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SECTION A

PROBLEM STATEMENT, HISTORIC BACKGROUND AND ANALYSIS OF ROYAL ENGINEERS BACKGROUND AND TRAINING

CHAPTER ONE

PROBLEM STATEMENT, AIM AND METHODOLOGY OF THE STUDY

1.1 INTRODUCTION

The colonial legacy of Africa has been cited as a major cause for the continued underdevelopment and dependency of Africa on the Western world. It has caused many economic and developmental imbalances which continue to thwart development and progress. Africa is saddled with an economic system, administrative structure and physical layout almost wholly imported from Europe.

As Africa slowly emerged with self governed democratic countries it has struggled to reconcile the systems, processes and physical patterns with its new identity. Many countries have sought to impose an African imprint with varying degrees of success (Meredith,2006; Baker,2000; Ake,1991; Ake,1993).

In order to truly understand Africa, especially its settlements, planning and governance systems today, it is necessary to analyse the colonial past. Only through a thorough understanding of the settlement patterns, administrative structures and military impositions is it possible to understand the strengths and weaknesses of the system which has been inherited and which now needs to be adapted as an inclusive rather than exclusionary system. It is the contention of this study that it is possible to better understand Africa today by understanding the settlement, planning and governance of the past. The colonial era could also offer valuable lessons as it was an era of very rapid physical development, the approach adopted may well offer valuable insights given the need today for rapid service delivery.

The origins of planning in South Africa is a field of study which, to date has not been examined in great detail. Haswell (1980) and Cardy (1990) have analysed the impact of the Dutch and *Voortrekker* (Dutch migrants who left the Cape Colony and formed the Afrikaner

Nation) groups and have contrasted their settlement patterns with those of the British settlers. These were descriptive studies, which did not attempt to analyse the impact of these settlements on the present day. However, the British settlements have not been analysed in any great depth. There is a need to carry out scholarly study of the origins of planning in this country. Although there have been studies of the military influences on planning in Canada, Australia and the United States (Home,1997; Stelter,1983; Reps,1965; Hamnett and Freestone,1999; Hall, 2004) the South African context has not been addressed.

In this study the use of the term “South Africa” specifically refers to the geographic area of what is today the Republic of South Africa, obviously the time frame of this study predates the establishment of South Africa. In the early colonial period the land colonised was limited to the Cape Colony; the northern and western borders of which were vague and expanding. Subsequently farmers migrated into the interior and as the history of the area illustrates (see Section A Chapter Two) there was always a complex and unresolved tension between the former colonial settlers (the Dutch) and the British. The two geographic regions which were British colonies at the time were the Cape and Natal Colonies; however, at times it is important to speak of the whole geographic region of South Africa as forces within this area had a profound impact on the colonial history.

This study will show that British Imperial planning in South Africa in the early years was based primarily on militaristic and administrative control criteria. These criteria were manifest in the selection of sites and in the physical layout of colonial towns, only later after the discovery of gold and diamonds did the commercial interests take over. This is unique, as most British colonies were major suppliers of raw materials and markets for British manufactured goods from the early stages. South Africa by contrast hid its riches for many years and agriculture was not easy in the arid climate. Having no rivers which are navigable by ocean-going ships, the primary mode of transport in the era was also a major curb on opening up the interior (Lamar and Thompson, 1981). It was however, on the sea route to India and thus of strategic significance. Military influences therefore, predominated in South African settlements for many years. South Africa is also unique in that in spite of the *Mfecane* (the wars amongst the African tribes in Southern Africa – circa 1815-1840)

and the wars of conquest, indigenous Africans have always constituted the vast majority of the population of the entire region (Thompson, 2006). This is the greatest and most fundamental difference between the outcome of the conquest of the indigenous peoples in North America and South Africa. The Native Americans were reduced to a tiny proportion of the population of North America and were confined to scattered reservations forming a minute percentage of the land area. The African population had experienced havoc and losses, but survivors still occupied substantial parts of their ancestral land. Colonial control in South Africa was political and economic rather than outright conquest of land (Thompson, 2006:128). In many ways this is more akin to the colonisation of India, however unlike India there was no pre-existing urban tradition.

South Africa was also unique in that the British took over the territory from the Dutch East India Company (*Vereenigde Oost-Indische Compagnie* or VOC in Dutch) which managed the settlement at the Cape, but which had already to all intents and purposes lost control of its free settlers. Once the British sought to better control the frontier settlements most of the existing frontier farmers left to form two new independent settlements. In the concluding act of partition of Africa, Britain, at the height of its Imperial power, set out to take over the *Boer* (farmers of Dutch descent) Republics, the Transvaal and the Orange Free State, and incorporate them into the British Empire, assuming that a war of conquest would take at most a matter of months. It turned into a gruelling campaign lasting three years, requiring half a million Imperial troops to finish it, and left a legacy of bitterness and hatred among Afrikaners. Faced with guerrilla warfare for which they were unprepared, British military commanders resorted to scorched-earth tactics, destroying thousands of farmsteads, razing villages to the ground and slaughtering livestock on a massive scale, reducing the *Boers* to an impoverished people. Women and children were rounded up and put in concentration camps, where conditions were so appalling that some 26, 000 died from disease and malnutrition (Meredith, 2006:3). South Africa was the scene of not only colonial conquest of Europeans over local populations but also a conquest of a major colonial power over an independent European population left by the previous colonial power (Thompson, 2006; Meredith, 2006; Welsh, 2000).

Other colonies such as America were considered as “spaces of production” from the outset. South Africa became a colony because of its strategic situation on the sea route to India – colonial development has thus always been for strategic reasons and has always been influenced by the Indian trade route. No major study has attempted to address this or the impact these unique conditions had on colonial settlement patterns. This study seeks to analyse one aspect of this colonial history, namely the role which the British played in the spatial development of South Africa. This study acknowledges that South Africa today evolved as a collage of different people’s influences and attitudes. It does not claim that the British had any pre-eminent influence on the development of South Africa, it does however; acknowledge that they were key characters in the story of South Africa’s spatial development. No study to date has attempted to look at the role the British played in the spatial development of colonial South Africa and this topic will be the focus of this investigation.

The majority of the existing urban areas in South Africa began as colonial centres. Early colonial planning and site selection for the towns has thus, had a major impact on the present urban landscape. ***It is the contention of this thesis that British colonial planning relied primarily on military concepts and military personnel; the towns’ plans thus are reflections of the rationale underpinning British Imperialism. The developmental expertise of the British Army rested in the Royal Engineers and Surveyors. This study aims to investigate the impact the Royal Engineers had on the spatial development of South Africa. The study focuses both on the physical legacy as well as analysing the approach they adopted to spatial development, with a view to analysing the impacts this has had on South Africa and its future.*** The period of the study spans the time from the second British occupation of the Cape (1806) to the date of Union 1910, 104 years. The main case studies, however, occur in the Eastern Cape which allows for the restriction of the time period from 1806 until the acceptance of responsible government by the Cape Colony in 1872; in other words the period of true British imperial dominance. If one analyses the entire time frame during which the British were involved in one way or another in South Africa, it is not surprising that the study finds no absolute design standards nor standard dimensions for towns and streets. The study does however illustrate a definite pattern and trend. Given this finding

the study has been written as a broad and overarching synopsis of development trends rather than as a detailed and analytical study. Detail is focused on the Eastern Cape area as this is where the British Imperial development is most clearly seen. The study identifies clear patterns and rationales, approaches and trends but also finds neither absolute standard nor design.

This thesis seeks to illustrate the impact that the military engineers and surveyors had on colonial expansion and particularly urban form and spatial development, using the Eastern Cape as a case study. The military influence can be traced to physical, economic, social, professional and theoretical aspects. The study concentrates on the Royal Engineers and Surveyors, as they are the physical planning and implementation arm of the British military as well as the Colonial Office. It is the contention of this thesis that the military influence in the planning of colonies has had a fundamental and far-reaching impact on urban form. Town plans in many former British colonies show remarkable similarities. Similar patterns of development occur in different places at different times, but the obvious trend implies some standard conception of what towns ought to look like, as well as a common philosophy on which the settlements were based. The similarities, it is argued, stem from a uniform training of those who laid out the towns and a cross-fertilisation of ideas from one colony to another. There was a great deal of cross fertilisation of ideas from one colony to another due to the movement of colonial officials. A transitory civil service was facilitated in its mobility by the military basis and the notion of deployment of troops and assigning temporary postings (Home, 1997;Stelter, 1983;Wieler, 1987;Whitworth-Porter, 1889).

1.2 AIM OF THE STUDY

The aim of the study is to document and evaluate the impact the Royal Engineers and Surveyors had on the colonial spatial development of South Africa and to analyse any lasting impacts and lessons which can be learnt from past experience and the methodology used. The study looks both at the physical development of this era as well as trying to analyse the design/development philosophy and methodology. The study focuses mainly on the period of true British Imperial dominance (1806 until the acceptance of responsible government by the Cape Colony in 1872) although the broader colonial period

is discussed by way of trends analysis. The study seeks to analyse the developmental methodology used: that is 1) why did the spatial pattern develop? 2) who planned these areas and the infrastructure? 3) what was provided by the state and why? 4) how did they go about the development?

It is fascinating that even though colonial development is now generally seen in a very negative light most of the colonial towns and infrastructural developments not only endure, but have twice been successfully adapted to fundamentally different social groups – firstly for the use of the Afrikaner groups during the National Party rule and lately to multi-cultural and predominantly African groups under the democratic governance. The towns have not been abandoned and the infrastructure has been augmented and developed further. This tends to imply that certain basic necessities or elements of development transcend time and culture and that often a good product will transcend the process through which it was developed (even when the process like colonisation has so many negative elements). The best example of this would be Haussmann's redesign of Paris (1852-1870), at the time vast slum clearances occurred which displaced large portions of the most vulnerable sectors of society, yet today people marvel at the stunning cityscape and vistas. This study seeks to analyse the colonial development in order to distil the valuable elements from the negative connotation of colonialism generally. The colonial era succeeded in developing a vast network of infrastructure, towns, ports and primary industries; it is necessary to unpack this process in order to understand which elements are worth replicating and retaining and which elements fostered all the negative connotations of colonialism (of which there are undoubtedly many).

1.3 RESEARCH METHODOLOGY

In the social sciences the generally accepted approaches to research methodology are twofold: quantitative and qualitative. Qualitative research involves an in-depth understanding of human behaviour and the reasons that govern human behaviour. Unlike quantitative research, qualitative research relies on reasons behind various aspects of behaviour. Simply put, it investigates the **why** and **how** of decision making, as compared to **what**, **where**, and **when** of quantitative research. Hence, the need is for smaller, but

focused samples rather than large random samples. Qualitative research categorizes data into patterns as the primary basis for organising and reporting results. Unlike quantitative research, which relies exclusively on the analysis of numerical or quantifiable data, data for qualitative research comes in many media - including text, sound, still and moving images (Bernard, 2000;Mouton, 1986;Mouton, 2000;Mouton and Marais, 1988;Scheurich, 1997;Alvesson and Skoldberg,2000).

Qualitative research approaches began to gain recognition in the 1970s. The phrase 'qualitative research' was until then marginalised as a discipline of anthropology or sociology, and terms like ethnography, fieldwork, participant observation and Chicago school (sociology) were used instead. During the 1970s and 1980s qualitative research began to be used in other disciplines, and became a dominant - or at least significant - type of research. One way of differentiating Qualitative research from Quantitative research is that Qualitative research is largely exploratory, while Quantitative research hopes to be conclusive. However, it may be argued that each reflects a particular discourse; neither being definitively more conclusive or 'true' than each other. Quantitative data is measurable, while Qualitative data cannot be put into a context that can be graphed or displayed as a mathematical term.

When studying history a number of research methodologies can be utilised; of necessity, however, all historic research relies on secondary information and primary sources and is of an analytical and narrative nature; it is qualitative not quantitative. Obviously primary sources of information are the most sought after, but often the exact information which the researcher seeks is not available or needs to be deduced or inferred from other sources. Most sources of information are secondary, where the researcher relies on the research and writings of others. The primary concern is the slant or biases of both primary and secondary research. Historic perspective changes as do social norms and values and it is important to understand that primary sources are often written from a different social viewpoint to today's notions of good and bad. Very often secondary sources have definite opinions and perspectives which need to be understood as the work of the author and not necessarily history itself. Churchill stated it best when he said "History is written by the victors". Colonialism today is seen in very pejorative terms yet at the time that colonial

expansion occurred it was viewed very differently and so the values utilised by the researcher of history will colour the account. When analysing colonisation in Africa it is also important to note that the written history of the time was penned by the Europeans, very few documented accounts from an African viewpoint were written until the period prior to independence when a significant and highly educated African elite emerged; often from the European education system. Again Churchill expressed it best when he stated: “History will be kind to me for I intend to write it” and “Men occasionally stumble over the truth, but most of them pick themselves up and hurry off as if nothing ever happened.” (Sir Winston Churchill; *British politician (1874 – 1965) Book of Quotes*).

It is impossible to avoid value statements in historical research; in this study sources of information are highlighted and the opinions of the author will be noted as such to allow readers to distinguish historic record from interpretation and conclusions drawn from the research. Given the research topic and intention of this study the collection of primary data has been focused on the Royal Engineers and the settlements of the Eastern Cape; a great deal of secondary literature exists about colonisation and the general history of the era. This study seeks to make a specific contribution with respect to the settlement patterns of South Africa and the background of those who planned them and the research has thus deliberately been focused in this manner.

The research approach adopted is that of a Narrative analysis as described by Mouton, (2001:170) it attempts to reconstruct a chain of events and identify those events that caused or triggered other significant events; in this case the findings were that the colonial towns in South Africa during the British colonial period were laid out primarily by the military. This is significant as the military were trained in a scientific and empirical manner which impacted on the manner in which towns and settlements were formed.

This study is based on qualitative research, background analysis and case studies; it neither tries to be comprehensive nor to give quantifiable answers. It seeks to explain the settlement patterns of South Africa today fully acknowledging the limits of colonial history, which was almost exclusively written by the colonisers.

1.4 STRUCTURE OF THE STUDY

Section A is devoted to the historic background to colonisation and specifically the colonial settlement history of South Africa. The background history of South Africa aims to explain the development of South Africa to those not familiar with South African history and set the context of the study which follows. It is fully acknowledged that the development of South Africa is a collage of many cultures and influences, indeed the Dutch input was the focus of the author's Masters Degree (Cardy, 1990); this study however, focuses on one colonial group – the British. The study begins in-depth in Chapter Three with a detailed analysis of the Royal Engineers and their training as it is shown during the case studies (Section C) that the Royal Engineers played a significant role in the colonial development of the Eastern Cape. It is therefore necessary to begin by explaining who the Royal Engineers were and what training they received. Section B of the study looks at the various aspects of British colonial development, beginning with ports, mapping, surveying and land tenure and moving on to defence, town layout and various infrastructural developments such as railways, water and sanitation. Section C contains the case study focusing on the area of true British Imperial influence, the Eastern Cape. The study concludes, in Section D, with a theoretical / methodological evaluation of the work done by the Royal Engineers and an analysis of the impact the Royal Engineers and Surveyors had on the spatial development of South Africa, and highlights lessons which could be learnt from the past.

CHAPTER TWO

COLONISATION AND A SYNOPSIS OF SOUTH AFRICAN¹ COLONIAL HISTORY

2.1 IMPERIALISM

The definition of what constitutes an “empire” is open to debate. The Latin word *imperium*, from which the term “empire” derives, literally means “dominion” or “legitimate authority”. Twentieth century political science has tended to restrict the term to a very precise model in which one state colonises another for economic gain and political or cultural domination. (Farrington,2003:6) “Few questions have engaged as much reappraisal, reinterpretation and recasting as western imperialism in the late nineteenth century...a majority of countries represented in the United Nations blame imperialism for the poverty, illiteracy and the generally unsettled condition of the Third World.” (Davis and Huttenback, 1986:1).

All empires throughout history share a number of characteristics. There is necessarily a ruling figurehead who utilises a successful military arm to gain new territories and maintain existing ones. He (or occasionally she) fortifies key strategic ports and cities, exploits economic resources such as fertile land or mineral reserves, and keeps the population in line through either fear or propaganda or both. Laws – and sometimes religion – are then imposed on a range of different cultures across a large geographic area. Grand public building works and monuments record the ruler’s greatness. Wealth is pursued aggressively through any combination of diplomacy, cajolery, reward and threat (Farrington, 2003:6). Any work that claims to deal with the development of empires cannot help but be concerned with the motives for grasping and holding an empire; in the literature, indeed these motives are legion. There are geographical explanations for

¹ Please refer to the definition used in this study for “South Africa” on page 2

particular acts of conquest, although attempts to generalise from these experiences have not proved too enlightening. The turbulent frontier hypothesis is one example of such a geographical theory. It conjectures that if an area of order is surrounded by a zone of disorder, the government of the frontier must eventually, for its own protection, conquer the latter. Thus, empires tend to expand until they reach some natural barrier (oceans or mountains) or until they reach the borders of another stable power (Davis and Huttenback, 1986). This theory would apply to the South African context in that the rationale behind the British expansion into South Africa (prior to the discovery of diamonds and gold) was always in the name of stabilising the borders against the *Boers* and the black populations.

The dearth of truly political theories is in contrast with the abundance of conceptual frameworks. Much debate has centred on the concept of “Informal Empire” and the influence of free trade on the establishment of British hegemony in so many parts of the world (Gallagher and Robinson, 2008; Thompson, 1992; Naylor, 1989). Informal Empire implies that formal empire or the acquisition of territory was a last resort; that the British government much preferred to support British business in what were in essence client states. Another approach as argued by Joseph Schumpeter (1951) is that imperialism is a social atavism not prompted by economic reason or national interest, but purely by the “objectless disposition on the part of the state to unlimited forcible expansion”, a tendency encouraged, according to David Landes, by “...the disparity of force between Europe and the rest of the world... that created the opportunity and possibility of domination.” (Davis and Huttenback, 1986:4). Similarly, but at the other end of the sociological scale, humanitarianism rather than atavistic behaviour has been advanced as an explanation of imperial adventures. In West Africa as well as South Africa it is argued, the British anti-slavery movement virtually forced the government to acquire unwanted territory in order to protect the native population (Drescher, 1977; Midgley, 1998; Hyam, 1993; Coleman, 2005). Other theories rest on individual or social psychology for their inspiration. Examples abound; and among these, those that assume irrationality was the driving force behind the advance of empire must be given place. How else, it can be argued, can we explain the strange triumphs of mindless ambition and the insane desire to “paint the map red” or whatever other colour represented national ego? In the age of slow communications the man on the spot could influence events according to his own designs, unrestrained by the

wishes of the home government; and empire thus might be considered the result of a series of idiosyncratic decisions. Cecil Rhodes in South Africa, Frederick Lugard in East Africa and Charles Napier in India are all examples of this phenomenon; and the British government was allegedly presented in each case with territory it would much rather have done without. One cannot leave this argument without mentioning the best example of this case, Charles “Chinese” Gordon, who stubbornly disobeyed orders and thereby brought about not only his own death but the massacre of the entire garrison of Khartoum. This so aroused the passions of the British populace that the government was forced to acquire the province; the conquest of which it had tried studiously to avoid (Davis and Huttenback, 1986:4). But irrationality is always hard to stomach as historical explanation. It is possible that in the case of British imperial expansion it involved all of the above theories, Britain started colonial expansion almost due to a competition with other European powers, then moved into commercial trade with little government control, government control came later more to defend the British economy than for any other reason. These factors all happened to various degrees in different locations at various times with a liberal sprinkling of mavericks thrown in for good measure.

Modern colonisation has been categorised by the work of Bergeson and Schoenberg (1980) and Taylor (1985) as falling into two long waves of colonial expansion and contraction. The first wave of colonisation was from 1500 to 1800; the second, from 1800 to 1925, these time frames related to long wave cycles of expansion and decline in the world economy. In modern history, there have been twelve formal imperial states, only five of which have been major colonizers: Spain, Portugal, and the Netherlands (principally between 1500 and 1750); and France and Great Britain, from 1600 to 1925 (King, 1990a:3). The first phase (especially 1600 to 1750) also includes the first “minor” colonizing states of the Baltic: Denmark, Sweden and Brandenburg/Prussia.

In the second wave of colonial expansion from 1800, were Belgium, Germany, Italy, Japan and the USA. There were also the colonial activities of Russia, which took Ussuri from China in 1860, and Austria-Hungary, which took Bosnia-Herzegovina from the Ottoman Empire in 1878 (King, 1990a).

Table 1, below lists the fifteen regions of colonisation together with the period of colonisation (divided into 50 year bands). It clearly indicates that the colonisation of Africa started as coastal enclaves, primarily geared for the exportation of slaves, and that interior development occurred in a latter period. This study focuses primarily on the expansion into the interior, which is the latter period of colonisation or formal colonisation.

Table 1: Establishment of Colonies by time period

<i>Table 1.1 Establishment of colonies: arenas of first competitive era</i>	
1. Iberian America	1500 ¹ -1800*
2. Greater Caribbean	1500-1880**/1925
3. Northern America	1600-1800/1850
4. African ports	1500-1850
5. Indian ports	1500-1800
6. East Indies	1500-1925
<i>Source:</i> Taylor, 1985: 82-4.	
<i>Note:</i> *Intervals indicated cover creation of colony, reorganisation of territory and, in certain cases, transfer of sovereignty.	
**Period of main colonial activity.	
<i>Table 1.2 Establishment of colonies: arenas of second competitive era</i>	
7. Indian Ocean islands	1600-1900
8. Australasia	1750-1925
9. Interior India	1750-1925
10. Indo-China	1850-1900
11. Interior Africa	1825-1925
12. Mediterranean	1500-1925
13. Pacific Ocean Islands	1750-1925
14. Chinese ports	1500-1925
15. Arabia	1800-1925
<i>Source:</i> Taylor, 1985: 82-4.	

