DEPARTMENT OF PUBLIC WORKS

GUIDE FOR ARCHITECTS CONCERNING

DRAINAGE WATER SUPPLY

AND

STORM-WATER DRAINAGE

MAY 2000

INDEX

REQUIREMENTS IN THE PREPARATION OF WATER AND DRAINAGE DRAWINGS

1. PREPARATION OF DRAWINGS

1.1 SKETCH PLANS

1.1.1 The following must be indicated on the site plan:

a. north point, contours and datum (bench mark) (contours must be: 0.1; 0,2; 0,5; 1; 2 or 5m contours)

b. existing services and servitudes;

c. outside drainage with the relevant ground and invert levels;

d. means of sewage disposal such as: municipal connections, septic tanks with french drain, conservancy tank, etc.;

e. connection point of the water supply pipe or bore-hole;

f. storm water drainage and manner of disposal and

g. road layout with testhole results.

1.1.2 The following must be shown on a building drawing of scale 1:100 or 1:200;

a. all sanitary facilities;

b. sizes and positions of water heating units and

c. water storage tanks

1.1.3 The siting of buildings may be influenced by the drainage system, for example, where septic tanks with trench drains have to be provided, sufficient area must be available for effluent disposal

.

1.1.4 In the preparation of the preliminary drawings the Project Manager is available for consultation and advice, if required. A list of the type drawing and drainage details, which are available from the Department, is shown in paragraph 8.

1.1.5 A schedule of sanitary appliances and water supply requirements for different buildings is attached. (Refer to Annexure A).

1.2 FINAL DRAWINGS

1.2.1 The water- and drainage drawings must be numbered using the following letters and figures after the service number:

Drainage drawings - /AD, -/2AD etc.

Water supply drawings -/1AW, -/2AW etc.

Storm water drawings -/Ast, -/2Ast etc.

Where a combination of different services is represented on one drawing the second letters must be combined e.g. -/1ADW, -/2ASW, etc.

1.2.2 Before the final water and drainage drawings are drawn up, a set of market up and coloured in paper prints, showing the proposals must be submitted to the Project Manager.

The following set colours should be used:

Brown - Drain and soil pipes

Green - Waste pipes (above ground)

Red - All vent - and anti-siphon pipes

Purple - Water main-, Fire protection - and combined water supply pipe

Blue - Domestic cold water supply pipe

Orange - Domestic hot water supply pipe

Black - Storm water pipe (dotted line)

1.2.3 The final water and drainage drawings must consist of a separate set of polyester film copies of the working drawings of a service drawn to a scale of 1:100, together with the site plan. The type of drawn line and pipe size necessary for the indication of the different services is shown in annexure B while annexure C is a list of abbreviations.

Two paper prints of each of these final working drawings must be submitted to the Project Manager for approval.

1.2.4 Apart from the requirements named in 1.1.1 the following has to be shown on the site plan:

(a) floor levels of all existing and proposed buildings;

(b) all existing and proposed drainage including: type, size and quality of pipe, siting and position of all inspection chambers, cleaning and inspection eyes, ground and invert levels and gradients;

(c) the water supply for domestic as well as fire protection purposes;

(d) storm water drainage with type, size and quality of pipes, ground and invert levels and gradients and

(e) all existing and proposed roads and paved surfaces.

1.2.4 Apart from the requirements named in 1.1.2 the following have to be shown on the working drawings:

(a) all drainage, water supply and storm water drainage on the plan;

(b) all sizes, ground and invert levels and gradients of drainage and storm water pipes and

(c) all surface drainage on the elevations and duct sections.

1.2.5 The relevant Local Authority should be consulted and the satisfaction of the project obtained, where applicable, as to the accessibility of drainage connections, water supply lines for domestic use and fire protection and the final disposal of storm water.

1.2.7 Where the requirements for the drainage and water supply are not covered by the guide the requirements of the "National Building Regulations and Building Standards act of 1977" will apply. The relevant Local Authority should be consulted <u>and where possible,</u> its requirements should be complied with, <u>but</u> drawings should not be submitted to the Local Authority for approval.

2. <u>WATER SUPPLY</u>

2.1 DOMESTIC USE AND FIRE PROTECTION

Connections, sizes and types of material must be shown. Water supply for fire protection and domestic use can:

a. be a separate network or;

b. a combined system where the fire mains constitutes the main supply, the branches for domestic use taken from the main supply. Each branch, however, must be provided with its own isolating valve.

Water meters are normally provided and installed by the Local Authority.

2.2 PIPE TYPES

2.2.1 A. Underground water piping

All piping in the ground from 80 mm dia and above is to be of class C asbestos cement pressure pipe and where of less than 80 mm dia is to be of class 16 high density polyethylene or thin wall hard drawn copper pipe.

B. Above ground cold water piping

Cold water pipework above ground level, but concealed in roofs and ducts etc. may be of galvanized iron, thin wall hard drawn copper or stainless steel, for all diameters.

C. Hot water piping

Hot water piping is to be of thin wall hard drawn copper or stainless steel for all diameters.

D. General

The use of any other type of pipe not mentioned above, may only be used with the approval of the Project Manager.

Cost considerations are to be taken into account when deciding on the type of piping to be used.

2.3 PROTECTION OF PIPES

2.3.1 Where it is necessary to run a pipe beneath a building it should be sleeved so that it can be withdrawn. Water pipes in buildings should be exposed to facilitate maintenance.

