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Tracing the origins of the Southern African building regulations, with specific reference to the period between 1650 and circa 1740

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Abstract

This paper uses contemporary definitions of building regulations and building standards to establish the first performance standard (and the source of building regulations) for Southern Africa. Specific focus is given to the period between 1650 and circa 1740. The author argues that the original premises remain relevant in the built environment.

Keywords: Building regulations and its origin, building standards, building codes, Code of Hammurabi, Jan van Riebeeck, regulating the built environment

Abstrak

Binne die artikel word 'n kontemporêre definisie van 'n bouregulasie en boustandaard gebruik ten einde die eerste voldoeningstandaard, asook die oorsprong van bouregulasies vir Suider-Afrika, te bepaal. Daar word spesifiek verwys na die periode 1650 tot circa 1740. Die gebruik van die gemelde bouregulasie-definisie illustreer die universele geldigheid van die oorspronklike argument.

Sleutelwoorde: Bouregulasies, oorsprong van bouregulasies, boustandaarde, boukodes, Wet van Hammurabi, Jan van Riebeeck, kontrole van die bou-omgewing

1. Methodology

The desk study focuses on the origin of building regulations of the built environment and is presented from a historic perspective (in chronological order). The first section of this article serves as an introduction that provides a brief overview of the origin of the regulatory framework. Thereafter a comprehensive definition of building regulations is provided and the relation between regulations and standards is stated. These aforementioned definitions are used

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to trace the origin of building regulations for Southern Africa. Specific focus is given to the period between 1650 and *circa* 1740.

2. Introduction

In early settlements, development associated with population growth continued to widen the gap between natural and man-made, thus further distancing man from his habitat. Glazewski (2000: 230) argues that the origin of planning can be traced to North Africa, where the "... ancient Egyptians used the familiar grid pattern to house workers on the pyramids in the third millennium BC".

When Herodotus of Halicarnassus visited Giza in *circa* 450 BCE, he was informed that it had taken 400.000 men 20 years to finish the pyramid of Cheops. By contrast, "... the British archaeologist Petrie estimated that 100.000 men would have sufficed" (York, 1997: 4). Notwithstanding the difference in estimates, a *laissez-faire* approach to the built environment would have inhibited development. It could therefore be argued that specific regulations were introduced in order to manage the man-made environment, building works and associated processes. According to David (2003: 56-59), it was necessary to organise the sites that housed the royal workmen, craftsmen and labourers. Often the sites "... were chosen because they were near to the worksite ... even the proximity of a good water supply was not considered essential to these town sites, the requirements of isolation and security being greater" (David, 2003: 59). However, these built environment regulations mostly focused on the man-made, while negating the possible symbiotic relationship between architecture and nature.

Advances in medicine impacted on the built environment in terms of additional health requirements. Descriptive examples can be found in, for instance, the Roman system for sewerage removal and the aqueducts constructed for the provision of fresh water. Population estimates indicate that at its peak Rome had approximately one million inhabitants. According to Cowan (1985: 68), "... the AD 300 census of Rome listed 1.797 *domus* (houses) and 46.602 *insulae* (blocks of flats) ...". With the development of civilisation, man increasingly exerted his influence on the natural habitat, using its resources to support his endeavours.

Unfortunately, events of catastrophic proportions usually necessitated the refinement of the rudimentary requirements employed to provide order within the built environment. After the great fire of AD 64, Emperor Nero issued a decree limiting the height of buildings,

banning mid-walls between *insulae*, requiring accessible roofs for firefighting at porticoes, and restricting the use of timber. In addition, he cut straight wide roads through the burnt-out areas of the city to act as fire breaks and to provide access for firefighters (Cowan, 1985: 68-70). In more recent history, the Fire of London in 1666 is perhaps the most widely recognised such event (Tricker & Algar, 2006: xiii). In 1667 the British Parliament passed the London Building Act, which restricted the use of timber, specified a minimum thickness for external walls, and banned inflammable roof coverings (Cowan, 1985: 205, 209). The origin of building regulations in Southern Africa displays similar characteristics, and is discussed later in more detail.

Since the Industrial Revolution, development within the built environment has continued unabated with associated control measures being introduced. However, the relationship between architecture and nature has changed to one of master and servant. Glazewski (2000: 11) states that "... virtually all environmental problems stem from the way we decide how to use and manage land". He further elaborates on this by claiming that "... the form of tenure on specific land invariably has environmental consequences ..." (Glazewski, 2000: 11).