Taylor (1985) also provides a brief overview of the economies of formal imperialism, illustrated by two classic cases, the Caribbean, and Africa, and the manner in which they were incorporated into the economies of the core.

The Caribbean zone from northeast Brazil to southeast North America was converted into “plantation America”, largely to produce tobacco and sugar for the new “tastes” of consumers in the core region (colonising state). By 1700, labour-intensive production was met by African slaves with the sugar plantations becoming, according to some interpretations, ‘the precursors of the organization that was to become the factory system in the industrial revolution in the core’ (King, 1990a).

In Africa, coastal stations were first established for exporting slaves. Drawing particularly on the work of Wallerstein, Taylor (1985) shows that in the final quarter of the nineteenth century, with the colonisation of the entire continent, Africa became incorporated into the world-economy as a new periphery, with its space economy divided into three zones: the first, producing for the world market, with each European colony having its own administration and infrastructure to channel commodities into the world market; the second, a zone of production for the local market where peasant farmers produced for labour working in the first zone; the third, a large zone of subsistence agriculture, integrated into the world-economy through its export of labour to the first zone.

King (1990a), Taylor (1985) and Christopher (1988) all demonstrate a theoretically well-established, symbiotic and interdependent relationship of the first international division of labour, with peripheral colonies producing primary products and raw materials for the industries of the core and receiving manufactured goods in return. The shift to urban industrial capitalism at the core is part of the same process as the shift to agricultural and mining capitalism in the periphery. As Christopher (1988) indicates, from 1875 the Empire was becoming increasingly important to Britain, so that by 1931 two-thirds of exports, by value, went to British possessions or dominions overseas and something of the order of half the imports came from there.

The factory system that centralized production in Britain depended for many of its basic raw materials (cotton, wool, rubber, tin and other materials) on supplies from its colonies. The main economic function of the colonies was the production of mineral and agricultural raw materials, hence, the focus was rural, the manifestations of colonialism were however

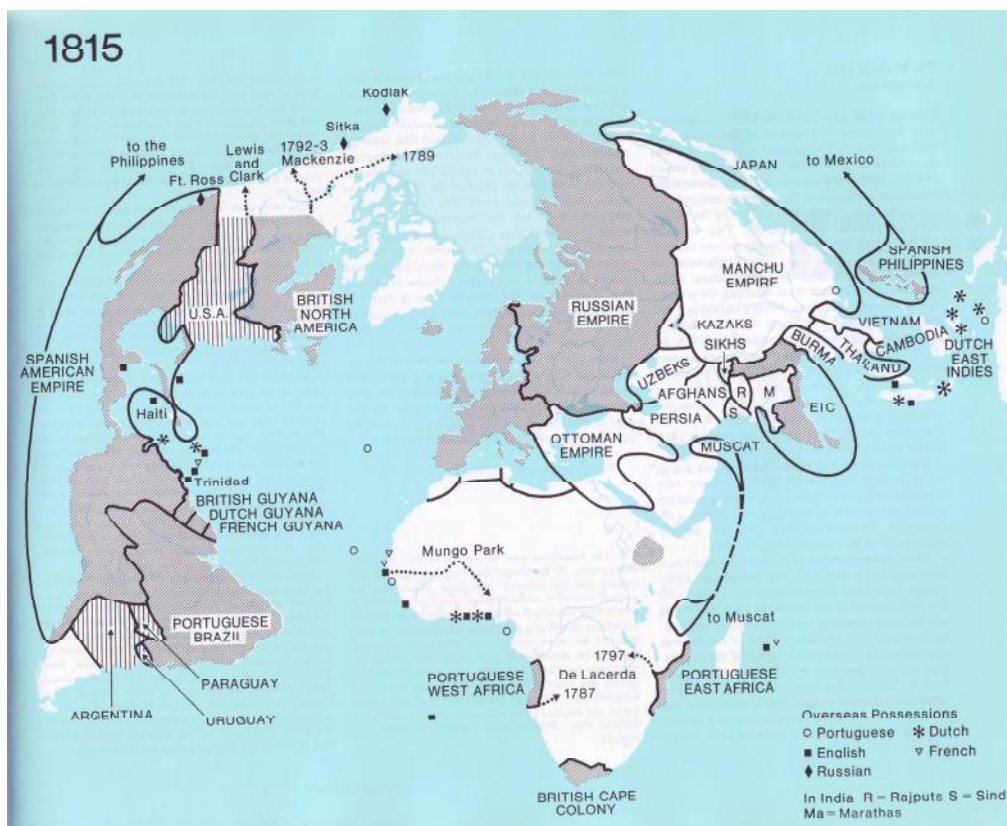
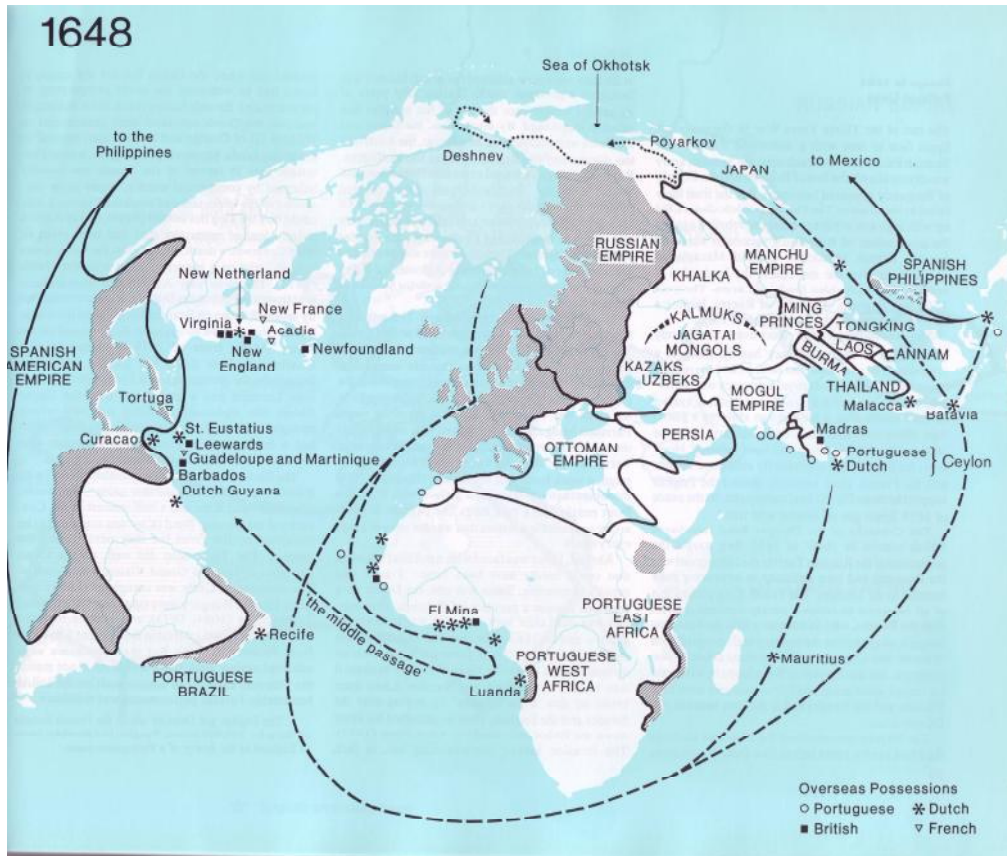


Figure 2: Colonial Expansion in the 1600 and 1800's (source: McEvedy, 1972:49,83)

urban. The political, administrative and economic role of colonial towns and cities was to function as centres of control and surplus extraction: subsequently, in their increasingly significant role as markets, they became centres for consumption and ‘theatres of accumulation’ (Armstrong and Mc Gee, 1985).

Stelter (1983:170) and others argue that colonial expansion follows the “dependency theory” (Baran,1968; Bratton, 1982; Smith, 1979; Chase-Dunn, 1975; Chilcote, 1974). A central point of this theory is that an imperial power literally develops “underdevelopment” in its colonies by using its political and economic power to prevent the emergence of modern forms of government or enterprises inimical to its own interests. Advanced technology and organisation are applied to those aspects of development most desirable to imperial interests. The benefits of this arrangement go both to the advanced society and to a small client class within the colony. Direct political control becomes less necessary after the client class is firmly established, for their decisions are made in the context of their dependence. King (1990a) argues that peripheral colonies and metropolitan cores are essentially integrated and interdependent. They form part of a single division of labour of the capitalist world economy. Colonial urban development cannot be understood separately from developments in the metropole but also similarly, urbanism and urbanisation in the metropole cannot be understood separately from developments in the colonial periphery – they are parts of the same process. The metropole is dependant on the colonies for raw materials (cotton, wool, rubber, metals and minerals) and food (wheat, rice, sugar and tea). Likewise the colonies depend largely on British capital, shipping, insurance, managerial expertise as well as cultural products in their broadest sense: education, science, language, religion and also architecture, town planning and urban design.

Towns and cities are thus, a direct element of colonial control; they are the vanguards of imperial expansion. Most of the settlements were “planted” in the sense that they were planned at the outset as substantial settlements; no one seems to have consciously planned anything as small and limited as towns or villages. In early Canada colonial officials felt always that they were founding cities, and named them as such, even when the town literally had no population (Stelter, 1983). This was also the case in South Africa

where most British towns were planned as complete towns, at least on paper, at the outset. Towns of Dutch descent in South Africa by contrast grew more organically (Haswell, 1984; Cardy, 1990). The Dutch settlements tended to start as central meeting places for '*nagmaal*' (quarterly communion) and over time a school would be built and a permanent church; older residents would also leave the farms to their sons and live on town plots near the church, thus a town would emerge. They all started as a '*rydorp*' (a single street lined with houses) and once the street started to get too long a second one would emerge parallel to the first. The British by contrast pre-planned the need for a town and designed and sited it prior to occupation (Haswell, 1984; Cardy, 1990; Lamar and Thompson, 1981). There are however, exceptions where settlement occurred prior to planning – the diamond rush at Kimberley and the gold rush at Johannesburg being two good examples.

Like colonial towns of earlier eras, notably those of Rome and the medieval bastides, early British colonial towns were fairly regular in form, in sharp contrast to the relatively spontaneous and unplanned form of London. While current European planning ideas were exported to some extent in laying out these colonial towns, this regularity represented the purely functional motives of central control (Haswell, 1984). This observation forms the starting point of this study; why when settlements are mostly organic in England are British colonial settlements so uniform, geometric and spacious? This is unpacked during the course of this thesis – a major reason, it is argued, is because the towns were planned by the military engineers to be practical and functional, the towns were a response to the problems of the British organic settlements not a replication of familiar environments. British towns were also much older and predated this interest in planned settlements. Kimberley however, which developed spontaneously, was organic and very similar to British settlements.

2.2 THE 'GRAND MODELL'

In his book Of Planting and Planning: the making of British Colonial Cities, Robert Home (Home, 1992:8-29) explains the evolution of a British colonial spatial development strategy. The strategy evolved over a period of two centuries, ending in the 1840's. During the period of evolution England planted new settler colonies in Ireland, the New World and

the Antipodes in accordance with a centrally devised scheme. In the 1670's Lord Shaftesbury formulated (or at least refined) a scheme he called the 'Grand Modell'. Its aims included commercial gain, strategic manoeuvring in the game of international geopolitics, and later, the removal of unwanted social groups (political or religious dissenters, debtors, and the unemployed). In the nineteenth century emigration was also a means of reducing population pressure at home (Home,1992:8).

The main components of the model can be summarised as:

2.2.1 POLICY OF DELIBERATE URBANISATION

Towns were seen as the centres of trade and defence and a civilising influence. The unsatisfactory alternative to such a policy, as perceived by Shaftesbury, was that settlers 'will expose themselves to the inconvenience and barbarism' of 'straggling and distant habitations' in the countryside (Brown in Home, 1992:9). The policy was intended to advert the danger of a rejection of central authority, as occurred in Bacon's rebellion in Virginia in 1676. The policy is best summed up by a quote from the Board of Plantations, predecessor of the Colonial Office:

"...it has been found by long experience that the settling (of) planters in townships hath rebounded very much to their advantage, not only with respect to the assistance they have been able to afford each other in their civil concerns, but likewise with regard to the security they have thereby acquired against the insults and incursions of neighbouring Indians or other enemies" (Labaree in Home, 1992:10).

Although it has been argued that Colonial development was primarily interested in primary resources such as minerals and agriculture which are rural, the method of colonisation was unmistakably urban.

2.2.2 ALLOCATION OF TOWN AND COUNTRY LAND RIGHTS

The policy of deliberate urbanisation was to be secured through land settlement , by structuring a symbiotic relationship between town and country. Under the Shaftesbury 'Grand Modell' land was allocated to the settlers in both town and country lots (and

sometimes suburban or garden plots as well). Thus a land owner would have both types of property to occupy him. Home (1992:10) interprets this as the royal authority after the restoration attempting to reassert authority after the civil war. In the commonwealth they attempted to replicate the power relationships of town and country – royal authority over the aristocracy was partly maintained by a seasonal pattern of attendance at court and London residence, alternating with periods living on landed estates (Home, 1992:10).

2.2.3 TOWN PLANNING IN ADVANCE OF SETTLEMENT

The town site was laid out in advance of occupation, according to a prepared plan. This assumed that a sufficient number of colonists to begin a settlement, a figure which was set at forty families in Ulster and fifty in New Hampshire. Such advanced planning was intended, in the words of an observer of the Carolina Colony in 1680, to avoid the *'undecent and incommodious irregularities which other English Colonies are fallen unto for want of an early care in laying out the townes'* (reps in Home, 1992:11).

2.2.4 WIDE STREETS IN GEOMETRIC FORM

The physical form of the colonial planned town was a rectilinear or grid-iron layout of wide streets, embodying classical ideals of symmetry, order and proportion. 'The ultimate symbol of the imposition of human order on the wilderness' (Home, 1992:11).

2.2.5 PUBLIC SQUARES

The centrepiece of this regular grid of wide, straight streets was the square reserved for public use, often framed by four or more satellite squares.

2.2.6 STANDARD SIZED, RECTANGULAR PLOTS

The street blocks of the colonial grid were subdivided into large, rectangular town plots. Plot dimensions varied. Plot frontages of fifty feet wide or more – two or three times those found in British towns of the period. The colonial plan actively discouraged continuous built-up frontages, partly reflecting the ready supply of land, but more as a response to the two great dangers of urban life at the time – fire and disease. Thus did London's Great Plague of 1665 and Great Fire of 1666 (which both Shaftesbury and Penn lived through) leave their mark on colonial planning (Home, 1992:13). In Philadelphia, according to Penn,

‘...every house be placed, if the person pleases, in the middle of its plot, as to the breadth way of it, so that there may be ground on each side for gardens, or orchards, or fields, that it may be a green country town, which will never be burnt and always be wholesome’ (Morris in Home, 1992:13).

2.2.7 PUBLIC LAND RESERVATIONS

Land was to be reserved for public purposes or as a source of public revenue, for example houses for public affairs, a meeting house, assembly or state house, market house, school house, etc (Home, 1992:14).

2.2.8 GREEN BELTS

A green belt, or physical separation of town and country first appears in colonial towns and was later adopted in England. These areas were town lands for common sheep pasturing (Home, 1992:14).

The model settlement presented above emerged early on in Britain’s overseas expansion, this study will seek to analyse whether it is evident in British colonial settlements in the Eastern Cape of South Africa.

Despite their divergent national origins, the various groups involved in the colonisation process each acted with some degree of international cohesion. The politicians, most of whom never visited the colonies, drew the boundaries. The soldiers carried out the conquests and frequently chose the ports from which to control the population. The military often formed the first colonial governments and coercion was an essential part of the maintenance of colonial administration (Christopher, 1977). “Indeed the demarcation between soldier and administrator in the colonies was rarely defined. The administrators determined the pattern of urban settlement by selecting the administrative posts and deciding upon the nature of the administrative regime” (Christopher, 1977:3), this bias towards functional administration and the use of military personnel to implement it had a profound impact on the spatial development of South Africa; it was ordered, spacious, functional and logical (from a colonial point of view).

2.3 THE SCRAMBLE FOR AFRICA

The term Scramble for Africa was apparently coined in 1884 and although the exact dates are disputed the final hectic phase of dividing up the continent occurred between 1876 and 1912. As Pakenham (1991) so accurately states “the Scramble for Africa bewildered everyone, from the humblest African peasant to the master statesmen of the age, Lord Salisbury and Prince Bismarck” (Pakenham,1991:xv).

Why this undignified rush? Many theories have been put forward over the years from the Surplus Capital in Europe approach (Hobson, 1965; Lenin,1999), through the Afro-centric idea of sub-imperialism to the work of Robinson and Gallagher (1981); but from a British point of view the strongest argument was public opinion. In May 1873 David Livingstone, the celebrated missionary-explorer, died at Ilala, in the unknown heart of the continent, and his sun-dried body was brought home and buried in Westminster Abby. The funeral raised public awareness of the Arab and Swahili slave trade in East Africa and it was in Protestant Britain, where God and mammon² seemed made for each other, that Livingstone’s words struck the deepest cords. The three “C’s” would redeem Africa: Commerce, Christianity and Civilization. That was not the way Africa perceived the scramble. There was a fourth “C” -conquest – and it gradually predominated (Pakenham,1991).

Little was known of the African continent, prior to 1876, other than the trading posts on the coastal fringe. Africa had proved an unhealthy climate for Europeans. Acemoglu, Johnson and Robinson (2000) point out that, European colonialists adopted very different colonisation policies in different colonies, and adopted different associated institutions. The choice of colonisation strategy was, at least in part, determined by whether Europeans could settle in the colony. In places where Europeans faced high mortality rates, they could not settle and they were more likely to adopt extractive institutions, with the intention of transferring resources rapidly to the metropole; the most extreme case being the slave

² Mammon: *New Testament*. riches or material wealth. Matt. 6:24; Luke 16:9,11,13. (Oxford English Dictionary)

trade from equatorial Africa. Europeans adopted very different colonisation strategies, with different associated institutions in areas where they could settle, such as the United States, Australia and New Zealand. In these cases they set up colonies with institutions that enforced the rule of law and encouraged investment, primarily via recognising property rights. The authors point out that those colonies which were intended for European settlement did better after independence than colonies set up for extraction as the institutions were better suited to economic development (Acemoglu, Johnson and Robinson, 2000). If mortality rates per 1 000 are compared based on information in Curtin (1989) which covers the pre-1870 period, South Africa was 15.5 whereas New Zealand was 8.5. There is little doubt that mortality rates were a key determinant of European settlements. Curtin (1964 and 1998) documents how both the British and French press informed the public of the mortality rates in the colonies. For example, early European attempts to settle in West Africa foundered due to high mortality from disease. In the “Province of Freedom” European mortality in the first year was 46%, in Bulama (April 1792 – April 1793) there was 61% mortality among Europeans, and in the first year of the Sierra Leone Company (1792 -1793) 72% of the European settlers died. On Mungo Park’s second expedition (May – November 1805), 87% of the Europeans died during the overland trip from Gambia to Niger, and all the Europeans died before completing the expedition. Such rates of mortality were shockingly high for Europeans at the time (Curtin: 1964 & 1998). Africa had thus, been left largely alone during the first phase of colonisation. It had remained a supplier of the slave trade with coastal trading posts. The slave trade transformed the history of the Americas, Africa and of Europe itself. Africa provided the labour so eagerly sought by Europeans on the African coast over a period of centuries, the labour built America where, until the mass exodus of Europe due to the Great Depression in 1820, when Europeans began to flee poverty in large numbers, Africans far outnumbered European settlers.

European encroachment into Africa in the fifteenth and sixteenth century was physically limited; they tapped into and obviously promoted through increased demand existing African and Arab slave trades. It developed into an enormously complex trading system that reached deep into Africa and which ensured that millions of Africans were passed



Figure 3: Colonial Settlement of Africa c 1870 (pre “Scramble for Africa”) (Dalziel,2006:72)

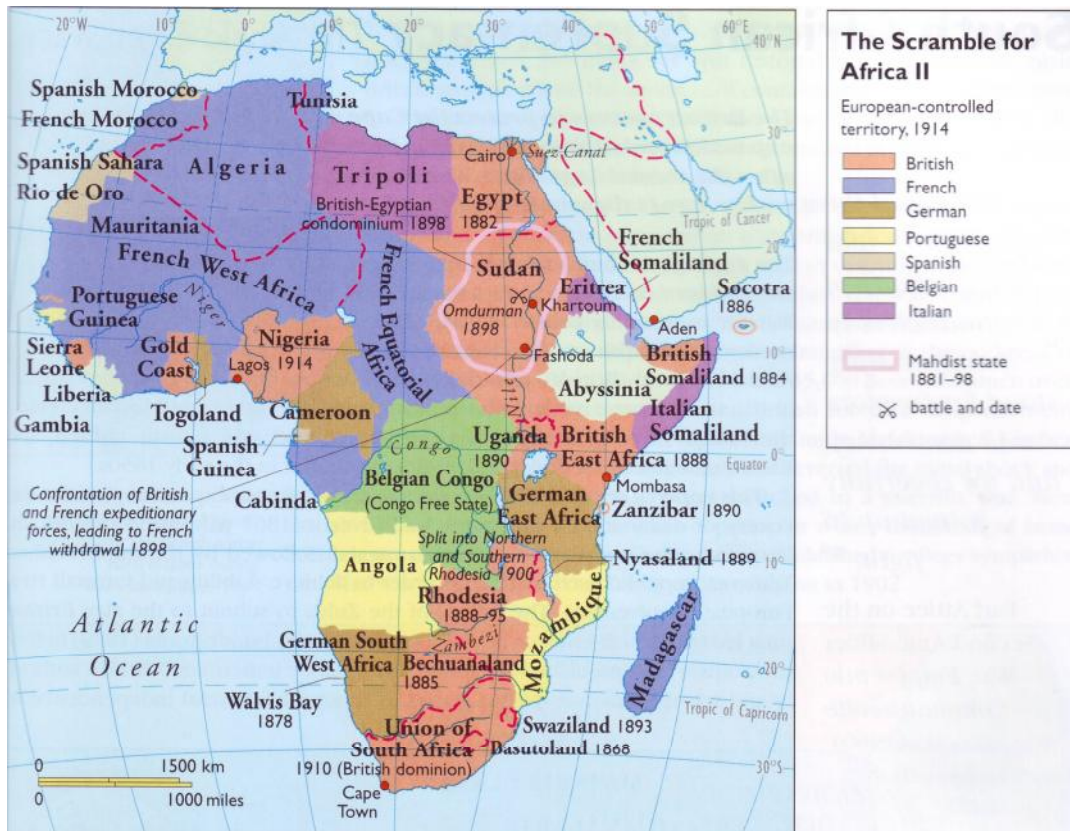


Figure 4: Colonial Partition of Africa as at 1914 (Dalziel,2006:73)

from hand to hand, from one internal African trading system to another, until finally the victims were delivered to the Europeans or their representatives on the coast. This system reached its height in the 1790's. All the major European powers became embroiled with slavery to varying degrees. Yet in a political and economic *Volte-face* of staggering dimensions they all turned against slavery. Europeans, who had all been deeply involved in slavery from the fifteenth century, transformed themselves into fierce abolitionists in the nineteenth. Lead primarily by British public opinion, Europeans turned their view of slavery on its head and by the nineteenth century viewed slavery as immoral and uneconomic (Walvin,2006:1-4). It is not surprising that the period of the Scramble for Africa (1876-1912), abolition of slavery (19th century) and the Great Depression (1820) coincide. They are all merely part of the same change in world economic forces. The need for new markets for the massive stocks piling up in the Manchester warehouses, the vast number of unskilled, unemployed people in Europe, the desire to exploit the riches of Africa and the need to decant the surplus population from Europe to the colonies were all related.