2.4 ISOLATING VALVES

2.4.1 Isolating valves on water reticulations must be shown at all important points, for example a water supply line to a ball valve, a hot water installation and a riser pipe to a roof tank should always be provided with a stop valve. No stop cocks are to be used on hot water reticulations.

2.5 SUPPLY TANKS

2.5.1 Cold water storage tanks must be provided in the following cases:

A. In buildings of more than two storeys;

B. where the water supply is poor and

C. to meet fire protection requirements

2.6 AIR CONDITIONING ROOMS

2.6.1 In air conditioning plant rooms a cold water supply line of approximately 25 mm in diameter is required. A drainage point for the condensation is necessary and may be connected to the most convenient drain or storm water drain.

2.7 PUMPS

2.7.1 Where pumps are required for cold water supply or for hot water circulation, the details of the pump requirements should be given to the Project Manager. The pumps are supplied by the Department and are not included in the building contract.

2.8 HOT WATER

2.8.1 The method of hot water provision is largely a matter of economical installation and maintenance.

2.8.2 Hot water must be provided to the following:

a. all baths and showers, except in swimming bath change rooms;

b. sinks in kitchens, except in tea kitchens:

c. wash tubs in laundries and wash rooms

d. wash basins in bathrooms, bedrooms of hostels (except school hostels), single quarters, doctors consulting rooms, large workshops, photographic dark rooms and prestige buildings. The provision of hot water to wash hand basins in prestige buildings should be confirmed by the Department. All other fittings are provided with cold water only.

2.8.3 A separate hot water installation is usually provided in personnel quarters in school hostels where the personnel are accommodated during school holidays.

2.8.4 It is to be noted that in the design of hostels, single quarters and other buildings where a large amount of hot water will be used, sufficient space must be allowed for the water heating units.

When hot water geysers with a capacity of 350 l and more are to be installed, the rooms must be provided with double doors.

3. DRAINAGE

3.1 DEFINITIONS AND INTERPRETATIONS

In the regulations contained in this manual unless inconsistent with the context, the following words and expressions have the meanings hereby assigned to them.

"ANTI-SIPHON PIPE" means any pipe provided in conjunction with a trap in the sanitary fitting to prevent unsealing of the trap by siphonage or back pressure.

"CONSERVACY TANK" means any covered tank without overflow which is used for the reception and temporary retention of sewage and which requires emptying at intervals.

"DRAINAGE INSTALLATION" means an installation vested in the owner of a site which is situated on such site and which is intended for the reception, conveyance, storage or treatment of sewage and includes sanitary fixtures, traps, discharge piped, drains, ventilating pipes, septic tanks, conservancy tanks, sewage treatment works, or mechanical appliances associated therewith.

"DRAIN" means that part of a drainage installation which conveys the sewage from a building to a connecting sewer or to a common drain or to any other means of sewage disposed on the site concerned, but shall not include:-

A any discharge pipe;

B that portion of a discharge stack which is below ground level; or

D. the bend at the foot of a discharge stack, whether such bend is exposed or not.

"INSPECTION CHAMBER" means a chamber not deeper than 750 mm and of such dimensions that access may be obtained to a drain without causing a person to enter into such chamber for the purpose of inspection.

"MAINHOLE" means a chamber of depth greater than 750 mm which allows access to a drain.

"ONE-PIPE SYSTEM" means a system of piping between sanitary fixtures and a drain in which both waste and soil water are permitted to flow down a common stack.

"PERCOLATION TRENCH (FRENCH DRAIN)" means a trench filled with graded aggregate and used for dispersal of waste water or liquid effluent from a septic tank.

"RELIEF VENT" means a vent or ventilating pipe branching from a stack below the point of connection there to of the lowest branch connection.

"SANITARY FIXTURE" means that part of a drainage system which is permanently connected to a water supply and which is used for the reception and discharge of waste water or soil water.

"SEPTIC TANK" means a tank designed to receive sewage and to retain it for such a time and in such a manner as to secure adequate decomposition of organic solids by bacterial action.

"SEWAGE" means waste water , soil water or, trade effluent and other liquid waste either separately or in combination, but shall not include storm water.

"SEWER" means a pipe or conduit which is the property of or is vested in the local authority, and which is used or intended to be used for the conveyance of sewage.

"SEWAGE SYSTEM" means the entire system of sewers, plant and associated machinery, which is owned by or vested in a local authority, and used for conveyance and treatment of sewage, the reclamation of water and the disposal of effluents or by-products resulting from the treatment of sewage.

"SINGLE-STACK SYSTEM" means a system of piping between sanitary fixtures and a drain, in which both waste and soil water are permitted to flow down a common stack, and in which the stack and discharge pipes serve also as vent pipes.

"SINGLE-STACK (MODIFIED) SYSTEM" means a single stack system in which a relief vent is provided appurtenant to the discharge stack and connected therewith below the lowest branch connection and at least at every alternate floor by a crossvent.

"SOIL FIXTURE" means a receptacle used for receiving and discharging soil water and includes a bedpan sink, bedpan washer, machintosh sluice, slophopper, squatting pan, urinal, urine bottle washer, or water closet pan.

"SOIL PIPE" means a pipe conveying soil water from the trap or outlet of a soil fixture to a stack or drain.

"SOIL WATER" means any liquid containing excreta.

