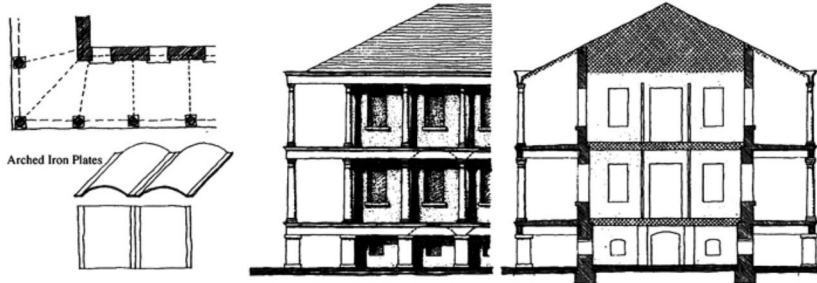
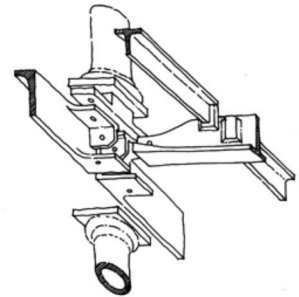


The iron duke's West Indian Barracks



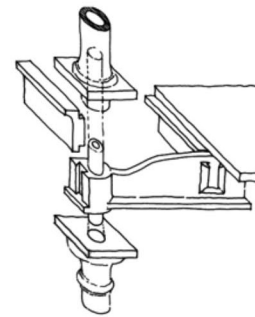
Lieut. Colonel Sir C.F. Smith's original proposal for the Uniform Barrack System



Junctions: Beam, Column, Cornice.
Bahama Barrack. Bolts & dovetails



Final version of Uniform Barrack System as erected at: Barbados, (single storey hospital and iron barrack), Bahamas, Antigua, St. Vincent, St. Lucia and Grenada.



Junctions: Beam, Column, Cornice.
Uniform System. Sockets & dovetails



Barrack building – St. Lucia

Photographed by Professor R. B. Lewcock circa 1960

NOTE : This paper is included in my thesis as APPENDIX C.

Guedes, Pedro (2002). **'The iron duke's West Indian barracks.'** In: J. P. Macarthur and A. Moulis, Additions to architectural history : Nineteenth annual conference of the Society of Architectural Historians, Australia and New Zealand. *Additions to Architectural History, XIXth Conference of the Society of Architectural Historians, Australia and New Zealand*, Brisbane, Australia, (72-94). 4-7 October 2002.

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ABSTRACT:

Wellington's Uniform Barrack System crystallized a complex vision, imprinting an 1820s type on generations of military builders for over a century.

Vernacular forms of Caribbean building with deep verandahs had influenced the design of 18th century barracks and hospitals. Lord Combermere used his authority as Commander-in-Chief, Leeward Islands to highlight certain features of this tradition, giving them official blessing. He also mused upon the economies of using iron and called upon medical opinion for scientific backing. The use of galleries was mandated for all Caribbean military buildings by a circular from the Secretary for War and the Colonies, Lord Bathurst, narrowing the options for fine judgments in design further still.

Wellington as Master General of the Ordnance saw the use of iron for colonial military buildings as a method of imposing absolute uniformity and central control. Under the influence of Combermere and Bathurst, Colonel Sir Charles Smith provided the dimensional templates. Edward Holl's ideas embodied in naval buildings were plagiarized for ideas and solutions. These were translated into building components by Lieut. Brandreth's collaboration with ironfounder William Bailey, under the watchful eye of General Gother Mann, Inspector General of Fortifications.

Buildings could henceforth be issued instead of designed, implemented rather than built. Iron castings, multiplying identical assemblies, would remove the uncertainties and waste of thinking through similar problems again and again. The norm replaced the specific or ideal response with the assurance that not all solutions to a problem could be equally satisfactory.

NOTE : This paper is included in my thesis as APPENDIX C.

The Iron Duke's West Indian Barracks

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*The Iron Duke's West Indian Barracks.*¹

In February 1819, the Duke of Wellington, became Master General of the Board of Ordnance.² This gave the Hero of Waterloo an influential ex officio seat in the British cabinet, at a time when the nation was emerging from a long war to a peace with depressed trade, unemployment and looming civil unrest in the growing industrial centres.³

His Grace would command the use of iron, the modern age's essential material, for standardised buildings required at the extremities of empire. These structures would go a stage further. Previous practices of standardisation in building depended on observing conventions of form and appearance, agreed dimensions and accepted methods of construction. In some respects, these observances shared a characteristic with dress codes in that they allowed room for a certain degree of personality to shine through. Cast iron components would allow no latitude for variation or idiosyncrasy whatsoever. They would be exactly the same for every building. Forms of components imprisoned in the wooden templates provided by the patternmaker, could be reproduced, exactly without the need for revision, as many times as deemed necessary. Iron's strength and intractability were perfectly matched to the Ordnance's system of centralised control that had grown accustomed to testing regulating and issuing military stores, from soldiers' boots to cannon for ships of the line.

Wellington imposed strict controls on the Ordnance Department expanding its responsibilities in 1821 to include the building of barracks both at home and in overseas territories, through the Inspector General of Fortifications, General Gother Mann.⁴

Royal Engineer officers would carry out these peacetime duties.⁵ Wellington placed great importance on having competent officers in this branch of the service, especially since the large reductions in their number after demobilisation.⁶ Wellington and Mann ensured that this cadre of professionally trained individuals would design and maintain all military buildings under a centralised regime, driven by the spirit of efficiency and economy.⁷

Militarily, the West Indies were considered important. The islands had been the focus of many naval engagements during the recent war and were well placed strategically, controlling access to former Spanish possessions on the South American mainland.⁸ They were also close to the United States, with whom Britain had been in conflict and continued to be in dispute over trade. The plantation economies were volatile with fears of slave insurrections and growing competition from elsewhere, but still represented very lucrative trade for Britain.⁹ Their garrisons badly needed renewal and rationalisation.

As Master General, Wellington made sure that officers he had worked with and trusted were on his staff.¹⁰ His interest in Caribbean military assets were helped by his longstanding personal associations with Earl Bathurst, the secretary for War and the Colonies, and with Lord Combermere who became Governor of Barbados and Commander-in-Chief of the Leeward Islands in 1817.¹¹

Combermere wrote to Bathurst in July 1818, reporting on the bad condition of military buildings in his command, suggesting ways of reducing expense, which included schematic Barracks proposals:¹²

.....with an open gallery and stores underneath, on which principle the Medical Officers have similarly recommended barracks to be built, as best adapted for the health of the troops, and I hope that Your Lordship will approve of all the barracks being erected on the same plan.

I should however propose that a gallery be erected all round, and as a means of saving a great expense of masonry, that instead of arches for the lower floor of stone or bricks, pillars of cast iron should be used.¹³

Buildings with verandahs, galleries or piazzas were part of the Caribbean Creole and American mainland vernacular¹⁴. Combermere's letter to Bathurst however, resulted in a circular to all West Indian colonies, making galleries mandatory on barracks and hospitals.¹⁵ In many, these galleries had slender cast iron columns, and occasionally cast iron girders, joists and cornices.¹⁶ Architectural propriety often conflicted with the austerity implied by this model in its pure form. To relieve monotony and create emphasis, central pedimented masonry elements were often brought forward into the bright sunshine, and 'solid' end wings deployed to contain the deep shadow of the galleries.¹⁷

Lieutenant Colonel Sir Charles Felix Smith was appointed Commanding Royal Engineer in the West Indies in January 1823 with headquarters at Barbados.¹⁸ With eleven different island colonies and only five Royal Engineer officers under him, the task of controlling building projects and repairs on structures that had only recently come into the hands of the Ordnance was enormous. Young Royal Engineers, when designing buildings, without clear, simple exemplars, were difficult to control by correspondence.¹⁹ The Commander of Forces and Governors continued interfering.²⁰

Ordnance estimates for West Indian barrack and hospital construction amounted to over £ 200,000 in 1823. This exorbitant figure was for buildings constructed largely of timber, reportedly designed in this material on medical advice. These would soon require extensive maintenance, if not total renewal, due to rot and the ravages of white ants.

Wellington decided to send a Commission to investigate the deployment of troops in the West Indies. They were to report on where buildings were needed from a strategic point of view, evaluate the condition of existing structures, investigate local prices of materials, labour and different methods of construction and seek out medical opinion on the best sites and form for buildings:²¹

....it will then be considered by the Commission how far it will be possible to make use of cast iron uprights, rafters, & co., so as to render the buildings as durable as possible, to render the public as little liable as possible to a renewal of the expense, and to have as large a proportion as possible of the expense of these buildings laid out in this country. With this view it would be desirable to ascertain whether it would not be practicable to construct the whole building in this country, to send it out in framework, and have it put together where required for use in the West Indies. It must be observed that this plan, if practicable, would be attended by the advantage of enabling the Commander-in-Chief to select the position of troops, and to alter it from time to time, as any particular position might be found unhealthy, or otherwise inconvenient or injurious.²²

The Commission's president was Colonel Sir James Carmichael Smyth RE, one of Wellington's trusted Peninsular veterans as was another member, Major Edward Fanshawe RE.²³ After a comprehensive tour of the Islands and the coast of Guiana, they wrote their report from *HMS Valorous*, in January 1824:^{24\}

...were much gratified to find that Lieut. Col. Sir Charles Smith had already turned his mind to the subject and nearly completed a plan for one uniform barrack to be hereafter used throughout the West Indies.... The two-storied barrack is of course proposed where there are no local objections, as saving the expense of an extra roof.

We beg leave to express our hope that this plan will meet with Your Grace's approbation. In all its building details it unites strength with simplicity. In its interior arrangements for the accommodation of the troops it is excellent. The Medical Inspector, Mr. Taggart, stated that it was perfectly unobjectionable.

As Iron is so much used in this plan (all the galleries, the beams & co., being of Iron), Lieut. Col. Sir Charles Smith wishes,....to be allowed to send home, one of the officers who have assisted him in drawing the plans and making the calculations, to superintend the casting of the first ironwork and to consult with the ironfounder..... As it is meant that the beams for one building should answer for all, it is impossible to be too exact or careful at first.²⁵

Smith's Memorandum champions the advantages of a uniform system of buildings:

Amongst the many barracks and other public buildings in the West Indies, there are hardly any two to be found of the same construction. The inconvenience attendant on this variety are numerous, but most striking are the impossibility of their being all good...The objections made by the Medical Officers to a large portion of them...The different materials of which they are constructed...and the difficulty of checking estimates for repairs.

I am of the opinion, that all buildings to be applied to the same purpose, in similar situations, should be built after one approved model, from which no person should be privileged to deviate. The estimates for repairs could then be easily checked...and the medical men could have no further plea for complaint.

On reflecting still further, it occurred to me, as the construction of habitations, stores & co., within the Tropics differs essentially from that in Europe, that buildings of every description might be classed as to bring them under two dimensions of roof which would be more desirable if my suggestion sometime since offered for substituting iron for the scantlings now used in wood, should happen to be approved. Upon this last principle, therefore, the accompanying plans, elevations & co. have been formed.

...a building may be constructed of greater or less capacity, by the insertion, or rejection, of so many lengths of plate, which would easily be effected if the parts appertaining to each length were sent out to this country as articles of store.

