

**A PRACTICAL TREATISE
ON ROADS, STREETS,
AND PAVEMENTS**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649060764

A Practical Treatise on Roads, Streets, and Pavements by Q. A. Gillmore

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

Q. A. GILLMORE

**A PRACTICAL TREATISE
ON ROADS, STREETS,
AND PAVEMENTS**

A
PRACTICAL TREATISE
ON
ROADS,
STREETS, AND PAVEMENTS.

BY
Q. A. GILLMORE, A. M.,

LIEUT. COL. U. S. CORPS OF ENGINEERS, BREVET MAJOR-GENERAL U. S. ARMY.

AUTHOR OF "LIMES, HYDRAULIC CEMENTS, AND MORTARS," "BÉTON
AGGLOMÉRÉ AND OTHER ARTIFICIAL STONES," "REPORT ON
STRENGTH OF BUILDING STONES OF THE UNITED
STATES," &c., &c.

NEW YORK
D. VAN NOSTRAND, PUBLISHER,
23 MURRAY AND 27 WARREN STREETS.
1876.

6371007

8358

SR

•G413

PREFATORY NOTE.

In the preparation of the following pages a few leading objects have been kept in view by the author.

First. To give, within the compass of one small volume, such descriptions of the various methods of locating country roads, and of constructing the road and street coverings in more or less common use at the present day, as will render the essential details of those methods, as well as certain improvements thereon of which many of them are believed to be susceptible, familiar to any intelligent non-professional reader.

Second. To make such practical suggestions with respect to the selection and application of materials, more especially those, with the properties and uses of which builders are presumed to be the least acquainted, as seem needful in order to develop their greatest practical worth, and realize their greatest endurance.

Third. To institute a just and discriminating comparison of the respective merits of the several street pavements now competing for popular recognition and favor, under the varying conditions of traffic, climate, and locality, to which they are commonly subjected.

Q. A. G.

NEW YORK, March 1, 1876.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry, no matter how small, should be recorded to ensure the integrity of the financial statements. This includes not only sales and purchases but also expenses and income.

The second part of the document provides a detailed breakdown of the accounting cycle. It outlines the ten steps involved in the process, from identifying the accounting entity to preparing financial statements. Each step is explained in detail, with examples provided to illustrate the concepts.

The third part of the document discusses the various types of accounts used in accounting. It categorizes accounts into assets, liabilities, equity, revenue, and expense accounts. It also explains the normal balances for each type of account and how they are used to calculate the net income or loss for a period.

The fourth part of the document covers the process of journalizing and posting. It explains how to record transactions in the journal and how to transfer the amounts to the appropriate T-accounts in the ledger. This process is essential for maintaining the double-entry system and ensuring that the books are balanced.

The fifth part of the document discusses the importance of adjusting entries. It explains how these entries are used to record accruals, deferrals, and other adjustments that are necessary to ensure that the financial statements are accurate and reflect the true financial position of the company at the end of the period.

The sixth part of the document covers the preparation of financial statements. It explains how to calculate the net income or loss, determine the ending balances for the assets, liabilities, and equity accounts, and prepare the balance sheet, income statement, and statement of owner's equity.

The seventh part of the document discusses the closing process. It explains how to close the temporary accounts (revenue, expense, and owner's drawing) to the permanent accounts (assets, liabilities, and equity) and how to prepare the closing journal entries.

The eighth part of the document covers the process of reversing entries. It explains how these entries are used to reverse the adjusting entries at the beginning of the next period, ensuring that the accounts are ready for the new period.

The ninth part of the document discusses the importance of internal controls. It explains how internal controls are used to prevent and detect errors and fraud, and how they can be designed to ensure the accuracy and reliability of the financial information.

The tenth part of the document covers the final steps of the accounting cycle, including the preparation of the financial statements and the closing of the books. It emphasizes the importance of reviewing the work and ensuring that all transactions have been properly recorded and adjusted.