"STACK" means the main vertical discharge pipe or ventilating pipe connected to a drainage system.

"STACK VENT" means the extension of a discharge stack above the highest connected discharge pipe.

"STORM WATER" means any water resulting from a natural precipitation or accumulation, and includes rainwater, surface water, subsoil water and spring water.

"STORM WATER DRAIN" means a pipe or surface channel, which is situated on a site and is used to convey storm water to a sewer or a point of discharge acceptable to the local authority.

"STORM WATER SEWER" means a pipe or conduit which is owned by or vested in a local authority, and which is used or intended to be used for the conveyance of storm water.

"TRAP" means a pipe fitting or a part of a sanitary fixture which is designed to retain water or fluid so as to prevent the emission of foul air or gas from a drainage system.,

"TRAPPED GULLY" means a drain fitting, incorporating a trap into which waste water is discharged.

"TWO PIPE SYSTEM" means a system of piping between sanitary fixtures and a drain, in which separate stacks are used for waste water and soil water and each stack is vented and all traps are vented.

"VENT" means a pipe (not being a drain) which is open to the external air at its highest point and which ventilates a drainage system either by connection to a drain or to a discharge pipe and prevents syphonage of water seals from traps.

"VERTICAL" in reference to a discharge pipe means any such pipe inclined at 45 degrees or more to the horizontal.

"WASTE FIXTURE" means any sanitary fixture which is used for the reception and discharge of waste water, and includes baths, bidets, drinking fountains, showers, baths, sinks, wash basins or wash tubs.

"WASTE PIPE" means a discharge pipe (not being a drain or overflow pipe) which conveys waste water from the trap associated with a waste fixture to a gully or stack.

"WASTE WATER" means the water not contaminated by soil water or trade effluent, and shall not include storm water.

"WATER SOIL" means the water in a trap which acts as a barrier to the passage of foul air or gas through the trap.

3.2 MATERIAL AND GRADIENTS

The following material should be used for the different pipes:

A. Underground drain pipes - vetrified clay pipes (VCP) except beneath buildings where they are of cast iron. uPVC, glass fibre or other types or pipe may only be used with the approval of the Project Manager.

B. Surface pipes:

1. Soil stacks and vent pipes - cast iron pipe (CIP) o ruPVC.

2. Waste pipes - cast iron or galvanised mild steel pipes (GMSP) or uPVC.

3. Anti siphon pipes - galvanised mild steel pipes or uPVC.

The use of uPVC surface pipes is subject to certain conditions and the Project Manager must be consulted on this matter.

3.3 INSTALLATION OF DRAINS

3.3.1 Where any drain is constructed adjacent to or under or through a structural part of any building, adequate measures must be taken to ensure that the trench in which such drain is laid in no way impairs the stability of such building or the stability of any other building or interferes with or affects any existing services.

3.3.2 A. Any drain shall be of such strength, having regard to the manner in which it is bedded or supported, so that the maximum loads and forces to which it may normally be subjected will be sustained by it and it shall where necessary be protected against damage.

B The requirements contained in paragraph (A) shall be deemed to be satisfied if either of the following is complied with:

i The minimum cover over the outside of the drain is not less than 300 mm or

ii Precast or cast-in-situ concrete slabs are placed over the drain, isolated from the crown of the pipe by a soil cushion not less than 100 mm thick and such slabs are wide enough and strong enough to prevent excessive superimposed loads being transferred directly to the pipes.

3.3.3 Any drain shall;-

A Be laid in a straight line between any points where changes of direction or gradients occur.

B. Be laid with approved flexible joints which will permit joint movement to take place throughout the life of the drainage installation.

C. Withstand root penetration and not deteriorate when in contact with sewage or water, and will not cause any obstruction in the interior of such drain.

D. Be laid at a minimum gradient of 1:60 for 100 ∅ and 1:100 for 150 ∅ pipes. However the Project Manager may in his discretion permit gradients less than those specified above.

E. Where the gradient exceeds 1:5 it must be provided with anchor blocks which must securely fix such drain in place.

3.3.4 Where any portion of a drain passes under any building such portion shall:

A Be of Cast Iron

B Be laid without change of direction or gradient.

C. Not be provided inside such building with any means of access for cleaning.

3.3.5 Where any portion of a drain passed through a building such portion shall be:

A. Cast Iron

B. Supported throughout its length without restricting thermal movement and such support must be securely attached to the building.

C. So placed that any junction, bend or any point of access into it is readily accessible.

3.3.6 Where any drain has a branch drain connected to it, such connection shall:-

A. be by means of a junction fitting which shall not be a saddle junction.

B. Enable the flow from such branch drain to enter the drain obliquely in the direction of flow so that the included angle between the axes of the two drains does not exceed 45°.

3.3.7 Where drains are to be laid in heaving, unstable or filled in ground, the Project Manager must be consulted.

3.4 <u>INSPECTION CHAMBERS (1C) AND MANHOLES (MH)</u>

3.4.1 Inspection chambers or manholes should be provided:

a. at a position 1,20m within the boundary of the property, except in the case of individual houses where cleaning and inspection eye must be provided;

b. at the junction of a branch to a main drain where three or more soil fittings join the branch line;

c. where a main collecting drain changes direction and/or gradient;

d. at both ends of a long flat grade;

e. at both sides of a building under which it is necessary for a sewer to pass and

f. at distances of 75m for a 100mm and 100m for a 150mm drain.

