

COPY 1

DERBYSHIRE COUNTY COUNCIL

SOAKAWAYS
FOR NEW ESTATE STREETS

GUIDANCE NOTES FOR DEVELOPERS

ENVIRONMENTAL
SERVICES
DEPARTMENT
TECHNICAL LIBRARY

David Harvey
Director of Environmental Services
County Hall
Matlock
Derbyshire DE4 3AG

SEPTEMBER 1997

625734



CONTENTS

- 1 Introduction.
 - 2 When can Soakaways be Considered.
 - 3 Chamber Location.
 - 4 Percolation Testing.
 - 5 Chamber Design.
 - 6 The Commuted Sum.
 - 7 Supervision of Construction.
 - 8 Further Information.
- Figure 1 - Soakaway Detail.
- Appendix A - Percolation Testing of Sub Strata.
- Appendix B - Procedure for Calculating and Agreeing Commuted Sum.

DERBYSHIRE COUNTY COUNCIL
SOAKAWAYS FOR ESTATE STREETS

Guidance Notes for Developers

1 INTRODUCTION

Where a proposed residential development has received planning consent, the County Council requires the submission of detailed designs for the new estate roads and the drainage system serving them. These should be approved prior to an adoption Agreement under Section 38 of the Highways Act 1980 being entered into.

The roads will only be accepted for adoption if they are drained via a positive, gravity fed system discharging to an approved outfall (ie, an existing public sewer, highway drain or watercourse) to be sanctioned by the Water Authority, Highway Authority and National Rivers Authority respectively where applicable.

If surface water run-off for both the roads and private property is discharged via the same new drainage system, this will have to be adopted using an Agreement under Section 104 of the Water Industry Act 1991 with the Water Authority and evidence of and an Agreement will be required by the County Council.

In rare circumstances there is no appropriate outfall available, and where this is the case, the Highway Authority will consider the use of soakaways to serve a separate surface water drainage system for the highway only.

2 WHEN CAN SOAKAWAYS BE CONSIDERED?

The Developer must prove that all other reasonable options for the disposal of surface water from the road have been thoroughly investigated. Possible alternatives will be off-site drains with an easement, hydro-brakes with balancing/storage systems, or a Section 104 public sewer. The use of pumped systems will not be considered on new estates. Only when such evidence has been submitted and agreed with the Highway Authority will soakaways be considered.

In addition, the County Highway Authority must be satisfied that the ground conditions will permit satisfactory percolation, that the capacity, design and location of the chambers is acceptable, and that the Authority's additional maintenance liability is offset by the payment of a commuted sum.

3 CHAMBER LOCATION

Soakaway chambers must be located so as to minimise their impact on the new roads and surrounding property. They should be positioned outside of the carriageway or footway or any verge which contains statutory undertakers equipment, but must be located so that free, safe and unencumbered access is available for Highway Authority operatives.

The position of the chamber(s) must also take account of the risk of run-off exceeding the capacity of the chamber(s) and water surcharging into private property. For this reason adequate overflow facilities will be necessary and the position and level of properties (particularly dwellings) in the vicinity of the chamber(s) must avoid potential flood areas.

Ideal locations for soakaway chambers are within public open space areas (subject to appropriate easements), wide areas of highway verge (eg, visibility splays) or possibly private car parking areas excluding the curtilages of dwellings (again subject to easements).

4 PERCOLATION TESTING

It is essential that the sub-strata of the site permits adequate percolation of the surface water from the chamber and to prove this a percolation test must be carried out. The County Council's laboratory offers a testing service (contact the Laboratory Manager, telephone number 01773 852268) or the Developer may use a competent geotechnical testing company. However, if the latter is used, a representative from the Highways Laboratory must be present during testing and their time paid for by the Developer. The test must be carried out in the same location as the proposed chamber, in accordance with the method outlined in Appendix A.