Suddenly in half a generation the scramble gave Europe virtually the whole continent: including thirty new colonies and protectorates, 10 million square miles of new territory and 110 million dazed new subjects, acquired by one method or another.

2.4 COLONISATION OF SOUTH AFRICA

South African colonisation was unique primarily for geographic reasons. For thousands of miles along the western and eastern coasts of Africa there are few practicable harbours except for those around the Cape of Good Hope. Once having left São Paulo de Luanda in Angola, ships had no other refuge until they reached India or Mozambique; and since dangerous currents swept the coast the whole region was to be avoided. For an even greater distance, from the mouth of the Congo to the Zambezi, no river was navigable for more than a few miles, a grave disincentive to exploration at a time when water transport was often the only method of penetrating the interior. Access by land was rendered difficult by the coastal mountain ranges, the great swathe of desert that stretched from the Atlantic

to the Vaal River, and by the unhealthy swamps of Mozambique (Lamar and Thompson, 1981; Welsh, 2000; Caffrey, 1973).

As a result of this geographical isolation, while other regions of Africa were, for better or worse, part of the world economy, trading with Europe and Asia, Southern Africa was left to develop at its own pace (Welsh, 2000).

“‘This Cape’, declared Sir Francis Drake in 1580, ‘is a most stately thing and the fairest Cape we saw in the whole circumference of the Earth’” (Caffrey, 1973:1). But he was not the first European navigator to pass that way, the Portuguese got there first – Bartholomew Diaz with two caravels at Mossel Bay in February 1488; Vasco da Gama, naming Natal on Christmas Day, en route to India in 1497, followed by Antonio da Saldanha who discovered Table Bay and climbed Table Mountain; and Francisco d’Almeida who was killed in a scuffle with local people at Table Bay on his way home as retiring Viceroy of India in 1510. But the Portuguese preferred to use St Helena as a refreshment station partly due to the friction with the local population and partly because of the dangerous tides, so they left the Cape alone. The next visitors were the Dutch, who in 1602 formed the United Chartered East India Company (*Vereenigde Oost-Indische Compagnie* or VOC in Dutch, referred to in the South African context as the Dutch East India Company). From then on both Dutch and English ships began to make landfall at Table Bay out and back on the six-month-long voyages between Europe and the Indies; leaving letters under stones for the next crew to find. In 1647 the Haarlem, an East Indiaman, was wrecked in Table Bay without loss of life. The crew did a ‘Robinson Crusoe’, camping at Green Point with their salvaged cargo that obligingly included vegetable seeds and garden tools. They planted the seeds and bartered with the local inhabitants for cattle and sheep. News of this colony carried back to Holland on subsequent ships and caused the Dutch East India Company to send out an expedition in 1652 headed by a ships surgeon named Jan van Riebeeck (Caffrey, 1973:1-3).

2.4.1 DUTCH SETTLEMENT AT THE CAPE

The first European settlement of what is today South Africa, began in 1652 when the Dutch East India Company established a market garden at the foot of Table Mountain. At

the time the area was sparsely inhabited by a transitory group of cattle herders – the *Khoikhoi*³. The station under the leadership of Jan van Riebeeck, and manned by approximately a hundred men, aimed purely at providing fresh produce to the VOC fleets en route to India to prevent the crews from contracting scurvy. Van Riebeeck was given the title of ‘Commander’, not ‘Governor’ underlining that there was no intention in the VOC directors’ minds of founding a formal settlement colony (Welsh, 2000; Nixon, 1972).

All the directors required van Riebeeck to do was to build a primate fort, an earth work on which cannon salvaged from the *Haarlem* could be mounted to cover the watering place. Vegetables and fruit enough to provision visiting company ships were to be grown, while for meat the Commander was to trade with the *Khoikhoi*. However, the station proved to be extremely expensive. In an attempt to boost production and cut costs van Riebeeck allowed private farming and so began the colonisation of South Africa (Cardy, 1990; Welsh, 2000; Nixon, 1972). Farmers were given thirteen and a half acres of land apiece, tax free, on which they promised to live for twenty years, but they were not free to trade, nor to grow tobacco, both Company monopolies. Eventually they imported slaves from the Guinea coast and from Malaya. In 1662 when van Riebeeck relinquished his command the Colony’s population was 1394, of whom thirty-six were *free burghers* (free citizens) who had come with their families (Christopher, 1976). In 1688 two hundred French Huguenots arrived, with names like de Villiers, Marais, de la Rey, Joubert, Malan, and brought the grape to the Cape. They settled mainly in the Drakenstein Valley, centred on the area of Paarl (Caffrey, 1973).

The early farmers soon learnt that the intensive Dutch farming practices were inappropriate in South Africa outside the fertile valleys in the Cape; instead they turned to extensive stock farming, which was often of a transitory nature. With extensive farming

³ Khoikhoi – the name they used for themselves meaning ‘men of men’ in the sense of men *par excellence*, or people of pure race. They were renamed by the original Dutch settlers as Huttentut (stammer or stutter) because of the peculiar clicks which gave their speech its distinctive character (MacLennan, 1986:25). The name was later anglicised to Hottentots. Another group of people at the Cape when the Dutch settled were the San, nomadic groups of hunter gatherers who lived primarily in the more arid northern Cape area, they were also often referred to as Bushmen, by the colonialists. Often mixed groups are referred to as the Khoisan in historic texts.

techniques, white settlement gradually extended. The Company lost control over the distant frontiers, which spread to the Eastern Cape (Cardy, 1990).

The frontier population was isolated and independent; they did not care much for the Company and its laws. "...the outlying *Boers* (farmers), under the nominal dominion of the East India Company, had been intolerant of the stern and partial rule of their masters. They fled into the wilderness in the first instance to escape the domination of the company and naturally they did not give much heed to its orders" (Nixon, 1972:14). In 1806 the census indicated that the colony covered approximately 150 000 square miles – a density of one person per 20 square miles. Equally livestock densities were low. The number of sheep in the colony rose from approximately 75 000 in 1721 to 203 000 in 1760 and to 1.2 million by 1806; cattle numbers in the same years were 18 000, 34 000 and 208 000 (Christopher, 1976; Cardy,1990).

When population densities were so low, village settlement was not spontaneous. The concern about the isolation of the stock farmers prompted the establishment of magisterial seats at Swellendam on the southern coastal plain (1743) and Graaff-Reinet on the eastern frontier (1786).

Ten years after the establishment of Graaff-Reinet, Barrow described the town as: "...an assemblage of mud huts placed at some distance from each other, in two lines, forming a kind of street. At the upper end stands the house of the *landdrost* (magistrate), built also of mud, and a few miserable hovels, that were intended as offices for the transaction of public business; most of these in so ruinous a condition as not to be habitable..."(Christopher, 1976:51).

In 1804 Uitenhage was founded, which was the last village prior to British occupation two years later. All the villages in the grazing districts remained small, provided few services, and through lack of trade they were unable to attract potential artisans.

Cape Town, however, remained as cosmopolitan as anywhere, but in the end it was the *trek boer* (migrant/transitory farmer), who opened up the country. In the apparently endless

silent land, isolated from the world, hard, brave, stubborn and tenacious men moved inland, for ever moving out of sight of their neighbour's smoke and the law, clinging to the Old Testament and the rifle (deKlerk,1975; Caffrey, 1973; Cardy,1990). They were self enclosed, self-reliant and they simplified everything down to its basics including their language, so high Dutch gave way to Afrikaans (Caffery:1973).

2.4.2 BRITISH OCCUPATION OF THE CAPE

England became concerned that the Cape, and hence the sea route to India, would fall to the French due to the shift in power in Europe brought about by the French Revolution. The French and the English raced for the Cape in 1780, two rival squadrons speeding south through the Atlantic and clashing briefly at Porto Praya in the Cape Verde Islands from which the French Admiral Suffren got away some hours ahead and landed in Simon's Bay. For three years the French made Cape Town a little Paris, constructing elegant buildings that have left a flavour to this day, and spending freely, which gave Cape Town a short period of light-hearted prosperity. They left the Cape to the Dutch in 1784, but on the French invasion of Holland after the French Revolution the Prince of Orange fled to England and authorized a British force to go to Simon's Bay and hold the Cape until he returned to power. In 1795 the Cape was annexed by England, but reverted to Dutch rule between 1802 and 1806. In 1806 it was retaken by England in the dramatic battle of Blaauwberg (Couzens, 2004).

Figure 5: The First Annexation: hoisting the British Flag at Cape Colony, 1795 (from a painting by Caton Woodville) (Caffrey:1973:7)



The British Governor, Sir George Yonge, made a telling remark in 1800: “I know very well this has been presented to us as a useless Colony, and even a heavy burden, and a place not worth retaining. The assertion is false and I assert that whoever has the Cape is master of the commerce of India.” (Caffrey,1973:6).

Cape Town during this time was described by a Mr Tuckey as one of the handsomest colonial towns in the world. “The streets, which are wide and perfectly straight, are kept in the highest order, and planted with rows of oaks and firs. The houses are built in a style of very superior elegance, and inside are in the cleanest and most regular order...” (Caffrey,1973:8).

The British concern to protect the Cape was frustrated by *Boer* expansion and African opposition to European encroachment. The Cape government struggled to achieve stability on the frontier, and so opened an era of reluctant British colonial expansion. Only after the second Anglo-Boer War did British power finally become a reality across the whole of South Africa.

The British expansion of the Cape into what is today South Africa can be broken down into five broad geographic/temporal categories, although nothing about South African Colonisation fits neatly into clear logical patterns. Firstly the Colony consisted of the Cape peninsula and its’ hinterland, the second distinct colonial trend was the expansion into the Eastern Cape, the third zone of expansion was Natal (simultaneous with the resolution of the conflict zone around the district of Queen Adelaide), the fourth phase defined the northern limits of present day South Africa by the establishment of the British colonies of Bechuanaland (Botswana) and Rhodesia (Zimbabwe), the final settlement zone was expansion into the interior and the annexation of the Orange River Colony and the *Zuid Afrikaanse Republiek* (ZAR) (Orange Free State and Transvaal respectively).

2.4.2.1 The Western Cape

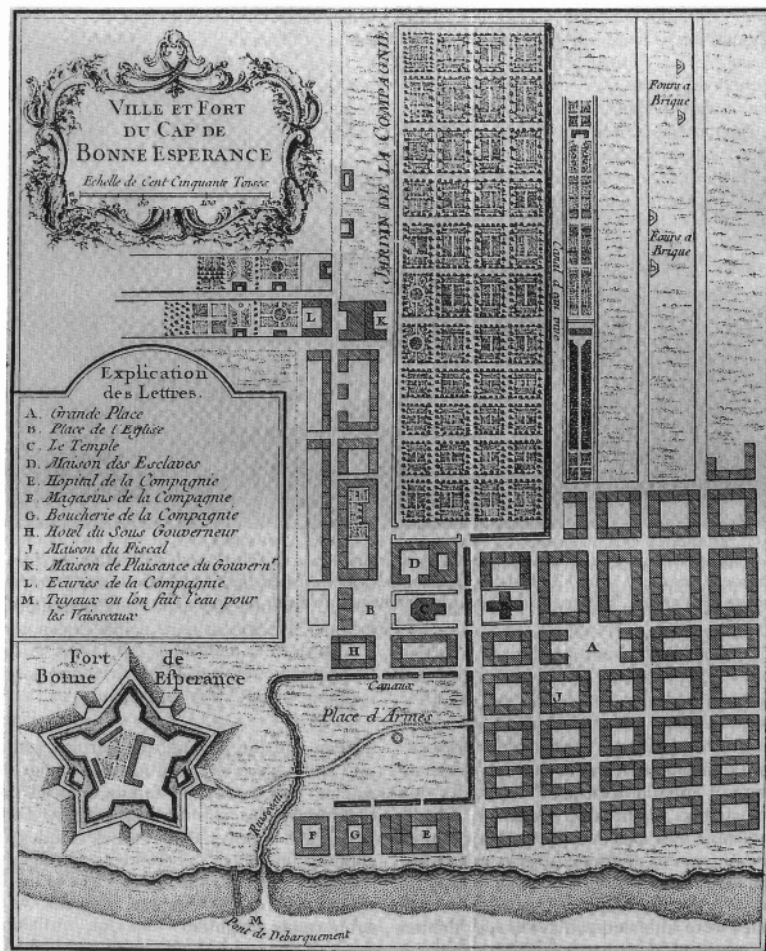
As previously stated the original Dutch East India Company (VOC) had no intention of forming a colony and thus, never intended to establish a town, however, when Company

servants were released from their contracts some chose to remain at the Cape. They were allowed to remain on agricultural plots and to build houses near the fort for protection (Christopher,1976; Haswell,1984). At this stage Cape Town consisted of a fort (in which all the Company servants lived), two inns, a hospital, store, cow and sheep sheds, bakery and mill; beyond which were thirty-five acres of gardens.

Van Riebeeck wrote to the VOC in reply to their criticisms about the free settlers: “our idea of laying out a town here had always been very little. We can very well feel the burden of freemen exclusive of agriculturalists and therefore, will allow no more than there are already, for which, should they build any houses here, we have in proper order, as an incipient town, marked off fifty roods outside the fort’s walls, so that it has a present more the name than the reality” (Christopher,1976:31).

“By 1660 the settlement along the shores of Table Bay began to take on the appearance of a typical Dutch canal-town. Dwellings were not to be built within fifty Rhineland Roods (188.35 meters) of the fort, and methodically the Dutch *freebughers* (free citizens) built along this line which produced the first street. A stream which flowed down the slope of the mountain was canalized, diverted down this street and named after its Amsterdam counterpart, the *Heerengracht*. When oaks were planted and bridges gave access to the cottages and their irrigated gardens, the atmosphere was unmistakably Dutch” (Haswell,1984:14).

Cape Town grew by the addition of streets parallel to the Heerengracht. “By 1693 additional streets ...had been formed, with *erwe* (erven/plots) now extending from street to street, and by 1751 Cape Town consisted of more than fifty blocks, demarcated by the intersection of long main streets and shorter cross streets“. Bernardin de St. Pierre described Cape Town as follows: “The streets are very straight, some of them are watered with canals and most of them are planted with oak trees.... When a man has seen one Dutch town he has seen them all” (Haswell,1984). The grid pattern had thus, been introduced. During the governorship of Simon van der Stel substantial improvements were made to the town. The gardens were moved back seven hundred and fifty feet and redesigned, which effectively opened up land for the town’s expansion. The city blocks



Cape Town in 1764. The oldest colonial settlement by Europeans in southern Africa was founded by the Dutch East India Company. The plan shows the regular street layout of the Dutch surveyors before the British conquest in 1796. (Source: Reproduced from the facsimile by Historic Urban Plans, Ithaca, New York, of Bellin's Petit Atlas Maritime)

Figure 6: Cape Town 1764 (Home:1997:52)

were small - generally three hundred feet square (8919 m²) with plots of a sixth of an acre (667 m²). The main roads were sixty feet wide and the minor cross streets forty feet wide. The site of the original fort was turned into a parade ground which was the only open space until the late eighteenth century (Christopher,1976; Cardy,1990; Haswell,1984).

As the colony expanded so problems occurred as the settlers left the arable area of the south west. In the south west wheat farming predominated which lead to a relatively settled population and towns such as Stellenbosh, Tulbough, Ceres and Franschoek flourished. Where fertile land existed in the valleys around Cape Town slowly a stable population established itself. However, under the divided inheritance practiced at the Cape

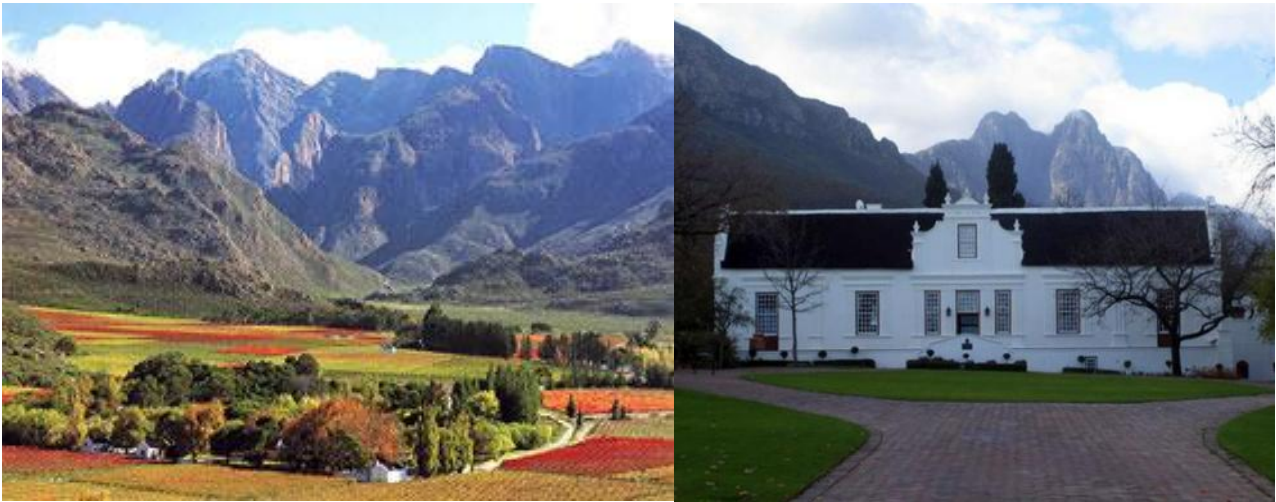
families could soon be reduced to poverty, it was only on the frontier of settlement that a man with a small sum of money could make a start in farming. Due to the arid conditions beyond the south west most farmers turned to livestock farming, the Company's pressing need to supply meat to the passing ships made them relax their control over the rapidly expanding frontier. These areas were allocated on a loan place system (land rented from the Company); this was a highly insecure tenure and consequently little improvement was made to the land; this is clearly illustrated by Barrow's comment in 1797: "The miserable hovels in which the graziers live are the pictures of want and wretchedness. Four low mud-walls, with a couple of square holes to admit the light and a door of wicker work, a few crooked poles to support a thatch of rushes, slovenly spread over them, serves for the dwelling of many a peasant whose stock consists of several thousand sheep and as many hundred heads of cattle" (Christopher, 1976:48).

Figure 10 (page 33) clearly illustrates that the main limitation on early expansion was the vast Hottentots Holland mountain range at the end of False Bay, not only was it a physical barrier in terms of traversing it but it was also a boundary between the Mediterranean climate of the Cape peninsula and the semi-arid interior. A number of attractive and well planned towns existed in the established cultivated areas; settlements such as Stellenbosch flourished and became the seat of the wine industry. With the importation of the French Huguenots a number of towns such as Franschhoek and Tulbough were established which have an unmistakably French atmosphere. It was the Huguenots who introduced the grape to South Africa (Figures 7-9).



Figure 7: Samuel Davis - Stellenbosch – 1779 (<http://commons.wikimedia.org>)

Figures 8 and 9: The Stellenbosch Valley and 'Lanzerac' – wine estate on the outskirts of Stellenbosch, note the Cape Dutch architecture (www.capevillacollection.co.za)



All of these early Dutch towns were agricultural centres; they had long, broad and straight streets and were serviced by diverting a river to flow in small water canals down the sides of the streets. The unique Cape Dutch architecture replicated the gables of Holland but with no need to conserve land the houses were large, barnlike and often one or two storeys. A central church dominated the skyline.

By 1806 some 15 000 immigrants had settled in the Cape and Natal (Caffrey:1973:9). In 1814 the King of the Netherlands finally ceded the colony to Great Britain. “Its liberation from the tyranny of the despotic East India Company gave a great impetus to its progress” (Nixon, 1972:13). The British colony consisted originally of only the Cape, even though there was already a small settlement in Natal at what is today Durban. The boundaries of the colony had not been defined and after British occupation in 1806 the lack of towns for the control of the population was immediately felt. As a result a series of new government towns were established for administrative, trade and commercial reasons. Unlike the settlements of the Dutch period, which tended to be small and which grew by the laying out of new streets and plots as the need arose, the British established substantial and complete towns (Cardy, 1990). These towns were predesigned and approved in London prior to establishment, in many cases they were plans on paper; in reality the actual settlements were initially little more than hamlets with a grand name.