The principal and gallery rafters being distinct, the galleries can be suppressed at pleasure, and the dimensions of the main roofs would answer for store houses, gun sheds, stables... and every class of outbuildings.²⁶

The design of the ironwork in this proposal is unique. The buildings are surrounded by deep verandahs, with cast iron columns at 9ft. centres supporting 2ft. cornices at each level. The floors, constructed with arched plates of cast iron, rising 1ft. 6ins., with a 9 in. flat area at each column line, create an 18 in. flat beam zone linking the column to the main walls of the building. The arched plates are built into the walls of the main building. The gallery floors are levelled up to the crest of the cornice, presumably with mortar and rubble and topped with waterproof paving. The constructional idea is simple and elegant. It creates relatively massive galleries with elements whose junctions could be made workable with quite wide tolerances. Sadly, the concept would not be followed in detail, despite the eventual uniform barrack system bearing Smith's name.²⁷

At the end of February 1824, funding for urgent repairs at several garrisons was authorised, while at others, deferred, awaiting the deliberations of the Commission in their voluminous report.²⁸ Smith, anticipating uniformity, had ensured that buildings already begun in wood, would:

.... afford the advantage of enabling him at any further period and in the event of any pitch pine beam being injured by the white ants, of removing it and substituting an iron one: as iron ones will have the same dimensions.²⁹

In May 1824, the Governor of the Bahamas, Major General Grant wrote to the Board of Ordnance with proposals for a barrack of his design³⁰. He offered excuses for not having asked the recently arrived Lieutenant Alderson, RE to concern himself with the project.³¹ Wellington lost no time. He ordered that Alderson report on the proposed site and that designs be prepared in London for a suitable barrack³². In October, he asked:

... why iron should not be used throughout as is proposed for the West Indies... that expense will ultimately be saved and that the Department will not have constant complaints of the barracks being in ruins.³³

The drawings were by a surveyor in the Inspector General of Fortifications' office.³⁴ The Duke was persuaded of the wisdom of not using iron for all structural components.³⁵ Gother Mann, who was closely involved in the design argued that iron roofs were too risky as there had been many recent failures and that the price of iron had risen, making them less economical.³⁶ The estimate for this abridged design received Treasury approval on November 30 1824 and by the end of March 1825, Mann's office had prepared detailed drawings and specifications of the whole building, under the supervision of Colonel Fanshawe:³⁷

...to which the contractors may have reference, and as they may be considered as the commencement of the barrack system for the West Indies..... the importance of the first castings and patterns being executed with the greatest accuracy, that they may serve as models for all barrack ironwork without further trouble or explanation..... I recommend Lieut. Brandreth should have the inspection in the first instance of castings and patterns to be made.³⁸

By May 1825 Alderson had received the drawings prepared in London and suggested that the roof be altered to be covered in shingles rather than slate, and requested expert builders be sent from England to help manage the project.³⁹ The contract for the ironwork was let to W&D Bailey.⁴⁰ Lieutenant Brandreth, went to Birmingham to inspect the castings, after working in Mann's office.⁴¹

The design of the ironwork for the Bahamas barrack was conventional, owing greatly in its detail to work carried out in iron for the Navy Board by their architect Edward Holl.⁴² His overseas projects included a very large naval hospital at Port Royal in Jamaica and a sumptuous house for the Naval Commissioner in Bermuda.⁴³ The resident Royal Engineers had written home about them.⁴⁴ Holl's favoured method of construction for floors consisted of regularly spaced cast-iron girders, with bridging joists spanning between them. The floor surface was of Yorkshire paving slabs accurately cut to regular widths, coinciding with the spacing of joists.⁴⁵ This constructional technique was significantly lighter than the accepted method of building iron framed buildings with brick arches between beams.⁴⁶ Holl had used it in the East Rope House, Devonport (1813) and extensively at the Quadrangular Storehouse at Sheerness, (1822) where the soil had a limited bearing capacity.⁴⁷ It was easily translated into an ideal method of building verandahs out of imperishable materials for tropical and sub-tropical military buildings.⁴⁸

The Bahama barrack, was cursed with difficulties from many quarters, including further interference from superior officers in the Bahamas and industrial disputes in Birmingham:⁴⁹

...In consequence of the repeal of the Combination Laws, the ironfounders strike their work whenever they please and each week was spent in fails and wakes so that no work could be done.... Something pleasant is requisite to clear the smoke – gloom and stupidity of this place.⁵⁰

Delays were also caused by the contractor being:

...induced to make the patterns in London, under the impression that they would be more faithfully executed there than in the country...where it was found necessary to alter several of them.⁵¹

The foundry work had been subcontracted giving W&D Bailey limited control in these turbulent circumstances, which further contributed to delays⁵². The ironwork was finally ready on the 20 November 1825, with Brandreth's helpful recommendation that Private Freeman of the Sappers and Miners be sent out with the castings, as he would be able:

... fully to explain the mode of putting the several parts together... (and) the best mode of remedying any defect in the metal which may by possibility arise in the course of the work.⁵³

In January 1826, Alderson was full of optimism and anticipation. The brigs *Highlander* and *Atlas* had arrived with bricks, stores hinges nails and cement and the building was to commence the instant the *West India Packet* came with the ironwork and the long awaited

overseer.⁵⁴ By February 20, however, after taking stock, he was asking for replacements for the broken girders and joists and remarking:

...that the marks on the different pieces of ironwork do not correspond, although it is hoped the pieces themselves will fit – as however the ground is so confined we have not had the opportunity of ascertaining to a certainty whether the whole will correspond as a very trifling difference in bolt holes will prevent their being made fast to each other – I should suppose that in shipping the ironwork, there has been similar Ironwork for other barracks mixed with it -- We have also received 2 kegs of short bolts which at present we do not see any use for, being too short; at the same time we are in want of the bolts described, for until their arrival not a single pillar can be erected and the foundations of the barrack are already commenced upon.⁵⁵

Alderson felt abandoned. The next letter he wrote to Mann, dated 24 April 1826 only arrived in London in mid July.⁵⁶ Meanwhile, at the Office of Ordnance precautions were being taken by ordering replacement castings in larger numbers than requested.⁵⁷ Attempts were also being made to understand what had gone wrong with the bolts.⁵⁸ Before standardisation, unambiguous methods of describing the humble bolt did not exist. Different trades described them differently. In this case, they seem to have been manufactured against a pattern, but when delivered, their quantities were checked by weighing the pattern bolt and multiplying this by the number required, without further verification. Wellington was furious:

This will never do.

Is this mistake of the Contractor, or Lieut. Brandreth or the Principal Storekeeper's Department or whom?

Let a Committee of Engineers be ordered to enquire; and I am determined that I will

proceed to extremity against the person whose fault and neglect has occasioned this

delay which is really disgraceful to the Department...⁵⁹

The enquiry was held and several witnesses called, but the verdict was inconclusive.⁶⁰ The proper bolts were sent in June 1826.⁶¹ Replacement castings were however rejected twice by a punctilious Royal Engineer, because of minor errors, causing further delays.⁶² Alderson's next setback was finding that the Yorkshire paving was not properly cut to size and would not fit the joists.⁶³ The building was finally ready for partial occupation in September of 1827.⁶⁴

In the early stages of the contract for the Bahamas ironwork, it was argued that with slight modifications, the patterns could be adapted for repairs of four barracks at Up Park Camp

in Jamaica. All the ironwork would be manufactured in Britain apart from that of the end bays which would be cast in Jamaica.⁶⁵

Before Brandreth went to Birmingham to supervise the ironwork, he had been working on the 'Uniform System' under General Mann and correspondence passed between Mann and the Duke concerning details of the proposed barracks.⁶⁶ Wellington followed the progress of the design minutely. He continued to be keen on as much iron as possible, insisting that iron bedsteads instead of hammocks be used.⁶⁷ Drawing on his experience of tropical climates, he made clear and specific suggestions about ventilation, ordering that the large barrack rooms be divided by louvred partitions.⁶⁸ He was impatient to get the idea approved by the Treasury, the Secretary of State and the Quarter Master General.⁶⁹

By March 1825, Brandreth considered the design sufficiently advanced to suggest that lithograph copies of the drawings be made and circulated to his colleagues on the various islands.⁷⁰ This may have been premature, as Brandreth continued refining the design while in Birmingham, learning from the Bahama barrack, the ironfounders and conducting load tests to reduce the weight of the joists without compromising their strength.⁷¹ He wrote to General Mann on August 9 1825, bemoaning the industrial strife in the Midlands, saying:

I have been daily expecting the models ---- I should like to explain my alterations in person – if there should be any to which the General object. I will however send the models as soon as possible.⁷²

The details were refined by reducing the number of bolted connections in favour of dovetailing and socket junctions.⁷³ By September 6 Brandreth was returning:

...the original correspondence of Col. Fanshawe and myself on the alterations of the patterns of ironwork..... As soon as the General approves the features, I will transmit further documents for Sir C. Smith and a detailed list of ironwork for a barrack of 200 men.⁷⁴

Brandreth was still in Birmingham in January 1826, writing to General Mann, enthusiastically suggesting that it would take only one extra pattern for a shorter joist to extend the System to include storehouses.⁷⁵ By May the general mood was more sombre as he was called by the Committee investigating the bolt problem of the Bahama barrack.⁷⁶ He also reported on the collapse of a cast iron roof at Maudslay's factory in Lambeth, reassuring readers that it had no points in common with the West Indian Barracks.⁷⁷

After the ironwork for the Bahamas barrack was completed in November 1825, work started on the castings for two hospitals: a double storey building for Antigua and a single storey one for Barbados.⁷⁸ On June 3 1826 the ironwork for the former had already been

sent out and that of the latter was nearly completed.⁷⁹ Brandreth embarked for Antigua, where he was to take charge of building the hospital. Meanwhile, a zealous colleague inspecting the Barbados ironwork upon its delivery to the London Ordnance depot, reported his discovery of small discrepancies in dimensions when comparing the lithographed drawings with the actual ironwork.⁸⁰ The contractor explained that Brandreth had authorised alterations.⁸¹ Wellington was enraged, heaping blame:

Lieut. Brandreth is unpardonable in having made any alterations from the drawings without reporting such alterations.... no great concern can be carried on in such a manner and we must put a stop to it.⁸²

Captain Smith was ordered to investigate. He chose to write a report that would be answered point by point by Brandreth, from which Smith would sum up. This process took until January 1828, quite some time after the Antigua hospital had been completed without the slightest hitch.⁸³ Brandreth's reply to detailed observations is prefaced by a covering letter defending his actions:

I did not carelessly execute the Commission you entrusted to me, and I trust some allowance will be made for the novelty of the service, the multiplicity of its details, the fact of its being carried on at the same time at four different establishments in England, and the anxiety I felt to render the Work as efficient as possible, by seeking information from the best authorities and, resorting to repeated proof for the strength and efficiency of the several parts.

I have now put up the first building, without a single failure, and with perfect facility, and it has since been submitted to the severest season that this Island has ever known, without a bar being moved.⁸⁴

Wellington resigned from the Ordnance in April of 1827 being succeeded by the Marquis of Anglesey⁸⁵. General Mann, who had steered the project cautiously and with sobriety, died in office in 1830⁸⁶. Brandreth asked to be allowed to return from the Caribbean in 1828, suffering from ill-health.⁸⁷

In 1838, Brandreth entered a new career as Director of Engineering and Architectural Works to the Navy.⁸⁸ His experience of working with ironfounders and contractors using the new materials of the industrial revolution gave him the confidence to increase the pace of modernisation in the dockyards, bringing to the Navy some of the vision it had lost with the removal of Sir Samuel Bentham as Inspector General of Naval Works in 1804.⁸⁹

Institutional rigidities ensured that barracks and hospitals using components exactly as developed in the 1820s for the Uniform Barrack System, continued to be built until the late

1840s despite significant advances in building technology.⁹⁰ Brandreth's corrected lithographed drawings were available at every Caribbean outstation in the event of a building being required.⁹¹

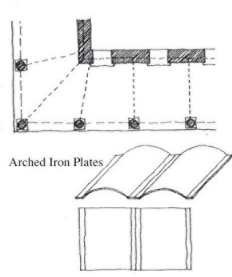
Later buildings were made more comfortable by enclosing verandahs with jalousies and other refinements.⁹² Covered walkways were added to outbuildings such as privies and kitchens, but the basic form remained consistent, undergoing minor adaptation, never substantial change.⁹³ The French, who had colonies in the West Indies followed the building of these iron barracks closely, but the approach they took in prefabricated metal buildings was entirely different.⁹⁴