3. Definitions of building regulations

The *Dictionary of Architecture and Building Construction* (Davies & Jokiniemi, 2008: 52-53) does not differentiate between building codes and building regulations, and provides the following overall definition:

A statutory code which regulates the construction, alteration, maintenance, repair, and demolition of buildings and structures.

Likewise, Watermeyer (2003: 6) does not distinguish between the two terms, and defines a building code or regulation as follows:

A document used by [a] local, state or national government body to control building practice through a set of statements of 'acceptable' minimum requirements of building performance. This is usually a legal document. Acceptable requirements are typically established on the basis of socio-political and/or community considerations.

The book entitled *Building regulations in brief* (Tricker & Algar, 2006: [i]) provides the most concise description of a building regulation:

A statutory instrument, which sets out the minimum requirements and performance standards for the design and construction of buildings, and extensions to buildings.

For the purposes of this article, a **building regulation** is acknowledged as:

- a regulating instrument, that
- describes a minimum standard, that
- should be implemented during the building process (that initiates with design, and continues through construction, maintenance, alteration and repair to demolition of buildings and/or structures), with the aim of
- protecting public health and safety during
- the construction, occupation and post-occupation phases of
- buildings and/or structures.

3.1 The relationship between building regulations and building standards

In the construction industry, a building regulation often refers to a building standard, and it is important to note the distinction between the directive and the yardstick with which its implementation is measured. Watermeyer (2003: 6) presents a standard as a benchmark, claiming that essentially it is “a series of technical documents that standardise ... some activity in relation to building and construction)”.

In the 2008-edition of the *Dictionary of Architecture and Building Construction*, Davies & Jokiniemi (2008:360) do not specifically include the term 'building standard', but provide the following definition for a **standard**: “any product, method, process or procedure which has been established as an exemplar ... or otherwise represents the norm”. A **norm**, on the other hand, is described as a “standard, an officially recognised exemplary standard of measurement, quality, regulative legislation or classification” (Davies & Jokiniemi, 2008: 251).

A **building standard** could thus be defined as:

- an official technical point of reference, that
- standardises building and construction activity,
 - (generally) in terms of 'quality', or 'performance,' and
 - (occasionally) in terms of size, or procedure
- thus providing measurement criteria.

According to the *Dictionary of Architecture and Building Construction* (Davies & Jokiniemi, 2008: 52) **building codes of practice** are described as:

legal documentation setting out the requirements to protect public health and safety, and outlining standards of good practice with regard to the construction and occupation of buildings.

4. The origin of building regulations

4.1 The code of Hammurabi

Watermeyer (2003: 25) claims that "... building standards have been in place since man was able to capture his thoughts in writing". According to Cowan (1985: 27), the oldest surviving building code can be traced back to the reign of King Hammurabi in Mesopotamia. Hammurabi's Code of Laws is inscribed on a basalt stele (Figure 1) that is on display in the Louvre. The code dates back to *circa* 1780 BCE, and was originally translated by L.W. King in 1910 and edited by Richard Hooker in 1996 (Hooker & King, 1999: online).



Figure 1: The 2.25 m high basalt stele erected by King Hammurabi of Babylon
Source: Iselin, 2011: online

The first translator of the code, Charles F. Horne, argued in 1915 that Hammurabi's code implied the existence of an earlier set of laws (King & Horne, 2006: online). This claim is corroborated by researchers at the Louvre who maintain the source of the Hammurabi Code as "... two Sumerian legal documents drawn up by Ur-Namma, King of Ur (c. 2100 BC) and Lipit-Ishtar of Isin (c. 1930 BC)" (Iselin, 2011: online). Nonetheless, the Hammurabi Code is considered "...

the most important legal compendium of the ancient Near East" (King & Horne, 2006: online), and it represents the earliest known example of a ruler proclaiming publicly to his people an entire body of laws. The code is grouped into different chapters that focus on family law, slavery, and professional, commercial, agricultural and administrative law (Iselin, 2011: online). It was displayed publicly, and comprised 282 different Codes of Laws. Cuneiform script was used, and Stockdale (2005) notes its efficiency in "... the expansion of literacy, and subsequent governmental regulation and authority over an increasingly literate public".