From the outset the British settlements were fundamentally different from those of the Dutch and Afrikaners, the towns of this era were not self sufficient and survived on trade, administration and commerce. The urban fabric reflected this as the towns, although still based on grid layouts were less regular than those of the Dutch and had a far finer grain. Land around houses was used as gardens or for the stabling of horses (being the primary means of transport of the day). British towns were not focused on the Church but rather the administration buildings, in the British tradition churches were surrounded by graveyards and thus tended to be close to the outskirts. British settlement also occurred after the reformation so there was no single religion for the British settlers and accordingly no one church dominated. Most British towns were planned, at least on paper, as complete settlements and were laid out as such. Often a complete town plan was approved in London even when there were no existing residents there. The need for approval for settlement from the Colonial Government, necessitated that a plan be drawn up for the settlement prior to pegging and that this plan be approved in London. The plans were also always referred to as town or city plans, no one ever consciously planned villages or hamlets, yet in reality that is exactly what they were. British towns also deviated from the Dutch settlements in terms of infrastructure, linkages between towns were important, fording points on rivers, pontoons and bridges were all created as part of the settlement and often the towns were supplied with wells instead of the water furrow system of the Dutch (Cardy, 1990; Haswell, 1984; Christopher, 1973).

British rule was not appreciated on the frontier. The frontier people had always been opposed to government interference and thus, with the more extensive and competent control of the colony by the British, the *Boers* began to rebel (Cardy, 1990). The Cape Colony proved to be harder to rule than was anticipated by the British. They never fully came to terms with the relations between the original Dutch and French Huguenot settlers and the British. Although Cape Town and the surrounding farming areas were well established and stable communities, the farmers on the frontier were transitory stock farmers who had no formal title to land and hence had a very unstable existence. Around this time the northern and eastward expansion of the Europeans started to clash with the southern expansion of the Zulu in Natal and the western expansion of the Xhosa around

the region of the Great Fish River. The second phase of colonial expansion had started before the British had the time to consider the limits of the colony (Welsh, 2000).

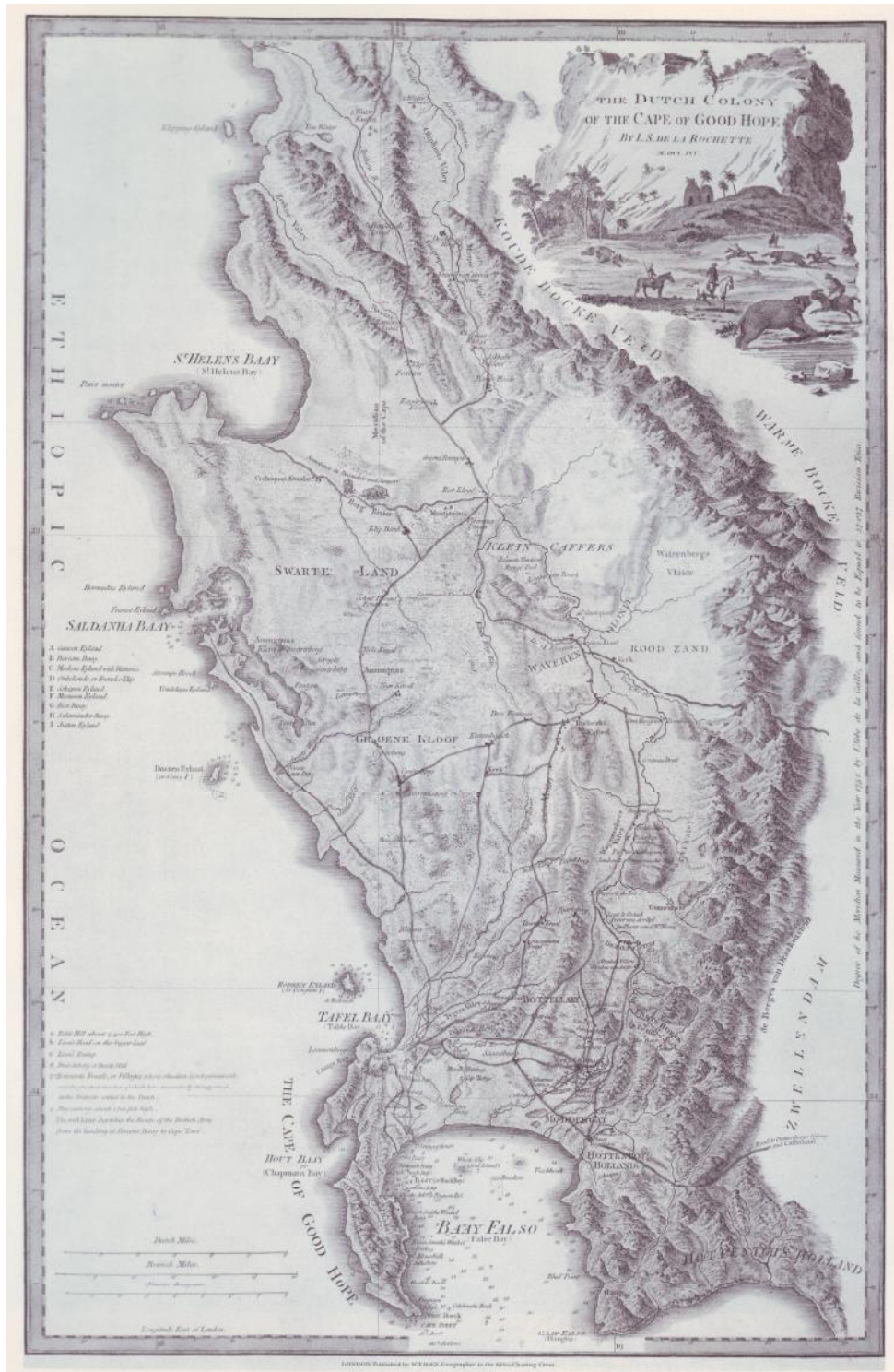


Figure 10: Topographical map of the Cape Colony in the eighteenth century by L.S.de la Rochette, 1795. Rembrandt van Rijn Art Foundation: Burger House, Stellenbosch (Smuts, 1979:15)

2.4.2.2 The Eastern Cape

The history of the Eastern Cape is discussed in depth in Chapter 8 and hence is not discussed here. Figures 11 and 12 give a sense of the geography of the area.

2.4.2.3 Durban and Natal

A settlement at Durban was founded by Lieutenant Farewell, Henry Fynn and their group of travellers who landed at the Bay of Natal in 1824. The bay was first discovered and named by the Portuguese seafarer Vasco da Gama who arrived at the present location of Durban on Christmas Eve in the year 1497, and called it "*Terra do Natal*", Christmas country. Because the Portuguese had already established an excellent port at Delagoa Bay now Maputo, Mozambique, they were not interested in settling in a bay surrounded by mangrove swamps and dense coastal forests. Even then, the bay was one of the few natural harbours along South Africa's eastern coastline. Only sporadically some pirates and ivory or slave dealers laid anchor, and it was much later, in the year 1824, that a proper settlement started, initially named "Port Natal". In 1824 Henry Fynn and Francis Farewell used the port to trade ivory (Cardy, 1990; Caffrey, 1973; Haswell, 1980; Lynsky, 1982).

A contingent of British pioneers, under the leadership of Flynn, had reached a contractual agreement with the mighty Zulu King, Shaka, authorising them to establish a trading station. The settlement of Port Natal encompassed just 30 people and was renamed "Durban" on the 23rd June 1835 in honour of Cape Governor, Sir Benjamin D'Urban as proclaimed by Captain Allen Gardiner, the newly arrived naval officer (Lynsky, 1982).

Natal had been for several years the resort of English adventurers. The question of its occupation as a British settlement had been mooted and decisively answered in the negative by Lord Glenelg. When, however, the Dutch emigrants proceeded to take possession of the Port Natal, the hands of Napier were forced, and an occupation of Natal became inevitable, however 'temporary and purely military'. Whatever the words of statesmen, the English Imperial spirit was not dead though sleeping, and the material

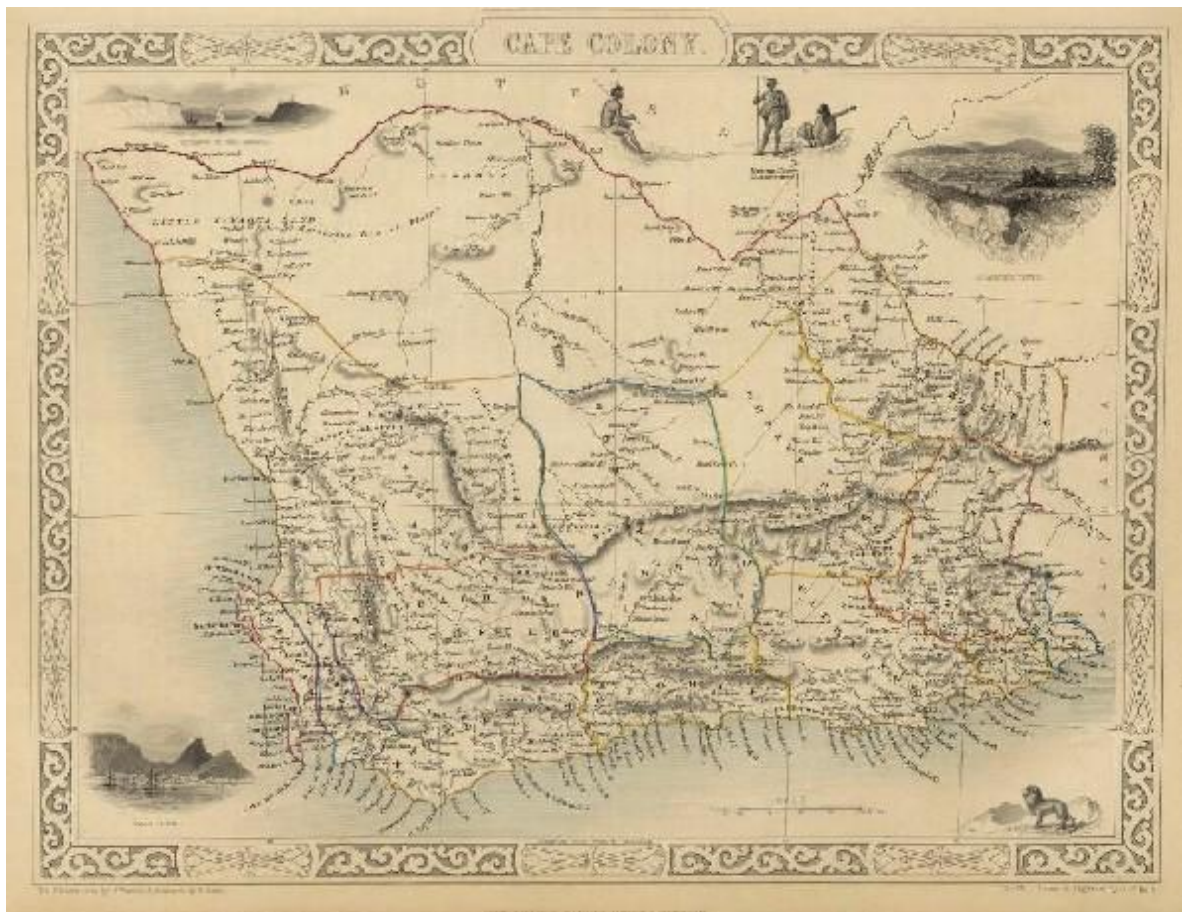


Figure 12: Cape colony 1851 Authors Martin R.M and Tallis J.F (1851) The Illustrated Atlas, and Modern History of the World Geographical, Political, Commercial and Statistical, Edited by R.Montgomery Martin Esq – J and F Tallis, London

interests of Cape Colony would not allow that an independent republic should be established upon the coast with a harbour through which access would be given to the interior. British Colonial Secretaries, however, could not yet reconcile themselves to facts, and so, in 1840, Napier, believing that the colonisation of that country would never be sanctioned, felt the further retention of the port might give rise to hopes or even fears, which it was probably the wish of Her Majesty's Government not to foster. The withdrawal of the English troops from Durban was almost simultaneous with the great victory of Panda, the ally of the *Boers*, over Dingaan's army (King Shaka's successor). The result was that Pretorius (a *Boer* Commander) was able to issue a proclamation taking possession of a territory more extensive both to the north and the south than is the latter Colony of Natal. The description given by Theal (1943) of the condition of things in the Natal Republic is very suggestive : 'The result was utter anarchy . . . public opinion of the

hour in each section of the community was the only force in the land. A loose kind of alliance had been formed between the Natal *Volksraad* (People's Council) and the Government of the settlers in the districts of Winburg and Potschefstroom. Roughly speaking, the Winburg district corresponded to about half of the latter day Orange Free State, the Potschefstroom district to the South African Republic (ZAR), while, between the Vet River and the Orange, there were several parties of emigrants acting independently. The Natal *Volksraad* proposed to send Commissioners to the Cape Colony to treat for acknowledgment of their independence with the rights of British subjects. Meanwhile English public opinion was moving, and in 1840 Lord John Russell wrote that he was favourable to the settlement of Natal as a British Colony, though not prepared to expend large sums of money in conquering the country from the emigrant farmers. The precarious state of affairs on the eastern frontier of Cape Colony prevented, for some time, any attempt to enforce this policy, and it was the action of the *Boers* in pressing the Ponds southward which finally caused the interference of the English. At the close of 1840 Napier issued a proclamation declaring that the Queen would not recognize the emigrants as an independent State, and that he was about to resume military occupation of Durban.

In May 1843, Natal was proclaimed a British Colony. When the British Commissioner, Mr Cloete, arrived at Maritzburg (Pietermaritzburg) he found 'the machinery of government at a complete standstill; there was not a sixpence in the treasury . . . The sentences of the law courts were in most instances completely disregarded . . . There was hardly one who had been in office but who candidly admitted that the *Boer* Republic of Natal was a failure' (KAB, Accession A457, Documents of Cloete family 1685 – 1893). The Natal *Volksraad* submitted; the more violent section of the farmers retiring beyond the Drakensberg Mountains to their kinsmen on the other side. Mr. Cloete next came to terms with Panda, the Zulu king, obtaining the formal cession of St. Lucia Bay, by which means the *Boers* were prevented from obtaining the seaport they coveted. Natal was to be a dependency of the Cape, though separate for judicial, financial and executive purposes. The Lieutenant Governor was to be aided by an executive Council. The Lieutenant Governor and Council might recommend laws to the Cape Colony authorities for their enactment. Lord Stanley was urgent that national preferences should be, as far as possible, indulged. Notwithstanding these good intentions, the rule that actual occupation for the twelve months preceding the inquiry must be shown to give a good title to land was difficult for the

Dutch settlers to prove and was the cause of a new emigration. Feelings were further embittered by the refusal of the Governor, Sir H. Pottinger, to see the Natal envoy, Mr Pretorius.

Sir Harry Smith, who became Governor in 1847, was convinced that he could bring them to terms. He had already served in South Africa and won all hearts. He assumed the government with a fully matured plan for the settlement of affairs north of the Orange River.

A new British Colony must be formed, and a general control exercised over the African chiefs. For this purpose Sir H. Smith proceeded to Bloemfontein. The picture which he gave in his dispatches of the state of feeling among the *Boers* is very vivid : 'Jealous to a degree of what they regard as their rights', 'constantly at variance with one another', 'the world has at no period produced a race of men so prone to give credit of evil reports, however monstrous and impossible their nature, as the Dutch emigrant *Boer*'. He frankly recognized that 'it must not be expected that perfect cordiality can at once be established among men who have for so many years led so unsettled a life as these emigrant farmers.' Unfortunately, though Sir H. Smith was well suited to the task of conciliation, he was in a great hurry, and his passage through the country, as was afterwards said, was like that of a meteor. He was anxious to reach Natal so as to prevent any further exodus of the Dutch from that Colony, and in this object he was successful. As a consequence of his hurry, the proclamation (1848) under which the government of the Orange River Sovereignty was carried on contained provisions, which caused future trouble. Especially the clause which required every able-bodied man to turn out in defence of the Queen and her allies, whenever called upon to do so, became, as interpreted by the British resident, Major Warden, a fertile cause of mischief. Under it the lives of European settlers might be risked in pursuing the quarrels of native chiefs. In any case, however, the assumption of sovereignty was at first, upon the whole, unpopular. It had reluctantly been assented to in England on the ground that the black people required protection from the Dutch, and that the better-disposed farmers, being in a condition of anarchy, would gladly submit to a settled government. For the moment, however, the more violent spirits obtained the upper hand, and it was necessary to use force to maintain the sovereignty.

Upon the defeat of the *Boers*, the most anti-British of them moved over the Vaal River, while fresh immigrants from the Cape Colony filled their places. According to a statement drawn up by the inhabitants in 1851, “no sooner had your Excellency extended the authority of the Queen than order and subordination were established, the confidence of the peaceful and well disposed revived . . . flourishing villages suddenly sprang up and the apparently waste land of a year or two previous became studded with substantial homesteads.” Doubtless other considerations had to be borne in mind. It is unfair to rail at the disinclination of English Ministers to extend British possessions in South Africa. It must be remembered that South Africa was a casket, which jealously hid its riches to the last. For a long time it was a continuous source of expense to the Empire, with no apparent corresponding advantages.

So began a period of continual debate and ineffectual policy towards the Transvaal and Orange Free State Governments. It is important to remember that diamonds and gold were only discovered late in the colonial process and invariably lead to the British finding a reason to regain control of the regions. In all honesty the British view until the discoveries of diamonds and gold was that Simon’s Bay was the only thing really worth caring about. Simon’s Bay was strategically important in maintaining the trade route to India; the jewel in Britain’s imperial crown.

The British established a sugar cane industry in Natal in the 1860s. Farm owners had a difficult time attracting Zulu labourers to work on their plantations, so the British brought thousands of indentured labourers from India on five-year contracts. As a result of the importation of Indian labourers, Durban became the settlement with the largest Asian community in South Africa (Brookes and Webb, 1967; Stuart, Webb and Wright, 1976; Welsh, 2000).

Durban became one of the most important seaports of the British Empire. Particularly significant was the boom of the sugar cane industry in Natal towards the end of the 19th century, when Durban's seaport became the largest sugar terminal in the world.

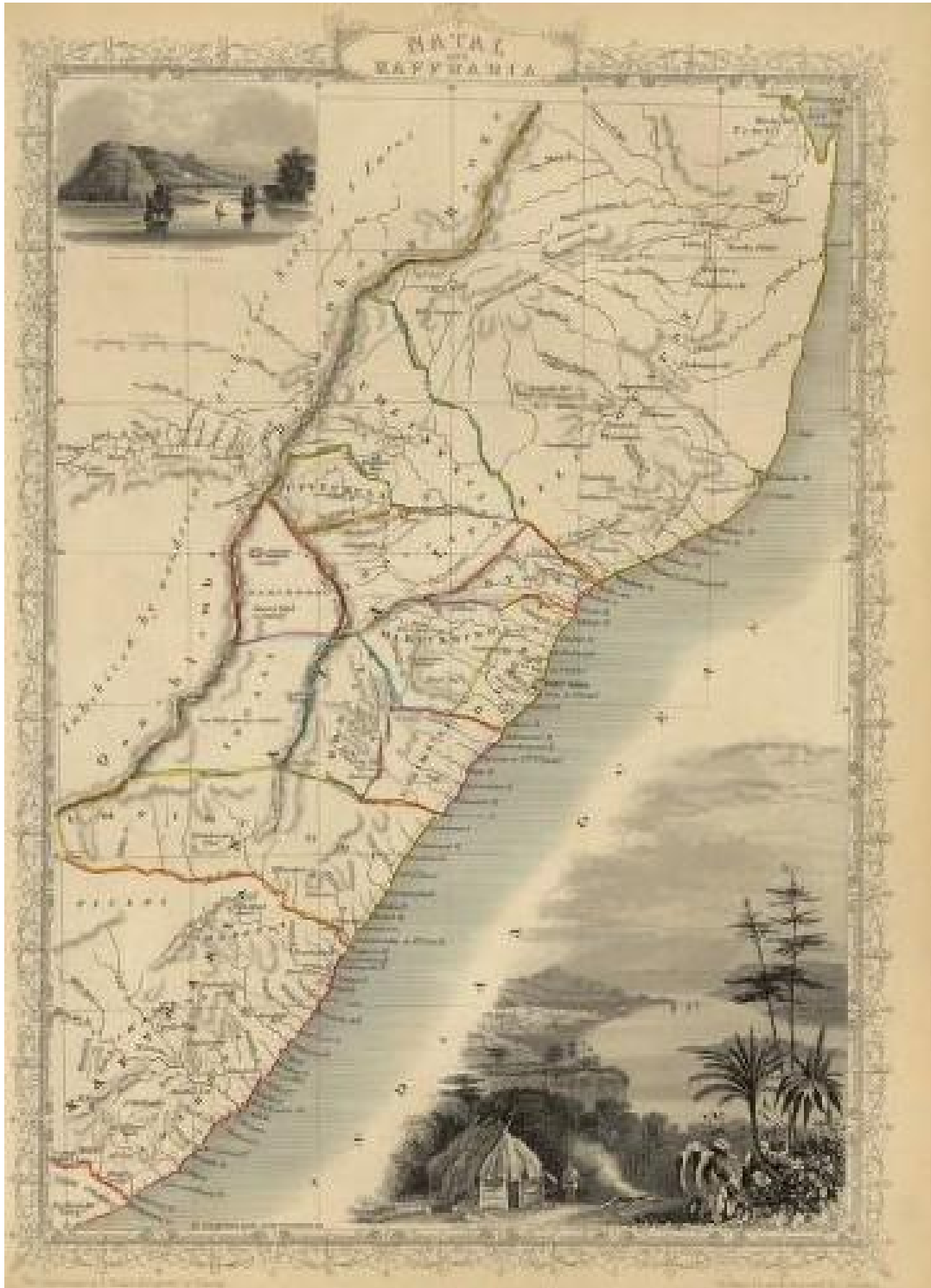


Figure 13: Natal and Kaffraria (sic)

**Authors Martin R.M and Tallis J.F (1851) The Illustrated Atlas, and Modern History of the World
Geographical, Political, Commercial and Statistical, Edited by R.Montgomery Martin Esq – J and F
Tallis, London**

2.4.2.4 Defining the Northern Limits of South Africa

The next period of British colonial expansion started with the discovery of diamonds at Kimberley. At the time Kimberley was somewhere on the ill-defined border of the Cape Colony, the Orange Free State and the Transvaal Republic. The British seized the initiative and defined the border with Kimberley as part of the Cape Colony. An extension of this policy also led to the creation of the British colonies of Bechuanaland and Rhodesia. This was also the beginning of the scramble for Africa and so possession and delineation of territory was starting to become important, until this time the northern extent of the Cape Colony had been vague – not surprising given the extremely arid nature of the territory.