3.4.2 MEASUREMENTS OF INSPECTION CHAMBERS AND MANHOLES

DEPTH IN m	INNER LENGTH IN m	INNER BREADTH IN m
Up to 0,6	0.6	0,45
From 0,6 to 2	0,9	0,6
More than 2	1	0,75

In the case of circular inspection chambers or manholes.

DEPTH IN m	INNER DIAMETER IN m
Up to 1,5	0.6
More than 1,5	1

3.5 INSPECTION EYE (IE)

3.5.1 Inspection eyes should be provided:

a. at all junctions (except those of vent pipes) and bends in the drainage system;

b. within 0,5m downstream of each cleaning eye;

c above and below each vertical or sloping ramp and

d above each ramp to an inspection chamber.

3.6 CLEANING EYE (CE)

3.6.1 Cleaning eyes should be provided:

a. above ground at each junction and bend of all soil and waste pipes;

b. underground at not more than 25m for a 100mm drain;

c. at the head of each branch drain longer than 3m;

d. at a distance of 1,2m within the boundary of a single house and

e. at each ramp. .

3.7 CONCEALING OF PIPES

3.7.1 No pipes longer than 0,5m may be visible to the public on the outside of the building. These pipes must be consealed either behind a screen wall or placed in a pipe duct.

3.7.2 DUCT MEASUREMENTS

Where pipes are installed on one wall only, the duct must be at least 0,8m wide and 1m deep when pipes are installed on either side of the duct. Duct walls must be one brick thick.

3.7.3 Pipe ducts must be accessible at each floor, be provided with a catwalk, be fully ventilated and be closed off with a door of at least 1 hour fire resistance.

3.7.4 Smaller ducts may be used to conceal pipes provided that all junctions and cleaning eyes are readily accessible by means of removable panels and sufficient working space is allowed for.

3.8 PIPES BENEATH BUILDINGS

3.8.1 Where it is necessary for a drain to pass beneath a building it must be of cast iron and be without change of direction or gradient. It must not carry any imposed load and provisions should be made for relieving arches on other supports where drains pass beneath the walls.

3.9 MINIMUM DEPTH OF DRAIN PIPES

3.9.1 To protect drains with a covering of less than 300mm they must be encased in concrete.

3.10 OPEN INLETS

3.10.1 No open inlets to drains, such as gulleys, are permitted within a building or beneath any roofed area.

3.11 VENT AND ANTI-SIPHON PIPES (VP AND ASP)

3.11.1 A vent pipe the same size as the drain pipe which it ventilates must be provided.

a. at the head of every drain or branch drain into which 2 or more fittings discharge;

b. at each vertical waste water pipe longer than 3,5m and

c. an additional vent must be provided where 8 or more WC's are connected in a row, for example at schools.

3.11.2 An anti-siphon pipe of 50m diameter must be provided.

a. where a branch drain is longer than 6m and only one fitting is connected to it

b. on the upper floors of a building where the fitting are connected to a common stack, each fitting must be anti-siphon with the exception of there being only one fitting on the upper-most floor which need not be anti-siphoned provided it is not more than 6m from the stack and

c. where the vertical discharge pipe from a WC pan on the ground floor is longer than 1,2m.

3.11.3 In the application of the single stack system, the Project Manager should be consulted.

3.12 PUMPING OF SEWAGE

Where sewage has to be pumped, the requirements of the pumping equipment should be given to the Project Manager. These items are provided by the Department and are not included in the building contract.

3.13 SEPTIC AND CONSERVANCY TANKS

3.13.1 Where sewage disposal is by means of septic tanks or conservancy tanks, type drawing of the tanks may be obtained from the Project Manager. The sizes of the septic tanks are based on the number of contributors to the tanks and these sizes are shown on the type drawings.

3.13.2 Septic and conservancy tanks must be located at least 3m from any building. French drains, soakage pits or agricultural drains at least 5m from any building. Care should be taken that underground water supplies are not polluted; where effluent flows away from any underground water supply the distance should be at least 50m. If effluent flows towards an underground water supply, the distance should be considerably greater and will depend on such conditions as depth of water supply, water table and soil or rock formations.

3.13.3 SITING OF CONSERVANCY TANKS

Conservancy tanks should be placed as close as possible to a street boundary. Where the distance from the street boundary is more than 3m a convenient road to the tank should be provided.

3.13.4 The capacity of a conservancy tank should not normally be less than 5ms. The capacity is calculated from the following formula:

c x d x q in litres

Where c = number of contributors

d = number of days between removals

q = quantity per person per day

VALUE OF Q IN LITRES

Residential buildings......200 l/person
Offices and workshops....35 l/person
Prisons..........................150 l/inmate
Schools.......................... 25 l/pupil.

This capacity represents the liquid capacity up to outlet water level. It is essential that the invert level of the suction pipe should not be more than 2,2m below the level at the outlet valve, at the coast this dimension may be increased to 2,5m.

3.14 COMBINED SYSTEM OF DISPOSAL

3.14.1 The combined system of soil and waste disposal should be used, except in certain cases such as waste water from laundries and large ablution blocks; in such cases it may be necessary to by-pass the septic tank and discharge the waste water directly into the effluent disposal system. Discharge from laundries is normally run into a balancing tank before entering the drain, (see Drainage Details).