Six specific codes refer to the built environment. Code 228 deals with payment after the completion of a successful building project, while the remaining five codes (229-233) list different manners of recourse, should a structure prove unsafe. It could be argued that this set of six official codes represents the origin of contemporary building regulations (Table 1). It is noteworthy that the largest part of the code refers to a minimum standard – requiring the builder to guarantee the safety of the construction. These objectives remain relevant to this day, and echo the primary purpose of architecture; to safely house man and his possessions.

Table 1: A synopsis of Hammurabi's Code of Laws according to the various requirements, subsequent events and the relevant obligations or recourses

<i>Hammurabi's Code of Laws:</i>						
No.	Requirement	►	Event	+	Post-event	= Obligation or Recourse
Objective 1: Erection of the structure and its associated cost:						
228	If a builder builds a house, and	►	the builder completes it	+	none	= Payment (fee/surface)
Objective 2: Should a structure prove unsafe during its occupation, the following recourses are available (it is presumed that the house was paid for in accordance with Code 228):						
229	If a builder, builds a house, and it is not properly constructed, and it	►	collapses (<i>falls in</i>), and	+	kills the owner, then	= Death to the builder See 232.b that is implied, although it might be difficult to achieve See 232.c that is implied, although it might be difficult to achieve

No.	Requirement	►	Event	+	Post-event	=	Obligation or Recourse
230	If a builder, builds a house, and it is not properly constructed, and it	►	collapses (<i>falls in</i>), and	+	kills the son of the owner, then	=	Death to the builder's son See 232.b that is implied, but not expressly stated See 232.c that is implied, but not expressly stated
231	If a builder, builds a house, and it is not properly constructed, and it	►	collapses (<i>falls in</i>), and	+	kills a slave of the owner, then	=	The builder has to pay slave for slave See 232.b that is implied, but not expressly stated See 232.c that is implied, but not expressly stated
232	If a builder, builds a house, and it is not properly constructed, and it	►	collapses (<i>falls in</i>), and	+	damages the owner's goods, then	=	The builder has to compensate the owner for the ruined goods and re-build the house at his own cost (own means)
233	If a builder, builds a house, and it is not properly constructed, and the	►	walls fail (<i>seem toppling</i>)	+	none	=	The builder has to re-build the walls at his own cost (own means)

Source: adapted from Hooker & King, 1999: online

The Hammurabian codes focus on the relationship between owner and builder, while the interests of a larger settlement (and by implication the interests of the neighbours) are not explicitly addressed. It could be argued that the stratification of society according to class and community structure implied settlement patterns and associated rules of engagement. However, as the number of inhabitants in a particular settlement increased, it inevitably led to an increased number of risks.

4.2 The growth of settlements

Klitzke (1959: 173) states that "... ever since man began to use fire as his servant, he discovered ... that it frequently could not be controlled. When man congregated in cities, the servant turned master even more often". Watermeyer (2007: 26) supports this point of view, and argues that settlement growth brought "... the scourge of fire and health risks associated with poor sanitation". Larger communities therefore necessitated a form of orderly settlement planning through regulation.

Arguably the best known assimilation of these regulations could be found during the reign of the Roman Empire. *The Encyclopaedic Dictionary of Roman Law* provides the following definition for the construction of a house (Berger, 1991: 353):

Aedificatio: Building a house. The construction of houses is governed by building regulations (*statutes, senatusconsulta, imperial enactments*) and is subject to the supervision of magistrates (*aediles, censors for public buildings, under the Empire the praefectus urbi and his staff*). Among the imperial enactments the building regulation by Emperor Zeno is the most important. The interests of the neighbors are protected by *OPERIS NOVI NUNTILATIO*, a kind of protestation against a new construction which may be detrimental to the owners of adjacent buildings or lands. On the other hand, the house builder who gives sufficient guaranty is protected by a special interdict *no vis fiat aedificanti* (= that force should not be used against the builder of a house) against disturbance. Unless special permission is granted, building on public places is prohibited. Demolition of constructions already erected may be enforced by an *INTERDICTUM DE LOCIS PUBLICIS*.

From the above it is evident that the Roman Empire introduced a hierarchical structure to govern the construction of buildings within the Empire. Emphasis was placed on a larger environment, with specific rights and obligations assigned to neighbouring properties. In addition, the construction process was supervised by a governing authority.