TABLE OF CONTENTS.

CHAPTER I.

LOCATION AND GRADES OF COUNTRY ROADS.

	PAGE
Considerations governing location.—Elementary principles to be kept in view.—Reconnaissance.—The Aneroid Barometer.—Advantages and manner of its use.—Surveys, maps and descriptive memoir.—Selection and location of line.—The adoption of the shortest line seldom practicable.—Questions of expediency are to be considered.—Maps of contour lines.—Parallel cross sections of routes.—Grades.—Tractive force.—M. Morin's experiments.—Undulating grades.—Maximum and minimum grades.—Statical resistances on grades.—Sir John Macneill's formulæ for dynamical resistances.—Mr. Law's table of same.—Increase of resistance on ascending equals the decrease on descending the same grade.....	1 to 34

CHAPTER II.

EARTHWORK, DRAINAGE AND TRANSVERSE FORM OF COUNTRY ROADS.

Excavations and embankments.—Computations of same.—The lead.—Increase in volume, or "growth" of excavated earth.—Moving earth.—Completed map and specifications.—Fixing the line on the ground.—Side slopes in cuttings.—Their treatment when infested with springs.—The drains necessary.—Other precautions to insure stability.—Cuttings through rock.—The formation of embankments.—Embankment slopes.—Methods of their protection.—Hill side roads.—Sustaining walls for same.—Roads along rocky hill sides.—Roads over

	PAGE
marshy and swampy grounds.—Same over deep marshes.— Roads over tidal marshes.—Protecting and draining same by dikes and sluice gates.—Application of this method to Jersey Flats.—Side-cuttings.—Spoil-banks.—Side drains.—Cross drains.—Cost of stone, brick and tile drains.—Surface drains. —Covered side drains, and silt basins.—Culverts of wood, con- crete, etc.—Width of main, cross and branch roads; of the French roads; of the Cumberland road.—Transverse form of roads.—Catchwaters.—Tools and implements.....	35 to 75

CHAPTER III.

ROAD COVERINGS.

The object of road coverings.—Best material for same.—The basaltic, doleritic and other trap rock.—Other materials.— Earth roads.—Construction, maintenance, and repairs of same. —Corduroy Roads.—Plank Roads.—Advantages and defects of same.—Gravel roads.—Directions for their construction.— Screening and applying the gravel.—Road rollers.—Good gravel roads.—Inferior gravel roads.—Macadam roads.— Practice of the English and the French constructors.—Roads of the Central Park in New York city.—Preliminary tests of stone for road coverings.—The stone crusher.—Thickness of the road covering.—Macadam's practice.—Applying the broken stone.—The "wings" of roads.—Telford roads.—The Telford sub-pavement.—Same with gravel and broken stone on top.—Rubble stone sub-foundation, and Telford pavement. —Same without the Telford pavement.—Concrete foundation with gravel and broken stone on top.—Foundation of rubble stone and concrete.—Shell roads.—Charcoal roads.....	76 to 108
---	-----------

CHAPTER IV.

MAINTENANCE AND REPAIRS OF ROADS.

Schemes for raising and applying the funds not discussed.—Ex- cellence of maintenance requisite from motives of economy alone.—Different conditions of the same road compared.— Relation of animal force to traffic on different roads.—Where traffic justifies the construction, it exacts the thorough main- tenance of a road.—Broken stone roads are seldom well kept up.—Method of maintenance by minute daily repairs, of roads

	PAGE
of moderate traffic.—Implements.—Whitworth's machine sweeper.—Street sweeper used in New York city.—A very soft sweeper necessary upon road coverings.—Directions for applying the new materials.—Thick layers to be avoided.—The process is properly one of constant patching.—Experience of the French Engineers.—Roads in the Department of the Sarthe.—Lyons and Toulouse road.—Tours and Caen road.—Method of maintenance by periodical reconstruction.—Adapted to roads of large traffic.—Practical precautions necessary.—Relaying and rolling.—Material to be sprinkled.—Determination of thickness and composition of road covering.—Relation between annual wear and average daily tonnage of roads in the Department of the Loire, and in the Arrondissement of St. Etienne.—Curves of daily tonnage and annual wear.—Ratio of wear to tonnage not constant.—Wear increases more rapidly than tonnage.—Necessity for using the best material increases with the tonnage.—Apportionment of materials.—Maintenance of gravel roads.....	109 to 138

CHAPTER V.