3.15 PREVENT STORM WATER ENTERING DRAINAGE

3.15.1 Every care should be taken to prevent storm water from entering the drainage system. All manholes, inspection chambers and gullies should be raised sufficiently to prevent this possibility, especially in paved areas.

3.16 CAR WASHING AREAS

3.16.1 Car washing areas must be drained through an oil and grease trap (see Drainage Details) into the drainage system, except where the drainage system includes a septic or conservancy tank; in these cases the area must be connected to a soakage pit or to the storm water drainage.

3.17 GREASE TRAPS

3.17.1 Grease traps should be provided at all large kitchens and also at residences where the kitchen waste is connected to a trench drain.

3.18 TRAPPED DISH GULLIES

3.18.1 A trapped dish gully shall be provided to take the discharge from every scullery or kitchen sink that is not provided with a grease trap.

3.19 TRAPPED GULLIES

3.19.1 With the exception of the discharge from fittings mentioned in clause 3.18.1 above, trapped gullies should be avoided.

3.19.2 Waste pipes are to be connected direct to the drain, as in the. one pipe system. All waste fittings are to be provided with a deep seal trap (Minimum dept of water seal must be 75mm).

3.20 FLUSHING CISTERNS

3.20.1 The installation of automatic flushing cisterns to urinals is prohibited. Manual operated flush valves or cisterns must be used.

3.21 DRAINAGE DETAILS

3.21.1 A set of diagrams of "Drainage Details" is obtainable from the Project Manager. This set contains details of inspection chambers, grease traps, trench drains etc.

4. TOILET FACILITIES

A schedule showing the various toilet facilities and water supply requirements for different buildings or institutions is attached (Annexure A).

4.1 GROUPING

Where possible all toilet facilities should be grouped in a building, both horizontally and vertically and low outlet fittings such as baths and showers should be placed as close as possible to outside or duct walls, to facilitate drainage.

4.2 VENTILATION

In toilet cubicles which are ventilated in a natural manner the area of light must be 10% and the area of ventilation 7% of the floor area.

4.3 POSITIONING

WC's and urinals must be placed against outside or duct walls or in the case of urinals, the drainage points may end against such walls. Urinals must be adequately screened from passages, windows etc.

4.3.1 A wash-hand basin must be available at all WC's.

4.3.2 Walls must be of one brick thickness where more than 3 wash hand basins or bowl urinals are to be hung and also where the wall holding any of these fittings is longer than 3m.

4.4 SHOWERS

4.4.1 Showers are provided in accordance with the schedule Annexure A, but in interpreting the requirements it should be noted that showers are not required, for instance, at workshops which are part of a school where ablution facilities are already available.

4.5 CLEANERS FACILITIES

4.5.1 In each building cleaners room should be provided, according to the specifications given below, calculated at a cleaner per 450^2 floor space.

a. for buildings smaller than 4 000m^2 one ventilated room of at least 5 m^2 with a drip sink, 4 m shelving and 1 lockable cupboard per cleaner per 1 400 m^2 floor space;

b. for buildings larger than 4 000m^2 one ventilated room of at least 3 m^2 with a drip sink and 3 m shelving per 1 400 m^2 and a change room with toilet;

c. the change room should consist of 1 lockable cupboard and 0,7 m^2 free floor space per cleaner and be a minimum of 7 m^2 and

d. the toilet which should be close to the change room, should consist of 1 WC, 1 urinal, 1 hand wash basin and 1 shower per 15 cleaners.

In the case of women the urinal should be replaced by an additional WC.

4.6 TEA KITCHENS

4.6.1 Tea kitchens must have adequate light and ventilation and must be provided with a stainless steel sink and drainer. Hot water is not normally installed in tea kitchens.

5. STORM WATER DRAINAGE

Provision must always be made for the draining away of all storm water from all buildings.

5.1 The following table is a guide for sizing of gutters and down pipes:

DOWN PIPES IN mm		ROOF AREA IN m^2
∅	75	45
∅	100	80
∅	125	130
∅	150	180
HALF ROUND GUTTERS IN mm		
∅	100	35
∅	125	55
∅	150	80
∅	200	50
DOWN PIPES IN mm		
75 x 75		55
75 x 100		75
100 x 100		100
100 x 125		125
100 x 150		150
150 x 150		225
RECTANGULAR GUTTERS IN mm		
75 x 100		70
125 x 100		110

150 x 100	140
200 x 100	180
200x150	280

NOTE:

1. Down pipes must not be more than 15m apart.
2. For ogee gutters take 4/5 area of box gutters.

5.2 RAIN WATER PIPES

5.2.1 Down pipes should be discharged into channels, onto concrete slabs or into pipes; where they are discharged into pipes, they should be connected direct to the pipe and not through a catchpit.

5.3 STORM WATER DRAINAGE

5.3.1 Storm water is normally conveyed by means of shallow brick or concrete channels, flumes or concrete pipes. No pipes of less than 200 mm diameter should be used. Pipes draining roads should not be less than 300 mm.

5.4 SIZES OF STORM WATER PIPES

5.4.1 The size of the concrete storm water pipe depends on: .

a. the surface of the area e.g. roof or tar surface; rocky,clay, or sandy ground; grassed surface etc;

b. gradient of the ground;

c. gradient of the pipe and

d. region (inland, Cape coastal area, etc.)

