VILLAGE HOUSING IN THE TROPICS

Tropical Architecture, although now a highly contested and debated term, is the name given to European modern architecture that has been modified to suit the climatic and sometimes cultural context of hot countries. These hot countries were labelled 'the tropics' and were often European colonies, or countries that had recently won their independence. Fry & Drew's book, written on the threshold of the end of the British Empire, was one of the first publications to offer practical advice to architects working in 'the tropics', based on the empirical studies they conducted whilst based in British West Africa during the Second World War. The book with its numerous illustrations, plans and easy to follow explanations became a key manual for all architects working in hot climates, and in particular those tasked with designing dwellings and small town plans.

Although the Royal Engineers and Schools of Tropical Medicine had long been designing and campaigning for better planning, improved sanitation and had for example developed methods of cross–ventilation, this book became an instant hit. 'Tropical Architecture' suddenly bloomed into its own distinct canon, and by 1955 the Architectural Association had set up a course specialising in tropical architecture, led for a short time by Fry.

Village Housing in the Tropics had a significant impact when it was written on a profession that had had little guidance on working in hot climates and on architecture students and universities who began to modify their courses to accommodate different conditions. Although from a post–colonial perspective many scholars now associate this architecture as being a continuation of the Imperial mission, this does not reduce the significance of the publication. Indeed, Tropical Architecture is regarded as being the forerunner to 'green architecture', developing passive low-energy buildings that are tailored to suit their climate and built with local materials.

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VILLAGE HOUSING IN THE TROPICS, WITH SPECIAL REFERENCE TO WEST AFRICA

Iain Jackson

This introduction sets the scene of how Edwin Maxwell Fry (1899–1987) and Jane Beverly Drew (1911–1996) came to write this book, tracing their unplanned sojourn into 'the tropics' and piecing together their thoughts and memories that were expressed in letters, diaries, drawings and articles – now carefully housed in various archives.[1] Although little more than a pamphlet, this slender volume was a seminal piece of work, perhaps the first to be written by architects for a wider audience, rather than a technically focused bulletin based on scientific research. The results are wholeheartedly empirical, and it has a charming 'suck it and see', pioneer tinkering approach, full of 'low-tech', but always practical solutions. It goes without saying that this publication was part of the Colonial enterprise, a small component in the machine of Empire that ensured British architects, contractors and consultants retained not only the key commissions and opportunities, but more importantly, were strategically positioned as the producers of knowledge and custodians of expertise. This is encapsulated in both the front and back endpapers of the publication that include a plan of British West Africa, alongside an engaging map of the world, coloured to highlight the tropics as well as the territories of the British Empire – graphically indicating from the outset where the book's advice could be applied. It also demonstrates how the tropics were viewed, as a homogenous band, defined as the orderly tract between the tropics of Cancer and Capricorn – nonchalantly and neatly spanning continents, oceans, climatic variances, altitudes, not to mention cultures, traditions and natural resources.

Wrapped up in this book, we also see something of Fry and Drew's lives. Fry ended up in Africa by happenchance, melancholically wishing he was somewhere else, whereas Drew turned the episode into a quixotic adventure (discussed below). Drew enjoyed working directly with the villagers, and although Fry also did to some extent, he was happier producing plans and solving construction details. Also entwined within these leafs are glimpses of their home-life – the book is dedicated to E. C. Gregory (1888–1959), a close friend of Drew's, and owner of the book's original publisher Lund Humphries.[2] Without this connection and Gregory's penchant for playing patron, it is unlikely this volume would have been published.

The third 'collaborator', Harry L. Ford, remains a largely unknown figure. He went on to develop a hydro-electric scheme for Kariba Township in Rhodesia during the early 1960s, and also planned a new town in Botswana in 1975 (Ford, 1975).

How did Fry and Drew become experts in this field, and what brought them to Africa in the first place? Fry's career was diverted, repeatedly, by the major events of the twentieth century, not least, the First World War had delayed his studies,[3] and it was the declaration of war in 1939 that was to interrupt his practice, just at a point when he was obtaining considerable work and recognition. He had built some ground-breaking social housing schemes, formed MARS and designed several glamorous Modernist villas for wealthy clients. He was writing frequently for the architectural press, and was perhaps the most well-known 'Modernist' architect who was also British (the rest were largely émigrés fleeing National Socialism in Germany). By the late 1930s, he had developed an architectural approach which was moving away from brusque geometric concrete forms, towards crafted brickwork offset with rounded specials, brightly coloured ceramics, timberwork and glassblocks. Perhaps this work was a maturing of the more derivative early 1930s work, as well as a result of his brief partnership with Walter Gropius, and the school they designed at Impington, Cambridge. Fry rightly declared that 'War and architecture never go together' (Fry, 1975, 163), and whilst reluctantly winding down his practice, he made one last attempt to preserve it, by humbly asking the War Office for work.

