

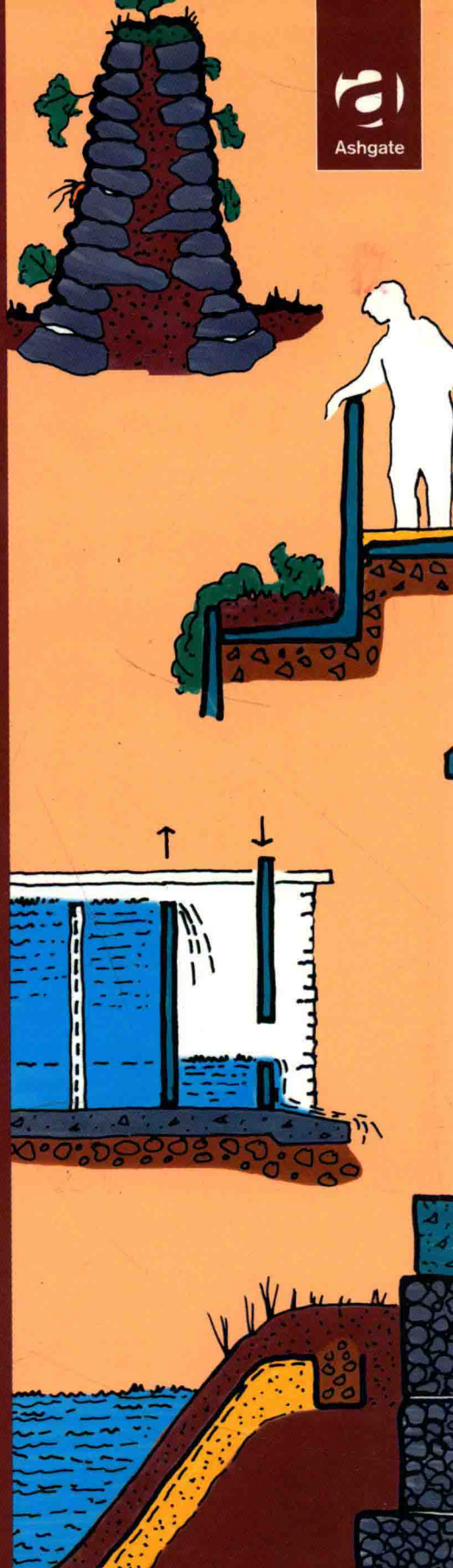
LANDSCAPE CONSTRUCTION

Volume 3

Earth and Water
Retaining Structures

C A Fortlage
and
E T Phillips


Ashgate



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VOLUME 3

Earth and water retaining structures

C. A. Fortlage and E. T. Phillips

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Aldershot • Brookfield USA • Singapore • Sydney

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Published by
Ashgate Publishing Limited
Gower House
Croft Road
Aldershot
Hampshire GU11 3HR
England

Ashgate Publishing Company
131 Main Road
Burlington, VT 05401-5600 USA

Ashgate website: http://www.ashgate.com
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British Library Cataloguing in Publication Data

Fortlage, C. A. (Catharine A.)
Landscape Construction
Vol. 3: Earth and Water Retaining Structures/C. A. Fortlage
and E. T. Phillips.
1. Landscape design.
I. Title. II. Phillips, Elizabeth, 1930– . III. Roads, paving and
drainage.
712

Library of Congress Control Number: 91-28570

ISBN 0 566 09043 0

Typeset in Great Britain by Bournemouth Colour Press Limited, Parkstone, Dorset and printed in Great Britain by MPG Books Ltd, Bodmin, Cornwall.

LANDSCAPE CONSTRUCTION

VOLUME 3

FOREWORD

Landscape is becoming of increasing importance to both urban and rural developments, but sadly many good landscape designs are marred by the unfortunate detailing of the hard landscape. When completed, this series will provide the first comprehensive work on construction written specifically for the landscape designer who, until now, has had to rely on extracts from technical information, manufacturers' catalogues, British Standards and architectural textbooks for information.

The four volumes of *Landscape Construction* will cover all aspects of hard landscape building and construction work. Basic building construction is an essential part of the training and professional skills of the landscape designer, and these texts will fulfil the need for straightforward and clearly illustrated information on each subject. There are plentiful illustrations supplemented by photographs on all aspects of hard landscape.