5.4.2 It should be noted that:

a. no storm water is allowed to flow into the drainage system;

b. where storm water pipes run under a building they are to have a minimum diameter of 300 mm and must be fitted with catchpits on both sides of the building.

c. Storm water from paved areas, roads and sport fields must be efficiently disposed of;

d. all ground levels, invert levels, sizes and grades of pipes and channels must be shown on the drawing pad.

e. the final disposal of storm water from a site must be clearly defined and must be designed in consultation with the Local Authority where necessary.

5.5 PUMPS

5.5.1 Pumping of storm water should be avoided. Where sumps are provided for draining storm water, underground water or for draining basements, they should be of an adequate size and depth. Where pumps are required for these sumps, the details of the pump requirements should be given to the Project Manager. These items are provided by the Department and are not included in the building contract.

5.6 DRAINAGE DETAIL AND TYPE DRAWING

5.6.1 Details of catchpits, junctions boxes, etc., are contained in the set of Drainage Details, copies of which are obtainable from the Project Manager. Type drawings for larger catchpits and road catchpits are also available.

6. SITES PAVED AREAS, SPORT FIELDS. SWIMMING BATHS etc.

6.1 SITES

6.1.1 Where not designed by the engineer, all levels, fillings, excavations, dimensions and grades should be shown, as well as the irrigation system and storm water drainage system on the site plan.

6.1.2 Paved areas should be graded to control the storm water run-off. Manholes, inspection chambers and gulleys in paved areas should be raised to ensure that storm water does not enter into the drainage system.

6.1.3 The foundation of roads, parking areas and paved surfaces of each service must be designed in conjunction with the Project Manager.

6.2 SPORT FIELDS

6.2.1 If provision is made in the accommodation list of only one sport field the architect may deal with it including its sizes, grades and irrigation system.

6.2.2 Extended sport fields with athletic track etc. will according to the layout of the architect, be designed and specified by the Project Manager.

6.3 SWIMMING BATHS

6.3.1 Although swimming baths are excluded from the Architects commission (the Project Manager being responsible for them) the siting of the swimming bath and filtration plant room must be shown. Provision must be made for a water supply to the swimming bath, normally a 50mm water supply pipe.

6.3.2 There are various sizes of swimming baths used by the Department namely: type A; 25 x 12,5m; type C; 15 x 10m and type D; 10 x 5 m.

6.3.3 The provision of the filtration plant will be a separate contract and will be handled by the Project Manager.

6.3.4 Although the design of the change room and filtration plant room is the responsibility of the architect, requirements for sanitary conveniences, dimensions for pumps and filter tanks etc. can be obtained form the Project Manager.

7. SERVICES IN VARIOUS BUILDINGS

7.1 DAY SCHOOLS

7.1.1 Hot water is not normally supplied to day schools except for hand wash basins in workshops.

7.1.2 In the toilets for boys, wall or bowl urinals must be installed together with the appropriate flush valves. Small partitions should be installed between each bowl urinal.

7.2 GYMNASIUMS

7.2.1 Gymnasiums should be provided with adequate ablution and toilet facilities; showers with cold and hot water should be provided. Separate shower and toilet facilities are required for instructors. In certain instances the facilities provided for the Gymnasium can be combined with the requirements for the swimming baths change rooms.

7.3 BOARDING SCHOOLS, HOSTELS AND SINGLE QUARTERS

7.3.1 To facilitate the washing down of kitchen floors, 100 mm floor channels with 80 mm outlets should be installed. Kitchen sinks are to be of stainless steel, and al potato-peeling machines, dish washing machines, etc. must be provided with proper waste drains and water supplies.

7.3.2 Wash troughs should be provided in the central ablution block or in a separate laundry for use by students.

7.3.3 Where staff in hostels are resident during school holidays, separate hot water facilities must be provided in their quarters.

7.3.4 Toilet facilities should be provided for visitors.

7.3.5 Adequate toilet facilities should be provided for staff at kitchens and where staff are resident on the site, showers with cold and hot water should be provided.

7.4 POLICE STATIONS, CELLS AND QUARTERS

7.4.1 Adequate toilet facilities must be provided for staff and visitors.

7.4.2 A wash hand basin should be provided in the office of the officer in charge.

7.4.3 In single quarters, wash hand basins with hot and cold water should be provided in each room.

7.4.4 A WC of the pedestal type pan with seat pads must be provided in each cell.

7.4.5 Flushing of WC's in cells may be carried out by means of a flush valve (∅ 32mm) installed outside the cell with only a press button in the cell.

7.4.6 The ablution accessible from the cell yard must be provided with at least one WC, similar to that in the cell, a stainless steel sink and a shower. The sink and shower must be provided with hot and cold water.

7.4.7 Storm water drainage of cell yards should be graded through the entrance doorway. No catchpits should be put in cell yards.

7.4.8 Kitchen facilities should be provided where prisoners are held overnight.

7.4.9 A separate room must be provided for the water heating unit. When hot water geysers with a capacity of 350 l and more are to be installed, the room must be provided with double doors.

7.5 PRISONS

7 5.1 A WC of the pedestal type pan with seat pads must be provided in each cell.

7.5.2 Flushing of WC's in cells may be carried out by means of a flush valve (∅ 32mm) installed outside the cell with only a press button in the cell.

7.5.3 The ablution block must be accessible from the cell yard and must be provided with at least one WC similar to those in the cells, a stainless steel sink and shower. The sink and shower must be provided with hot and cold water.