Similar laws that fall within the ambit of building regulations in *The Encyclopaedic Dictionary of Roman Law* are:

- **Ambitus:** Describes the open space between neighbouring houses (Berger, 1991: 360).
- **Lex municipalis tarentina:** A municipal charter that contains provisions about the building regulations, among others (Berger, 1991: 557).
- **Lex lulia de modo aedificiorum:** A building regulation that determines the maximum height of houses and the thickness of walls (Berger, 1991: 554).
- **Lex lula municipalis:** Although Caesar's authorship and the date of the law are debatable, some of the topics dealt with in the *Tabula Heracleensis* are building and traffic regulations (Berger, 1991: 554).
- **Servitus altius non tollendi (sc. aedes):** This "urban servitude imposed on the owner of a building the duty not to build higher over a certain limit. A counterpart was a servitude *ius*

altius tollendi which gave the beneficiary the right to build higher" (Berger, 1991: 703).

- **Servitus ne prospectui officiator:** According to this servitude, the owner of an immovable property has the "right to prevent his neighbour from building a house or planting trees which might impede the beneficiary's pleasant view" (Berger, 1991: 703).
- **Servitus oneris ferendi:** This urban servitude involves the right of a beneficiary to have his building supported by a neighbour's wall. "The latter was bound to keep his wall in good condition" (Berger, 1991: 703).

Cowan (1979: 90) finds that fire damage and structural failure have featured in safety regulations from a very early time, and specific building regulations in this regard in the City of London go back as far as the 12th century.

5. The origin of building regulations in Southern Africa

In 1650 the United East India Company decided to occupy the Cape of Good Hope as a refreshment station, and tasked Governor Jan van Riebeeck to build a fort in Table Bay (Figure 2). Just over two weeks after arriving in 1652, Van Riebeeck (and his party) managed to mount a canon on 3.75 metre-high earthen ramparts. These walls tapered from six metres at ground level to five metres at their highest point (Hartdegen, 1988: 6-7).



Figure 2: Map of the fort erected under the guidance of Jan van Riebeeck
 Source: Castle of Good Hope, 2010: online

Unfortunately, the earth was barely workable and because the “Company instruction did not specify alternative solutions ... the ramparts were a leaky crumbly structure[s]” (Hartdegen, 1988: 7). The imminent failure of the walls required immediate maintenance. Ras (1959: 23) notes that heavy rain caused the collapse of one side of the *Walvis Bastion* and the partial collapse of the curtain walls in August 1654.

The Company instruction above is most probably the first prescriptive specification implemented in Southern Africa. However, the failure of the ramparts of the fort could also be described as the first failure of a prescriptive standard imposed on the South African built environment.

According to the publication *Our Building Heritage* (Hartdegen, 1988: 7), “... much of South Africa’s building heritage rests on a building system derived almost exclusively from mud, stone, shells, reed, thatch and timber, developed and refined by the European pioneers of the seventeenth century”. Hartdegen (1988: 7) also describes the experimentation with various building methods and

materials by a hundred men (*including eight masons*) to construct stores, sheds and living quarters within the fort.

In his diary, Van Riebeeck noted: "Although we have found reeds for thatch, we want people who know how to lay them on, for what has already been done, has been done in such a slovenly and insufficient manner that it must be taken off again" (Hartdegen, 1988: 9).

The third volume of H.B. Thom's translation of Van Riebeeck's diaries includes the following inscription entered on Wednesday, 7 January 1660 (1952: 173):

Line no.

...after mature

deliberation, and in the interests of the Hon. Company and for the security of the

said buildings and the goods stored in them, it has been considered essential, and

has also been decided that the thatch should be removed from the roofs of all

the Company's buildings and replaced by baked tiles. Furthermore it has been

decided that we should try and sell the thatch to the free burghers so as to defray

the additional costs as far as possible. To this end an agreement has been reached

with the free brick and tile maker, Wouter Cornelissen Mostert, who is also the

free miller, whereby he shall forthwith make as many tiles for the Hon. Company

as are required for the said purpose at a rate of 40 guilders a thousand, counted

whole on the roof, each tile being in Rhineland measure, 6 inches wide and 12

inches long. The Hon. Company shall at its own cost convey the tiles by cart or

wagon from the oven.