Whenever a new barrack or hospital was proposed, there were invariably complex arguments and disagreements about siting, perhaps the only factor that could not be regulated. Medical opinion was always sought and generally followed even though it was quite often contradictory.⁹⁵ Orientation and prevailing winds were considered and great care was taken to avoid exposing buildings to malarial exhalations from certain soils, swamps and decomposing vegetation. Copper mesh screens were advocated as neutralisers of miasmas, working on the principle of the Davy lamp.⁹⁶ The buildings performed remarkably well from a 'sanitary' point of view, with one exception in Barbados where the 'Iron Barrack' hosted a very virulent outbreak of fever.⁹⁷ They also survived hurricanes with little damage.⁹⁸

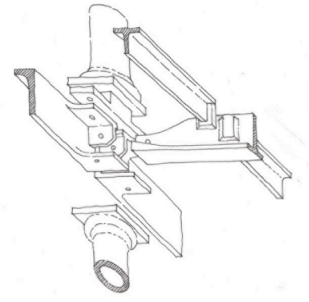
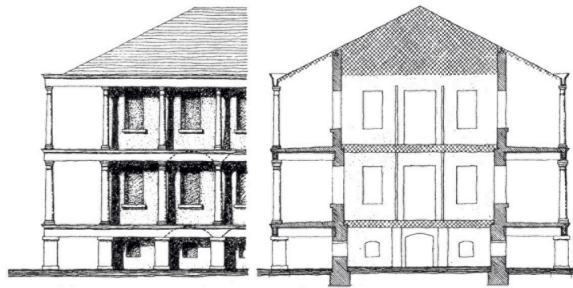
The Uniform Barrack System was a remarkable technical achievement. The Duke's vision brought together the most advanced building techniques of the 1820s and combined them with the bureaucratic controls of a large military organization, delivering durable, predictable utilitarian buildings to islands where tradesmen's skills were limited and the officers responsible for erecting them were often inexperienced. His Grace's Ordnance Department sought to harness tried and tested methods of controlling the quality of goods delivered by contractors, so that the buildings could be issued reliably and confidently in the manner that uniforms, cannons and other military impedimenta were distributed. Buildings riding the crest of the wave of technical progress when first conceived, became imprisoned in the standard patterns of the Uniform System of components. Intelligent overview and reappraisal had no place in a large bureaucracy wedded to the comforts of repetition and obedience. The consequences of entrenched methods of thinking and parsimony contributed to the poor performance of the Ordnance in the Crimean War.

Although the Islands for which the Uniform System was conceived ceased to have any major military significance, the barracks, hospitals and other military buildings based on ideas evolved in and for the Caribbean became heavily imprinted as models for the design of British overseas military establishments throughout the Victorian empire.⁹⁹

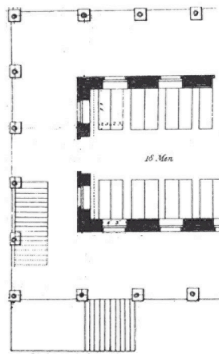
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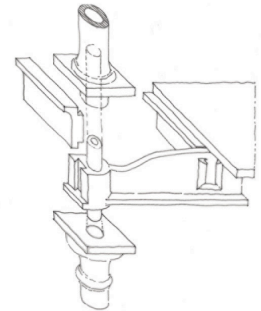
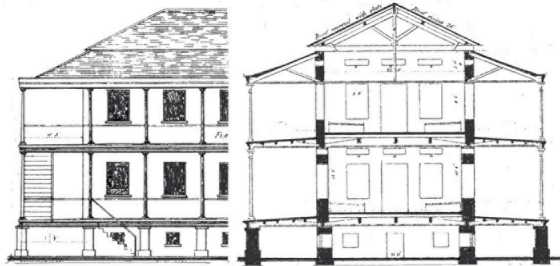
Lieut. Colonel Sir C.F. Smith's original proposal for the Uniform Barrack System



Junctions: Beam, Column, Cornice.
Bahama Barrack. Bolts & dovetails



Final version of Uniform Barrack System as erected at: Barbados, (single storey hospital and iron barrack), Bahamas, Antigua, St. Vincent, St. Lucia and Grenada.



Junctions: Beam, Column, Cornice.
Uniform System. Sockets & dovetails

Figure 1: Evolution of the Uniform Barrack System.



Figure 2: Barracks, Nassau. 1890. By kind permission of Balmain Antiques, Nassau, Bahamas.

Acknowledgement: The West Indian Iron Barracks were brought to my attention by Prof. R.B. Lewcock, who helped me locate the relevant documents in the Public Record Office in London.

Archival Sources: Manuscript papers held in the Public Record Office, Kew, are referred to by their 'bundle' number and date of correspondence. This material includes all references to *WO* (War Office), *MPH* (Maps and Plans) and *ADM* (Admiralty) documents.

Copyright: Fig. 1. Top drawings traced by author from Col. Sir C.F. Smith's Report in Appendix to *WO 55 1828*, dated Barbados, 5th November 1823. Bottom Drawing from Capt. Brandreth RE 'Memorandum relative to a System of Barracks for the West Indies, recommended by Colonel Sir C.F. Smith, CB, RE, and approved by the Master-General of the Board of Ordnance.' *Professional Papers of the Corps of Royal Engineers*, vol II, 1838 pp 239-246.

Drawings of Column, Beam and Cornice detail: Top, Bahama Barrack: Bahama barrack drawings in *WO 78 886*. Bottom, Uniform System drawings in *MPH 192*. Note: The details of the ironwork assembly published in 1838 are misleading as they suggest that the column capital is a separate component. Pl. 5 in Brandreth, 'A System of Barracks for the West Indies,' *Professional Papers of the Corps of Royal Engineers*, vol II, 1838.

Fig. 2. Bahama barrack C.1890. By kind permission of Balmain Antiques, Nassau, Bahamas.

1. See note 85 below.
2. The Duke of Wellington, (ed) *Despatches, Correspondence, and Memoranda of Field Marshal Arthur Duke of Wellington, K.G.....edited by his son...vol 1, .[January 1819, to December, 1822]*, London: John Murray, 1867, pp 20-21.
3. *Dictionary of National Biography (DNB)* entry under: Wellesley, Arthur, first Duke of Wellington (1769-1852) See also: Michael Glover, *Wellington as Military Commander*, London: Penguin Books, 2001.
4. *Despatches* vol I, pp170-174.

See also: *Despatches* vol I, pp 196-202, *Despatches*, vol I, pp 235-237. *Despatches*, vol I, pp 242-247, and pp 282-283.

Charles Dupin, *View of the History and actual state of the Military Force of Great Britain. Translated by an Officer.* London: 1822. Chapter IV, Quartering of Troops, Barracks pp 216-228.

A. Forbes, (Major General, CB, CMG), *A History of the Army Ordnance Services*, London: The Medici Society Ltd. 1929, vol I, Chapter IX, pp 171-201.

Whitworth Porter, (Major General, RE). *History of the Corps of Royal Engineers*, London 1889.

vol II, part II Chapter 1: 'The Board of Ordnance,-- The Engineer Staff. pp 93-95. 'History of the office of Inspector General of Fortifications'.

DNB, Gother Mann (1747-1830) General, Inspector--General of Fortifications, and Colonel Commandant of Royal Engineers.

5. John Michael Weiler, *Army Architects, The Royal Engineers and the Development of Building Technology in the Nineteenth Century.* PhD Thesis, University of York, 1987. p 3,

See also: J.M. Weiler, 'Colonial Connections: Royal Engineers and Building Technology Transfer in the Nineteenth Century.' *Construction History*, vol 12, 1996 pp 3-18.

And: J.M. Weiler: 'The Making of Collaborative genius: Royal Engineers and Structural Iron 1820-1870.' In Robert Thorne (ed) *The Iron Revolution: Architects, Engineers and Structural Innovation 1780-1880.* London: RIBA, Heinz Gallery, 1990, pp 40-47.

G.W.A. Napier (Colonel RE), 'The Royal Engineers Contribution to the Science of Building Construction in the Nineteenth Century.' *Construction History Society, 12th Annual Seminar.* 11 August 1993.

6. Porter, *History of the Corps of Royal Engineers*, vol II, p 171.

Weiler, *Army Architects.* p 2.

7. Porter, *History of the Corps of Royal Engineers*, vol II, pp 169-185.

Weiler, *Army Architects*, p 468, Biography of Sir Charles William Pasley (1780-1861) Also Obits. in *DNB* and *Proceedings of the Institution of Civil Engineers*, vol 21, 1861. pp 545-560.

8. Sir Alan Burns. *History of the British West Indies.* London, George Allen and Unwin Ltd., 1954, Chapter XX, 'Peace and Emancipation (1816-1838)' pp 611-650.

Edwin Williamson, *The Penguin History of Latin America.* London: Penguin Books, 1992.

9. Richard Drayton, 'The Collaboration of Labour: Slaves, Empires, and Globalizations in the Atlantic World, c. 1600-1850.' In A.G. Hopkins (ed.), *Globalization in World History*, London: Pimlico, 2002. pp 98-114.

10. *Despatches* Vol I pp 20-21.

DNB, Somerset, Lord Fitzroy James Henry, first Baron Raglan. (1788-1855)

11. *DNB*, Bathurst, Henry (1762-1834) third Earl Bathurst.

DNB, Cotton, Sir Stapleton (1773-1865), sixth Baronet, first Viscount Combermere.

12. Before the Ordnance took over responsibility for these buildings in 1821, Local Commanders-in-Chief and Governors procured them in an ad hoc and difficult to control manner.

13. *WO 55 942 Ordnance Miscellanea.* Letter from Lord Combermere at his Headquarters in Barbados to Earl Bathurst, 4 July 1818.

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Marion D. Ross, 'Caribbean Colonial Architecture in Jamaica'. *Journal of the Society of Architectural Historians*, vol X, No.3, 1951, pp 22-27.

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- Jonathan Fricker, 'The Origins of the Creole Raised Plantation House'. *Louisiana History*, vol. 25, 1984, pp 137-153.
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- MILITARY ARCHITECTURE
- Roger Willock, *Bulwark of Empire: Bermuda's Fortified Naval Base 1860-1920*. Princeton N.J.: Privately Published. 1962.
- D.J. Buisseret, 'A Brief Assessment of the Chief Military Monuments of Grenada, Saint Vincent, Saint Lucia, Antigua'. *Caribbean Quarterly*, vol 16, 1970, pp 58-67.
- David Buisseret, *The Fortifications of Kingston 1655-1914*. Kingston: Bolivar Press. 1971.
- P.F. Campbell, 'St. Ann's Fort and Garrison'. *Journal of the Barbados Museum and Historical Society*. vol 35, 1975 pp 3-16.
- Michael Pawson and David Buisseret, *Port Royal, Jamaica*. Oxford: Clarendon Press. 1975.
- Dennis Radford, The Role of the Military Engineer in the Evolution of Creole Architecture. *Unpublished Paper*, Durban: University of Natal, School of Architecture, 1998.
15. *WO 55 944*, 17 May 1822, Barbados: Mentions "Lord Bathurst's Circular, Re: Galleries".
WO 55 598, 18 February 1824. (West India, Estimates), Letter from Fitzroy Somerset (Secretary to the Master General of the Ordnance) to W. Griffin, (Secretary of the Inspector General of Fortifications [IGF] Gother Mann)
16. *WO 55 942*, 1 August 1823, Tender from Ironfounders W&D Bailey .
17. A good example of this type of Architecture can be found in St. James' barracks Port of Spain Trinidad. Built 1824-27.: Ackworth, *Treasures in the Caribbean*, p 27, Pl. 44.
18. *DNB*: Smith, Sir Charles Felix (1786-1858) lieutenant-general, and colonel commandant of royal engineers.
19. *WO 44 598*, 5 August 1823. Lieut. Brandreth (in Antigua) to C.F. Smith in Barbados
 Brandreth, Henry Rowland (1794-1848) *Obits: Professional Papers of the Corps of Royal Engineers*, vol 10, 1849, pp 1-35.
Proceedings of the Institution of Civil Engineers, vol 8, 1848, pp 12-15.
Civil Engineer and Architect's Journal, vol 11, 1848, p 96.
20. *Despatches*, vol II : pp 252-259: 3 and 6 May 1823.
WO 55 942, 9 November 1825, C. F. Smith to IGF.
21. *Despatches* vol II pp126-129: 10th September, 1823. Memorandum for Mr. Griffin... Draft of Instructions for West Indian Commission.
WO 44 378, (vol I) *WO 44 379*, (vol II) Continuation of correspondence.
22. *Despatches*, vol II, p 127.
23. *DNB*, Smyth, Sir James Carmichael, baronet (1779-1838)
 Obit. 'Memoir of the late Lieutenant General Edward Fanshawe, C.B., R.E.' *Professional Papers of the Corps of Royal Engineers*, vol IX, N.S., 1860, pp 62-63.
24. *DNB* (Smyth) : The Commission visited: Berbice and Georgetown in Demarera, Tobago, Trinidad, Grenada, St. Vincent, Dominica, Antigua and St. Kitts.
25. *WO 55 1828*. 20 January 1824. Report of West Indies Commission. Paragraphs 9—11, pp 3-5.
26. *WO 55 1828*, 20 January 1824. Appended Document. Memorandum to accompany two drawings. Barbados 5 November 1823.
27. Captain Brandreth, Royal Engineers, 'Memorandum relative to a System of Barracks for the West Indies, recommended by Colonel Sir C. F. Smith, CB, RE, and approved by the Master-General and Board of Ordnance.' *Professional Papers of the Corps of Royal Engineers*: vol II, 1838, pp 239-246.
28. *WO 44 598*, 18 February 1824, Letter from Fitzroy Somerset to W. Griffin.
WO 55 1828, 20 January 1824.
29. *WO 55 1828* 20 January 1824. Paragraph 58. p 32.