Although Fry's early career is generally well known and documented, Drew has not received the same level of interest. Whilst studying at Architectural Association (1929–34) she worked part-time for Charles Holden and George Grey Wornum, both eminent architects, and married a fellow student, James Alliston. She struggled to find work after graduating and eventually worked for Joseph Hill (1888–1947) on public house designs and cinemas. By 1937 she set up her own practice with Alliston on the strength of winning a competition entry for a hospital in Dawlish. They also designed a number of private houses as well as an unexecuted town plan proposal in Kenya; a preface for what was to come later.[4]

In short, Fry and Drew met at an RIBA committee meeting[5] and after Fry's first marriage had broken down (Drew was already divorced and establishing her vision of a 'women-only' practice by this point), she ended up taking him in, amongst others, to her house in Woburn Square, which had become a kind of doss-house for numerous artistic waifs and strays.[6]

At the War Office in Whitehall, Fry managed to arrange a meeting with General Williams of Fortifications and Works. The General declined the services of his practice, but offered Fry the post of Staff Captain in the Corps of Royal Engineers.

Fry was effectively a civil servant working on supplies, logistics and the administration of war, organising the setting up of camps for hundreds of soldiers and ensuring supplies were available.[7] He was posted to Derby and filled his spare time writing.[8] Fry loathed his time there and longed for something else to do, volunteering for 'over seas' work at the earliest opportunity. Fry wasn't the only architect offered foreign posts whilst serving in the Royal Engineers, and some of his fellow students obtained similar

positions, although it seems none were aware of this until after they had returned to the UK.[9] On the 24th April 1942, the day before he was due to depart, Fry and Drew married at Caxton Hall, Westminster, followed by a lunch-time reception at their favourite venue, *The Café Royal*.

Fry sailed from Liverpool, shaken at the devastation enemy raids had wreaked upon his home town, and unaware of his final destination, which had not been divulged. Whilst on board he continued writing, having recently obtained a contract for a book called, 'Architecture for children'. He claimed that he completed the final chapter just as they arrived at their destination twenty-five days later, on the west coast of Africa.[10]

The ship docked at Accra in the Gold Coast (now Ghana) and although Fry had wanted to leave the UK, he again found himself, 'desperately unhappy. Jettisoned. Marooned in a tropical backwater' (Figure 1).[11] He described that despite being 'the Royal Engineer factotum for the country with a large Humber car to take me about' he, 'was not overburdened with work'.[12] His friends kept in touch, expressing their occidental and romanticised imaginings of Africa, including the artist, Hans Feibusch (who did a mural at Sun House) who described the sojourn, 'since the outbreak of war you have been gradually disappearing into an official cloud, being whisked away into the war office first, then into the country, and now God knows where into the Orient; and although you are always very much present in my mind it is you as you were formerly, that I see moving about, in offices full of gold braid, or building barracks, or now sweating in Africa'.[13]

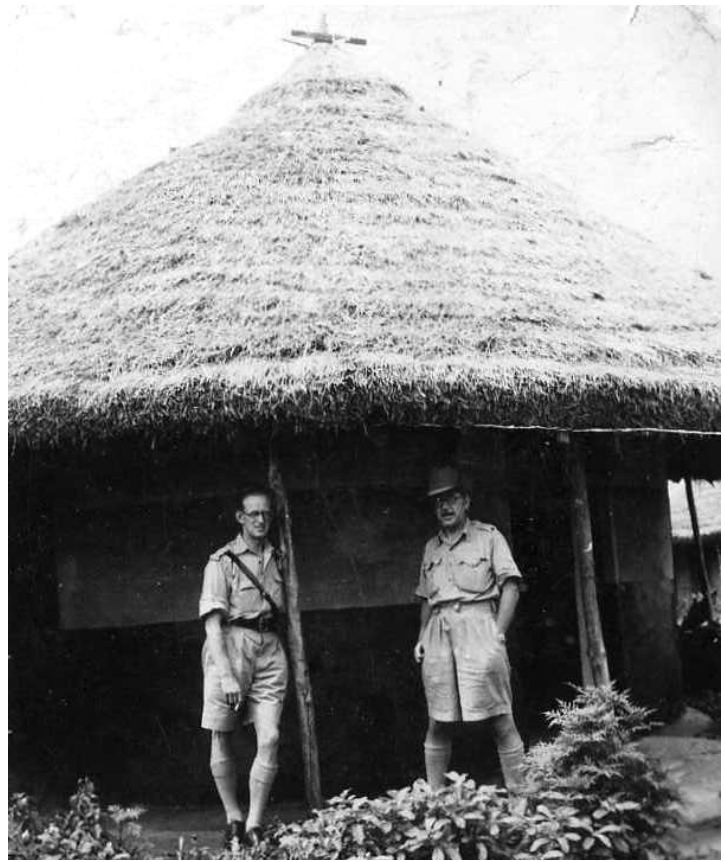

Figure 1 Fry on left, in Ghana. Photograph courtesy of John Morrison.

His old professor, Charles Reilly, kept in touch too, lyrically picturing the African women as, 'gaily clad...walking like queens and the men like Roman Emperors'.[14] There is little information about what Fry actually designed during this period, other than some 'useless airstrips',[15] extensions to the European Club and a Boy Scout HQ;[16] we know he became proficient at snooker (all very colonial so far), and spent time in the 'black towns' (he was also a progressive liberal), but no plans or drawings survive.[17] Drew, on the other hand, was very busy in London. She was involved in curating exhibitions, such as 'Rebuilding Britain', she sat on various RIBA committees, designed kitchens and stoves for the British Commercial Gas Association, as well as fake factories designed, optimistically, to confuse the enemy bombing missions. Intriguingly, it is alleged that she also did some work for MI6, using her practice as a cover. She was paid cash for these services, which may have involved translating documents written in French into English, although the details are curiously sparse, as Drew candidly teases, 'I wasn't allowed to talk about it then and I still don't let myself'.[18] Drew had a thirst for adventure and was eager to work abroad, she was also compassionate and had a genuine desire to use architecture to improve housing conditions. She was also eager to join her new husband in Africa.