The British established not only the northern limits of South Africa but also two colonies to the north, Bechuanaland (Botswana) and Rhodesia (Zimbabwe). Perhaps one of the most astounding settlements in Africa was that of Rhodesia, for its sheer scale; although Rhodesia is not part of South Africa it was an important phase of development for South Africa as it closed off the frontier to continued *Boer* expansion northwards. Cecil Rhodes, as Prime Minister of the Cape, dreamed of an all red route from Cape to Cairo, he also wanted to out-flank the unfriendly *Boers* of the Transvaal Republic, he advocated that British influence would be good for the Africans and of course he thought there was gold in the North. He therefore induced King Lobengula of Matabeleland, who held some sort of sway over both the Matabele and the Mashonas, to grant him a mining concession in those areas, and then persuaded the British Government to allow him a Royal Charter, authorising him to govern and administer them. He formed a Chartered Company, the British South Africa Company, to occupy the country and in 1890 he sent a column of pioneers northwards into Mashonaland (Morris, 1968:84).

Two hundred young men had formed the nucleus of this column, with an escort of five hundred police. They had been carefully picked as an embryo of a new white colony, and included farmers, miners, engineers, lawyers, doctors, builders, artisans and miscellaneous adventurers. They travelled under military discipline as soldiers, but they were disbanded and let loose as civilian settlers once they reached Mashonaland (Morris, 1968). They made the march in eleven weeks and on the 12th September 1890 they halted at Harare, renamed it Fort Salisbury in honour of the British Prime Minister,

hoisted a Union Jack and launched Rhodesia, without the loss of a single life. It was not all smooth sailing however, and trouble soon erupted, the treaty with Lobengula was morally dubious, Rhodes had acquired the full mining rights for an enormous and carefully ill-defined slab of territory. Lobengula had little idea how much he was signing away, and the Company's right to administer the country at all, however confidently it gained the imperial assent, was morally shaky. The rights Lobengula signed away were rights with ..."full powers to do all things that might be deemed necessary..." (Caffrey,1973:57). This was achieved at a cost of £100 a month paid to Lobengula, 1 000 rifles with 100 000 rounds of ammunition, and the promise of a gun boat on the Zambesi (Caffrey,1973:57). Once occupation occurred, Lobengula, finding himself dispossessed proved a bitter enemy until his death in 1893; by which time there had been two major wars against the Matabeles and a war with the Mashonas still raging. Disease ravaged the settlers' cattle. The gold reef proved disappointing. "All in all things had not been easy; and Salisbury had developed a wiry, rather bitter, often bigoted kind of self-sufficiency, mud on the boot and guns on its shoulders" (Morris, 1968:84).

In terms of physical planning, Rhodes ordered that the towns of Salisbury and Bulawayo should have streets wide enough to allow an eight pair team of oxen to turn comfortably. Rhodes looked to the Afrikaner model of town building and rectilinear surveying when laying out Rhodesia and the towns of Rhodesia look remarkably similar to those of the Transvaal. The cadastral system adopted was a crude system of riding on horse back for half an hour from the farm homestead, or pacing out of urban plots. In reality the settlers in Rhodesia were not really intending to make their living from farming, they were looking for the legendary King Solomon's Mines, though as it turned out mining there was always chancy (Caffrey, 1973:60).

Rhodesia is however, of enormous interest to this study as colonisation was by a company. As Morris (1968:85) notes "The New Imperialism was easily fired by dreams of freebooter and buccaneer, and was also much concerned with private profit: and prominent in its lore were the grand old companies which had created the original Empire, established the imperial routes and planted the first trading posts – the Levant Company, Hudson's Bay, the Gold Coast and Gambia Companies, above all the East India

Company, a major power in itself, with its own armies, warships, diplomats and currencies.”

Rhodesia was a return to the old style of colonialism, company lead and mercantile in nature, it was the only period of southern African colonisation, bar a small interest in the 1820's, during which the British actively colonised a region with the view to permanent settlement and British capitalist markets, everything else in South Africa had happened begrudgingly and in a reactionary way in response to other pressures such as thwarting Napoleon, the *Boers* or the African tribes.

2.4.2.5 The Anglo-Boer War and the Acquisition of the Transvaal and the Orange Free State

The southern part of the African continent was dominated in the 19th century by a set of epic struggles to create within it a single unified state. British aggressiveness into southern Africa was fuelled by three prime motivations: initially, in order to control the trade routes to India that passed around the Cape; second, the discovery, in 1868, of huge mineral deposits of diamonds around Kimberley on the joint borders of South African Republic (called the Transvaal by the British), Orange Free State and the Cape, and thereafter in 1886 in the Transvaal of a major gold find, all of which offered enormous wealth and power; and finally this was a time of rapid European colonisation, as part of a general colonial expansion into Africa. Other potential colonisers included Portugal (who already controlled East and West Africa including modern day Mozambique to the East and Angola to the west), Germany (modern day Namibia), and further north, Belgium (Congo) and France (West and Equatorial Africa, and Madagascar).

The origins of the Anglo Boer War were complex, resulting from over two centuries of conflict between the *Boers* and the British. The British had in 1806, during the Napoleonic Wars, taken permanent possession of the Cape Colony and over subsequent decades successive waves of *Boers* had migrated away from the rule of the British Empire in the Cape Colony, first along the eastern coast towards Natal and then, after Natal was annexed in 1843, northwards towards the interior where two independent Boer republics (the Orange Free State, and the South African Republic) were established. The British

recognised the two *Boer* Republics in 1852 and 1854 but the annexation of the Transvaal in 1877 lead to the First Boer War, 1880-1. After British defeats, most heavily at the Battle of Majuba, Transvaal independence was restored subject to certain conditions but relations were uneasy.

When in 1886 massive deposits of gold were discovered in the Transvaal, a huge inflow of *uitlanders* (foreigners/ non-citizens), mainly from Britain, came to the region in search of employment and fortune. Gold made the Transvaal the richest and potentially the most powerful nation in southern Africa but it also resulted in the number of *uitlanders* in the Transvaal eventually exceeding the number of *Boers* and precipitated confrontations over the old order and the new. Disputes over *uitlander* political and economic rights resulted in the failed Jameson Raid of 1895. This raid led by (and named after) Dr Leander Starr Jameson, the Administrator in Rhodesia of the Chartered Company was intended to encourage an uprising of the *uitlanders* in Johannesburg. However, Johannesburg failed to rise and Transvaal government forces surrounded the column and captured Jameson's men before they could reach Johannesburg.

As tensions escalated from local to national level, there were political manoeuvrings and lengthy negotiations to reach a compromise ostensibly over the issue of '*uitlander* rights' but ultimately over control of the gold mining industry and the British desire to incorporate the Transvaal and the Orange Free State in a federation under British control. Given the number of British *uitlanders* already resident in the Transvaal and the ongoing inflow, the *Boers* recognised that the franchise policy demanded by the British would inevitably result in the loss of independence of the Transvaal. The negotiations failed and in September 1899, Chamberlain (the British Colonial Secretary) sent an ultimatum to the *Boers*, demanding full equality for those *uitlanders* resident in the Transvaal. President Kruger, seeing no other option than war, issued his own ultimatum giving the British 48 hours to withdraw all their troops from the border of the Transvaal, failing which the Transvaal, allied with the Orange Free State, would declare war against the British. The rejection of the ultimatum followed and war was declared.

The war had three distinct phases. First, the *Boers* mounted pre-emptive strikes into British-held territory in Natal and the Cape Colony, besieging the British garrisons of

Ladysmith, Mafeking and Kimberley. The *Boers* then won a series of tactical victories at Colenso and Spion Kop against a failed British counter-offensive to relieve the three sieges. Second, after the introduction of greatly increased British troop numbers under the command of Lord Roberts, another and this time successful British offensive was launched in 1900 to relieve the sieges. After Natal and the Cape Colony were secure, the British were able to invade the Transvaal and the Republic's capital, Pretoria, was captured in June 1900.

Finally, beginning in March 1900, the *Boers* engaged in protracted hard-fought guerrilla warfare against the British forces. This lasted a further eighteen months during which the *Boers* raided targets such as British columns, telegraph sites, railways and storage depots. In an effort to cut off supplies to the raiders, the British, now under the control of Lord Kitchener, responded with a scorched earth policy of destroying *Boer* farms and by moving civilians into concentration camps.

The campaign had been expected by the British to be over within months, and the protracted war became increasingly unpopular back in Britain, especially after revelations about the conditions in the concentration camps (where thousands died of disease and malnutrition). The demand for peace led to a settlement of hostilities, and in 1902 the Treaty of Vereeniging was signed. The two Republics were absorbed into the British Empire, although the British were forced to make a number of concessions and reparations to the *Boers* and to the establishment of the Union of South Africa. The war had a lasting effect on the region and on British domestic politics. The war, known as the last British imperial war, was the longest (almost three years), the most expensive (over £200 million), and the most disastrous of all wars for Britain between 1815 and 1914.

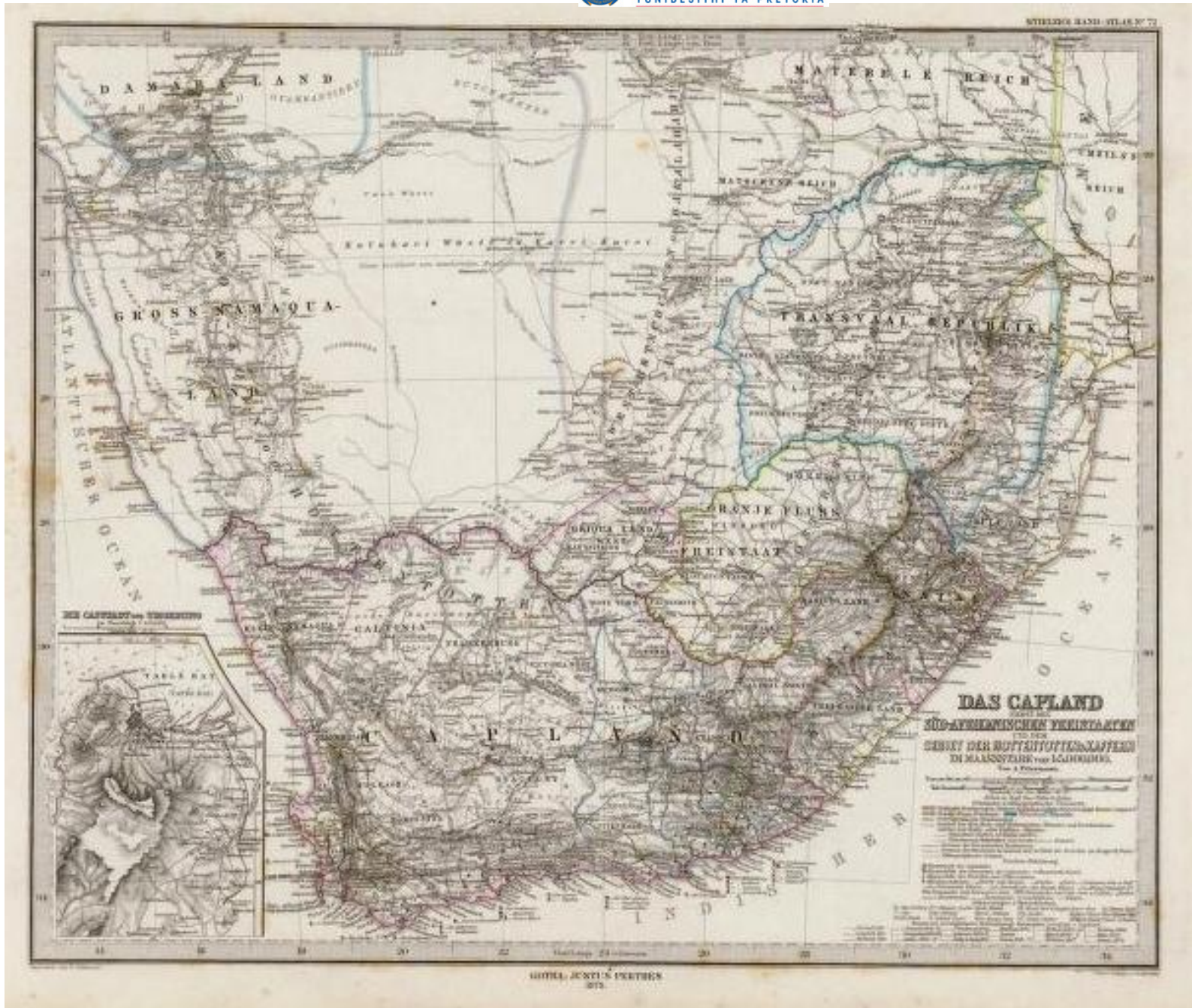


Figure 14: Map of the Cape Colony and Transvaal Republic (Das Capland Nebst Den Sud-Afrikanischen Freistaaten) (1875) Stielor, A. (1875)Hand Atlas Uber Alle Theile Der Erde Und Uber Das Weltgebäude. Herausgegeben Von Adolf Stielor. Gotha Justus Perthes.

2.5 CONCLUSIONS

As illustrated the history of colonial settlement in South Africa is complicated. From the British point of view colonial settlement was not their main objective in securing the Cape Colony. The British wanted to protect the trade route with India, which at the time (before the Suez Canal) went around the Cape.

The colonial expansion in South Africa occurred in a reactionary way, the colony was never intended as a plantation or settlement colony. In an era when agriculture predominated the lack of fertile land and the absence of major rivers penetrating the interior was a major disincentive.

Even though colonial expansion was not the primary aim the British still sought to better control the colony and thus established public administration and massively increased the urban foot print. Although the colonies were overwhelmingly rural in nature the control of the colonies was through urban centres.

This study focuses on the Royal Engineers contribution to the story of South African colonial development. Annexure A, taken from Floyd (1960), tabulates all the towns established in South Africa pre 1900. Note the phenomenal rate of town establishment during the time frame of this study; this was the time in which the vast majority of the South African settlement pattern was determined. Research into the British colonial development of South Africa repeatedly highlighted the involvement of the Royal Engineers. A staggering amount of work was carried out by this institution, especially in the Eastern Cape. In order to fully understand the settlement patterns discussed later it is first necessary to take a step back and to research the Royal Engineers and their training as this research sets the scene for much of the spatial analysis that follows. Chapter Three is devoted to understanding the Royal Engineers and their training as it is demonstrated later that they had a significant impact on British colonial development in the Cape and Natal Colonies.

CHAPTER THREE

THE ROYAL ENGINEERS: BACKGROUND, TRAINING, DUTIES AND DEPLOYMENT

3.1 INTRODUCTION

Prior to any meaningful analysis of the contribution of the Royal Engineers to spatial development in South Africa it is first necessary to study who the Royal Engineers were and assess the training they received. This chapter seeks to explain the broad background history of the Royal Engineers as a unit and then analyses in depth the training they received. The training is inferred from all available literature and records. The aim of this chapter is to understand the academic background of the people who were responsible for much of the spatial development of South Africa.

3.2 BACKGROUND

To quote from the Royal Engineers on their website: “The story of the Corps of Royal Engineers covers over nine hundred years. The Corps can claim direct descent from the military engineers brought to England by William the Conqueror and an unbroken record of service to the Crown since then.

The Corps has no battle honours of its own, its motto *'ubique'* ("everywhere"), awarded by King William IV in 1832, signifying that members of the Corps have taken part in every battle fought by the British Army in all parts of the world. As well as the Royal Engineer's role in war, their skills have been in even greater demand in peace, where Sappers have built the infrastructure of 'civilization', wherever British interests have led.”
(www.army.mod.uk)

This sweeping historic statement is unpacked in the following historic background analysis – the broad background history has been compiled from secondary sources, most notably Porter (1951:vol. I and II), Watson (1954: vol. III), Baker Brown (1952: vol. IV), Buchanan (1989), Chandler (1995), Finch (1951) and Napier (2005), however the training and skills have all been researched via primary references mostly housed in the British Library, Euston London; Public Records Office, Kew and the Royal Engineers Library, Chatham. Higham (1972) offers a valuable guide to reference sources. In the case of this section the primary references were the original Royal Engineer publications, training manuals, pocket books and general accounts written at the time of the study.¹

3.2.1 THE NORMANS

For his invasion of Saxon England, William of Normandy brought in Humphrey de Tilleul from France as his Chief Engineer. He is shown in the Bayeux Tapestry building a prefabricated fort, brought in sections from Normandy, on an earthen mound formed by throwing up the soil dug from a ditch surrounding it. From the outset the Normans used a “shock and awe” strategy to subjugate the native peoples of Britain. “Shock” in the ferocity of their troops and “awe” in the pomp of their lieutenants and in the edifices erected by their engineers (Buchanan, 1989; Chandler, 1995).

Humphrey defected back to Normandy, and was replaced by a young monk from Bec, called Gundulph. The skills needed to build a castle were little different from those required to build an abbey so it was appropriate that a man of the church should be appointed as the principal military engineer. Gundulph built a great edifice to overawe the

¹ The following original material was studied at the Royal Engineers Library however, they offered no more information pertinent to the training of REs than the training manuals and pocket books and thus are not quoted directly often, they are however of research interest on the RE's more generally: a) RE Unit Diaries (Boer War -16 boxes) (housed in the Annex) these were fascinating accounts of the Boer War but offered little insight into the training nor civil works; b) RE Corps Orders 1813 – 1894 16 vols (355.133) c) Connolly Papers: Captain Connolly's original MS biographical notes on RE officers (8 volumes) (strong room) – these give a fascinating insight into the kind of people involved in the REs and their approach to life – These records would form a fascinating future study if one were to follow the life and career of one of the officers and contrast it with a modern counterpart; d) List of soldiers graves in South Africa 1899 -1902 (92/650) – sobering reading; e) Royal School of Military Engineering order books, letter books and annual reports, 19th – 20th century – after the time frame of the study but still interesting reading.

Saxon citizens of London. It still stands today as the White Tower within the Tower of London. He also strengthened the castle at Rochester (Chandler, 1995).

Appointed Bishop of Rochester, he developed the Saxon church there into a cathedral, the second oldest in England. Gundulph's Tower still stands against the South Trancept. Today the Cathedral is the Church of the Corps and houses many memorials. From the outset therefore there is a very strong link between engineering and the building of Cathedrals, since the stone masons were formed as the guild for those involved in the construction of early churches, it is highly possible that it explains why so many Royal Engineers in South Africa were also Freemasons and in fact why most early British settlements have a Masonic hall. Freemasons have certain sacred forms and shapes, which may have been carried through to the layout of early towns in South Africa.²

In feudal times levies (taxes and the claim of artisans and troops for military service from the feudal lord) supplied skilled craftsmen to construct the King's castles. By the time of Richard I (1189-99) the King's Engineers and their skilled levies had gained a reputation of being among the finest castle builders in Christendom, building castles in both England and France. Their renown stemmed from their innovations in design and their craftsmanship; they introduced the concept of building a series of barriers to form a coherent defence system for fortified towns (Finch, 1951).

A hundred years later Edward I (1272-1307) used the construction of strategically sited castles as part of his strategy to conquer and rule Wales. The castles were designed and constructed under the guidance of the King's Engineers, in particular Master James of St George, who enjoyed the title of 'Master of the King's Works in Wales' (Buchanan, 1989; Chandler, 1995; Finch, 1951).

² Freemasons: Most early British colonial towns in South Africa have a Masonic lodge and a very large percentage of military engineers and public administrators are listed as members. It is possible that some of the beliefs and patterns of development are Masonic in origin. Symbolism is central to Freemasonry; symbols such as squares, circles, triangles, arrows and crosses predominate. Regular angles are also revered as true forms. The regular grid layout of the settlements may also have been appropriate to the designers for this reason. It is impossible to prove, however many of the Royal Engineers of this era are listed as Freemasons (Roll of officers in the Corps of the Royal Engineers, manuscript RE Library – see reference list) and Masonic lodges appear in most early British Colonial towns. More detail is available in Verlag (1989); Worrel (2002) and Gnosis (2002). This would be an interesting field of further study.

In medieval times of war King's Engineers were responsible for designing and organising the building of siege engines such as belfries (wooden movable siege towers), catapults (engines worked by a lever and rope to discharge darts, stones etc.) and trebuchets (engines for casting heavy missiles using a sling) (Finch, 1951; Chandler, 1995).

3.2.2 THE BOARD OF ORDNANCE

With the development of cannon the Office of Ordnance - later, the Board of Ordnance - was set up in Gundulph's Tower in London to control the King's cannon, arsenals and fortifications. The first Master of Ordnance was Nicholas Merbury who had been Chief Engineer to Henry V at Agincourt. Until its abolition in 1855, the Board held all Gunners and Engineers on its permanent establishment, in effect a private army. The advent of cannon fire necessitated a fundamental redesign of fortifications and the arrow shaped bastion, introduced in Britain from Europe in the 16th century, became widely accepted as the most effective. The Dutch castle in Cape Town is a good example of the use of this design (Whitworth Porter, 1889).