And as straight laths must be sawn for such a tiled roof, an agreement has also

been made with the free sawyer, Leendert Cornelissen of Seevenhuijsen, to deliver

the required laths (each to be sawn not less than one inch square) at a rate of 13 guilders per hundred foot of plank from which they are cut.

Resolved and affirmed in the fort of Good Hope on the above date.

*(Signed) Jan van Riebeeck,
Roeloff de Man,
Abraham
Gabbema,
Pieter Evrards and
Gijsbert van
Campen (Secretary)*

If the earlier definition of building regulations is applied to the journal entry (Table 2), this inscription could be interpreted as the first official transcribed building regulation for Southern Africa.

Table 2: A comparison of the diary entry by Jan van Riebeeck with the requirements of a building regulation

<i>The first building regulation in Southern Africa</i>		
<i>Definition: building regulation</i>	<i>Selected keywords from the Journal of Jan van Riebeeck: 7 January 1660 (Thom, 1952: 173)</i>	<i>Line no.:</i>
a) a regulating instrument, that	... in the interests of the Hon. Company ...	ii
	... considered essential ...	ii
	... Resolved and affirmed ...	xviii
b) describes a minimum standard, that	... decided that the thatch should be removed from the roofs ...	iv
	... and replaced by baked tiles ...	v
c) should be implemented during the building process (that initiates with design, and continues through construction, maintenance, alteration and repair to demolition of buildings and/or structures), with the aim of	It is implied that the changing of the roofing materials should take place during the alteration/replacement/maintenance phase of the buildings' lifespan	n/a
d) protecting public health and safety during	... security of the said buildings and the goods stored in them ...	ii-iii
e) the construction, occupation and post-occupation phases of	See c	
f) buildings and/or structures.	... all the Company's buildings ...	iv-v

The journal entry proposed a standard in addition to the regulation. When the regulation is further investigated it becomes evident that the specification for the roof tiles and battens follows a performance approach. An agreement is reached with a free burgher to manufacture as many baked tiles as necessary for the purpose of providing a fire-resistant roofing material. A price per 1.000 units (counted per whole tile on the roof) is agreed on, as well as the size of the tiles and the standard of measure (Rhineland)¹.

In a similar agreement with carpenter Seevenhuijsen, he is to provide laths that are cut in straight lengths of a minimum size. The rate of payment is determined per length of timber from which the battens are cut. It could be presumed that the Company was responsible for the supply of the timber and the carpenter was only required to saw it to the correct size, while the actual batten lengths were of less importance.

This building regulation was formulated in accordance with a contextual approach. The danger of fire necessitated the change of a particular roofing material, while cost dictated that an indigenous solution be sought. This regulation was only applicable to certain Company buildings inside the fort, although the settlement continued to expand.

Outside the walls of the fort, in the village of *De Kaap*, the first homes consisted of single-storey rectangular wooden frameworks with wattle-and-daub walls. Where thatch was used as a roofing material, the reeded ceiling was usually smeared over with a coating of clay to form a "... *brandzolder*, or fire ceiling in the event of fire. In later years, thatched roofs were prohibited because of the fire hazard, and a tax of two shillings a month was levied on each chimney" (Hartdegen, 1988: 11).

It could be argued that the risk of fire necessitated the development of the first official building regulations for Southern Africa. In accordance with the arguments presented earlier (see par 4.2), the community and authorities shared an interest, and the introduction of a tax levy on each chimney is possibly the first time that building regulations in the European tradition were enforced locally. Nevertheless, the associated cost of exchanging one roofing material for another remained excessively high, and it was only once the risk grew too great that alternatives were implemented.

1 To accept these terms, Mostert must have had adequate faith in the strength of the fired tiles, their loading and transport from the oven to the buildings, their possible storage, and finally their installation on the roof, because Mostert's involvement in the process after manufacture is not entirely clear.