See also "Building norm" of the Correctional Services Dept.

7.6 LABORATORIES

7.6.1 Drainage, water supply and gas installations to laboratory benches are normally carried in floor ducts with chequer plate or similar removable coverings, so as to make them accessible.

7.6.2 Special provision must be made for the disposal of contaminated waste such as radio-active waste, acid disinfectants, etc. In these cases the office of the Project Manager should be consulted.

8. LIST OF TYPE DRAWINGS AND DRAINAGE DETAILS

Catch pits .	D 260/230,	D 260/238
Conservancy tanks	D 260/234,	D 260/251
Septic tanks	D 260/239.	D 260/240. D260/241
Swimming bath	D60/255, (type A), D 260/267 (type C) D 260/295 (type D)	
Seepage trench	D260/294	

<u>DRAINAGE DETAILS</u>

D1D	Method of laying drains
D2D	Cleaning eye, inspection eyes, ramps
D4D	Stable and dished gully
D5D	Grease Trap, Type A and B
D6D	Detritus intercepting Trap for stables
D7D	Oil and grease trap for vehicle wash bay
D8D	Grease Trap for car washing slab Type B
D9D	Grease Trap type C
D10D	Inspection Chambers (under 1 530mm deep)
D10/AD	Inspection Chambers (brick work less than 1 530 mm deep)
D11D	Manholes (over 1 530 mm deep)
D11/AD	Manholes (brick work over 1 530 mm deep)
D12D	Control Chamber
D13D	Balancing Tank for Laundry block
D14D	Catch Pits type A & B
D15D	Catch Pit type C
D16D	French Drain
D17D	Soakage Pit
D18D	Acid Neutralising Tank
D19D	Dumping Pit
D20D	Absorption test hole
D21D	Prefabricated circular septic tanks
D22(A)D	Typical waste pipe connection to drain
D22(B)D	Typical connection to drain

D22(C)D	Typical waste pipe connection to drain
D22(D)D	Typical WC connection
D23(A)D	The one pipe system
D23(B)D	Use of anti-siphon pipes on soil fittings in the two pipe system
D23(C)D	Use of relief and back vents in the two pipe system
D23(D)D	Single stack system
D23(E)D	Single stack system
D25(A)D	Typical hot water system (in series)
D25(B)D	Typical hot water system (in parallel)
D33D	Corner support for water tank
D34D	Stand for 4 546 and 9 092 litre tank
D35D	Stand for 1 220 mm high pressed steel tanks
D36D	Stand for 2 440mm high pressed steel tanks
D37D	Platforms and cat ladder
D38D	Connections and footplate
D39D	Chequer Plate cover
D41D	Agricultural Drain
D42D	Valve chamber
D44D	Junction box for stormwater pipes

ANNEXURE A

SCHEDULE OF SANITARY APPLIANCES AND WATER SUPPLY

EXPLANATIONS	WC's	URINALS	BUILDINGS
Abbreviations M - Male F - Female HW - Hot Water CW - Cold Water 1/P - Litres per person	M. 1/25-50, 1/50 F. 1/20-60, 1/30 Personnel M. 1/8 F. 1/6	As EC's - 1/10 -	DAY SCHOOL
	M. 1/12-36, 1/25 F. 1/10-30, 1/15	1/15-30, 1/30	HOSTELS AND SINGLE QUATERS
The notation 1/12-36, 1/201 applicable per 12 to 36 persons thereafter 1 appliance per 20 persons	M. 1/15-60, 1/25 F. 1/10-60, 1/25	1/15-30 -	WORK SHOPS
	M. 1/12-36, 1/20 F. 1/10-30, 1/15	1/15-30, 1/30 -	HOSPITALS
Prison hospitals are as hospitals	M. 1/15-30, 1/30-200 1/40-420, 1/50 F. 1/10-40, 1/20-120 1/30-240, 1/40	As WC's -	PRISONS
	O .1/12-36, 1/20 R. 1/15-45, 1/25	1/20-60, 1/40	OFFICERS MILITARY CAMPS RANK
	M. 1/15 F. 1/18	1/15	SPORTS CHANGE ROOMS
The number of fittings necessary for gymnasiums and sport stadiums must be based on the number of partici-pants at one time	M. 1/125-200 1/250-500 1/800-1 000 1/1 000 F. 1/40-200 1/100-700 1/250-1 700 1/500	1/50-500 1/100-1 000 1/200-2 000 1/500 -	PLACES FOR OUT-DOOR GATHERINGS (STADIUMS, HALLS, THEATERS ETC.)
	1/15-30, 1/25		SERVANTS