Fry was summoned to meet with Lord Swinton, the Resident Minister for West Africa. Swinton needed a Town Planning Advisor and asked Fry if he was qualified, to which Fry replied he was not, but could do the job, providing three conditions were met:

1. That Jane Drew become Chief of Staff
2. He was granted three months' leave prior to starting the post
3. That a research trip to Roosevelt's Tennessee Project was funded during the three-month leave.

Fry, conceitedly, thought that he'd been singled out for the new post, but it transpired that Drew had written to the Minister for Town and Country Planning, Henry Strauss, and met him for lunch at *The Ivy* where she 'put in a word for her absent husband with the desired result'.[19] This is demonstrative of Drew's approach, she was a 'people person' with a likeable character, and able to turn situations to her advantage – or as Trevor Dannatt put it, 'she was a rainmaker'.[20]

Drew wanted the adventure but felt torn; she didn't want to leave her children behind, and in addition, she was developing her own successful practice in London, despite being 'bombed out totally once', where she 'lost the Picassos, Henry Moores and Bonnards' she had been given.[21] Fry tried to entice her with the attractive proposition that she 'could have Nigeria'[22] (that is, to do the plans for Nigeria, with Fry presumably planning the remaining three smaller colonies).

The appointment was to last 18 months, starting from when Fry returned to Africa in 1944. His salary was to be £1200 per annum with an additional £400 per annum not subject to income tax. They would also receive free furnished accommodation in the Gold Coast, travelling allowance and free first-class return passage from the UK (Figure 2).[23] One major condition, however, was that they could not engage in any

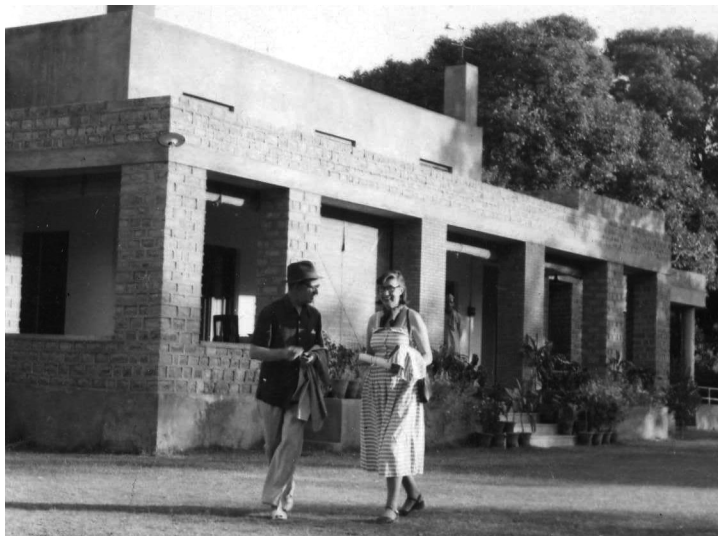

Figure 2 Fry and Drew in Accra. Photograph courtesy of John Morrison.

private architectural practice, so any dreams of re-establishing a London office were put on hold.[24]

Although Lord Swinton could grant most of Fry's conditions, he would have to write to the Colonial Offices in Downing Street to explain why he wanted to visit America. He stated that it was a research trip that would 'bring me livelier ideas of planning than I found among my own contemporaries here…I would like to fulfil the long wish to see the Tennessee Valley administration work and discuss with them the growth of administration from its small beginnings and how they were led to their present policy'.[25] Fry could combine the visit with Drew's, who was conducting research into coloured enamels for kitchen appliances in the States. Together, they considered how timber prefab, civil engineering, and solar energy for hot water could be deployed in Africa. They also visited Walter Gropius and Drew agreed that she would join Fry on the project. They would fly direct from the US to the Gold Coast.

Eager to supplement the basic accommodation in Africa with some home comforts, they arranged for china from *Fortnum and Mason*, a radiogram and a typewriter to be shipped out, as well as a second-hand Ford V8 which was to be sent to the Port of Takoradi.[26] In addition they also requested a whole array of office equipment, including six double elephant-size drawing boards, pastel crayons ('these rather important'), reams of paper, paints, surveyors' levels, stainless-steel drawing instruments, scales, inks, filing cabinets and a sunprint frame with chemicals, all to be charged to the Colonial Development Fund.[27]

Fry's official title was Town Planning Advisor to the Resident Minister, and together with Drew, their role was to 'provide draft or sketch plans for a selected number of the principal towns … to advise the Government on the setting up of town planning legislation, and some kind of machinery for carrying it out, and for dealing with nearly everything that came our way' (Fry, 1946, 197). They were permitted to recruit their own team of staff (which amounted to just four assistants) and tried to persuade old friends to join them. Peter Shepheard (1913–2002) wrote to Fry just before Christmas in 1943, 'I have thought very hard about

your invitation to West Africa and have decided that, as things stand at the moment, Mary [his wife] and I feel we cannot join you'. One of the main reasons for turning down the offer was the anticipation of the heat, with Shepheard stating that, 'I am no good myself at sticking even English heatwaves'.[28] William (later Lord) Holford was also making enquiries on Fry's behalf, trying to arrange for staff.[29] They eventually hired, amongst others, 'Mr. Tetlow, the first fully qualified West African architect' (Fry, 1946, 197).