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30. WO 44 588, 26 May 1824, Government House, New Providence, Bahamas. Governor and Commander-in-Chief, Maj. Gen. Grant, to IGF.
31. WO 55 588, 26 May 1824: Grant to IGF.
32. WO 44 588, 22 September 1824, Memorandum from Wellington to IGF.
33. WO 44 588, 27 October 1824, Fitzroy Somerset to W. Griffin.
34. WO 78 886. 18 October 1824. 'Drawings: Plan and Elevation of a Barrack for 200 men, Proposed to be erected at Fort Nassau, New Providence, Bahamas.'
- WO 44 588 18 October 1824, 84 Pall Mall, G. Mann to W. Griffin.
35. WO 44 588. 1 November 1824, Marginal note on returned letter of 27th Oct. Fitzroy Somerset to Griffin.
36. WO 44 855, 2 November 1824, G. Mann to W. Griffin.
- Mechanics Magazine*, vol 3, 1824-5, pp 414-415:
-English Iron, which, eighteen months ago, was £ 7 per ton at the works, is now about £ 14 per ton there.
37. WO 78 886, 16 March 1825 (Harwich) Attached to the drawings there is a note from Fanshawe to Mann.
38. WO 44 588. 30 March 1825, Mann to Griffin.
39. WO 44 588, 7 May 1825, 2 letters, Alderson to Mann.
40. WO 55 924, 2 May 1825, Griffin to Mann:
- I am directed to inform you that the tender of Messrs W&D Bailey ...has been accepted for the supply of Ironwork for this Service.
- W&D Bailey of 272 High Holborn were Ironfounders who had tendered for Ordnance work on many occasions. They were also pioneers in all iron glass house construction, being the principal contractors for J.C.Loudon's Curvilinear Glasshouses. See: Georg Kohlmaier and Barna von Sartory, *Houses of Glass, A Nineteenth Century Building Type*, Cambridge, Mass., M.I.T. Press, 1990. pp 62, 72, 87, 88, 111, 119, 132, 135, 141. William Bailey took out two patents related to iron construction and glazing in metal sashes. Patents: 4277 11 July 1818 and 4765, 18 March 1823.
41. WO 55 924, 3 June 1825:
- Board approve of Lieut. Brandreth going to Birmingham
42. Holl, Edward (--1824) Architect in charge of Naval Works from 1804. Howard Colvin, *A Biographical Dictionary of British Architects. 1600-1840*, London: John Murray. 1978.
- Holl was succeeded by George Ledwell Taylor (1788-1873).
- G.L. Taylor, *The Autobiography of an Octogenarian Architect.*, London: 2 vols 1870-1872.
- He lost his post to H.R. Brandreth RE, in 1837 in a reorganisation of the Admiralty. (Colvin, *Biographical Dictionary*.)
43. Jean and Oliver Cox, *Naval Hospitals of Port Royal, Jamaica*. Kingston: University of Technology, Kingston, 1999.
- J.G.Coad, 'The building of Commissioner's House, Bermuda Dockyard'. *Post-Medieval Archaeology*, vol. 17, (1983) pp163-176.
44. WO 55 934, 15 June 1824, Capt. Barney RE in Jamaica to Gen. Mann.
- WO 55 928, 16 May 1823, Major Blanchard RE at St. Georges Bermuda to General Mann:
45. R.S. Fitzgerald, 'Development of the Cast Iron Frame in Textile Mills to 1850', *Industrial Archaeology Review*, vol X, Spring 1988, pp 27-145, Flagged Floors, p134.
- Colum Giles and Ian H. Goodall, *Yorkshire Textile Mills: The Buildings of the Yorkshire Textile Industry. 1770-1930*. London: HMSO, 1992. pp 64-65.
46. S.B. Hamilton, 'The use of Cast-Iron in Building, *Transactions of the Newcomen Society*, vol. 21, 1941, pp139-155.
- S.B. Hamilton, 'Old Cast-Iron Structures.' *The Structural Engineer*, vol 27, 1849, pp172-192.
- Turpin Bannister, 'The First Iron-Framed Buildings', *Architectural Review*, April 1950, pp 231-246.
- A.W. Skempton and H.R. Johnson, 'William Strutt's Cotton Mills, 1793-1812.' *Transactions of the Newcomen Society*, vol 30, 1955-57, pp179-205.
- John Harris, 'The Iron Pioneers.' *Architectural Review*, vol. 130, 1961, pp 60-61.
- A.W. Skempton and H.R. Johnson, 'The First Iron Frames' *Architectural Review*, vol 131, 1962, pp175-186.

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- R.J.M. Sutherland, 'The Introduction of Structural Wrought Iron.' *Transactions of the Newcomen Society*, vol 36, 1964, pp 67-84.
- Robert A. Jewett, 'Structural Antecedents of the I-Beam, 1800-1850.' *Technology and Culture*. Vol 8, 1967, pp 347-362
- A.J. Pa cey, 'Earliest Cast Iron Beams' *Architectural Review*, vol 145, 1969, p140.
- Ron Fitzgerald, ' The Development of the Cast Iron Frame in Textile Mills to 1850.' *Industrial Archaeology Review*, vol 10, 1988, pp127-145.
- Sara Wermiel, 'The Development of Fireproof Construction in Great Britain and the United States in the Nineteenth Century.' *Construction History*, vol 9, 1993, pp 3-26.
47. Jonathan Coad, 'Two Early Attempts at Fire-Proofing in Royal Dockyards', *Post-Mediaeval Archaeology*, vol 7, 1973, pp 89-90, Plate XV.
- See also: Jonathan Coad, 'Historic Architecture of H.M. Naval Base Devonport'. *Mariner's Mirror*, vol 69, 1983, pp 341-392.
- ADM 140 98, 1812. Saw Mills at Chatham or Woolwich.
- ADM 140 99, Various Roof Structures and other parts of buildings.
- ADM 140 257, 22 December 1812, three storey building with flagged floors on iron beams and joists.
- Sir John Rennie, CE. *Theory, Formation, and Construction of British and Foreign Harbours*. London: John Weale, 1854. vol 1 p. 41
- Plate 19 shows a plan, section and elevation of the five storey buildings.
- See also: Jean Taylor, 'John Rennie's Reconstruction of Sheerness Dockyard', *Industrial Archaeology Review*, vol 1, 1977, pp 235-264.
- Cyril T. G. Boucher, 'John Rennie (1761-1821) including a study of his bridges and the structural background of the early nineteenth century.' *Transactions of the Newcomen Society*, vol 34, 1962, pp1-13, Plates: I-VII.
- Other buildings by Holl are described in:
- Jonathan Coad, 'Historic Architecture of Chatham Dockyard 1700-1850.' *Mariner's Mirror*, vol 68, 1982, pp133-186.
- Jonathan Coad, *The Royal Dockyards 1690-1850, Architecture and Engineering Works of the Sailing Navy*, Aldershot: Scolar Press 1989. There are many references to Holl's work throughout this volume, as it is arranged thematically by building types.
48. In detail, the ironwork of the Bahamas barrack had many points in common with Holl's overseas projects. Joists and girders were united through dovetail connections, Dovetailing by Holl clearly visible in the published drawings of the Devonport Ropery and Quadrangular storehouse at Sheerness. Details of the Port Royal Hospital and the Commissioner's House at Bermuda beams and joists are similar.
- Coad, 'Two Early Attempts'.., Rennie, *Theory*..,
- Cox, *Naval Hospitals* and Coad, 'Building of Commissioner's House'...
- The junctions of girders to columns and cornice elements were made with bolts of various types. Cox, *Naval Hospitals*, p19, ' The Cast Iron Hospital of 1819', has details of Holl's component assemblies at the Port Royal Hospital and at the Commissioner's House at Bermuda.
- WO 78 886, 18 October, 1824 . The equivalent details of the Bahamas Barrack are in this set of drawings.
49. WO 44 588, 7 May, 1825. Capt. Alderson to Gen. Mann Reporting on a conference with Major General Sir John Keane, in which it was suggested that the siting of the barrack be altered and that major demolition works take place at Fort Nassau.
50. WO 55 924, 9 August 1825, Brandreth, in Birmingham to Mann .
51. WO 55 924, 14 September 1825 , Brandreth in Birmingham to Mann .
52. WO 55 924, 14 September 1825.
53. WO 55 924, 20 November, 1825, Brandreth, in Birmingham to Mann.
54. WO 55 924, 1 January 1826. Alderson in the Bahamas, to Mann.
55. WO 55 924, 20 February 1826. Alderson to Mann.
56. WO 55 924, 24 April 1826. Alderson to Mann.
57. WO 55 924, 24 April 1826, Byham, Secretary to the Ordnance who replaced W. Griffin, to Mann.

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58. *WO 55 924*, 1 May 1826, Byham to Mann.
59. *WO 55 924*, 17 May 1826. (Butler , for the secretary, to Mann.)
60. *WO 55 924*, 22 May: 'Proceedings of a Committee of Officers of the Corps of Royal Engineers'.
61. *WO 55 924*, 8 July 1826, Principal Storekeeper to Mann.
62. *WO 55 924*, 3 August 1826 Capt. J.M.F. Smith RE. to General Mann.
63. *WO 55 924*, 1 May 1827, Alderson in the Bahamas to Mann.
WO 55 924, 4 July 1827, The Principal Storekeeper Mr. Porret was instructed by General Mann on the to supply stones to the correct width and send them out to the Bahamas as soon as possible.
WO 55 924, 6 July 1827, Storekeeper to Mann.
64. *WO 44 588*, 10 September 1827. 'Direct Order'.
65. *WO 55 934*, 15 June 1824, Capt. Barney to General Mann.
WO 55 934, 1 September 1824, C.F. Smith to General Mann.
WO 55 934, 20 February 1825, Capt. Barney to General Mann.
WO 55 935, 21 June 1825, Lieut. Brandreth to Lt. Col. Elliscombe (in General Mann's Office).
WO 55 935, 5 July 1825, Capt. Barney to Lt. Col. Elliscombe.
66. *WO 44 945*, 21 January 1825. Brandreth to Mann. By March 2, Brandreth's revised plan and estimate incorporated changes ordered by Wellington.
WO 44 390, 19 February 1825, General Mann to Fitzroy Somerset.
67. *WO 44 390*, 25 February 1825. Note from the Duke enclosed in a memorandum from Fitzroy Somerset to W. Griffin:
 Let accurate estimates be formed of such buildings and the subject referred to the Treasury, the Secretary of State and the Q.M.G. and then be considered as finally fixed.
 It is to be clearly understood that there are to be beds in these Barracks, not hammocks.
 Signed W.
68. *WO 44 390*, 22 March 1825, Marginal note (by Griffin) in a letter from General Mann to Griffin.
69. *WO 44 390*, 31 March, 1825. Fitzroy Somerset to W. Griffin: The M. G. approves ...
WO 44 390, 15 April, 1825. Quarter Master General requests plans of Barracks from Griffin.
WO 44 390, 23 April, 1825. Note from ' Horse Guards' to Griffin: 'The Commander-in-Chief approves the plan for Barracks.'
WO 44 390, 27 April, 1825. 'Treasury Chambers' to Griffin:
 That they entirely concur with the proposed measure.
WO 44 390, 29 April, to Griffin from Mr. Horton, Downing Street:
 His Lordship's approval of this plan and inform them that His Lordship has taken copies of your letter upon the subject to the respective Governors of the Colonies for their information.
WO 44 390, 4 May 1825, To Griffin from the Q.M.General's Office:
 the Q.M. General has stated that: " His Royal Highness most fully approves of the whole of this arrangement as proposed for the construction of the Barracks in the West Indies, and observed that had this measure been carried into effect some thirty years ago with due attention to the site of each Barrack, many valuable lives would have been saved to the service as well as very large sums of Public Money."
WO 44 390, 7 May 1825, Griffin to Mann:
 I am directed to express His Grace's desire that these plans for Barracks may be strictly adhered to in every instance.
MPH 192. Set of drawings of the 'Approved System.'
- EXPLANATION
 Of the Eight Plates, relative to the construction of the BARRACKS in the WEST INDIES.
 Upon the System originated by
 LIEUT. COLONEL SIR CHARLES F. SMITH Kt. CB.
 Commanding Royal Engineers in
 the WEST INDIES:

and modified and approved by order of
His Grace the Master General and the
Board of Ordnance
Dated May 11. 1825