This third volume describes the principles of construction of earth and water retaining structures. Volume 1 dealt with brick and stone landscape walls, fences, security barriers, gates and railings, together with their fittings and finishes. Volume 2 covered paving and road surfaces, drainage and services. Volume 4 will cover steps, ramps and light structures in the landscape.

Together the four volumes of *Landscape Construction* will be an essential desktop reference work for the landscape designer who is concerned with good standards of construction and workmanship, and should do much to give the student of landscape design a sound technical foundation for his professional work.

Professor Derek Lovejoy CBE
MA (Harvard) DipTP FRIBA FRTPI PPILA FRSA FIHT

Authors' note: Professor Lovejoy died in the winter of 2000, but since the authors have known him well for the last twenty-five years, his family know that he would wish to be associated with these, the last two volumes, in the series.

INTRODUCTION TO VOLUME 3

This book covers the construction of simple earth and water retaining structures as far as the normal scope of landscape work is concerned; major civil engineering projects such as highway embankments and reservoirs are excluded. These are specialized subjects best left to civil and structural engineers, since both the calculations required and the actual construction are very complex, and the effect of errors in design and supervision can be disastrous.

There are many different ways of dealing with changes in level in landscape work; these range from the softest grassed slopes to massive granite walls, and the possibilities for imaginative earth retention are almost infinite. Whilst this is not a book on design, the intelligent landscape designer will be able to visualize any number of design options based on the types of construction described here.

Chapters 1 to 4 cover the simpler forms of earth retention likely to be part of a landscape contract; they are divided into those methods of construction which rely on the soil as part of the structure, various types of gravity retaining walls, and those which are constructed independently of the soil.

Remember that earth is bulky, heavy, slippery, and sometimes very wet and sticky; it can bulk up to an amazing extent when excavated and it requires a large number of trucks to move it on or off the site. The landscape designer should note that it has to be put somewhere during the construction period, so that a design which takes account of this problem will certainly be cheaper to construct than one where earth has to be handled two or three times during the contract. The neat little X's on the drawing showing where the spoil is to be placed will become large muddy, untidy spreading mounds on site, and it is probable that they will spread out exactly where they will cause most obstruction.

Chapters 5 to 9 deal with all types of water retaining construction, from 'natural' lakes to small ornamental pools, and the construction of natural and ornamental watercourses is covered.

The main point to keep in mind when dealing with water retention is that flood

water is a very powerful and uncontrollable force, and all water retaining works should be over- rather than under-designed. Always make sure that flood water can escape to some area where it can do the least damage, and that the construction can stand up to all the expected pressure and speed of floods. Like earth retention, water structures range from soft erosion control matting to hard heavy gabions or mass concrete designed by a civil or structural engineer, and this book offers a good choice of methods which should allow the landscape designer to choose the most suitable solution. The authors suggest that small water features such as pools and cascades should be constructed as mock-ups before the final construction is undertaken, since the behaviour of moving water is very complicated; it is much better to set up a small plastic and timber 'mock-up' to check the movement of the water, and to make adjustments on this rather than to alter the final concrete and stone structure. For large bodies of water, there are laboratories who will (for a price) set up computer simulations of water movement, but this is only really necessary when there is a danger of floods causing serious damage.

Appendix 1 gives a summary of the calculations required for masonry retaining walls up to 1.5 m high.

Appendix 2 gives useful information on the effects of sulphate soils on concrete. Concrete may look satisfactory when poured, and even meet all test requirements, but it will not be long before cracks and crumbling appear if the mix is not suitable for the soil conditions. As concrete is often below ground or at the bottom of the construction, repairs and replacement are difficult, expensive if it involves underpinning, or just impossible without some demolition. Therefore careful specification and site checking of all concrete will save a lot of trouble later on.

Appendix 3 gives a description of the reconnaissance survey which should be undertaken before any project is even initiated. It does not take very long to check most of the points given here, and a little time spent making sure that nothing critical has been overlooked can save many pounds and hours later, not to mention a good deal of professional embarrassment caused by litigation. This is not a check list – it is meant to stimulate the landscape designer's understanding of all aspects of the site and its surroundings, since all good landscape work is based on a full appreciation and management of the site factors.

Readers will see that the Figures have been drawn freehand; this is done deliberately in order to remind the landscape designer that real landscape does not follow tidy computer generated lines.

The authors recommend that this Volume should be read in conjunction with Volumes 1 and 2 which give much more detailed information on brick bonds, concrete mixes, walls and paving, and hard landscape work generally.

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