Fry dismissed all previous African attempts at 'architecture', and although he claimed they searched for architectural precedents, 'there was none. Not in our own colonial buildings which were without character or the sort of response to natural conditions that we were seeking; nor in African building which taught us the value of shade but was of a passing order the beauty of which we could admire as it fell and decayed. . . .'[30]

As a result and without any hint of reserve he claimed, 'We were fated to make a new architecture out of our love for the place and our obedience to nature, and to make it with cement and steel, asbestos sheets, wood above the termite line, glass, paint and some stone later, and not much else'.[31]

Fry and Drew liked to give the impression that they were trail-blazers inventing a new architecture in every continent they set foot in, when, in reality, they derived a considerable amount of their methods from others, not least in West Africa from the Public Works Department building guides and bulletins, produced under the direction of the Engineer, Sir Hubert Edmund Walker. Mr. A.E.S Alcock, the Town and Country Planning Officer at Kumasi, was also very active in developing 'experimental housing' at this time, and collaborated with Fry and Drew on a model self-build village.[32] There was also considerable experimentation and building research undertaken by scientists concerned with Tropical Medicine, and coupled with the ordinances of the Royal Engineers a considerable foundation of knowledge existed that Fry and Drew could capitalise upon (see for example, Simpson, 1916; Balfour Kirk, 1931; Blacklock, 1932). Nevertheless, Fry and Drew were not writing for the specialist engineer or hard-bitten *Sapper* – their booklet was aimed at the 'District Commissioners and District Officers, the Chiefs and Native Authorities', as well as what they described as 'the growing number of Africans alive to the future of the place they live in' (Fry, 1947, 72). It was to be an easy read, carefully laid out as a handy guide for the non-specialist, that could easily be slipped into the jacket pocket of a safari-suit and carried around the colonies. It brought together the conclusions and practical outworkings of a number of specialist guides, whilst maintaining the feel of a personal notebook-cum-travellers-sketchpad, rather than a dry building manual with graphs and formulas for calculating bending moments and so on.

Most of the work in West Africa at this time was pragmatic and rather unglamorous; at Bathurst, Gambia, for example, the practice provided new layouts for drains, which previously flooded and even flowed the wrong way. In Sierra Leone they were asked to develop a plan for Freetown, but thought that a town plan was a 'complete luxury, until the port has a new deep water quay and a proper system of water storage' (Fry, 1946, 198).[33] Freetown had the highest rainfall on the coast but still suffered water shortages in the

Dry Season. A plan had been prepared by the Public Works Department as early as 1929 to improve the water supply, but remained unexecuted – until the arrival of the large development grant and introduction of people like Fry and Drew, there seemed to be a lethargy in completing tasks such as these in the colonies (see Colonial Office, 1929).

The Gold Coast was the pilot colony as it was close to their base in Accra and was the location of the Resident Minister's office. Here they developed proposals for Takoradi, Sekondi, Kumasi, as well as in Accra. They were not designing specific buildings but, in a similar vein to Fry's early work with Thomas Adams (1871–1940) (see Adams, et al., 1932), were making broad, strategic town planning proposals, such as linking the two ports of Takoradi, and draining a marsh in Kumasi as well as building a bridge to connect the two parts of the town across the railway station. In Accra the demand was for quality housing which Fry proposed should be set within parkland leading into the centre of the town (Figure 3). Fry maintained his old credo that architecture and town planning were one and the same, and attempts to separate the 'art of town planning is retrograde…' (Fry, 1947, 73), indeed a significant portion of this book is devoted to small planning interventions, such as the placing of roads around a village, the visibility of road junctions, social and public amenities as well as gardens and sports provision. There is considerable emphasis on building orientation, which if positioned correctly would not only keep the building cool, but also prevent soil erosion. Many of these principles involve siting the building parallel to the contours of a hill, rather than perpendicular to the gradient, an argument that was made by Fry's old business partner, Longstreth Thompson (1891–1973) in 1923, albeit for the temperate climate (Thompson, 1923). Fry and Drew also wrote about the location of protective tree belts, and gave guidance on how planting and building details can reduce mosquitoes and Tsetse fly breeding.

In Nigeria, Fry described the problems as 'extremely difficult'; they made plans for small districts throughout Lagos but these were deemed inadequate in a matter of months due to the 'rush' of new residents and Government Departments wanting to develop certain large areas of land (Fry, 1946, 201).