5 CHAMBER DESIGN

The soakaway chamber(s) must be large enough to accommodate an adequate volume of water based upon the percolation characteristics of the sub-strata. On this basis, sites for soakaways will fall into 3 broad categories:

- GOOD - High percolation rate
- MODERATE - Acceptable percolation rate
- POOR - Low percolation rate

Poor soakaway sites will not be considered for adoption and other alternatives will have to be found. Moderate sites will have to provide a higher level of storage capacity than good sites and for this reason, the soakaway chamber(s) and drainage system shall be designed to accommodate a storm frequency of 1 in 40 years. Good soakaway sites shall be designed with a chamber and system which can cope with a 1 in 20 years storm frequency. Where flooding may be prejudicial to private property these design parameters may be increased.

Chambers should be constructed with pre-cast concrete perforated rings **surrounded by a lining (to prevent migration of fines)** and set into free draining material, generally as shown on the attached diagram. Chamber size should be restricted to a maximum volume of 24 m³ and depth of 3 metres. Where a greater capacity is needed, multiples of the standard design shall be used, either in close proximity to each other and interconnected with perforated pipes or as separate entities at different points around the site. On particularly steep sloping sites where the road/drain gradient exceeds 4% (1 in 25) a silt trap shall be provided immediately in advance of the soakaway chamber inlet. All designs must be agreed in writing with the Director of Environmental Services before works commence. A typical design is shown on Figure 1.

6 THE COMMUTED SUM

Soakaways represent an extra liability to the Highway Authority in that the chamber requires periodic cleaning and other maintenance, and will in time require complete replacement/reconstruction. To off-set this liability, a non-returnable commuted sum must be paid to the Highway Authority before the Section 38 Agreement is signed and sealed. The security supporting the Agreement (bond or cash deposit) will also have to increase accordingly, to include the cost of the highway drainage works.

The commuted sum calculation is based primarily upon the size and design of soakaway chamber and is made up of elements to cover regular maintenance and reconstruction over a 15 year period. The sum will be paid into the highways maintenance budget. Outline details of the procedure for calculating and agreeing the commuted sum are given in Appendix B.

7 SUPERVISION OF CONSTRUCTION

The chambers shall be constructed in accordance with the approved designs and supervised by the Highway Authority's site representative (the Area

Engineer's Clerk of Works). Any departure from the approved design shall be notified to the Clerk of Works who will confirm any changes with the Director of Environmental Services.

Where new estate streets are drained into a soakaway system, the Section 38 Agreement will be subject to an increased maintenance period of 1 year, to maximise the opportunity of observing the system under storm conditions. If at any time prior to adoption the system is found to be inadequate, the Highway Authority reserves the right to require modifications to the design and construction to overcome the problem.

8 FURTHER INFORMATION

For further information or advice about the provision of soakaways on new estate streets, please contact the County Council's Network Development (Highways) on telephone number 01629 580000 and ask for the New Estate Roads Officer dealing with the Borough/District in which the development site falls. If you require specific information or advice on fees for percolation testing, please contact the County Council's Materials Testing Laboratory at Ambergate on telephone number 01773 852268.

APPENDIX A

Perculation Testing of Sub Strata

General

This method covers the determination of the suitability of a site for soakaway drainage and gives a method of calculating the size of soakaway required.

Criteria

The guidelines for an effective highway soakaway are that it should be capable of containing the water from 2 hours of rain falling at 15 mm per hour over the catchment area and that this volume should soak away in 24 hours. For the purposes of calculation it is assumed that time of entry of the stormwater into the soakaway is immediate.

Relevant Standard

None.

Equipment

- (i) JCB type excavator capable of 3 m dig with small bucket (18 inch or 2 ft) attached.
- (ii) Water bowser (at least 1,500 gallon required for test).
- (iii) Steel measuring tape.
- (iv) Two 2 m ranging rods or other suitable datum.
- (v) Watch.

Procedure

The test shall be carried out as near as possible to the proposed position of the soakaway chamber. Excavate a straight sided pit approximately 1.5 m x 1.5 m to the depth of 3 metres. This depth should be modified according to the soil conditions and should ideally be at the expected depth of the finished soakaway. Any turf/topsoil shall be stacked separately for re-use.