De Bosdari (1953: 47) indicates that in 1712 the thatched village of De Kaap had grown to 170 private dwellings and this required a form of settlement planning, which is described by Bierman (1955: 13) as follows:

Reeds vroeg in die bestaan van die dorpie in die Tafelvallei gryp die owerheid in om sindelikheid en orde te bewaar. Die Valsrivier kry gemesselde walle en sluise en 'n deftige naam, die Heerengracht; strate wat mekaar reghoekig oorkruis word uitgelê, en die boupersele weerskante raak aan streng bou-ordonnansies onderhewig. Om brand in die rietdak te voorkom, mag die dak nie te na aan die grond sak nie; om brandverspreiding deur die rietdakke te verhoed, mag geboue nie teenmekaar staan nie. Onder dié toestande raak die tradisionele boerehuise uit die Tafelvallei weg – hy trek binneland toe – en sy plek word deur die stadshuis ingeneem, want korte jare na die stigting, is „de Caabse uithoek” reeds 'n stad.²

According to Bierman (1955: 34-35), traders in the Kaap often built double-storey houses, with the bottom storey used to store products, and the living quarters situated above. Frequent conflagrations resulted in the abandonment of thatch after the 1717 instruction by the Council of Policy (De Bosdari, 1953: 47). Within the built-up area, flat roofs were proposed as an alternative. However, the resulting problem of water tightness was difficult to overcome.

The Council of Seventeen of the United East India Company issued the following recommendation on how to construct a new flat roof (Hartlegen, 1988: 11):

The walls of the building being finished and the beams laid thereon, laths or ribs are to be laid upon them, each three or four inches, the broadest (sic) side resting on the beams. No planks are to be used; otherwise the defects of the roof will not be visible from below. Over these ribs, grey or other burnt bricks which are made here, eight by four inches, are laid with the heads meeting each other on the laths. The floor having been thus laid, the builder is to take four parts of stamped lime shells taken out of the oven (kiln) and two parts

2 Very early on in the existence of the Table Valley village, the authorities stepped in to preserve cleanliness and order. The Vals River received built embankments and sluices, and a dignified name, the Heerengracht; streets that intersected at right angles were laid out, and the adjacent building sites became subject to strict building regulations. To prevent fire in the thatched roofs, they were not to descend too close to the ground; to prevent fire spreading through the thatched roofs; buildings were not allowed to stand too close to each other. Under these circumstances the traditional farmhouse of the Table Valley disappeared – it migrated inland – and its place was taken by the townhouse, because a few short years after its establishment, the remote Cape hamlet had already become a town (Translated by author, 2011).

ordinary mason lime and two parts finely powdered bricks. All these materials are to be well mixed whilst dry, and gradually cocoa-nut oil is to be thrown until the whole is thoroughly prepared like dough. It is then at once to be laid on one and a half inches thick, and rubbed in with the trowel and steadily beaten together as much as possible with wooden mallets. The mallets are not to be too heavy and the beating must be gentle or moderate lest the bricks are broken. Whilst busy with this, the second layer is to be prepared, viz, ten parts finely sifted lime, three parts finely sifted gravel of baked bricks and one part of Bengal Gor or sediment of sugar (draf zucker = molasses). This composition is to be treated in the same way as the first and to be put on when ready, about one inch thick, and carefully beaten down on the other layer. Finally a liquid composed of lime, oil and Gor is made with a strong hand and a smooth trowel well rubbed on the last coat.

In 1736, five houses were gutted by a fire fanned by a Southeaster. One of the houses was rebuilt with a flat roof, and "... many other people followed ... [t]his example ... At the beginning of the 18th century Cape Town was a thatched village: by the end of it, the fear of fire has changed it into a flat-roofed town" (De Bosdari, 1953: 47).

The establishment of a settlement and its associated growth necessitated the development of some form of regulation. The various municipalities performed this regulatory function and individually developed their own sets of municipal by-laws that addressed the built environment, among others. Holden (2006: [1]) states that "... every town council in South Africa had its own set of building by-laws, many of which were archaic and convoluted". According to Watermeyer (2007: 26), the 19th-century lawmakers developed building laws to ensure proper sanitation and to diminish possible conflagrations, while 20th-century lawmakers "developed minimum standards for the construction and maintenance of buildings, designed to protect public health, safety and general welfare".

6. Conclusion

This article determines the origin of building regulations for Southern Africa by revisiting the diary of Jan van Riebeeck. Unfortunately, the diary documents the first failure of a performance specification in Southern Africa. Comparing the entry dated 7 January 1660 with a contemporary definition of a building regulation highlights the relevance of regulatory requirements in the built environment and alludes to the limited changes of these constraints over the years.

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