Fry's ambition for the planning of Lagos and surrounding towns was stunted by the rapidly changing conditions, the inability to enforce planning and the rate at which land was developed illegally. Recognising the limits, they set about trying to organise transport routes and simple measures such as proposing sufficient open space to flank each road. Acknowledging the arduous task, and the limits of what could be achieved, Fry conceded 'all we concerned ourselves with, was to provide a plan which would make a road structure likely to work, and which would safeguard the remaining open spaces, of which there are very few' (Fry, 1946, 201). Drew described how the extended 'ribbon development along main roads' was particularly 'rampant', and they wanted to avoid this by encouraging more development with village clusters.[34] Although Drew was more focused on improving welfare and amenity, she outlined some of the pragmatic objectives of their dwelling designs, the findings of which are illustrated in this volume; 'we had to collect water from the roofs of buildings to

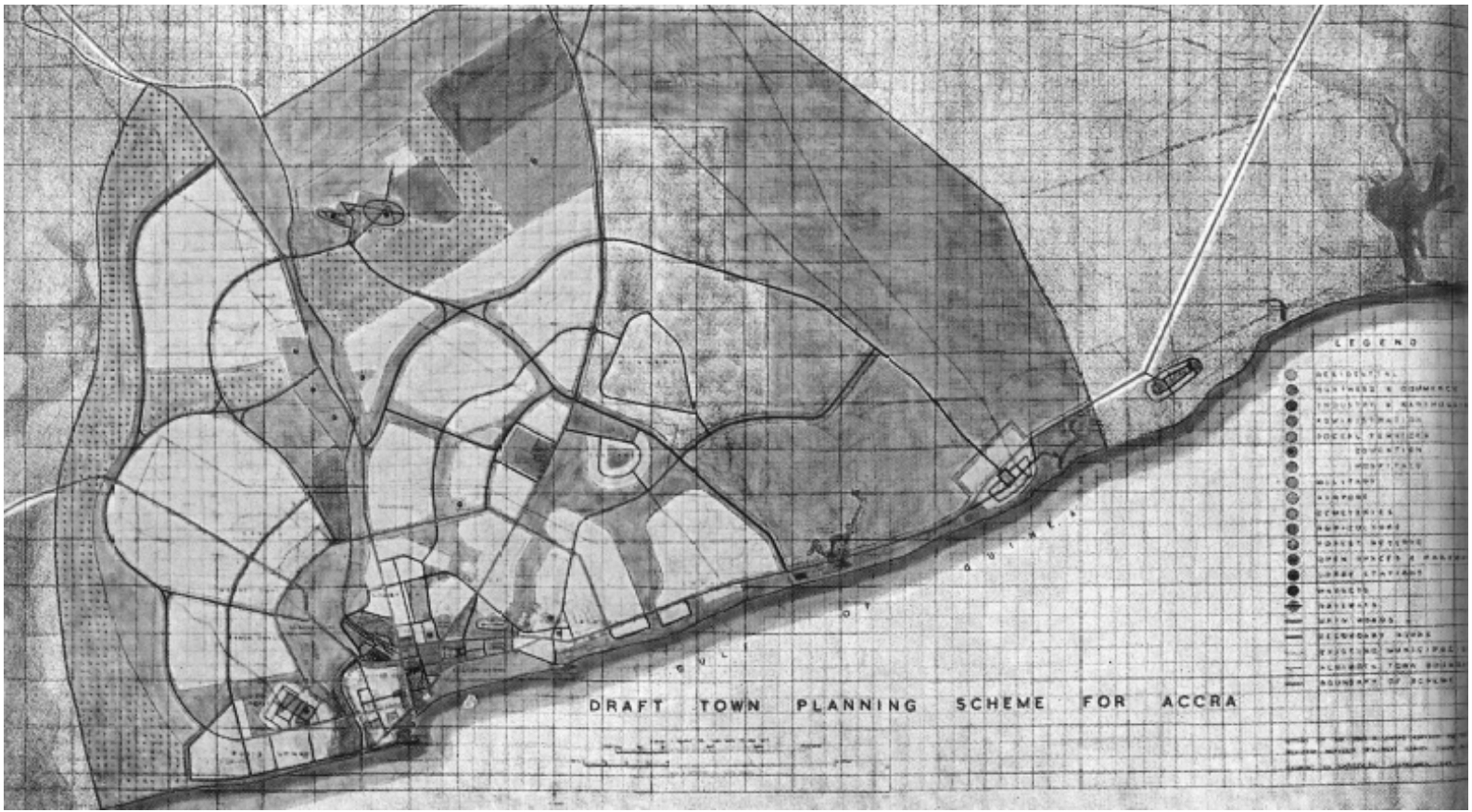

Figure 3 Fry's Plan for Accra

re-use when purified. We had to design buildings that could be used without air-conditioning. We had to work out shading devices. We would have to build in concrete for the structure, as no other material was available.'[35]

In addition she set up extensive consultations with the future inhabitants, and having gained a basic grasp of the local languages was able to develop a rapport with the Africans.[36] She explained that 'for any job it is worth consulting, where possible, all those who work in and use such buildings and get direct reaction, and to regard the building as something which will help to produce the required work and the required atmosphere'.[37]

In order to explain their town planning proposals further, they organised an exhibition in their office and invited the local dignitaries, 'who arrived in full regalia with their umbrella bearers before them….we had a certain success with the chiefs who were quite quick at seeing what improvements town planning could bring'.[38]

They developed simple methods of providing 'latrines, easy ways of digging wells. We found out what trees to grow' (Fry, 1975, 58). All this information they tried to represent graphically in this volume, using as few words as possible and without technical jargon. They looked to address the problems of water supply, sanitation and laundering in particular. If these three elements could be improved, better health would follow, as well as reducing physical effort and the time expended on such mundane chores. They also attempted to use local materials and building techniques, including 'stabilized earth' (that is, soil and clay mixed with Portland cement) which formed a durable, cheap building material that could be built using widespread skills. These houses were also cooler than the houses in the city that, as a result of the bye-laws, had to be constructed from concrete blocks. However, Drew described how this method was rejected when 'the Africans realised they [the houses] were in fact made largely of mud. Then we got a back-lash. It was political, if concrete was right for the Europeans it must be right for them.'[39]