Figure 15: The Castle Cape Town
(www.south-africa.me.uk)

Until the establishment of the Royal Military Academy at Woolwich in 1741 young engineers had been trained on the continent and mainly studied fortifications and siege warfare. It was the construction of saps or trenches to enable the enemy fortifications to be assaulted which gave the Corps its nickname of 'Sappers'.

Although the Royal Engineer's roots can be traced to Norman times, it was not until 1716 that a Royal Regiment of Artillery and a corps of Engineers were formed. By 1741 the Royal Military Academy had been founded at Woolwich to train them (Weiler, 1987, p1). The word 'Engineer' derives from an Old French word 'engigneur' meaning one who designs and constructs military engines or works (Oxford English Dictionary). The medieval records often use the word 'ingeniator' to describe the engineers who were not only skilled builders but also served on the King's campaigns for siege engine duties.

On 26 May 1716 a Royal Warrant of George I authorized the Royal Regiment of Artillery and the Corps of Engineers as separate entities. In 1787 they were granted the title Royal and Engineer officers were styled Royal Engineer. Commissions were awarded on merit, unlike the cavalry or infantry, where they were purchased. It was customary at the time for noble families to buy officer ranks for their children, regardless of their talent (or often lack thereof); the Royal Engineers was fundamentally different because it set entrance exams and selected cadets based on their intellectual (rather than family) merits. Engineer and Gunner officers received rigorous professional training at the Royal Military Academy. The Engineer workforce was recruited from civilian tradesman as required for particular campaigns but this system faltered in Gibraltar. After several sieges the Chief Engineer, William Green, persuaded the Ordnance Board in 1772 to allow him to recruit some soldier artificers, skilled tradesman who would wear uniform and be subject to military discipline. The Soldier Artificer Company was so successful during the Great Siege of 1779-1783 that in 1787 a similar unit, the Royal Military Artificers, was formed in England for service worldwide. It is important to distinguish the Royal Engineers from the Artificers (later known as Royal Sappers and Miners), the artisan soldiers who served under the command of engineer officers (Weiler, 1987).

The Peninsular Wars against France showed the need for a trained body of field or combat engineers. In 1812, on the authority of the Duke of Wellington, Major Charles Pasley RE set up a school for this purpose at Chatham. It continues today as the Royal School of Military Engineering (RSME). The first trainees saw action in Spain in 1813 and in 1814. After the Napoleonic Wars, the Royal Engineers and Royal Sappers and Miners were

employed around the world both on active service and in the peaceful development of the Empire. Tasks were many and varied. Campaigns in North and South America, Africa, China, Australia and New Zealand all had Engineer support (Napier,2005).

Royal Engineers who also carried out the Great Trigonometrical Survey of India and set out the international boundary between Canada and the United States of America. They staffed the Ordnance Survey of Great Britain and Ireland. Throughout the Empire, towns were set out and public buildings, roads, canals, railways and water supply systems were designed and built by the Royal Engineers (Simpson and Sweeny,1973; Owen, 1992).

The Royal Engineers were also responsible for the introduction of much new technology to the Army - telegraphy during the Crimean War of 1854 - 1856, photography in the Abyssinian Campaign of 1867 and steam road traction in the Ashanti Campaign of 1873 (Weiler, 1987; Napier, 2005).

3.3 THE ENGINEERING PROFESSION

At the beginning of the nineteenth century it was only in France that engineering was clearly and definitely established as a learned profession. It had emerged there during the previous century first in the military and then in civil practice and under state-supported scientific education. Indeed the word 'engineer' had been used from the Middle Ages to denote someone engaged in the design of military engines and defence works. This use of the term persisted to the late eighteenth century and retained a military connotation in France and America well into the nineteenth. The title 'civil engineer' developed to distinguish non-military engineers. In Britain civil engineering was a skilled craft not an intellectual pursuit and was the work of artisans. John Smeaton, who combined practical skill with scientific interests, is said to have been the person through whom the profession of civil engineering emerged in Britain in the late eighteenth century. The profession was still in its infancy with the establishment of the Institute of Civil Engineers in 1818 (Weiler, 1987).

Notwithstanding the establishment of an institute, both civil engineers and architects were decidedly below military engineers in social status until the latter part of the century. In an attempt to increase their standing in society both adopted the 'gentleman' behaviour. This is interesting if one considers the social origins of the professions around this time; Weiler's analysis (Weiler, 1987, p.6) suggests that in the Institute of Civil Engineers 14 percent were upper class, 49 percent middle class and 23 percent lower middle class; for architects only 3 percent were upper class, 69 percent middle class and 17 percent lower middle class. This contrasted strongly with the military. Although the Royal Engineers were unique in the use of entrance examinations rather than purchasing commissions, they still operated the military system of reserving officer rank for those of appropriate class.

Given the dates of emergence of the civil engineering and architecture professions in the early nineteenth century neither profession was in a position to influence early colonial settlements in any significant way. Therefore there was a very heavy reliance on military officers. Most colonial civil governments also recruited retired Royal Engineers and hence the influence remained very strong throughout the nineteenth century.

3.4 THE TRAINING OF THE ROYAL ENGINEERS

This study has stated in a number of places that the Royal Engineers had a significant impact on the colonial development of South Africa; before illustrating this with the case study of the Eastern Cape, this section seeks to better understand the Royal Engineers. This chapter focuses on the training of the Royal Engineers in order to understand their background and knowledge prior to their deployment to South Africa. The training will be theoretically analysed after the case study in order to place and interrogate their training and approach within the framework of modern planning theory and education.

The formal training of an engineer officer in the nineteenth century was a two-stage process. A cadet would first enter the Military Academy at Woolwich where he studied for up to five years. Upon graduation he would receive his first commission as a junior engineer officer and be sent to Chatham (founded 1812, School of Military Engineering

after 1869) where he completed his training in a course lasting a year at the beginning of the century but later extended to eighteen months and then two years. The emphasis at the former was on theoretical knowledge and the latter on practical skill. Engineer officers in the service of the East India Company also had the benefit of further formal training at the Royal Engineer headquarters in India accompanied by a formal apprenticeship (Weiler, 1987; RE Corps Orders 1813-1894, RE Library 355.133; Connolly Papers, RE Library; Pasley, 1822-1866).

The Royal Military Academy at Woolwich was for nearly two hundred years the cadet training institution for the majority of Royal Engineers and Royal Artillery. It was essentially a militarised public school until reforms occurred in the late nineteenth century. During the eighteenth and early nineteenth centuries recruits were as young as thirteen or fourteen years of age, but from 1835 admission age was fixed at not under fifteen or over seventeen. Admission was by nomination by the Master General of the Ordnance (until 1857) and subject to an entrance examination which tested proficiency in writing English, maths, French, geography, history and the elements of drawing. Recruits had therefore to have received suitable primary and some secondary education in schools or through private tuition before entry. An analysis of the early educational background of some Royal Engineers (Weiler, 1987, p.8) revealed that the vast majority had attended public school, college, an academy or other private school.

As previously stated the course of study was in two parts, namely theoretical and practical. Below is a synopsis of the entrance examinations, the courses offered and a few pertinent specialised courses which give a feel for the type and extent of the training:

3.4.1 ENTRANCE EXAMINATIONS

Until 1855 the Master-General of Ordnance, under which the Royal Regiment of Artillery and the Corps of Royal Engineers fell, could select cadets for entry into the Academy at Woolwich. From 1855, however, all cadets were required to go through a course of instruction at the Royal Military academy, for which competitive entrance examinations were held in London twice a year. All cadets were between 16 and 19 years of age and had to sit examinations in: (Source: Head, 1869, p.4-5)

- Mathematics: Arithmetic, algebra, euclid, plane trigonometry, spiracle trigonometry, elements of co-ordinate geometry, differential and integral calculus, statistics, dynamics and hydrostatics.
- English language and composition
- History of England, its Dependencies and colonies.
- Geography
- Classics: Latin language and Greek language
- French language
- German language
- Hindustani language
- Experimental Sciences: Chemistry, heat, electricity, including magnetism
- Natural Sciences: Mineralogy and geology
- Drawing: Free-hand drawing of machinery, architectural, topographical, landscape or figure subjects.

Bearing in mind this was the admissions examination the academic standards were high. Forty entrants were accepted from each exam.

3.4.2 THEORETICAL TRAINING

(This information is extracted from Guggisberg, 1900, pp 28-29)

The four year theoretical training course was divided (in 1772) into two academies, the upper and lower and both of these were divided into four distinct classes. The qualification for each course was laid down and a cadet's promotion from the lower to the upper academy was conditional on his passing an examination held in the presence of an inspector.

3.4.2.1 Lower Academy

First Class

Mathematics: The elements of arithmetic
Classics: Latin grammar and cordory.

Drawing: Simple and easy drawings in black-lead
French: Boyer's grammar, and *Abrégé de L'Histoire de L'Angleterre, par demande et réponse.*

Second Class

Mathematics: The elements of arithmetic applied to practice
Classics: Phædrus, Erasmus, Ovid's *Epistles*, and Nepos.
Drawing: Easy but instructive drawings in indian ink
French: Louis XIV par Voltaire; *Revolutions de Portugal*, par Vertet.

Third Class

Mathematics: Vulgar and decimal fractions, with extraction of square and cube roots.
Classics: Ovid's *Metamorphoses* and Cæsar's *Commentaries*, Virgil and Sallust
Drawing: Landscapes and military embellishments
French: *Mémoires du Marquis de Fenchières, et Gil Blas*

Fourth Class

Mathematics: The principles of algebra, as far as quadratic equations
Classics: Horace and Cicero
Drawings: Theory and practice of perspective
French: *Travels of Cyrus and Belisarius*, by Marmontel to be translated into French.

3.4.2.2 Upper Academy

First Class

Fortification: The elements of fortification regularly explained
Mathematics: The elements of euclid
Drawing: Landscapes in indian ink

Second Class

- Fortification: The attack and defence of fortifications, practical geometry, and the art of surveying
- Mathematics: Trigonometry applied to fortification, and the mensuration of superficies and solids
- Drawing: Large and more difficult landscapes, coloured.

Third Class

- Artillery: The theory of artillery, with the construction of its carriages and the principles on which all pieces of ordinance are constructed according to the tables used in the Office of Ordinance
- Mathematics: Conic sections. Mechanics applied to the raising and transporting heavy bodies, together with the use of the lever, pulley, wheel, wedge and screw, etc.
- Drawing: Landscapes, coloured from nature

Fourth Class

- Fortifications: The theory of mining, together with the use and construction of fougasses
- Mathematics: The laws of motion and resistance, projectiles and fluxions
- Drawing: Perspective applied to buildings, fortifications, etc.

Lieutenant Colonel Buchanan-Dunlop further elaborated these educational requirements in 1892 when he listed the content of the key courses of instruction: (Buchanan-Dunlop, 1892, p 33) See details of course content in table below:



FORTIFICATION.

1. The definitions and explanations of the works of both Regular and Irregular Fortification, correctly wrote and understood.
2. The construction of the 1st, 2nd and 3rd Systems of M. De Vauban, described on paper.
3. The same of M. Coehorn's System.
4. The same of M. de Cormontaigne's System.
5. Irregular Fortification described on paper.
6. The Attack and Defence of Fortified Places.
7. The Art of Mining.
8. The Elements of Field Fortification.
9. How to Trace on the Ground: Permanent and Field Fortification, with and without Mathematical Instruments.
10. To take Plans with and without Instruments.
11. Theory and Practice of Levelling.
12. How to estimate the Works of a Fortification, viz. : Revetments, Ramparts, Ditches, Batardeaux, Powder Magazines, Turned and Groined Arches.
13. To produce a fair copy of the book containing Calculations, Plans, and Sections relative to the Estimates.
14. To produce a complete Course of the above, neatly drawn, containing the Plans, Sections, and Geometrical Elevations, composed of 68 plates.
15. To produce the Field Book containing the Practice on the Ground, the Tracing, and Works of Permanent and Field Fortification, Surveying, and Levelling.

Printed and Manuscript Books made use of in the above Course.

- The Course of Fortification from M. Landmann, comprised in 68 plates.
- The Estimates from M. Landmann's Manuscripts.
- Surveying and Tracing Outworks on the Ground, from M. Landmann's Manuscripts.
- The Attack and Defence of Fortified Places, by Mr. Muller.
- Pleydell's Field Fortification.



ARTILLERY.

1. The definitions and explanations of the several parts of Artillery ; also tables containing the general dimensions and construction of Guns and Mortars, correctly wrote and understood.
2. The general construction of Brass and Iron Guns; Sea and Land Mortars and Howitzers, described on paper.
3. The general construction of Ship and Garrison Carriages, Travelling Carriages, Land and Sea Mortar Beds, described as above.
4. The same of the Iron Work for Ship, Garrison, and Travelling Carriages.
5. The different kinds of Wood made use of for the several sorts of Gun Carriages and Mortar Beds.
6. How to find the Weight of Guns. Mortars, and Howitzers.
7. To find the Quantity of Powder which a Chamber contains.
8. To find the Diameter of Shot and Bores of Guns.
9. To find the Weight of Shot and Shells.
10. To find the Number of Shot and Shells contained in a Pile.
11. To ascertain the Number of Horses necessary to draw the different natures of Ordnance.
12. The Number of Men required to construct a Battery in one night.
13. To produce a Complete Course of the above neatly drawn, containing the Plans, Sections, and Geometrical Elevations, composed of 57 Plates.

Printed and Manuscript Books made use of in the above Course.

- The Course of Artillery from M. Lendmann, in 57 Plates.
- The Construction of Artillery from Major Bloomfield, Inspector, of the Royal Artillery.
- Muller's Artillery.



MATHEMATICS

1. Arithmetic in all its parts.
2. Logarithms: Their nature, use, and construction.
3. Geometry : The Theory from Euclid's Elements ; four first books.
4. Algebra : From the first Elements to the Solution of Cubic and Higher Equations.
5. Trigonometry with Heights and Distances.
6. Mesuration : In Superficies and Solids ; in Theory and Practice, with Surveying and Measuring of Artifice & Works, Buildings, Timber, &c.
7. Conic Sections.
8. Mechanics : Including Motions equable and variable ; Forces constant, variable, and percussive ; Gravity, Sound, and Distances ; Inclined Planes ; Projectiles ; Practical Gunnery ; Pendulums ; Centres of Gravity ; Percussion, Oscillation, and Gyration ; Ballistic Pendulum.
9. Fluxions.
10. Hydrostatics and Hydraulics : Including the pressure, motion, and issuing of Fluids ; the filling and exhausting of Vessels, &c. ; Specific Gravities of Bodies ; Syphons ; Pumps ; Diving Bells.
11. Pneumatics: Including the nature, properties, and effects of the Air and the atmosphere ; with the Air Pumps, Syringes, Condensing Engine, Thermometer, Barometer ; with the method of measuring altitudes by the Barometer and Thermometer.
12. Practical Exercises : Concerning these and various other branches ; as the weight and dimensions and piling of Shot and Shells ; bulk or capacities of various vessels or figures to contain certain weights of Powder ; distances by the motion of Sound ; concerning the effects of variable and constant forces.
13. Resistance of Fluids, as Water, Air, &c., with their action on bodies in motion.
14. Gunnery : Robin's new principles of Gunnery ; Experiments, particularly with the Ballistic Pendulum.

Printed and Manuscript .Books made use of in the above Course of Mathematics.

- Books.-Dr. Hutton's Arithmetic : Logarithms, Mensuration, Conic Sections, and select exercises; Tracts.-Mr. Robin's Gunnery, the 1st vol. of his Works ; Professor Simpson's (of Glasgow) Elements of Algebra ; Rossignol's Geometry ; Bonycastle's Algebra ; Simpson's Algebra for application to Geometry.
- Manuscripts.-Dr. Hutton's Fluxions, Mechanics, Hydrostatics, Pneumatics.
- The above Course of Mathematics is correctly wrote down by the Gentlemen Cadets in their books, with Drawings applicable to the several parts of it.

DRAWING.

With the 2nd Drawing-Master.

- Figure Drawing : The several parts of the Human Figure, from Drawings by the Master.
- Perspective : In Theory and Practice : 1st, Theory of Perspective; 2nd Putting Planes in Perspective ; 3rd, Elevations ; 4th, Measures and Proportions of Figures at different distances ; 5th, Lights and Shadows, Thus far with the Jesuit's Perspective.

With the 1st Drawing-Master.

- With Mr. P. Sandby : Putting Perspective in Practice by copying from Drawings, which qualifies them for Drawing from nature; teaches them the effect of Light and Shade ; and makes them acquainted also with Aerial Perspective. Then to proceed to take views about Woolwich end other places ; which teaches them at the same time to break ground, and forms the eye to the knowledge of it. (Buchanan-Dunlop, 1892, p33)

It is interesting to note that the course is very scientific and although it delves into languages and classics it does not cover any of the humanities. The process of engineering was about understanding the requirements and the terrain and solving problems. Nothing in their training would lead the Royal Engineers to consider societal forces, communities, customs, nor cultures. The course also illustrates that the officers were training to be gentlemen - well read and with knowledge of the classics and classical languages.

With respect to subjects relevant to the technology of building, the theoretical course was heavy on mathematics and physics including arithmetic, algebra, logarithms, geometry, hydrodynamics and pneumatics. The method of teaching was to divide the cadets into classes or levels of competence and provide lectures and examinations both oral and written given by professors (Weiler, 1987).

The theoretical course also included the study of fortification, which comprised practical geometry, perspective in theory and practice and measured drawing. Cadets had to copy

drawings, take views around Woolwich and other places and prepare plans, sections and elevations of an ordinary simple building, with conventional colouring, to show the different building materials and with technical names of different parts printed. The practical course included lectures in chemistry, geology and metallurgy intended to equip engineer and artillery officers with useful knowledge on materials and structures or architecture (Weiler, 1987).

A major benefit of the engineer officer's training was the exposure to some of the finest mathematicians and scientists of the time in Britain. Among these were Charles Hutton (1737-1823), Olinthus Gilbert Gregory (1774-1841), Michael Faraday (1791-1867), Sir Frederick Able (1827-1902) and Peter Barlow (1776-1862). Hutton was appointed Professor of Mathematics in 1773 and remained in the position until 1807. He was author of several publications including A course of Mathematics for the use of Cadets in the Royal Military Academy (1709-1801) which ran through several editions. On Hutton's recommendation, Gregory became mathematics master in 1802 and was appointed Professor of Mathematics in 1807, a position which he held until 1838. Gregory also authored several publications, most notably A Treatise on Mechanics (1806). Faraday, who is best known for his work in electricity and his professorship at the Royal Institution (1833-1862), lectured at the Academy in chemistry from the 1820's to 1852. He was succeeded in the post by Able, chemist to the War Office, another distinguished Victorian man of science. Barlow was appointed in 1801 as an additional mathematics master under Hutton. His career at the Academy lasted until 1847, making him the longest serving member of the educational staff. Barlow was an early member of the Institute of Civil Engineers (1820). Most influential was his publication in 1817 of an Essay on the Strength and Stress of Timber, which went through five editions.

In glancing through the lists of the staff, one can not help being struck by the very long time that some of the instructors filled their billets. Professor Barlow heads the list with forty-one years service, although he is run very close for first honours by the thirty-nine years of Doctor Bonnycastle (mathematics) and thirty-eight years of Mons. Landmann (fortifications). Mons. Landmann was a French gentleman of great ability. Previous to his appointment to the Academy, he had held the position of professor of fortification and

artillery at the *École Royale Militaire* in Paris (Guggisberg, 1900, p 23-24). The Royal Engineer cadets thus, not only received extensive training, but they were also trained by some of the best minds of the time. This was quality education meant to fully equip the army with highly skilled and very versatile elite.

3.4.3 PERTINENT TRAINING MANUALS

A number of training manuals and pocket books from the era remain in the Royal Engineer's Library at Chatham and in the British Library collections; these cover a range of courses and give detailed content. The pocket books are fascinating as they are specifically designed to be carried around in the pockets of Royal Engineers when on tours of duties. The content of a pocket book is brief and explicit. They contain detailed, dimensioned drawings and plans of items discussed. The various pocket books cover both general topics as well as specific tasks, examples are the Regulations for Encampments (1853) later revised as Encampments Made Easy (1908) and the Pioneer Pocket Book: India (1922).

A couple of the training manuals are discussed in the table below to highlight the training pertinent to the founding and laying out of colonies, as well as the skills and tools used by the Royal Engineers. These pocket books were found scattered between the Military Museum library, Saxonwold, Johannesburg, The Public Records Office, the British Library and the Royal Engineers' Library.

Training Manuals
<p><u>Course of Instruction- Practical Geometry and Principles of Plan Drawing</u> (Pasley, 1814) From studying the contents of this manual it offered an intensive course, based on a former geometry training, in plan drawing. It covers solids, superficies surfaces (e.g. surface of a brick (Pasley, 1814, p 4)), plan superficies, curved superficies, line point, right line, curved line, mixed line, parallels, tangents, angles, right angle, perpendicular, oblique</p>

lines, acute angles, triangles, all major shapes e.g. rhomboid, trapezium, etc. cylinders, pyramid etc. The manual goes on to list the tools used as a pair of compasses, drawing pen, ink pot, flat ruler (1 foot long) and a wooden right angle length 6 inches and height 6 inches, slate and pencils. From this it is possible to summarise that the Royal Engineer were trained to draw with a high degree of accuracy and the minimum of tools, a skill necessary when posted to remote locations.