Measure the dimensions of the hole and note the soil profile. Note any unusual features and the presence of any groundwater. Set up a fixed datum point from which water level readings can be taken. Measure the height of the datum point from the base of the pit.

Fill the pit with water from the tanker up to the loose surface layer and maintain this level by further additions from the water tanker for 30 minutes. Measure the distance of the water level from the datum point and continue taking readings at intervals until the behaviour of the soakaway is apparent; typically every 30 minutes for 4 hours. The above procedure may have to be modified where very high or very low soakage rates are encountered.

On completion of the test any remaining water shall be removed, the hole filled in, and the surface restored as close as possible back to its original state. For safety reasons test pits should not be left open overnight.

If the proposed soakaway system is large with multi-chambers, 2 or more separate test pits may be required to prove the ground conditions over the area of the system.

Calculations and Interpretation of Results

From the measurements taken calculate the depth of water above the base of the pit at all stages. Plot a graph of depth against time and from this obtain an estimate of the rate and time of emptying expressed in cu.m/hr and hrs respectively. This enables the capacity of each soakaway in terms of the volume of water capable of soaking away in 24 hours to be assessed.

The impermeable drainage area (in square metres) is the area of all "hard" surfaces to be adopted by the Highway Authority as determined from the site plan. Unless the grassed area in verges etc is large, this can be ignored. The total rainfall (in metres) predicted during the 2 hour storm multiplied by the impermeable area gives the total volume of water in cubic metres to be drained by the soakaways.

The required storage volume the system has to provide below the inlet is calculated by subtracting the volume of water likely to soakaway during the initial 2 hour storm period from the total volume of water calculated previously.

From these calculations, the number of soakaway units can be assessed. Unless the drainage of water from the soakaway is rapid (ie about 4 hours) the required storage volume to be provided is the governing factor determining the size and number of soakaway units required.

A minimum of 65% of total volume of the system must be provided in the soakaway chamber voids, the remainder can be in the voids in the free drainage material surrounding the chambers.

The Developer should note that the percolation tests described in BS5930 and BRE Digest 365(1991) are not considered appropriate for use on highway soakaways and will not be accepted as a sound basis for the chamber design.