As a result of this experience, and the subsequent publication of this book in 1947, the couple were in the right place at the right time. Their contract as Town Planning Advisors was rapidly coming to an end, and with only the prospect of a 'starchy English diet of schools and housing' (Atkinson, 1953, 17) available in the UK, they were keen to obtain well-paid work in the tropics. Governor Gurney explained to Fry that 'the British Government has promised us £200m to develop the colonies after the war and we propose to have a good bite of it. We could send to London for one of those big stuck-up architects, however, what about you two?' (as quoted in Fry, 1975, 56)

They had to undergo additional interviews and pass the selection committees,[40] but their prior experience of the region made them clear favourites for the large proposed education builds, including a new university and no fewer than thirteen schools, colleges and many other associated buildings. Fry and Drew did not remain in West Africa to undertake this subsequent work, and were keen to establish a London practice, relying on junior staff to run the jobs on site. When expressing their interest in the work, Fry stated, 'we feel that the working drawings should be done in London because they would involve a staff of many qualified

assistants working closely with and in touch with the technical and trade resources of the capital'.[41] This enabled them to build up a much larger office, with the central hub located in the metropolis from which they could direct numerous building projects around the world.

In addition to the work in Africa, they designed buildings in the Oil Fields of the Middle East, and worked with Le Corbusier and Pierre Jeanneret on the design of Chandigarh, India between 1951–1954. Whilst absent in India, they missed out on a series of rapid developments in the field of tropical architecture, which resulted in a major conference on the topic held at University College London in 1953 (Foyle, 1954). The conference was a maturation of the canon, and the assembling of practitioners with considerable expertise from around the world, but its 'innocence' and claims of technical impartiality should be tempered within the broader political context. Tropical Modernist architecture was being presented as a neutral alternative to the now politically unpalatable colonial architecture. The style of architecture may have changed, but the underlying networks of power and influence remained (colonial skin, white modernist masks) (See, Crinson, 2003; and Le Roux, 2003).

Shortly after Fry and Drew returned from India, the Tropical Architecture course was established at the AA with Fry leading the unit until 1957, when Otto Koenigsberger took over (having also previously worked in India on various building and town planning projects, see Koenigsberger, 1952). Fry and Drew continued to work throughout the world, including in Mauritius, Sri Lanka and Singapore. Their research activities also continued, and they wrote two further books on tropical architecture, further contributing to the tropical anthology that was emerging as the forbearer of today's sustainability debate (Fry and Drew, 1956; and Fry and Drew, 1964).

'We will leave behind us, therefore, some guide to the principle of village planning – exactly what we would ourselves use in the sort of help we gave this place – in the form of a booklet to be called *Village Housing in the Tropics* (Fry, 1947, 72).

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Bibliography

Thomas Adams, F. L Thompson, Edwin Maxwell Fry, and James Adams, *Recent Advances in Town Planning* (London: J & A Churchill, 1932).

G. Anthony Atkinson, "British Architects in the Tropics". *Architectural Association Journal* 69 (1953): 7–21.

J Balfour Kirk, *Public Health Practice in the Tropics* (London: J&A Churchill, 1931)

D. B. Blacklock, *An Empire Problem: The House and Village in the Tropics* (Liverpool & London: The University Press of Liverpool, Hodder & Stoughton 1932).

Colonial Office, 'Freetown: Canalisation of Streams and Surface Drainage (Typescript Correspondence, Annotated, and Memoranda Relating to Public Works in Freetown, between Acting Governor Cookson in Sierra Leone and the Colonial Office)' (London: HMSO, 1929).

Colonial Office, 'Colonial Development and Welfare: Despatch Dated 12th November 1945 from the Secretary of State for the Colonies to Colonial Governments', (London: H.M.S.O., 1945).

Mark Crinson, *Modern Architecture and the End of Empire* (Aldershot: Ashgate, 2003).

Jane Drew, Edwin Maxwell Fry, and H. L Ford, *Village Housing in the Tropics: With Special Reference to West Africa* (London: Lund Humphries, 1947), 3.

Harry L. Ford, 'A New Town in Botswana', *Planner* 61 (1975), 145–49.

Arthur Foyle, ed., *Conference on Tropical Architecture, 1953* a report of the proceedings of the conference held at University College, London, March 1953 (London: Organising Committee, Conference on Tropical Architecture, 1954).

E. Maxwell Fry "Town Planning in West Africa." *African Affairs* 45(181), 1946 pp197–204. E. Maxwell Fry, 'Town Planning in West Africa', in Drew, J (ed), *The Architects' Year Book no.1* (London, Elek 1947), 72.

E. Maxwell Fry, and Jane Drew, *Tropical Architecture in the Humid Zone* (London: Batsford, 1956).

E. Maxwell Fry, and Jane Drew, *Tropical Architecture in the Dry and Humid Zones* (New York: Reinhold Publishing, 1964).

E. Maxwell Fry, *Autobiographical Sketches*, (London, Elek 1975), 163.

E. Maxwell Fry, 'Max Fry: Inspirations, Friendships and Achievements of a Lifetime in the Modern Movement', *Building,* 229 (1975), 52–58.

A. Jackson, *The politics of architecture: a history of modern architecture in Britain*. (London, The Architectural Press, 1970) 78.