Course of Practical Surveying and Astronomy (Sandham, 1855, p. 60) The section begins by stating it is a course of survey instruction "...in which junior Officers of the Royal and Honourable East India Company's Engineers are taught and practised at the Royal Engineer Establishment is intended to be such as shall fully qualify them for survey operations, - either for general purposes, such as occasion may demand, whether on Home Service or in the Colonies, but which may be considered as perhaps more especially applicable to the latter, - or for military purposes, as Reconnaissance, or sketches of Positions, etc. on active service in the field, - or for special purposes, as the purchase and sale of lands, **the framing of Plans for the purpose of laying out Towns or Fortifications** (in which the practice of contouring forms an essential part), -or finally, for taking part in the operations of the great national survey, under the Ordinance..."(Sandham, 1855, p.60) The training covered General Survey, The Selection and Measurement of a Base Line, Triangulation, Traversing, Plotting of Detail, Drawing from Models, Levelling, Special Survey, Contouring, Military Reconnaissance, Barometrical Measurements (to check heights trigonometrically obtained), Practical Astronomy (specifically to find time, latitude and Longitude, direction of the Meridian and the variation of the needle), Meteorological observations, construction and adjustment of instruments. The manual specifically mentions training in the use of the Gunter's Chain, 5 inch Theodolite, Spirit Level, barometer, as well as several astronomical and meteorological instruments.

Course of Architecture (Sandham, 1855, p.58) Each cadet was given a series of plates in order to familiarise him with the various properties and proportions, as well as the application of the materials used in the buildings. It was expected that by careful examination of the plates the officers would acquire a degree of useful information which would qualify them for ordinary duties of the Corps, in designing buildings for all military purposes. The officers also attended courses on properties of materials, on brick making and lime burning, on the conversion of timber, and on roofing and foundations. They were also trained to measure and make abstracts and bills of quantities. During the time they were engaged on the course they were also required to read some of the best authors on Architectural Construction such as Tredgold, Barlow, Nicholson, etc.

Architectural Course- 1867 (Wray, 1867, pp.2-3) Further detail of the Architecture training is gained from the 1867 Synopsis of Courses of Instruction.

The course is divided into 5 parts.

- PART 1 THEORY OF CONSTRUCTION.

This part consists of a series of examples in construction, about 50 in number (Appendix: A.), which will be varied from time to time. They are drawn up with a special view to the application of the mathematical knowledge already possessed by the Officers to some of the cases, which they are likely to have to deal with in practice.

References are given in the margin of the printed-paper of examples to some of the many books in which the information necessary for their solution can be found.

The Instructing Officer will explain every morning, except Saturday, as many of the examples as he considers the Officers

can work during the remainder of the day.

The object of these short explanations is two fold :-1st. To explain the principles on which the particular cases or similar cases are to be dealt with. 2nd. To impart in a condensed form some of the varied information which is familiar to all Engineers of experience, but which an Engineer at the commencement of his career, often has a difficulty in finding. The Officers will take notes of these explanations and write each morning's notes at the head of the fair copy of the examples to which they refer.

The examples explained on each day are to be worked out on that day in the fullest manner; the reasoning of each step is to be stated ; and all rough calculations are to be left on the paper, so as to lessen as much as possible the labour of examination. They are to be brought to the Instructing Officer the following morning, and, after examination, are to be written out fair on ruled fools- cap, quarter margin, on the right hand sheet, with explanatory diagrams to a large scale, where necessary, on the left hand sheet.

The weights, strength of materials, and other information will be found in the printed tables.

This part of the course occupies about 5 weeks, and while it continues leave will be granted on Saturdays and Sundays only.

- PART II. MATERIALS.

The object of this part of the course is to give the Officers some sort of guide in judging of the quality of the principal materials which they will have to use, as well as to afford them Information as to the particular material most suitable for a building or engineering work.

It may be subdivided into 3 parts, viz.,-Lectures given by Professors in the Lecture Theatre ; Lectures given by the Instructing Officer ; and visits made by the officers to Lime Works,

Cement Works, Brickfields, &c.

The lectures in the Lecture Theatre are delivered at the periods most convenient to the lecturer, but the notes taken by the Officers form a part of this course, and will be bound up with the rest of the papers.

The notes of the lectures delivered by the Instructing Officer are to be written out fair, in accordance with the instructions given further on, (Tour Reports and Lectures) and brought to the Instructing Officer on the following morning.

A printed paper detailing the particular points to which officers visiting manufacturing works are to direct their attention will be given to each officer, and a report is to be sent in as soon as possible after each visit to the Instructing officer.

Sketches-which should be dimensioned-to illustrate the lectures and visits, are to be as numerous and complete as possible.

This part of the course, occupies about 3 weeks, inclusive of the time required to visit the works referred to.

The officers will also be instructed after they leave the Architectural Course, in the method of testing the quality of some of the materials by chemical analysis, for which a fortnight is allowed.

- PART III. PRACTICE OF CONSTRUCTION.

Subdivision 1: Military Buildings.

The notes of this part are printed under the title, of, '(Notes on Military Building" by Colonel Collinson, R.E., and a copy is issue to each officer. They are to be carefully read. The lithographed, drawings (Appendix B) are intended to illustrate these notes, and the officers will colour such parts of them as are coloured in the patterns books deposited in the Hall of Study. This colouring is to be done from the original copies, and not from- the pattern books

or drawings of other officers.

There are a few corrections and additions to be made on these lithographs, which are indicated by a red cross on the lithographs in the pattern book.

It is to be understood that these drawings are not intended to be models of their kind, but are merely good examples which may be of use to Officers in designing buildings or works of a similar character.

Appendix C is a list of photo-lithographs, which afford useful information as to dimensions required in designing different buildings.

Subdivision 2: Ordinary Buildings.

The notes of this part of the course are printed under the title "Notes on the practice of Building," by Colonel Collinson, R.E., and are issued to each Officer. They are a collection of short practical memoranda, extracted by Colonel Collinson, R.E., from good authorities on the application of theory to practice in construction, and on practical details in construction. They are to be carefully read.

The 'copper-plates (Appendix D) issued to each officer contain most of the details of the construction of an ordinary building. Some few details, which it appeared desirable to add are to be supplied by the sketches detailed in Appendix E.

Portions of the copper-plates (Appendix D.) are to be coloured by the Officers from pattern drawings deposited in the Hall of Study.

The sketches (Appendix E.) are to be drawn and coloured (to scale or freehand as the Officer prefers; but in either case with dimensions written b) from the originals deposited in the Hall of Study. c) All the drawings in this part are, in order to prevent loss of the originals, to be executed in the Hall of Study.

Two weeks are allowed for these drawings, in all of which the

colouring should be of a decided character.

Subdivision 3: Workshops.

Each Officer will in turn be attached to the Officer in charge of the Workshops for a short time, probably a fortnight, with the object of giving him an opportunity of becoming acquainted with the books and forms in ordinary use in Royal Engineer Offices, as well as of seeing some of the ordinary building work in course of preparation.

- PART IV. VALUATION AND MEASUREMENT OF WORK.

This part will commence with one or two lectures on the different systems of carrying out work-by day work, piecework, or contract-of which the officers will take notes.

They will ultimately be printed.

A printed form of estimate for a building, of which a model has been made, will then be issued to each Officer. In this form the different kinds of work required is filled in, but the Officers will write in the quantities. The Instructing officer will go through the estimate with the officers, explaining by means of models and sketches the different kinds of work, and the mode of measuring them, and each officer will fill in the dimensions as he proceeds. These dimensions need not be squared out, but the method of completing the estimate will be explained so as to enable each officer to take away with him a pattern estimate for his future guidance.

The Officers will afterwards measure some part of one of the buildings in course of execution in the district, squaring out the dimensions and abstracting the quantities preparatory to bringing the work into bill. Two weeks will probably be sufficient for this part of the course.

- PART IV. DESIGN.

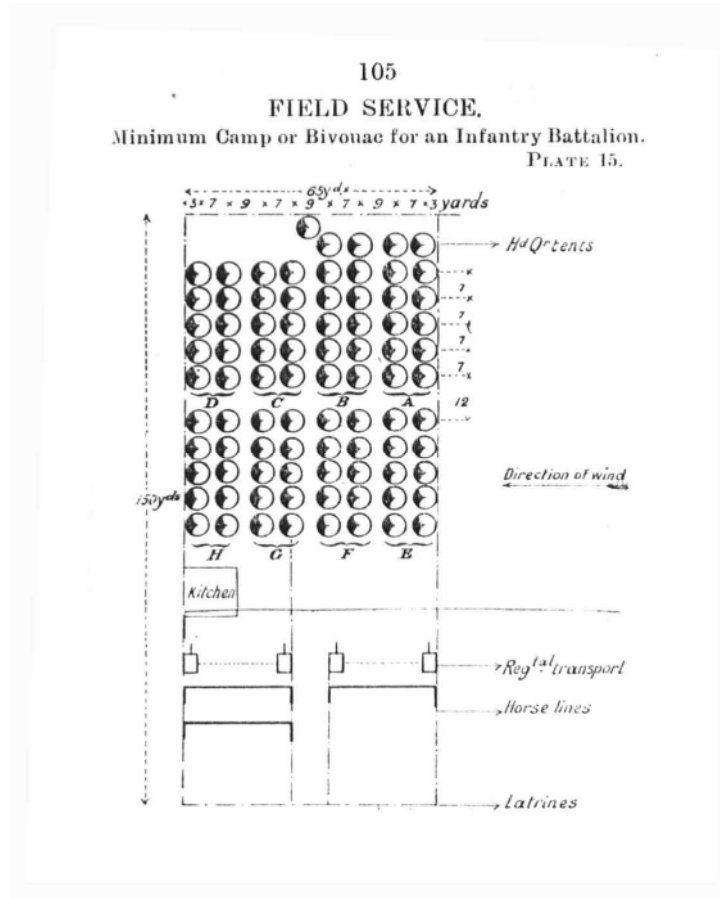
The design is intended to afford to each officer an opportunity of applying the knowledge he may have acquired on the course to some case which he may actually hereafter have to deal with. About 6 weeks are available for this part of the-course, and the conditions under which the design is to be made will be furnished to each officer.

As a rule, the design will consist of a general plan and report, with some part worked out in detail; this part being specified for and estimated.

The drawings are to be prepared in accordance with the instructions deposited in the Hall of Study. (Wray, 1867, pp.2-3)

Notes on Military Buildings (Collinson, 1865) This manual covered detailed aspects of design for the following Barracks (infantry, cavalry, artillery), Cookhouse, Latrine and Drainage, Wash-house, Hospital, Commissariat Department, Military Store, Barrack Department, Educational Buildings, Recreational Buildings, Revetments, Casements, etc. What is particularly interesting in this book are the numerous drawings of platoons, wagon trains, etc with dimensions. Examples provide very practical information which could easily be translated into street widths, parade sizes etc. (Figures 118 -123)

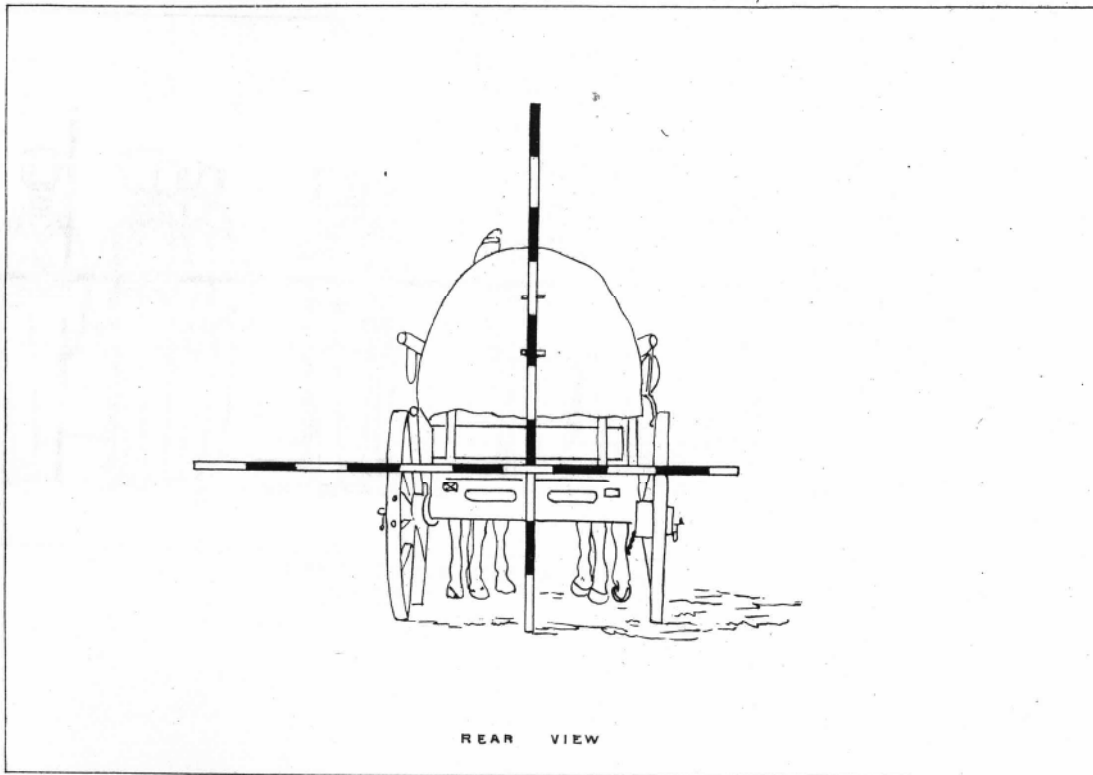
Figure 16: Example of Royal Engineer's Pocket book (actual size)
(Regulations for Encampments, 1853:105)





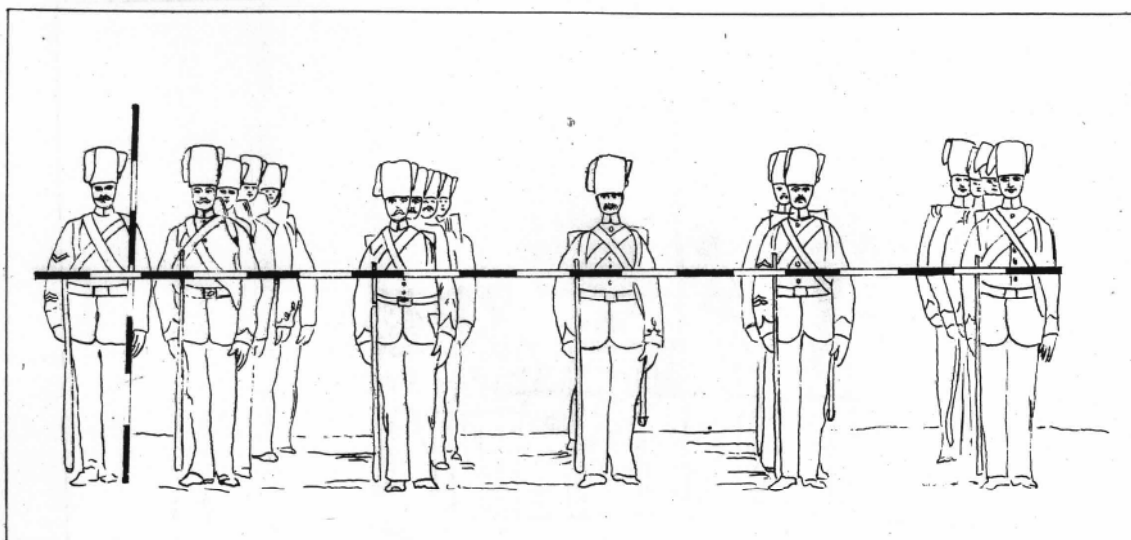
Figures 17 – 21 Examples from Royal Engineers Pocket Books (all actual size)
(Regulations for Encampments, 1853)

MILITARY TRAIN (BAGGAGE WAGON.)



THE RODS ARE DIVIDED INTO FEET.

MEN IN POSITION



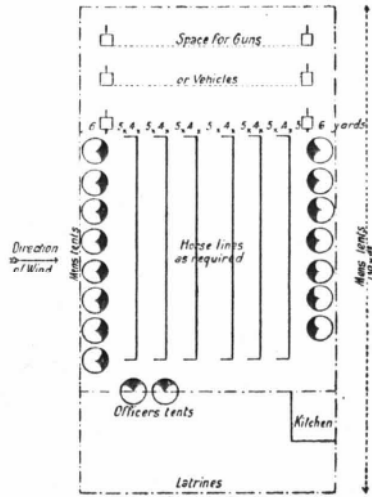
THE RODS ARE DIVIDED INTO FEET.



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FIELD SERVICE. PLATE 14.

Minimum Camp or Bivouac for a Battery, Ammunition Column
or other unit having many Vehicles.



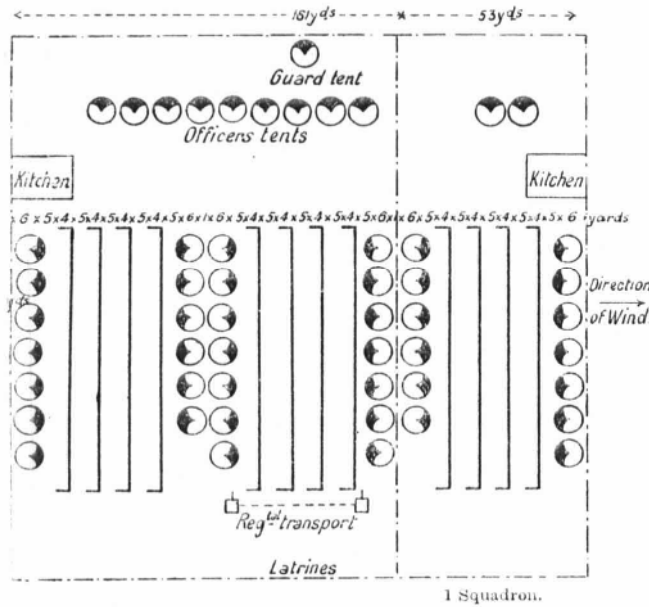
NOTES.—1. The minimum frontage allowed depends on the number of horse lines necessary. For units having 2 horse lines allow 35 yards, and add 9 yards for each additional horse line.
2. A brigade R.A., including its Ammunition Column, will usually camp or bivouac in the same way as a Cavalry Regiment.
3. When plenty of ground is available, an additional interval of four yards may be allowed in rear of each row of heel pegs, to allow the horses to be swung round on their heel pegs on to fresh ground.

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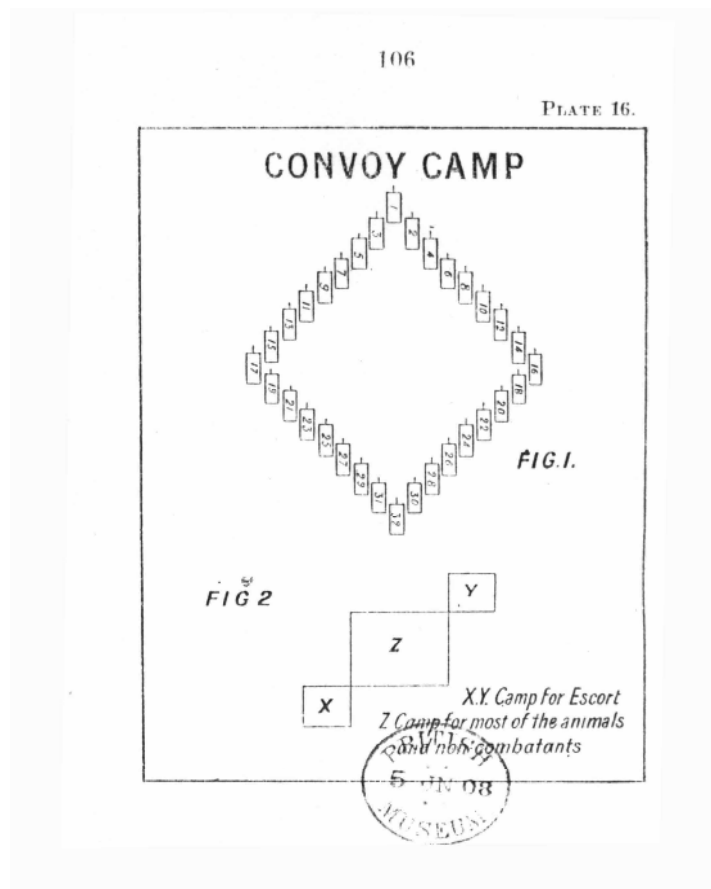
FIELD SERVICE.

Minimum Camp or Bivouac for a Cavalry Regiment.

PLATE 13.



NOTE.—Mounted Infantry camp and bivouac in exactly the same way as Cavalry.



(Regulations for Encampments, 1853)

3.4.4 POCKET BOOKS

Numerous pocket books are available in the Royal Engineer's Library at Chatham as well as in the British library, which are also of relevance to this study, in that they are comprehensive and explicit manuals in the field. A few examples of those in the British Library are:

The Royal Engineers Pocket Book, 1936. [With maps.] ENGLAND. Departments of State and Official Bodies. Army. Royal Engineers. London, 1936. 8o.
The Royal Engineers Field-Service Pocket-Book. By Major G. K. Scott-Moncrieff. ENGLAND. Departments of State and Official Bodies. Army. Royal Engineers

pp. vi. 367. Royal Engineer Institute: Chatham, 1894. obl. 12o.

Royal Engineers Supplementary Pocket Book.

ENGLAND. Departments of State and Official Bodies. Army. Royal Engineers
[London,] 1948- . 8o.

Abstracts from the meteorological observations taken at the stations of the
Royal Engineers in the year 1853-4. with a brief discussion of some of the
results and notes on meteorological subjects. edited by H. James
1855

Notes for officers proceeding to India. Compiled by A.T. Moore
Moore. A. T.
1912

Papers on subjects connected with the duties of the Corps of Royal Engineers
1837-1876

Abstracts from the meteorological observations taken in the years 1860-61, at
the Royal Engineer Office, New Westminster, British Columbia. edited by Sir
Henry James
1862

Several of these warrant specific description:

- Regulations for Encampments (1853) This pocket sized book spells out the principles and gives practical examples of how to layout encampments. It is however, very pragmatic as it states: "Although troops must be guided in the position and form of their encampments by the shape and nature of the ground, the proximity of wood and water, and in actual warfare by the variety of considerations

which defy all rules, it is nevertheless desirable that certain definite forms of encampments should be established by authority, to be departed from in all cases whenever circumstances shall make it desirable to do so for the convenience and efficiency of the troops” (Regulations for Encampments, 1853, p.1). The pocket book goes on to give four broad principles to govern the disposition of all camps of whatever form, these are a) the front of the camp be made to correspond in extent with the front occupied by the troops in line, b) that means of passing freely through the encampment with a large front be maintained, c) that tents be disposed with a view to the greatest amount of order, cleanliness, ventilation and salubrity, and d) that the camp be as compactly arranged as the above considerations permit (Regulations for Encampments, 1853, p.2).

