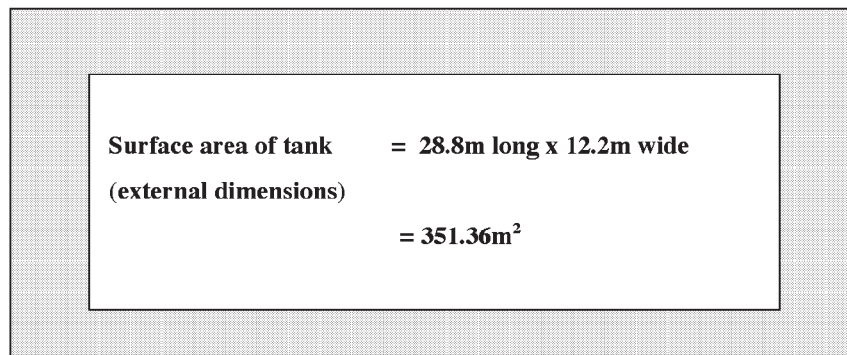
Volume (m³) = Length x Breadth x Depth
= 30.8 x 14.2 x 3.15
= 1377.68m³

Diagram 5 – Backfill Volume – Typical Calculations

Side View



Top View



Calculation

$$\begin{aligned} \text{Total excavated surface area} &= 30.8\text{m } (28.8 + 2) \times 14.2\text{m } (12.2 + 2) \\ &= 437.36\text{m}^2 \end{aligned}$$

$$\begin{aligned} \text{Surface area to backfill} &= 437.36 - 351.36 \\ &= 86\text{m}^2 \end{aligned}$$

$$\begin{aligned} \text{Volume to back fill} &= 86\text{m}^2 \times 2.9\text{m (depth)} \\ &= 249.4\text{m}^3 \end{aligned}$$

Diagram 6 – Reinforced Concrete Slab

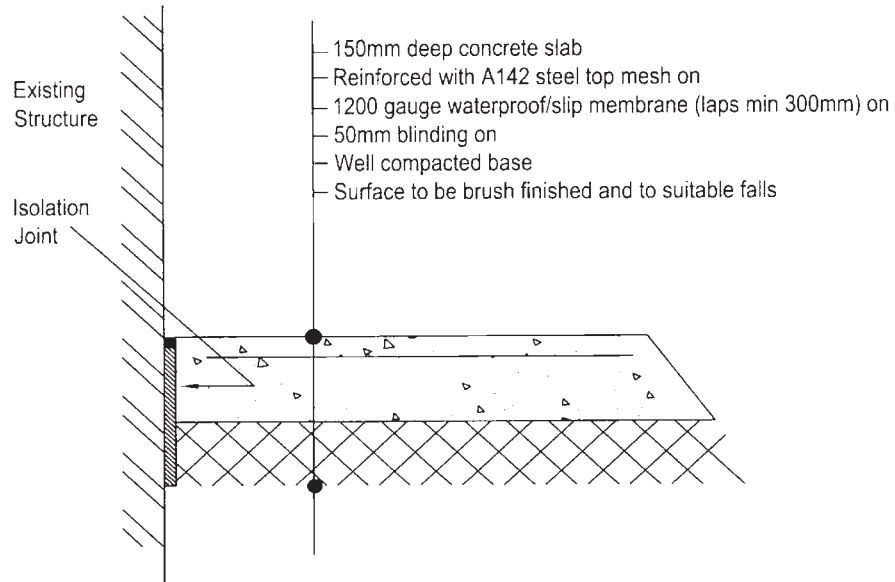


Diagram 6 - Reinforced Concrete Slab

(Typical Cross Section)
not to scale



Department of
**Agriculture and
Rural Development**

www.dardni.gov.uk

AN ROINN
**Talmhaíochta agus
Forbartha Tuaithe**

MÁNNYSTRIE O
**Fairms an
Kintra Fordèrin**