70. *WO 44 390*, 14 March 1825, G. Mann to W. Griffin:
I therefore recommend that the Board will be pleased to authorise fifty copies of these papers to be lithographed.
71. *WO 55 924*, 3 June 1825, Office of Ordnance to Mann.
WO 55 924, 9 June 1825, Brandreth to Col. Elliscombe.
WO 55 945, 6 September 1825, Brandreth to Mann. Brandreth had load tested a joist, the most common component in the building and found it to be oversized. He altered the pattern to save weight and achieve an adequate rather than oversized structural component.
72. *WO 55 924*, 9 August 1825, Brandreth writing to General Mann from Birmingham.
73. *WO 55 945*, 8 August 1825, Brandreth, in Birmingham to Lt. Col. Fanshawe, explaining that dovetailed connections would be preferable to flanges with bolting as there were risks of breakage in transport.
74. *WO 55 924*, 6 September 1825, Brandreth in Birmingham to Mann.
75. *WO 55 926*, January 12 1826, Brandreth in Birmingham to Mann.
76. *WO 55 924*, 22 May 1826, Proceedings of a Committee of Officers of the Corps of Royal Engineers....
Assembled To investigate upon the following report from Capt. Alderson... dated Bahamas 20th February 1825...
77. *WO 55 945*, 25 May 1826. Report by Brandreth. Concludes that roof collapsed because it did not have a tie bar and that the structure had nothing in common with the Uniform Barrack System.
78. See note 70 above.
79. *WO 55 923*, 3 June 1826, Brandreth in London to Mann.
80. *WO 55 923*, 21 and 26 July 1826. Capt. Smith's reports to General Mann.
81. *WO 55 923*, 26 July 1826. Capt. Smith's report of interview with W. Bailey, the contractor. Bailey explained that Brandreth had reduced the metal in the joists after conducting load tests.
82. *WO 55 923*, 31 July 1826. *This Memorandum of Wellington's is also reproduced in Despatches, vol. 3 p 352-353.*
83. *WO 55 923*, 31 January 1828, Report by Capt. I.M.F. Smith RE.
84. *WO 55 923*, 20 October 1827, Resident engineer, Antigua, Returning Report on the Iron Work with replies.
85. *Despatches*, vol 3 pp 630-631: the Duke resigns the offices of Commander-in-Chief and Master General of the Board of Ordnance.
Pope, *History, Corps RE*. vol 2, pp 91-92.
Anderew Roberts, 'Arthur Wellesley, 1st Duke of Wellington 1769-1852', *BBC: Church and State, Monarchs and Leaders*. 2002. www.bbc.co.uk/history/state/mo...
...a strong-minded Tory who believed in a strong, authoritative government and an isolationist policy. In 1828, he reluctantly became prime minister and allowed the repeal of the Test Act, the Corporation Act and put through the Catholic Emancipation bill--all of which he opposed, but the public demanded.
Although a politician who overlooked his own beliefs to govern fairly, his stubbornness would be the downfall of his government. It also earned him the name '**The Iron Duke**' for the iron shutters his London home was secured with after rioters smashed them in response to his denial of parliamentary reform in 1830.
86. Pope, *History, Corps RE*. vol. 2 p 94.
87. *WO55 945*, 22 September 1828. Brandreth in Barbados to the I.G.F. requesting end of W. Indian service after 10 years.
Colonel Lewis R.E., 'Memoir on the Professional Life of the late Lieut.-Col. Brandreth, R.E. *Prof. Papers Corps RE*, vol 10, 1849, pp1-35.
88. Brandreth succeeded G.L.Taylor, who had taken over from Edward Holl. Taylor had obtained his position on the recommendation of "Soane Nash and Smirke, the Government architects"...see: G.L.Taylor, *The Autobiography of an Octogenerian Architect*. London: 1870, vol 1, p163.

89. Coad, *The Royal Dockyards*.

R.J.M. Sutherland, 'Shipbuilding and the Long Span Roof.' *Transactions of the Newcomen Society*, vol 60, 1988-89, pp107-126.

DNB, Bentham, Sir Samuel (1757-1831)

M.S. Bentham, *Life of Brigadier-general Sir Samuel Bentham, K.S.G., formerly Inspector of Naval Works, lately a Commissioner of his Majesty's Navy, with the distinct duty of Civil Architect and Engineer of the Navy, by his widow*. London: 1862.

Bentham's widow was tireless in promoting her late husband's reputation as a genius and inventor.

She wrote regularly to technical journals about his innovations and visionary schemes.

90. OTHER BUILDINGS IN THE UNIFORM BARRACK SYSTEM.

Bahamas: additional Iron Barrack Fort Nassau. (2 iron Barracks) demolished 1899 to make room for Hotel Colonial. *WO55 925*, Correspondence: 22 May 1841, 21 July 1841, 1 December 1841, Sec. of Ord. To IGF.

Jamaica: iron galleries proposed for Up Park Camp barracks. *WO 55 934*. several letters from resident engineer in Jamaica to IGF. in 1824, 1825.

Barbados, single storey hospital erected in 1827. *WO 55 923*, 3 June 1826, Brandreth to IGF., Ironwork nearly complete. Other correspondence in this bundle, relating to Capt. Smith's investigation of Brandreth's alterations. *WO 44 399*, 1 May 1828., change of site. *WO 55 927*, fencing hospital 24 January, 1831.

Barracks for 600 men. Scheme 1834: *WO 55 927*, 18 August 1834.

Barrack for 200 men: *WO 55 927*, 15 June 1842, as built drawings forwarded by resident engineer to IGF. Also, Drawings: *MPH 312*.

Antigua, Hospital, 2 storey, smaller than a complete 200 man barrack as illustrated in *MPH 192*. *WO 55 926*, 8 May 1827, Brandreth in Antigua to C.F. Smith in Barbados: details the ease with which the whole job was executed. *WO 55 923*, 20 August 1827, Brandreth returning reports on Ironwork alterations:

I have now put up the First Building, without a single failure, and with perfect facility, and it has since been submitted to the severest season that this Island has ever known, without a bar being moved.

St. Vincent. Hospital, 2 storey. *WO 55 939*, 2 February and 21 May 1827: Queries on Ironwork (Storekeeper at Woolwich). 29 October 1828, suggested change of site, 26 October 1832, request for replacements of broken cast iron parts, etc.

St. Lucia. Barracks, 2 storey. Mentioned in the article: Captain Smyth, Royal Engineers.' On the Construction of Barracks in Tropical Climates.' *Prof. Papers Corps R E.*, vol 2, 1838, p 238.

Grenada. Large 2 Storey Hospital. *WO 55 933*, 20 September 1841, initial order to use ironwork. A timber hospital had been burnt down when a fire lit to reduce surrounding brushwood went out of control. *WO 55 949*, 8 September 1847, plans approved. *WO 55 948*, 18 November 1846, construction underway. *WO 55 951*, 31 May 1849, non-arrival of certain stores.

Technical advances brought about by the Railway boom of the 1830's along with progress in the understanding of the behaviour of iron structures made many of the constructional details of these barracks somewhat dated when they were still being built in the late 1840's.

91. *WO 55 927*, 26 September, 1834. C.F. Smith at Barbados to IGF:

With reference to the Order no 180, I have the honour to state the transmission of the Estimate has been alone delayed by labour in copying the Lithographed Drawings which were all damaged in the Hurricane, I hope however that all the required documents will be ready by the time I return from Berbice.

92. *WO 55 947*, 23 November 1842, Secretary of the Board to IGF. Mentions additional comforts expected by troops since the Barracks were first designed. Also, Hospital at Antigua, shown in drawings *WO 55 947*, 26 June 1840, details of enclosing the verandahs with jalousies.

93. *WO 44 588*, 3 August 1839, In respect of the additional barrack at Fort Nassau in the Bahamas:

...Consisting of a new range of Barracks for 200 men similar in size and arrangement to the present one, with Guard Room, Cooking House, Armourers' Shop, Magazine, privies and all other Out Buildings allowed by regulations for a building of this extent.

94. A. Romand, 'Note sur un Hopital en Fer, construit au Camp Jacob' *Revue Generale D'Architecture et des Travaux Publics*, vol 7, 1847, paras. 108-123, 141-151.

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95. Review of: J. MacCulloch, 'An Essay on the Remittent and Intermittent Diseases, including generally, Marsh Fever and neuralgia; comprising under the former, various anomalies, obscurities and consequences, and under a new systematic view of the latter.....' *Quarterly Journal of Science*, 1828. part 1: pp 34-62, part 2: pp 38-76.
- Review of: James Clarke M.D., 'The Influence of Climate in the prevention and cure of chronic diseases....' *Edinburgh Journal of Science*, 1829, pp 361-363.
- Thomas Stuart Traill, 'Suggestions for the diminution of mortality and the improvement of diet amongst the troops in the West Indies.' *United Services Journal*, July 1837, p 379.
- 'Retrospect for 1837.' (Rotation of Regiments, Rations, Upgrading of Camps.) *United Services Journal*, January 1838, pp 8-11.
- Dr. William Fergusson, Inspector General of Army Hospitals, 'On Barrack Accommodation in the West Indies' *United Services Journal*, January 1838, pp 89-95.
- Dr. W. Fergusson, 'Remarks on the Statistical Report on the Sickness + co. among the Troops in the West Indies.' *United Services Journal*, October 1838, pp 235-240.
- 'Captain Tulloch's Report on the Sickness and Mortality of Troops in the West Indies.' *United Services Journal*, November 1838, pp 306-324.
- Editor's portfolio, 'Mortality of Troops "Windward and Leeward Islands Improved."' *United Services Journal*, December 1842, pp 605-607.
- Charles W. Short, late Captain and Lieut. Colonel Coldstream Guards, 'Remarks on the position of Barracks in the West Indies as affecting the Health of Europeans: On the health and Management of European soldiers serving in the Tropics; and the advantages of an increase of the West India Corps considered.' *United Services Journal*, July 1844, pp 446-450.
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96. H. Davy, 'On Wire Gauze Safe Lamps for preventing Explosions from Damp, and for giving Light in Explosive Atmospheres in Coal Mines', *Quarterly Journal of Science*, vol 1, Art 1, pp 1-5.
- Captain Smyth, RE. 'On the Construction of Barracks for Tropical Climates', *Prof. Papers Corps RE*, vol 2, 1838, pp 233-238.
- The idea of using wire gauze as a preventive of Malaria is mentioned in some of the medical articles cited above. It is also discussed in correspondence on Barrack and Hospital improvements and repairs.
97. WO 55 950, 31 Mar 1848, Memorandum Office of Ordnance on Fever in Barbados iron Barrack.
- WO 55 950, 5 June 1848, Remedy: increase ventilation.
- WO 55 951, 12 May 1849, Sec of Ord. To IGF, suggesting moving Barbados accommodation to more 'wholesome ground.'
- WO 44 599, 27 March 1848, Medical and Engineer reports on mortality, volumes of air per man etc.
98. WO 55 952, 17 April 1850, CRE Bahamas to IGF, suggesting precautions in case of Hurricanes.
- Lieut. Colonel Reid, RE, 'On Hurricanes', *Prof. Papers Corps RE*, vol 2, 1837, pp137-208.
99. Mr. Cuming, Clerk of Works, RED, Cork, 'Memorandum with reference to the accompanying Sketches of the Officers' Barracks erected at George Town Demarera'. *Prof. Papers Corps of RE*, vol. 2, 1838, pp 248-250.
- Timber, preserving the form and dimensions.
- Major Jebb, RE, 'On the Construction of Prisons', *Prof. Papers Corps RE*, vol. 7, 1845, pp 10-32. Jebb has a section on 'Colonial Prisons', in which he advocates buildings surrounded by verandahs with a section virtually indistinguishable from the West Indian Barrack System. The description is given on p 30, and illustrated at Pl XIX.
- Major Aldrich, RE. 'Description of the Mat covering Sheds used at Hong Kong in the erection of the Ordnance Buildings, and of the mode adopted by the Chinese in transporting and raising heavy Weights for the Buildings.' *Prof. Papers Corps RE*, vol 10, 1849, pp152-154. Pl. V, (drawn by Lieut. Collinson, RE.), shows a two storied barrack building under construction. It has verandahs all round, and the ground floor is raised on a basement storey. The columns appear to be of stone rather than Cast Iron.