HAND WASH BASINS (HWB)	BATHS (B)	SHOWERS (Sh)	BUILDINGS
M. 1/50-50, 1/100 F. 1/30-60, 1/60 Personnel M. 1/16 F. 1/12		Necessary for Gymnasiums Sport Stadiums	DAY SCHOOL
M. 1/4-20, 1/6 F. 1/4-20, 1/6	1/12-24, 1/20 1/8-24, 1/20	1/8-24, 1/16 1/12/24, 1/20	SCHOOL HOSTELS
Half the number of WC's + /1bedroom	M. 1/12-24, 1/20 F. 1/8-24, 1/16	1/8-24, 1/16 1/12-24, 1/24	SINGLE QUARTERS ETC. (ADULT)
Half the number of WC's		Postmen only 1/8-24, 1/16	OFFICES
As Wc's + 1/workshop		1/15-45, 1/25	WORKSHOPS
M. 1/8-40, 1/15 + 1/hall F. 1/80-40	1/15-30, 1/30	1/25, 1 for theater doctors	HOSPITALS
M. As WC's F. 1/15-30, 1/30-120 1/40-240, 1/50	F. 1/15-30, 1/30	1/10-50, 1/15-120 1/20 1/15-30, 1/120 1/25	PRISONS
O. 1/5-25, 1/10 R. 1/5-25, 1/10	1/15-30, 1/30 1/15-30, 1/30	1/8-24, 1/15 1/10-20, 1/25	OFFICERS MILLITARY CAMPS RANKS
M. 1/8 F. 1/8		1/5 1/5	SPORTS CHANGE ROOMS
			PLACES FOR OURDOOR GATHERINGS (STADIUM, HALL, THEATERS etc)
1/10		1/10	SERVANTS

SINKS (S) OR WASH TROUGHS (WT)	HW SUPPLY	BIUILDING	
1 Drip sink per cleaners room		DAY SCHOOL	
1 Drip sink per cleaners room 1 or 2WT/washroom	30 l/p	HOSTELS AND SINGLE QUARTERS	
1 Drip sink per cleaners room 1 S/Tearoom	20 l/p	OFFICES	
As required According to Dept. of labour	30 l/p for showers (min. 100l)	WORK SHOPS	
As required 1 slop pan sluice room	40l/patient (60 l/patient for mental hospitals	HOSPITALS	
WT 1/20-40 1/25-115 1/30 1 double WT per average.cell	m. 10l/prisoner F. 20l/prisoner	PRISONS	
Wt 1/30-90 1/40	100 l/shower	OFFICERS MILITARYCAMPS RANKS	
	100 l/shower	SPORTS CHANGE ROOMS	
WT 1/20	10 I/P	SERVANTS	

CW SUPPLY FOR 2 DAYS	REMARKS	BUILDING
Higher than 2 stories where the pressure is weak 50 l/student	For nurse schools li crease facilities by 20%	DAY SCHOOL
Higher than 2 stories or where the pressure is weak 400 l/p		HOSTELS AND SINGLE QUARTERS
Higher than 2 stories or where the pressure is weak 70 l/p		OFFICES
As necessary		WORK SHOPS
600 l/patient	Blend water where Necessary	HOSPITALS
3001/prisoner	See also prisons "building norm"	PRISONS
As necessary	Extra showers may be allowed in place of Baths	OFFICERS MILITARY CAMPS RANKS
		SPORTS CHANGE ROOMS
		PLACE FOR OUTDOOR GATHERINGS (STADIUMS, HALLS, THEATERS, ETC.)
As necessary		SERVANTS

ANNEXURE B
INDEX FOR ARCHITECTS DRAWINGS:

PIPE INDICATIONS

VCP = Vitrified clay pipe (Drain pipe) (Brown) =

_____.________.__________.________

W = Water main (Purple) =

_____W______W________W_______

R = Ring Main (Purple) =

_____R_______R________R_______

F = Fire Main (Purple) =

_____F_______F________F_______

(C) WSP = Cold water supply pipe (Orange) =

____ ________ _________ ________

StWP = Storm water pipe (Black) =

___ ________ ________ _________

GP = Gas pipe (Yellow) =

____G______G_______G_________

FURTHER PIPE ABBREVIATIONS

NB: Existing pipe line must be drawn as a thin and new pipe line as a thick line.

CIP Cast iron pipe

SCP Asbestos cement pipe

DIAMETER OF PIPES

The indication of pipe diameters are 15 ∅; 40 ∅; 100 ∅ etc.

SITE PLAN

Scale: 1:200; 1:500; 1:000 etc.

CONTOUR LINES

0,1; 0,2; 0,5; 1; 2 or 5 m contours, with each 5th contour drawn in thicker.

DATUM

The bench mark must be clearly noted on the drawings.

INDICATION OF GROUND LEVEL

9,725	x = existing ground level
$\boxed{9,730}$	x = final ground level

SLOPE INDICATIONS OF BANKS

Slope planted with grass 1: 1,5 (1) High side

1,5

Plan

Slope paved with stone 1,5:1 (1,5) Low side

1

ANNEXURE C

IMPORTANT ABBREVIATIONS

Vitrified clay pipe	VCP
Cast iron pipe	CIP
Asbestos cement pipe	ACP
Galvanized mild steel pipe	GMSP
Copper pipe	Cop. P
High Density Polyethylene Pipe	HDPE
Concrete pipe	Con. P
Unplasticised Polyvinyl chloride Pipe	Upvc
Bath	B
Shower	Sh
Wash hand basin	WHB
Sink	S
Wash trough	WT
Drip sink	DS
Water closet	WC
Urinal	U
Inspection chamber	1C
Inspection eye	IE
Cleaning eye	CE
Dished gulley	DG
Grease trap	GT
Waste pipe	WP
Vent pipe	VP
Waste and vent pipe	WVP
Soil and vent pipe	SVP
Anti syphon pipe	ASP
Ramp	RAMP

Rain water pipe	RWP
Storm water pipe	StWP
Catchpit	CP
Stand pipe	SP
Expansion pipe	Exp. P
Garden hose box	GHB
Ground level	GL
Invert level	IL
Excavation level	Excav
Fill	Fill