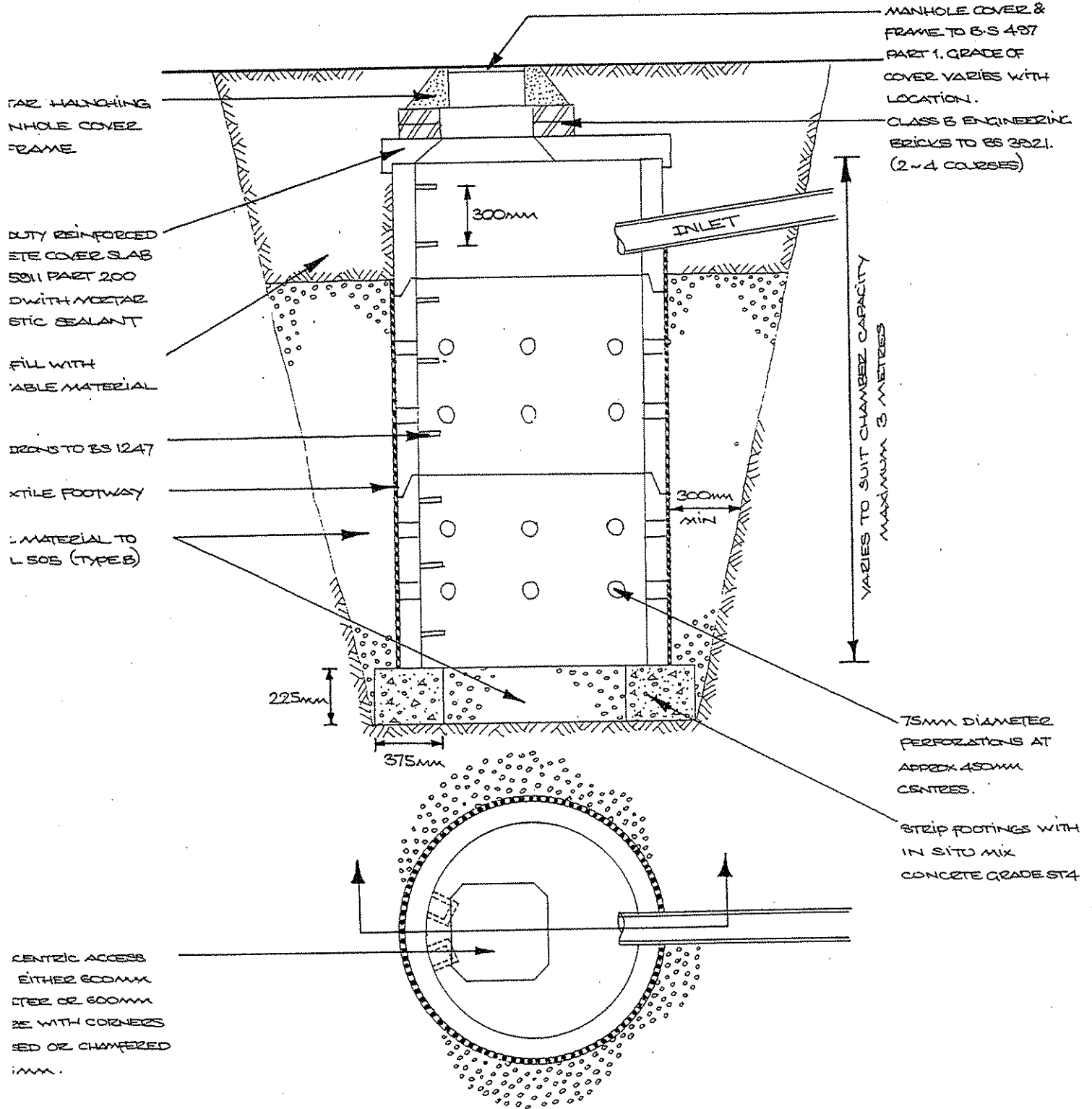
The test results and laboratory recommendations shall be forwarded to the Highway Authority for consideration, together with or followed by a design for the soakaway system.



FIGURE 1

SOAKAWAY DETAIL

Diagrammatic Plan and Section





APPENDIX B
PART 1

Calculation of Commuted Sum

Having determined that a soakaway can be constructed and will operate successfully, the Highway Authority must ensure that the chamber(s) do not increase demands for public funding for repair and maintenance during the life of the highway drainage system. Should the system fail, either structurally or functionally, the Highway Authority will seek to remedy the situation using a commuted sum to be provided by the developer in advance of works commencing.

The commuted sum must, therefore, include sufficient funding to completely reconstruct the chamber(s) based upon the County Council's projected estimates for the works or as may otherwise be agreed in writing by the Director of Environmental Services. In addition, the Authority anticipates having to carry out periodic inspection, cleaning and minor repair of the chamber(s).

The commuted sum will, therefore, comprise a total of the following:-

- Chamber reconstruction cost at year of design life end.
- Maintenance cost of £100.00 per chamber per year for design life.

The above calculation will be based upon a 15 year design life and compound interest of 3% per annum to take account of inflation.

APPENDIX B
PART 2

Authorisation of Commuted Sum

For each soakaway or set of soakaways to be the subject of a commuted sum a report will be produced detailing calculations used to derive the cost of the soakaway and its maintenance, and any assumptions used in those calculations. This report will be checked by a senior member of staff (not the same member of staff who prepared the report) (normally the new works engineer or area development control engineer) and signed to indicate the check had taken place. When the report has been agreed it will be submitted to a "manager" (normally the network development manager or the transportation strategy manager) for authorisation.

Any negotiations with a developer concerning the amount of the commuted sum will be the subject of a written report, to be independently checked, and submitted to a manager for authorisation in the same manner as the original report.

The County Council reserves the right to indicate that it will refuse to adopt a soakaway if agreement cannot be reached with respect to the commuted sum.