Taylor F.S. Capt. R.E. 'European Infantry Barracks, Nowshera, Punjab.' *Professional Papers in Indian Engineering*, vol 1, 1865, pp 130-133. Elaborate Barracks with double Verandahs. Internal arrangements within the wards is very similar as are the dimensions.

J.G. Medley, 'Indian Barracks' *Professional Papers in Indian Engineering*, vol 2, 1865, pp103-108, suggests that:

...the present fashion of barracks arose from our first tropical stations being on or near the sea coast, in which numerous doors are required through which the refreshing sea breezes may sweep through the building. But it is prima facie unlikely that buildings erected after the same fashion in a totally different climate such as Hindostan, should answer their purpose.

'Barracks at Aden,' *Engineer*, vol. 68, July-December 1889, pp 188, 190, 189,198, 208. These barracks have the same form as the West Indian Barracks, but are framed in steel sections fabricated in Britain for assembly on site.

ADDITIONS TO ARCHITECTURAL HISTORY

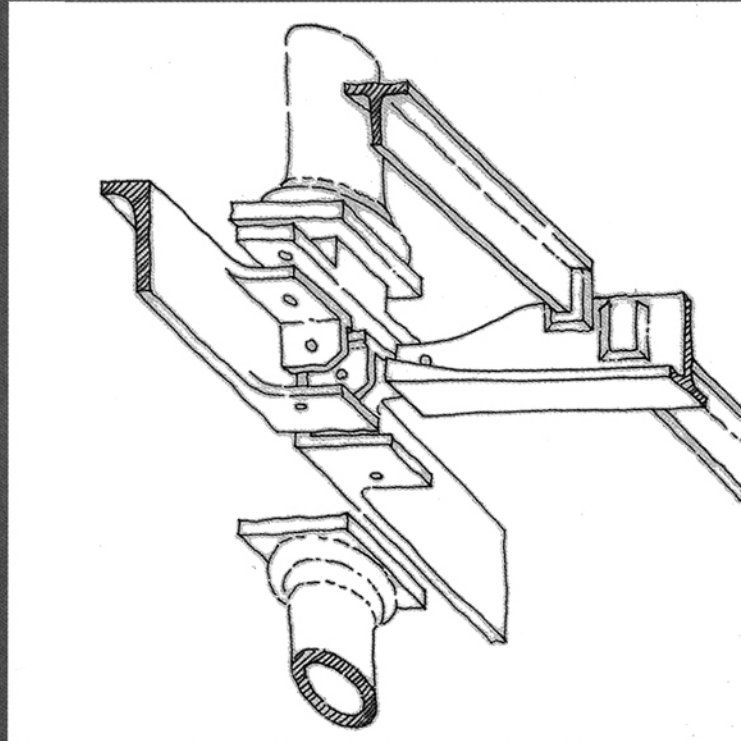
XIXth annual conference of the
Society of Architectural Historians
Australia and New Zealand

Brisbane, Australia
4-7 October 2002



ARCHITECTURE + 19TH C / TECHNOLOGY

Some histories would give us cause to treat the nineteenth and twentieth centuries as distinct eras, separated by the advent of the formal vocabulary of Modernism around the year 1900. However, a case can be put for seeing this period unified at other levels, and by processes that begin in the nineteenth century such as: the structuring of the profession and its relation to other forms of knowledge; and the development of architectural planning in response to new technique of social formation. Papers in this session open these questions by looking at the relation of architecture and engineering, and at the planning of houses and public exhibitions.



**Kevin Green**

School of the Built Environment
Northern Territory University

A rough trade: How artisan ironworkers mediated architectural modernism: A case study of early steel framed architecture, the 1897 Wesleyan Church, Darwin

In 2001 the former Methodist church at the corner of Knuckey and Mitchell streets in Darwin NT, was dismantled, refurbished and re-erected on a new site in the Darwin Botanic Gardens. As well as being the oldest surviving church building in Darwin, it is a unique example of nineteenth century prefabricated steel framed building. The building was first erected at the Knuckey St. site in 1897. It was manufactured at a time when artisan craftsmen worked the new construction materials of iron and steel with highly evolved handicraft skills, but were making increasing use of machine tools. This continuation of artisan production into the late machine age, places it at odds with the process of modernisation Giedion describes in *Mechanisation Takes Command* and raises questions about the manner in which the application of the steel frame 'modernised' architecture.

Pedro Guedes

School of Design and Built Environment
Queensland University of Technology

The Iron Duke's West Indian Barracks

Wellington's Uniform Barrack System crystallized a complex vision, imprinting an 1820's type on generations of military builders for over a century.

Vernacular forms of Caribbean building with deep verandahs had influenced the design of 18th century barracks and hospitals. Lord Combermere used his authority as Commander-in-Chief, Leeward Islands to highlight certain features of this tradition, giving them official blessing. He also mused upon the economies of using iron and called upon medical opinion for scientific backing. The use of galleries was mandated for all Caribbean military buildings by a circular from the Secretary for War and the Colonies, Lord Bathurst, narrowing the options for fine judgements in design further still.

Wellington as Master General of the Ordnance saw the use of iron for colonial military buildings as a method of imposing absolute uniformity and central control. Under the influence of Combermere and Bathurst, Colonel Sir Charles Smith provided the dimensional templates. Edward Holl's ideas embodied in naval buildings were plagiarised for solutions which were translated into building components by Lieut. Brandreth's collaboration with iron-founder William Bailey, under the watchful eye of General Gother Mann, Inspector General of Fortifications.

Buildings could henceforth be issued instead of designed, implemented rather than built.



Colophon

92

Additions to Architectural History

The Proceedings of the XIX Annual Conference of the Society of Architectural Historians, Australia and New Zealand

Published in Brisbane, Australia, by the Society of Architectural Historians, Australia and New Zealand (incorporated in South Australia) 2002

Each paper in this volume has been blind refereed by members of a panel of academic peers appointed by the conference committee.

This volume is available for purchase through the Society of Architectural Historians, Australia and New Zealand. Contact Andrew Leach (SAHANZ Secretary)

www.sahanz.net

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The Conference committee would like to thank all those peers of the Society who gave their time and expertise to the refereeing of papers.

Conference production

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The Iron Duke's West Indian Barracks

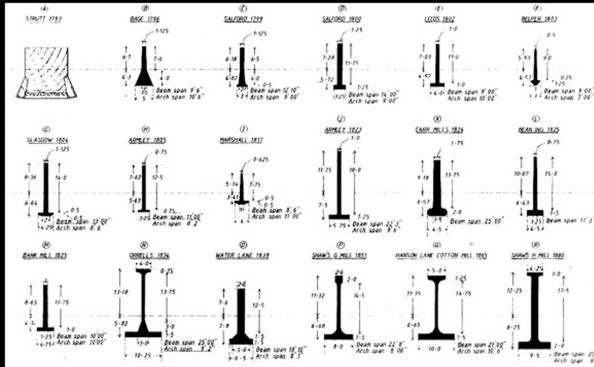


I know of no point more important than closely to attend to the comfort of the soldier.
His Grace, The Duke

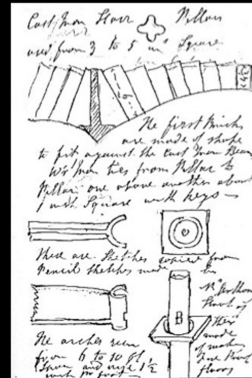


The Duke of Wellington.

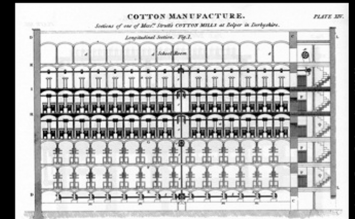
We would rather see his long nose in a fight than a reinforcement of ten thousand men any day. Capt J. Kincaid, 95th Rifles



Scholarship on early iron structures has focused on the evolution of textile mills as precursors of steel framed skyscrapers at the end of the 19th century.



Simon Goodrich. Belper Noth Mill, details.

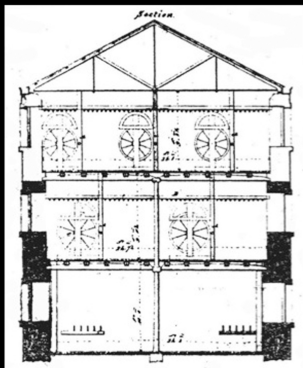


Belper North Mill, Section.

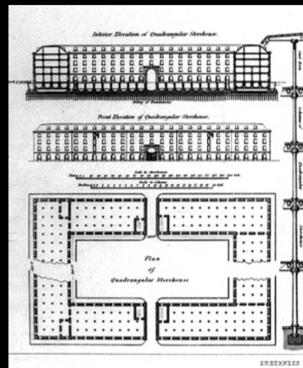


K.F. Schinckel, sketch of Manchester textile mills, 1826.

Typical 'fireproof' mill construction, early 19th cent. Cast iron columns supporting cast iron beams with brick arches spanning between them. Heavy brick external walls help stabilise the structure.



Ropery, Devonport. 1813.



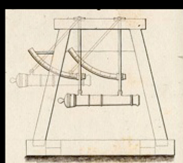
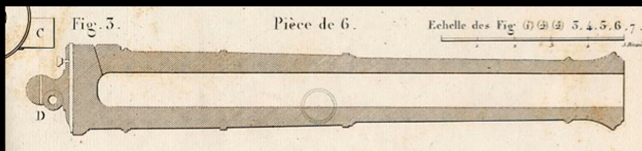
Quadrangular Storehouse, Sheerness, 1822.

Edward Holl. Cast iron framing for the Royal Navy. Both buildings have floor structures of cast iron beams and joists with York flags



HIS GRACE, became MASTER GENERAL of the Board of Ordnance in 1819.

This gave him an ex-officio seat in the nation's cabinet.



Materiel was supplied to the Board under contract.
Standardisation and quality control were strictly enforced.
Performance testing was routine.



The Board of Ordnance provided the Army and Navy with all their war fighting materiel, from guns to uniforms.

In 1819, the Board became responsible for designing and building barracks for the Army both at home and for garrisons overseas.