Otto Koenigsberger, 'New Towns in India', *Town Planning Review,* 23 (1952), 95–132.

Hannah Le Roux, 'The Networks of Tropical Architecture', *The Journal of Architecture,* 8 (2003), 337–54.

W. J Simpson, *The Maintenance of Health in the Tropics* (London: London School of Tropical Medicine and John Bale, Sons & Danielsson, 1916).

F. L Thompson, *Site Planning in Practice: An Investigation of the Principles of Housing Estate Development* (London: Frowde, Hodder & Stoughton, 1923).

Notes

1 Their material is housed at the Royal Institute of British Architects, The National Archives as well as in various private family archives.

2 "Mr. E. C. Gregory." Letter from Jane Drew to *The Times* [London, England] 14 Feb. 1959: 10. *The Times Digital Archive*. Web. 13 June 2012. See also Jane Drew Biography, Unpublished Manuscript, John Morrison Archive, p34–35. Fry described it as a 'marital triangle with Peter (E. C. Gregory) in the third, and yet commanding position', Maxwell Fry's Memoirs, 'Building', undated, RIBA Archive, F&D 14/4, 61.

3 E. Maxwell Fry, 'A collection of texts by Maxwell Fry', 1958–1974, RIBA Archive, F&D 13/5, 1.

4 For more on Jane's life and career see *Jane Drew Biography*, John Morrison Archive, unpublished manuscript and Drew, J. 'Reflections on My Life and Work', Fry and Drew Collection, RIBA archive, F&D/25/3

5 Maxwell Fry, 'Maxwell Fry Memoirs, "England" Chapter 1', RIBA Archive, F&D/20/1, 4

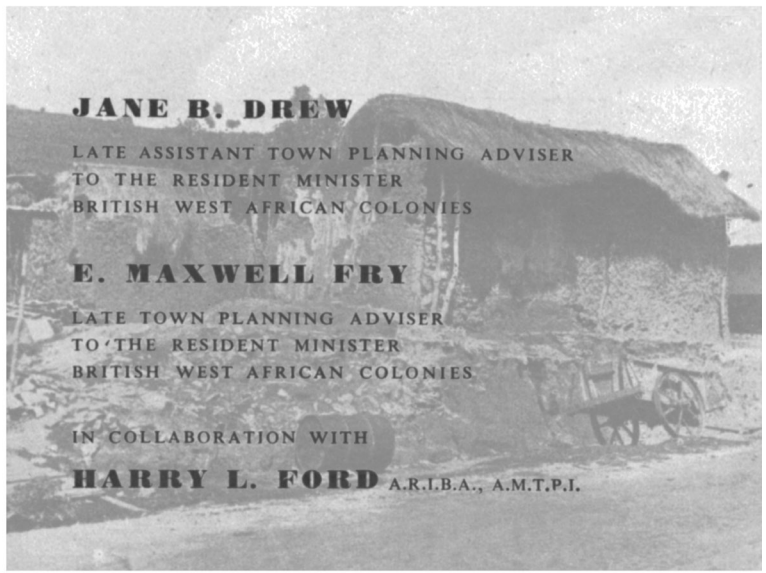
6 Other residents included, Richard Llewellyn-Davies and Peter Moro.

7 Architects over the age of twenty-five were exempt from military service and were to be only employed in ways that utilised their professional training. They were used to complete the large works required by the armed forces. See Jackson, A. (1970).*The politics of architecture: a history of modern architecture in Britain* (London, The Architectural Press), 78.