- Encampments Made Easy (1908) This pocket sized book (actual size 8.5cm x 12cm), although published after the time frame of this study is interesting as it represents the information learnt in the establishment of encampments over the period between the two books and hence over the period of this study. The most striking advance is the incorporation of public health and concerns over drinking water, sanitation and ventilation. This is not surprising if one considers the lessons learnt in public health and hygiene over the Crimean War and the disastrous concentration camps run by the military during the Anglo Boer War. Selected sections of this book are highlighted as they spell out the laying out of camps in technical terms as well as giving the rationale behind instructions. This is of relevance to the study as it is possible that many of these principles could have been applied to town layout. The points below are laid out in the order in which they appear in the book and under the headings given in the book, the layout of the book and the headings used make the book very easy to use as a quick reference work.
- Choice of Ground In the presence of an enemy, tactical considerations, e.g. favourable ground for defence in the event of attack, concealment, facilities for protection, and consequently, economy in outposts, are of first importance. The comfort of the troops, in conjunction with the sanitary conditions, is the next consideration.(p2)

- Water Supply A good water supply is essential. But considerations of safety may necessitate a camp or bivouac being placed at some distance from it. Other points to be considered are the facilities, which a site offers for obtaining shelter, fuel, forage and straw.(p3)
- Site to be Dry The site for a camp or bivouac should be dry, and on grass if possible. Steep slopes must be avoided, but gentle slopes facilitate drainage. Large woods with undergrowth, low meadows, and newly turned soil are apt to be unhealthy. Clay is usually damp. Ravines and watercourses are dangerous sites, as a sudden fall of rain may convert them into large streams. (p.3)

Allotment of Ground

- Each Body of Troops to be Kept Together Each commander, in his own degree divides the area available for bivouacking, billeting or camping among the bodies of troops under his orders. Each organized body of troops should be kept together under its own commander. There should seldom be difficulty in effecting this, where bivouacs or camps are concerned; in billets, however, to admit of stabling being fully utilised, it may be necessary to mix the arms. (p.4)
- Boundaries to be Clearly Defined When ground is allotted either by the commander of an army to the officers commanding divisions, or by these officers to brigadiers, or by them again, to officers commanding units, the boundaries of the area for which each commander is responsible must be clearly defined. If a road, a ditch, a stream, or any similar feature is the dividing line, the responsibility for looking after it must be assigned to one of the commanders. (p.4)
- The ground to be allotted before Troops Arrive The allotment of ground should, if possible be completed in time to admit of officers commanding units, or their representatives, making adequate arrangements before the troops arrive. (p.5) The book goes on to explain how to dispose of dead animals, where and how to position latrines and kitchens (these are at opposite ends front, rear or flank) and what roads are to be used by various ranks and regiments.
- Prominent Features of the Ground to be Communicated The names of prominent features of the ground near camps, bivouacs or billeting areas should, if they are

not shown on the map, be communicated to officers taking over areas. Names should be invented for such features if none exist. (p.7)

- Camp and Bivouac Spaces The following tables are given as an aid in working out the space required in bivouacs or camps, on field service, in a fairly level and open country, and in estimating the accommodation of a billeting area. In the table the first number is the frontage and the second the depth. (pp.7-8) These dimensions are very interesting and show similarities to the dimensions of towns laid out by Royal Engineers.
 - In this section it also states that dwellings should be divided into classes and a type of each class examined and then the number and distribution of each class ascertained. This is an obvious physical manifestation of the army hierarchy into the class system expressed in the quality and size of accommodation.
- Water Supply to be Marked with Flags An advance party composed of engineers will mark the water supply with flags as follows: white for drinking water, blue for watering animals and red for washing and bathing places. (p.22)
- Horses, How watered At a stream below the place where troops drink, but above the place where troops wash. (p.22)
- Administrative Districts when large forces, e.g. one or more divisions are concerned, bivouacking, billeting or camping areas will, for purposes of good order, supply sanitation and the necessary measures of internal defence, be divided into administrative districts, the senior officer in the district being termed the district commandant. (p.11)
- Market Place In each district a place for a market will, if necessary, be selected, and a tariff of prices arranged. All persons coming into the district to sell articles of any kind must be confined to this place. (p.13)
- Frontage Required for a Horse Horses should be picketed in lines, facing away from the prevailing wind if possible. A horse when picketed requires a frontage of about 4 feet 9 inches and a distance of four yards from picket line to heel peg. (p.24)
- Sanitation Latrines must be at least 100 yards from (and Leeward of) water supply and kitchens.

- Ventilation and movement A space of one yard must be left between pegs of one tent and those of the tents adjoining it. A gangway of ten yards is the usual interval between units. (p.31)

There are a number of scale drawings in the pocket book depicting the layout of encampments. These layouts clearly depict a grid layout

- Pioneer Pocket Book India (1922) This book although after the period of focus in this study is interesting as it illustrates the purpose of the pocket books, it begins by stating that this pocket book "...aims to be a handy book of ready reference, portable enough to be carried in the field". The book is based on the Manual of Field Works (1921), Pioneer Manual (1909) and Notes on Hill Road Making, Useful data for bridging, and light railways.

These books were thus practical reminders of the courses the Royal Engineers studied, they contained the main dimensions statistics, formulae and other readily needed reference material.

3.5 DEPLOYMENT

Royal Engineer officers were never deployed as units; they were used as skilled staff added to other military units, the Corps of Royal Engineers are considered as a combat support arm. That is why in the beginning of this chapter it was stated: "The Corps has no battle honours of its own, its motto '*ubique*' ("everywhere"), awarded by King William IV in 1832, signifying that members of the Corps have taken part in every battle fought by the British Army in all parts of the world" (www.army.mod.uk). Royal Engineers were assigned as needed as individuals or small groups and very often as officers in command of non-engineering troops. They were considered the professional staff and assigned judiciously. The non-commissioned officers who served under the Royal Engineer Officers were the sappers and miners; the Royal Engineers also raised a number of militia and volunteer units.

Evolution of the Corps
(Royal Engineers' Museum www.remuseum.org.uk)

Officers	Soldiers
<p>King's Engineers of Norman and Medieval times.</p> <p>1716 Corps of Engineers (controlled by Board of Ordnance) in 1757 military rank was granted to Corps of Engineers.</p> <p>1787 Corps of Royal Engineers (controlled by Board of Ordnance).</p>	<p>Skilled levies</p> <p>1772 Company of Soldier Artificers raised in Gibraltar (controlled by Board of Ordnance, commanded by Corps of Engineers).</p> <p>1787 Corps of Royal Military Artificers (controlled by Board of Ordnance, commanded by Corps of Royal Engineers).</p> <p>1812 Corps of Royal Sappers and Miners (controlled by Board of Ordnance, commanded by Corps of Royal Engineers).</p>
<p>1856 The soldier Corps of Royal Sappers and Miners amalgamates with the officer Corps of Royal Engineers to form the Corps of Royal Engineers (controlled by the War Office).</p> <p>1862 Bengal Engineers, Bombay Engineers and Madras Engineers of the late Honourable East India Company Army (HEICA) transferred into the Corps of Royal Engineers.</p> <p>1957 Gurkha Engineers (raised in 1948 and granted Royal title Queen's Gurkha Engineers in 1977) affiliated to the Corps of Royal Engineers.</p> <p>1992 Women of the Women's Royal Army Corps serving with Royal Engineer units were transferred into the Corps of Royal Engineers.</p>	

The auxiliary forces (the militia and volunteer units) have their origins in the Militia Act (1757) and the Volunteer movements of the 1790's and 1860. The demands placed upon Britain to provide the recruits for the British forces engaged in overseas conflicts against the French during the Seven Years War (1756-63), seriously depleted the home defence capability. In 1757 the Militia Act was passed to enrol 32 000 men by ballot for a term of three years service at home. The Act and its terms were amended in following conflicts to include, in some cases, overseas service and so set the precedence for the terms of engagement for military service when the Board of Ordnance was finally abolished in 1856 and the Corps came under the command of the War Office. Until that time the Board of Ordnance had its own system of recruiting for the Ordnance Trains which were raised to accompany the field army for each campaign (Napier, 2005).

The other source of auxiliary troops was the Volunteer movements of 1790's and 1860, where individuals volunteered their services for home defence. They were raised in an atmosphere of fear of invasion from France. These Volunteers, which ran in parallel with the Militia, cost the Government little for their members provided their own arms and covered all their personal expenses except for when they were on active service. Some examples of these units were:

- **Engineer and Railway Volunteer Corps - 1865-1993:** The Engineer and Railway Volunteer Corps was raised in 1865 as one of the Volunteer units. It consisted of entirely Volunteer officers drawn from the managers and engineers of the principal railways of the day.
- **Royal Monmouthshire Royal Engineers (Militia):** One of the first militia units to become part of the Corps of Royal Engineers was The Royal Monmouthshire Royal Engineers (Militia), which traces its history back to 1539 when it was an infantry unit. In 1877 it converted to an engineer role with opportunities for overseas service. At the beginning of the **Anglo-Boer War** (1899-1902) the Regiment was embodied and sent three companies to South Africa to carry out building, bridging and railway work.
- **Royal Anglesey Royal Engineers (Militia):** Shortly after the Royal Monmouthshire Militia had become a Royal Engineers unit another Welsh militia unit, the Royal Anglesey joined the Corps (1877). The unit was first raised as the Anglesey Militia in 1762. During the Napoleonic Wars (1809-15) it was titled 'Royal Anglesey Light Infantry Militia' (1810). As an engineer unit it saw service in the **Anglo-Boer War** (1899-1902).
- **Submarine Miners Militia and Volunteers – 1880's:** During the 1880's the defence of the ports in the British Isles and the Empire became a priority. The responsibility for their defence fell jointly upon the Royal Navy and Royal Engineers, the Corps' contribution was the Submarine Mining Service. After 1885 the service was expanded rapidly, and that expansion was met by the formation of Militia and Volunteer Submarine Mining units both at home and abroad

- **Telegraph and Postal-** 49th Middlesex Rifle Volunteers Corps -1870: After the nationalisation of the private Telegraph Companies in 1870, the Royal Engineers provided two companies to assist the General Post Office (GPO) in telegraphy work. This event gave rise to the formation of a Telegraph company raised from the Telegraph branch of the GPO as part of the 49th (later 24th) Middlesex Rifle Volunteer Corps. In 1880 the 49th was renumbered 24th. Sanction was given in 1883 to increase the strength of the company to 200 and that branch of the 24th Middlesex Rifle Volunteer Corps thereafter appeared separately in the Army List as 'Telegraph Companies'.
- **Corps of Electrical Engineers – 1897:** In 1897 a new volunteer corps was organised to assist the Submarine Mining Service. They provided search lighting. The officers of the Corps of Electrical Engineers were recruited from men of science and leading members of the electrical profession; the rank and file were practical electricians or students of electrical engineering. The Corps of Electrical Engineers provided the 2nd Searchlight section for service during the Anglo-Boer war (1899-1902).

Engineer Auxiliary Establishment - 1886

In 1886 the establishment for the Auxiliary Forces of the Royal Engineers in Britain stood as follows (Royal Engineers' Museum www.remuseum.org.uk):

Unit	Size	Type
Royal Anglesey, Royal Monmouthshire	Battalion (x 2)	Militia
1st (Hampshire), 2nd (Hampshire) 3rd (Devonshire), 4th (Kent) Submarine Mining	Company (x 4)	Militia
Aberdeenshire, Cheshire 1st Gloucestershire, 2nd Gloucestershire Hampshire, Lanarkshire, 1st Lancashire, 2nd Lancashire 1st London, 1st Middlesex Newcastle-on-Tyne, Northamptonshire Tower Hamlets 1st Yorkshire, 2nd Yorkshire	Battalion (x 15)	Volunteer
Engineer and Railway Volunteer Corps		Volunteer

It is interesting when studying biographies of various Royal Engineers (see Section C) how many posts they had and how individuals moved around the British Empire, most of them moved from colony to colony and many of them became governors.

The Colonial Governors - 1776-1914

The choice of a Royal Engineer officer as governor was often determined by the needs of the colony at the time of his appointment (e.g. major military or civil works project or boundary settlement). Below is a list of Royal Engineer officers who have held governors appointments (Royal Engineers' Museum www.remuseum.org.uk).

**This table was taken from the Royal Engineers Museum, however there seem to be some glaring omissions for example Gordon, Kitchener, Guggisberg which have been added by the author.*

The rest of the table should be read as a guide only.

Name	Colony	Dates
Lt Col Blount	St Helena	1886
Sir James Carmichael Symth	British Guiana (now Guyana)	1833-1836
Sir Frederick Chapman	Bermuda	1867-70
Maj Sir JR Chancellor	Mauritius	1911-1914
Lt Gen Sir HC Chermiside	Queensland, Australia	1902-1905
Lt Gen Sir Andrew Clarke	Straits Settlement (now Singapore)	1873-1875
Lt Gen Sir W Denison	Van Dieman's Island (now Tasmania)	1846-?
	New South Wales, Australia	?-?
	Madras, India	? - 1866
Lt Gen GA Elliott	Gibraltar	1776-1790
Sir Charles Fox Smith	Trinidad, West Indies	1828-1831
Lt Gen Sir TLJ Gallwey	Bermuda	1882-1888
Sir George Gipps	New South Wales, Australia	1838-1846
Col Sir EPC Girouard	Northern Nigeria	1907-1909
	East African Protectorate (now Kenya)	1909-1912
Gordon	Governor –General Sudan	1874-1879
Guggisberg	Governor of the Gold Coast	1919-1927



Name	Colony	Dates
Lt Gen Sir William FD Jervois	Straits Settlement (now Singapore)	1875-1877
	South Australia	1877-1882
	New Zealand	1883-1889
Kitchener	Consul-General Egypt	1911-1914
Maj Gen Sir R Laffan	Bermuda	1877-1882
Col Sir HE McCallum	Lagos (now Nigeria)	1897-1899
	Newfoundland (now part of Canada)	1899-1901
	Natal, South Africa	1901-1907
	Ceylon (now Sri Lanka)	1907-1913
Capt RC Moody	Falkland Islands	1842-1848
FM Lord Napier	Gibraltar	1876-1882
Lt Col Sir M Nathan	Gold Coast (now Ghana)	1900-1903
	Hong Kong	1903-1907
	Natal, South Africa	1907-1910
Maj Gen Sir Harry Ord	Dominica	1857-1861
	Bermuda	1861-1863
	Straits Settlements (now Singapore)	1867-1873
	Western Australia	1987-1880
Maj Gen Sir William Reid	Bermuda	1839-1846
	Barbados and Windward Islands	1846-1848
	Malta	1851-1858
FM Sir JLA Simmons	Malta	1884-1888
Col Lord Sydenham	Victoria, Australia	1901-1904
Lt Gen H Wray	Jersey, Channel Islands	1887-1892

It is difficult with any degree of certainty to establish exactly how many Royal Engineers were in South Africa at any given point. In the early years three Royal Engineer officers

were in the Cape and later only one Royal Engineer was in post (See Section C). During the time frame of this study a variety of names appear in the archives and text and on maps and plans drawn at the time these are discussed in section C. It was the intention of the author to list all the Royal Engineers involved in South Africa and offer biographies where available however, the fragmented historic records made this impossible. The study offers the names and biographies of Royal Engineers known to be in South Africa during the time frame of this study in Section C. In the period immediately after the study however, the Royal Engineers' Museum lists the Royal Engineers numbers during the Zulu Wars and the Anglo Boer Wars as follows:

- **Zulu War - 1878-79:** The British forces were commanded by General Lord Chelmsford (1827-1905), who lost a major part of his army to Cetshwayo's Zulu impis at the battle of Isandhlwana (22 January 1879), among those killed was Colonel A W Durnford (1830-1879), Royal Engineers, commander of the Natal Native Contingent. The engineer units involved in the war were:
 - 2nd Field Company (Captain WRC Wynne RE) - despatched from England 2 December 1878
 - 5th Field Company (Captain WP Jones RE) - despatched from England 2 December 1878
 - 7th Field Company (Major FW Nixon RE) - the resident Royal Engineer unit in South Africa at the time.
 - C Telegraph Troop (Major AC Hamilton RE) - arrived in South Africa in May 1879
- **Anglo-Boer War - 1899-1902:** During the Anglo-Boer War (1899-1902) engineer Militia and Volunteers units were deployed in the Lines of Communication (L of C) areas, carrying out building, bridging, telegraph, electrical and railway work.

Their deployment figures for the period December 1899 to January 1900 were:

Type of Unit	Officers	Other ranks	Total
Militia	8	250	258
Volunteers	23	407	430
Totals	31	657	688

In May 1901 the figures were:

Type of Unit	Officers	Other ranks	Total
Militia and Volunteers	49	1,020	1,069

(Royal Engineers' Museum www.remuseum.org.uk)

3.6 THE RELEVANCE OF THE ROYAL ENGINEER'S TRAINING IN THE COLONIAL CONTEXT

It is interesting to note from the structure of the training course and all of the pocket books and manuals that the overriding method of instruction was to learn from example. Cadets were introduced to examples of buildings and learnt by copying, apprenticeships and reading recognised experts. This would go a long way to explaining the high degree of similarity of town layouts, as the Royal Engineers would apply a known solution to a problem. Creativity and unique designs would have been considered less important than functionality and order. Even the freehand art courses aimed at recording surroundings rather than abstract art. The cadets were taught to observe and to learn by example, thus having visited a town which functioned they would be inclined to emulate it if they had to lay out a new town. The courses are also overwhelmingly scientific with a strong emphasis on mathematics and its application.

It is also very interesting to note that many of the skills are directed at peace-time needs and not just war. Indeed The Report of the Committee on Duties and Training of Royal Engineers Field Units (1899) specifically states "A sapper should always be employed at civil work when he is not training, he must be perfectly trained, but the training should be arranged so as to interfere with civil work as little as possible." (1899, p.19)

It would seem that the military side was a necessary addition to the Royal Engineers skills rather than the only rationale for his training. Weiler summarised the main characteristics of the Royal Engineers; firstly with regards their formal training he states (Weiler, 1987, p.439) "(the) Royal Engineers had superior theoretical education but inferior practical training to Civil Engineers and Architects of their time. They learned principally on the job

and arguably best in civil employment as opposed to military duty. Their sound theoretical education, albeit not as good in some respects as foreign military engineers, especially the French, seems to have been a major factor in their considerable versatility and ability to learn a succession of new jobs quickly and well. It also served as an excellent background for an experimental aptitude.” Records note that the Royal Engineers sought technical and scientific advice from others and often employed experts to help with design thus, further enhancing their ‘on-the-job’ training (Napier, 2005; Weiler, 1987; Porter, 1951; Finch, 1951).

The Corps of Royal Engineers was small in numbers compared to civil engineers as a profession, but its contribution was arguably considerable for its size. Moreover, the Corps’ achievements were particularly notable considering the extremely low percentage of engineer officers whose fathers were engineers or from other building professions or occupations, in marked contrast to civil engineers and architects where the percentage was high. It was probably an advantage to be from a building profession family in times when the apprenticeship system prevailed as the usual route to knowledge and skill. Even so, Royal Engineers, by virtue of their ‘scientific’ education and social position as military officers, were highly regarded as professionals. It was because of their social and professional status that Royal Engineer officers were entrusted by the state with important civil appointments, notwithstanding the fact that their services could be obtained more cheaply than civilians of comparable knowledge and skill (Weiler, 1987,p.449). Promotion for Royal Engineers in the army was by strict seniority only and therefore there was no incentive to seek advancement by meritorious works. Nevertheless no explicit evidence has been found that this situation discouraged excellence. The call of duty seems to have been a strong substitute (Weiler, 1987, p.441). It could also be argued that removing the need for self-advancement may well have promoted a greater sharing of ideas and teamwork (Napier, 2005; Weiler, 1987; Porter, 1951; Finch, 1951).

The Royal Engineers made major contributions both at home and abroad. They played a major role in the global diffusion of building technology through the British imperial expansion in the nineteenth century. Technology transfer in building materials, structural forms and methods of construction was a two way process. It involved the interaction of

European experience with indigenous environments, traditions and techniques. The Royal Engineers provided both military and building technology expertise for British imperial expansion and were therefore in the front line of European interaction with colonial conditions and cultures. Still, this important global phenomenon has been little exposed by scholars except in general terms (Morris, 1983; Weiler, 1987).

The fact that most of the lecturers were people of immense ability is also important. The Royal Engineers were exposed to the best minds of the time; the education was of a high standard and comprehensive. The lecturers also all served long tenures thus; successive years of engineers all received the same training from the same lecturers ensuring a standardised programme and continuity. Analysis of the courses shows that the training was overwhelmingly technical, scientific and rational; it was a practical course in building an empire, there was never any pretence of asking residents what they wanted in the modern “public participation mode”, the engineers were trained to solve problems, come up with practical solutions and then implement them. But importantly they were trained to emulate good solutions and designs, so they learnt to analyse other solutions and implement the best known designs.

It is important to note that although the Royal Engineers had a scientific training many of them showed notable artistic flare. Many paintings by Royal Engineers survive which show more than technical skill. Furthermore, certain town designs such as Adelaide, Khartoum and Queenstown show a design flair. Modern planning training course materials often speak of the “art and science” of planning. The Royal Engineers show that although they were taught the science of development this clearly did not limit those with natural artistic flair.

The detail in the pocket books demonstrates that the Royal Engineers clearly had standard ideas of street widths, turning room, sanitation, separation of land uses (for example separating latrines and stables from living areas), these were however guides and were not imposed standards.