STREETS AND STREET PAVEMENTS.

Functions of a modern street.—Ancient sewers.—Modern sewers.—Necessity of subsoil drainage.—Different methods of securing it.—The object and essential requisites of a good street pavement.—Pavement foundation of broken stone.—Of sand.—Of cobble stones.—Cobble stone pavement.—Old road coverings as foundations.—Rubble stone pavement, as a foundation.—Concrete foundation.—Foundation of rubble stone and concrete.—Sidewalks and sidegutters.—Curb and gutter stones.—Pavement of stone blocks.—Best dimensions for the blocks.—Different methods of laying same.—Special methods on steep grades. The Guidet stone pavement.—The Russ and the Belgian pavements.—The Nicolson, Stowe and other wooden block pavements.—Treatment of wood to prevent decay.—Chicago wooden pavements.—Hydro-carbonized brick pavements.—Asphalt pavements.—Varieties of bitumen.—Description of natural mineral tar, bituminous limestone and asphaltum.—The mineral tar, called also asphaltic cement, formed by uniting two or more bitumens.—Proper proportions of petrolene and asphaltine.—Bituminous limestone pavements.—Concrete the best foundation for same.—Old pavements for foundation under certain precautions.—Heating
--

the asphalt or bituminous limestone.—Method of applying the same.—Importance of an even finish on surface.—Directions for making asphalt pavements, without the asphalt rock, comprising—(1) The preparation of asphaltic cement—(2) The powdered calcareous sand—(3) Mixing the cement and powder, and (4) applying the mixture by the first method.—Asphalt block pavements.—Merits and cost of asphalt pavements.—Asphalt pavements of New York city.—Comparative merits of wood, stone, and asphalt pavements as to—(1) durability—(2) first cost—(3) Cost of maintenance and repairs—(4) Facility of cleansing—(5) Convenience, and (6) hygienic considerations.—General conclusions.	137 to 207
--	------------

CHAPTER VI.

SIDEWALKS AND FOOTPATHS.

Concrete footpaths.—Foundation for same.—Precautions against upheaval by frost.—Proportions of ingredients.—Directions for laying.—Treatment of surface layer.—Squares or rectangles preferable to a single sheet.—The Schillinger pavement.—Deficient in compressive strength and power to resist frost.—Table of compressive strength of Portland cement and Rosendale cement Mixtures.—Béton Coignet.—Asphalt footpaths.—Their thickness.—May be made with the asphalt rock, or with bituminous mastic.—Directions for making bituminous mastic.—Extensively used on public works.—Method of application.—Sidewalks over street vaults.—Must be water tight.—The precautions necessary to secure that condition.—Brick footpaths.—Foundations for same.—Flagging stone footpaths.—Hudson river flagging.—Broken stone and gravel footpaths.—For parks and sidewalks of country and suburban roads.—Preparation of the bed for the material.—Tiles for sub-drainage.—Lower layer and surface layer.—Park walks.—Transverse form.—Sod-gutters and cobble stone gutters.—Drainage of an area covered by a system of walks.—Hand-made concrete.—Mill-made concrete.—The cubical concrete mixer, and manner of using it	208 to 226
---	------------

CHAPTER VII.

TRAMWAYS AND STREET RAILWAYS.

Comparative tractive force, on stone tramways, broken stone roads, and gravel roads.—Definition of tramway.—Adapted to	1
--	---