Lord Combermere. Governor of Barbados And C-in-C Leeward Islands

In 1818, Combermere wrote to Bathurst, proposing Barracks For the West Indies with iron Framed verandahs all round.

He suggested that this would Result in large savings.



Henry Bathurst, 3rd Earl Bathurst, Secretary for War And the Colonies.

The Board of Ordnance took over responsibility for the design and procurement of barracks from Military Commanders



Deanery, Nassau, Ca. 1710

BE Chan, Historic Architecture of the Caribbean, 1998



Kingston Jamaica, Street scene.

Blaugess, Architecture of the Caribbean, 1980



Oakes house, Nassau, Bahamas.

Blaugess, Architecture of the Caribbean, 1980

Caribbean Creole Vernacular.

Verandahs and screening.



B.E. Chan, Historic Architecture of the Caribbean, 1998

St. James' Trinidad. Designed 1822, completed 1826

Architectural centrepiece and substantial Tuscan columns would become inadmissible in the strictly controlled **Uniform Barrack System**



General Gotter Mann RE

Inspector General of Fortifications, and Colonel Commandant of Royal Engineers.

Every design or expenditure for a military building had to be scrutinised and approved by his office.

He took particular interest in the design and detail of the **Uniform Barrack System**.

Inspector General Of Fortifications

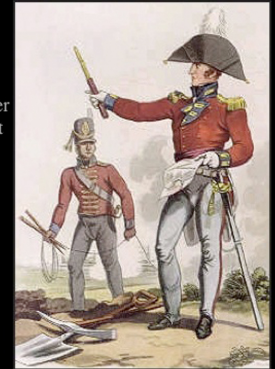
The work of General Mann's office was overseen by the Board of Ordnance.

A Royal Engineer officer directing building operations.

In the background, a sapper using string lines to set out a building.



Button from a Royal Engineer's uniform, bearing the insignia of the Inspector General of Fortifications.



Royal Engineers.

Lt Col Sir C F Smith RE was Commander Royal Engineers in the West Indies.



Fortifications and Barracks on the islands coloured Red were the responsibility of Lieut Col Sir CF Smith RE, Commander Royal Engineers, West Indies.



Lt Col Sir CF Smith RE's command extended over 11 island colonies, with only 5 RE officers.



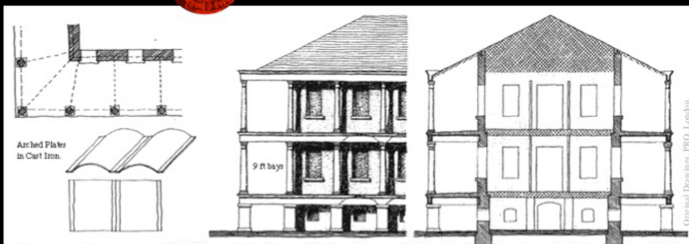
HMS Valorous

Wellington's brief included the suggestion that the commission consider the merits of Iron structures.



His Grace, Master General

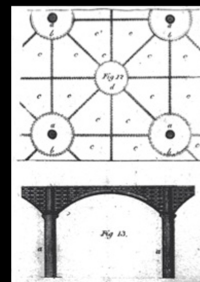
In 1823, the Master General sent a Commission to the West Indies.



Traced from drawings brought home by the West India Commission chaired by Col. Sir James Carmichael Smyth RE

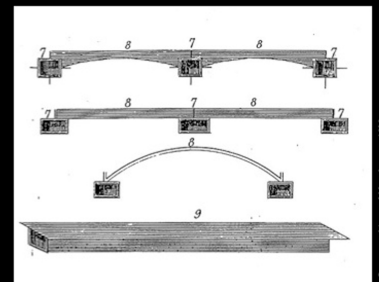
Lt Col Sir C F Smith RE's 1823 proposal for the **Uniform Barrack System**

Verandah built with cast iron arched plates spanning 9ft between columns.



Samuel Wyatt, 1800. Cast iron curved plates form the intrados of groin vaulting.

Reynolds of Iron and Manufacturers, 1800



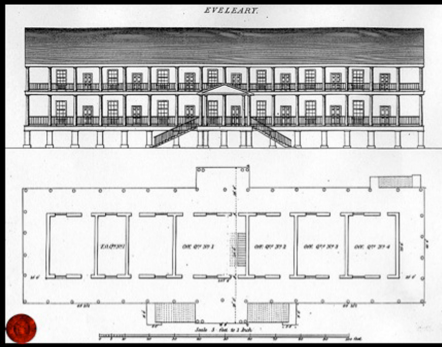
Ralph Dodd, 1808. Cast iron tubular beams with iron arched plates spanning between them.

Reynolds of Iron and Manufacturers, 1808

Early Patents for using cast iron structurally.

May have influenced him in his design for the

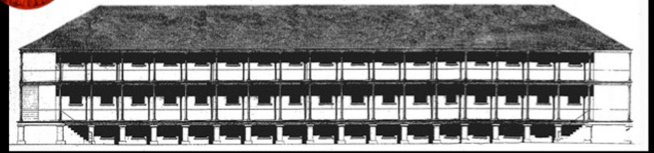
Uniform Barrack System.



Professional Papers of the Corps of Royal Engineers - 1838

Barracks built in hardwood at Eveleary, Demarera on the S. American mainland, 1820s.

These barracks are built to a 9ft module and share many dimensions with the **Uniform Barrack System**.

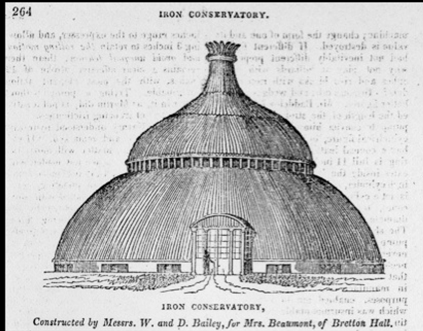


Original Drawing: Microsoft, PRO

Designed by Col Fanshawe RE in London under General Gother Mann RE, drawn by a surveyor

First Bahama Barrack, designed 1824.

Cast iron columns, beams, joists and ranging plates. Verandah floors: York flags. This building became the prototype for the **Uniform Barrack System**.



R.C. London, Dept of Roads of Cottage Farm near Villa Archiburne - 1833

Ironwork contractors for the Bahama barrack and early buildings of the **Uniform Barrack System**, W&D Bailey, were patentees and specialists in iron curvilinear conservatory construction.



Thomas Hornor 1783-1844

Ironworks



Percy Williams 1798-1844

Foundry



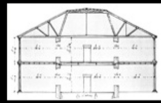
Blast Furnaces

Cast iron components were made in Birmingham for the Bahama Barrack and the first buildings of the **Uniform Barrack System**.



John Bees Roberts

Both these buildings have verandahs built with cast iron beams, joists and columns and floors of Yorkshire stone flags.



Col. Ward Humphreys 1979

Commissioner's House, Ireland Island, Bermuda.

1824

1818 - 24

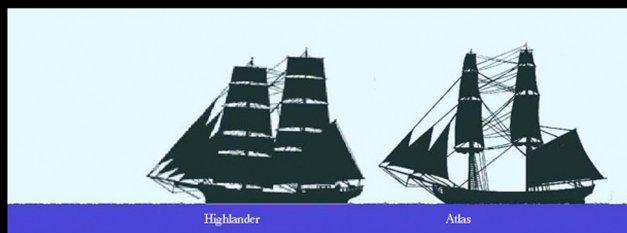
Naval Hospital, Port Royal, Jamaica.

Edward Holl's Overseas Projects

Influenced the the First Bahama Barrack and The **Uniform Barrack System**.



Lt Brandreth RE was in Birmingham with the iron founders during a time of political unrest. The Combination Acts had recently been repealed and strikes were legal.



Highlander

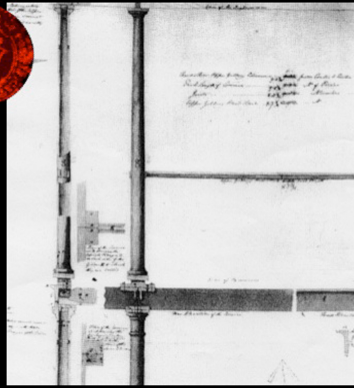
Atlas

The Brigs *Highlander* and *Atlas* brought the supplies for the Bahama Barrack in January 1826. All that remained was for the ironwork to arrive.



The *West India Packet* came with the much expected ironwork and overseer.

High expectations were soon dashed as Capt. Alderson tried in vain to understand the components he had been sent.

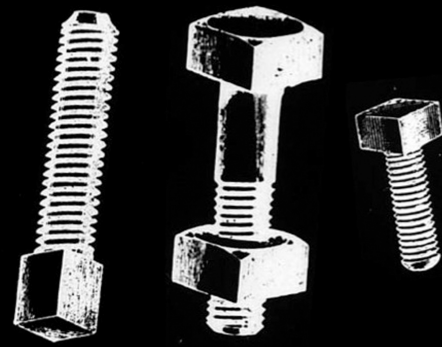


Original Drawing miscellin PRO

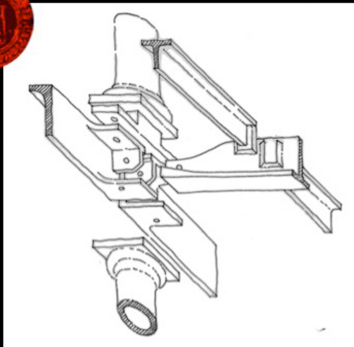
Drawing produced under the supervision of Col Fanshawe RE

First Bahama Barrack, ironwork details

When first unloaded, Alderson could not understand how the pieces went together. He even feared that parts of different buildings had been mixed up.



To make matters worse,
Not a single item of ironwork could be erected !
None of the bolts sent would fit.



Three dimensional interpretation based on original drawings.

First Bahama Barrack, 1824.

Column, Beam and Cornice connections.
Bolts and Dovetails.



By kind permission of Bahain Antiques, Nassau, Bahamas.

Barracks, Fort Nassau, Bahamas.

Circa 1880.

The first Bahama barrack is central to the photograph. Behind the second iron barrack is just visible. It was built in 1841 in the **Uniform Barrack System**



Original Drawing miscellin PRO

Uniform Barrack System, 1825.

Elevation.

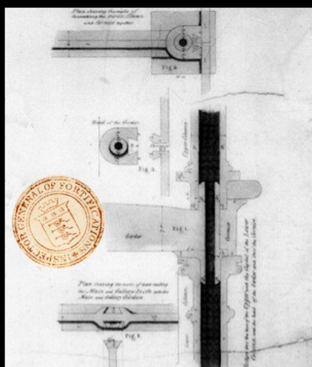
Part of lithographed drawings circulated to Royal Engineer Officers throughout the West India Command, to ensure absolute uniformity in barrack design.



Professional Papers of the Corps of Royal Engineers - 1833

Uniform Barrack System.

Detailed design by Lt. Brandreth RE, in the office of General Gother Mann in London. Final alterations were made at the foundry from experience gained in manufacturing the Bahama Barrack.

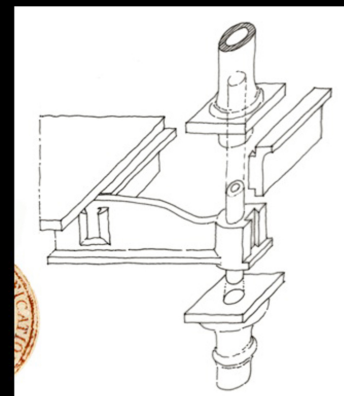


Original Drawing miscellin PRO

Uniform Barrack System.

Details.

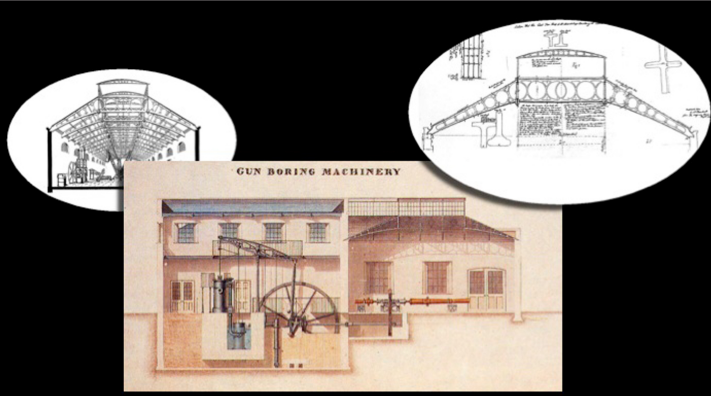
From the original drawings upon which the lithographs were based.



Uniform Barrack System.

Column, Beam and Cornice connections.
Sockets and Dovetails.

Less fragile than Bahama Barrack details.



Lieut. Brandreth RE investigated the collapse of a cast iron roof at Maudslay's factory in Lambeth.

IRON

- 83 different component types.
- 1606 individual pieces.
Cast iron: 1526.
Wrought iron: 80.
- 800 fixings (bolts)
- 216 Tons of Iron.

Professional Papers of the Corps of Royal Engineers. 1858

Floor framing. Iron girders and joists to Main barrack room and verandah.

Girders and joists.

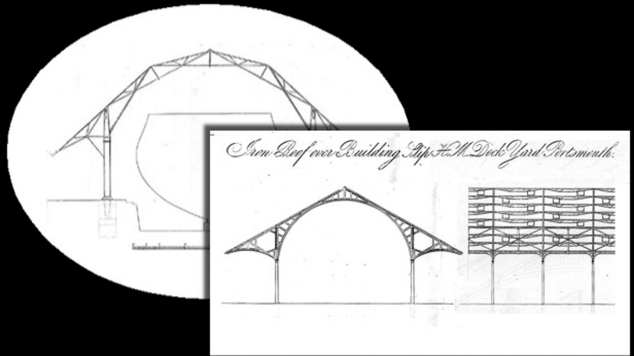
Staircase components, iron jalousies and assemblies.

Uniform Barrack System.
Components for 200 men.

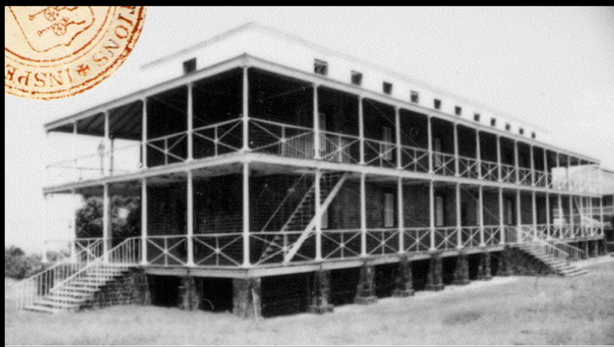


The Duke of Wellington became Prime Minister in 1827.

His popularity with the public was nowhere near the esteem with which he was held by the troops. When rioters broke the windows of his official residence in London, Aspley House, His Grace had iron shutters made to prevent it happening again. From this incident, he earned the nickname ' Iron Duke'.



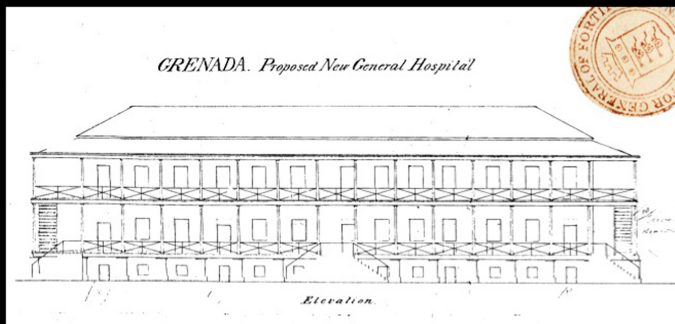
Brandreth's modernisation of Naval Shore Establishments included large span Iron Roofs.
These were the precursors of the great 19th Century train sheds.



Uniform Barrack System.
Iron Barrack, St. Lucia.
Completed mid 1830s

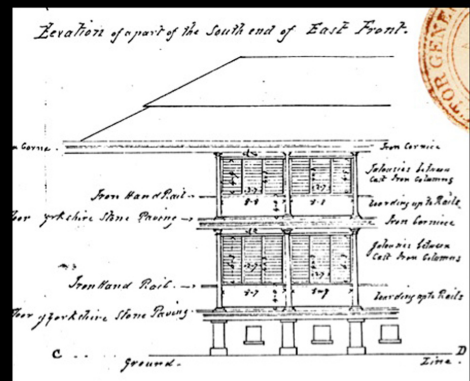


Uniform Barrack System.
Iron Barrack, Barbados.
Building completed 1842. Photograph circa 1890.



Uniform Barrack System.
Grenada General Hospital. RE Officers expediently deskilled.

Built 1847. Working drawing traced from 1825 lithographed plans. Uniformity with little scope for variation and no room for design.



Uniform Barrack System.
Antigua Hospital. Alterations, mid 1840's.
Enclosure of verandahs with jalousies and copper mesh gauze.

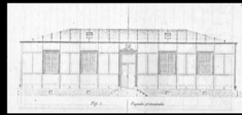


It was not until the early 20th century that the mosquito was identified as the vector for malaria. 19th century medicine favoured the miasma theory of the propagation of fevers.

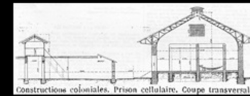


In the 1830s, enclosing verandahs with mesh screens was thought to neutralise miasmas on the same principle that the Safety lamp prevented explosions in mines.

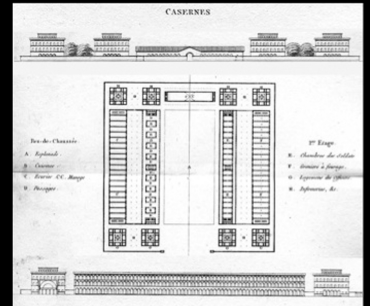
The prevention of malaria was a major consideration in the design and siting of barracks in the West Indies



Experimental hospital in sheet metal for Guadeloupe. 1842. Door and window frames in cast Iron. Walls with ventilated cavity.

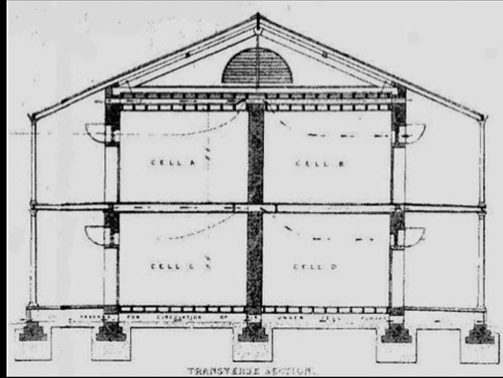


Prison for Cayenne. 1894. Large 'warehouse' volume under ventilated steel roof. Cells back to back with open iron grille ceilings.



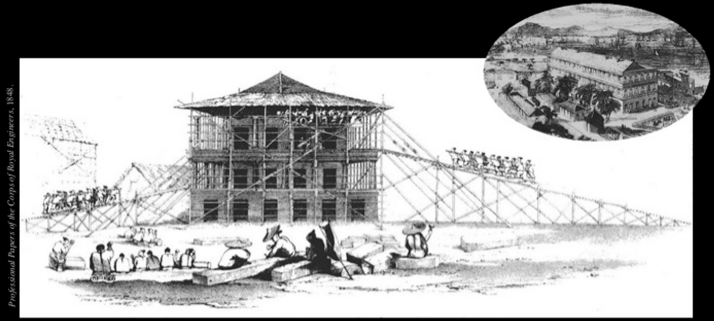
J.N.L. Durand's design for a barracks complex on a grand scale, designed in the year VIII.

French designs and experiments with barracks and hospitals were remarkably different to British examples.



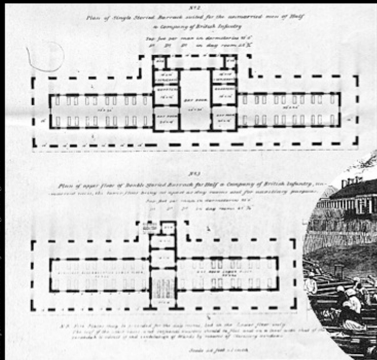
Tropical Prisons.

Major Joshua Jebb RE's proposal, 1845. Similar in form to West Indian Uniform Barrack System.



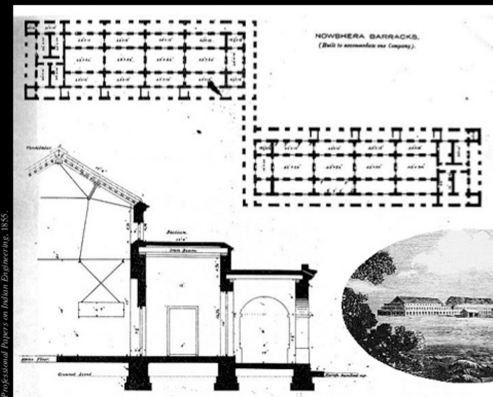
Hong Kong, Victoria Barrack.

Under construction 1846
Granite masonry, including columns, similar in form to West Indian Uniform Barrack System.



Standard Plans for Barracks in India. 1860s.

Verandah supports in masonry and additional accommodation in main body of building. Echoes of the West Indies.

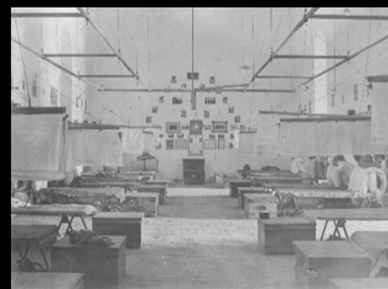


Barracks for the Punjab 1855.

Double verandahs and massive internal volumes. The verandah idea carried to the extreme.



Colaba Barracks, Bombay. The basic form architecturally embellished.



Frames above the beds are for traditional punkahs



Electric punkahs and Mosquito nets. 1915.

Interiors of Indian barracks, similar to those of the Uniform Barrack System. Note very high volumes.



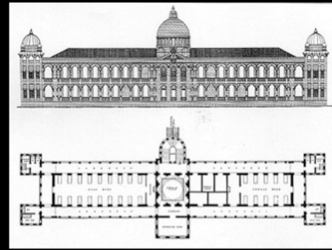
Prospect Barracks, Bermuda.



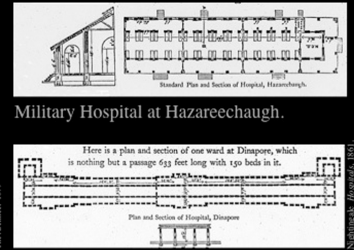
Victoria Barracks, Sydney

Barrack buildings with verandahs.

A universal solution for buildings in all parts of the British Empire, originating in the West Indies vernacular and disseminated by Royal Engineer officers.

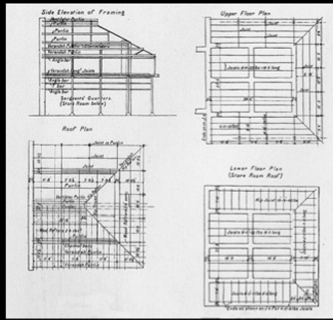


Takhtsingji Hospital, Bhavnagar. 1879
W. Emerson architect. Civilian building.



Military Hospital at Dinapore.

Hospitals in India. Variations on the Verandah theme.

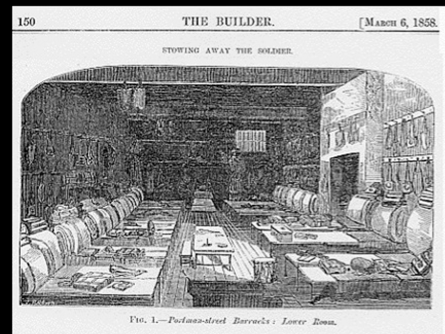


Royal Artillery barracks, Aden. 1889. Steelwork framing details.

Building much the same form as **Uniform Barrack System** of the 1820s.



End



Barracks in Britain were often improvised and squalid. Lack of light and ventilation were common. Note individual iron beds. They were introduced by Wellington in favour of hammocks in 1825.