8 Maxwell Fry, ' Maxwell Fry Memoirs, "England" Chapter 1', p37, RIBA Archive, F&D/20/1. It was at Derby that he wrote *Fine Building*, Faber, 1944
9 For example, Robert Gardner-Medwin was posted to the West Indies, Percy Johnson-Marshall to Burma, William Henderson to Turkey.
10 Maxwell Fry, 'Maxwell Fry, Full Autobiography, 1985', RIBA Archive, F&D/20/2, 48.
11 Maxwell Fry, 'Maxwell Fry, Full Autobiography, 1985', RIBA Archive, F&D/20/2, 54.
12 Maxwell Fry, 'Maxwell Fry, Full Autobiography, 1985', RIBA Archive, F&D/20/2, 55.
13 Letter from Hans Feibusch, dated 30 November 1942, 'Correspondence to and from Maxwell Fry, 1942–1947', RIBA Archive F&D/12/1.
14 Letter from Charles Reilly to Fry dated 4 September 1942, 'Correspondence to and from Maxwell Fry, 1942–1947' RIBA Archive F&D/12/1.
15 Maxwell Fry, 'Maxwell Fry, Full Autobiography, 1985', RIBA Archive, F&D/20/2, 56.
16 See Letter from Fry to Drew, 4th April 1943, RIBA Archives, F&D/18/3.
17 A collection of texts by Maxwell Fry, 1958–1974, RIBA Archive, F&D 13/5, 1.
18 Jane Drew, 'Fragments of Jane Drew's Autobiography and relating documents, 1983', RIBA Archive, F&D/25/1, 13.
19 E. Maxwell Fry, 'Maxwell Fry, Full Autobiography, 1985', RIBA Archive, F&D/20/2, 89
20 Interview with author, 26th October 2011.
21 Jane Drew, 'Biography', John Morrison Archive, 38. See also letter from Trevor Dannatt to Charles Reilly regarding the bombing of Miss Drew's Office, 21 September 1944, Liverpool University Special Collections and Archives, D207/4/5.
22 Jane Drew Biography, 38.
23 Letter to Fry from Secretary of State, Colonial Office dated, 14 December 1943 'Correspondence to and from Maxwell Fry, 1942–1947' RIBA Archive F&D/12/1.
24 Drew was permitted to continue with the *Architects' Year Book*.
25 Letter from Fry to K.E. Robinson, Colonial Office dated, 19 November 1943 "Correspondence to and from Maxwell Fry, 1942–1947" RIBA Archive F&D/12/1.
26 Letter from Fry to Mssrs Griffiths McAllister ltd., , 11 December 1943 "Correspondence to and from Maxwell Fry, 1942–1947" RIBA Archive F&D/12/1.
27 Letter from Fry to Mr. Bratreet, Crown Agents to the Colonies, dated, 1 December 1943 "Correspondence to and from Maxwell Fry, 1942–1947" RIBA Archive F&D/12/1. In 1945 a Colonial and Development and Welfare Act was passed providing a total of £120m to be spent on various projects throughout the British Colonies, over a ten year period – this funded Fry and Drew's projects as well as later ones such as the schools and universities. See Colonial Office, 'Colonial Development and Welfare: Despatch Dated 12th November 1945 from the Secretary of State for the Colonies to Colonial Governments', (London: H. M.S.O., 1945).
28 Letter from Peter Shepheard to Fry dated 8 December 1943, 'Correspondance to and from Maxwell Fry, 1942–1947' RIBA Archive F&D/12/1. Perhaps Shepheard overcame his aversion to the heat, as he later put forward his CV to be selected for the Chandigarh project in 1950; see Chandigarh Gallery & Museum Archive, 'Selection of Architects and Town Planners for Chandigarh', LT-0006.
29 They discussed someone called, 'Spreull', with whom Fry had apparently once danced the Can-Can, and 'the other is a girl, - is that a bar?'
30 Fry, E. M 'Fry's Memoires' Fry and Drew Collection, RIBA Archive, F&D/14/4, 16.
31 Fry, E. M 'Fry's Memoires' Fry and Drew Collection, RIBA Archive, F&D/14/4, 16.
32 See The National Archives, London, Housing Schemes Kumasi, 1945–6, CO96/781/1.

33 Ships had to 'dock' at sea and rely on smaller surf boats to bring in/out the goods resulting in an inefficient and time consuming process.
34 Jane Drew Biography, 38.
35 Jane Drew Biography, 38.
36 Drew, J. 'Reflections on My Life and Work', Fry and Drew Collection, RIBA archive, F&D/25/3, 3.
37 Jane Drew Biography, 43.
38 Drew, J "Complete Biography" Fry and Drew Collection, RIBA Archive, F&D/30/1, 74.
39 Drew, J "Complete Biography" Fry and Drew Collection, RIBA Archive, F&D/30/1, 74.
40 See the National Archive Records, BW90/309.
41 Letter from Fry to the Colonial Office, 9 October 1947, National Archives, BW 90/309.

VILLAGE HOUSING IN THE TROPICS



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WITH SPECIAL REFERENCE TO WEST AFRICA

LUND HUMPHRIES LONDON: 1947

TO E. C. GREGORY

Made and Printed in Great Britain

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PREFACE

In writing this book it is realised that though few villages can be located completely *de novo*, most villages are fortunately still constructed of impermanent materials and this facilitates their conversion to new and better forms even in their existing locations. Much that affects the siting of villages lies in the province of the agriculturalist, conservator of forests, water engineer, etc., and we advise the District Commissioners and District Officers, the Chiefs and Native Authorities, and others for whom this book is intended to consult these experts on such matters.

Considerable help has been obtained from many sources in all colonies and at home, and much use has been made of reference books. It would be tedious to list them, but it may be taken that the references given in the book for further information on detailed subjects are our main sources.

This book is not considered as in any way complete, but rather as a guide to those responsible for locating and designing villages, and who have not at their disposal the services of an architect or planning officer.

Every village is an individual problem, but we have been able to deal only in general principles. Whenever possible it is advised that an architect or town planning officer be called in for consultation, and this book may then be a help in understanding his advice.

1. THE PROBLEM

General Preamble

Agriculture is the foundation of wealth in West Africa. The concomitant of agriculture is villages. The creation of efficient villages where a high standard of life is possible is a prime town planning responsibility of the coast. The stabilisation of an agriculture based on the rotation of crops rather than shifting cultivation will help the permanent location of villages as well as combat two great evils: soil erosion caused by heedless destruction of the forests, and soil impoverishment. Mining and fishing villages have not been dealt with separately since their location is fixed, but in general they follow the same principles outlined for other villages.

In siting a village the obvious factors controlling its position are farming land, water, and accessibility to main roads, or sometimes to sea or streams. Less obvious considerations are its exposure to wind and rain, the nature of the ground on which it is to be built, and its proximity to stagnant water of insect breeding bush.

Water is the most important of all—the provision of good water supplies, sufficient for the village and its agriculture.

Water, generally speaking, is a matter for the expert. He should be consulted on the provision of wells and water for irrigation. It is often easier to plan the village near its water than bring the water to it. Sound wells and boreholes are not usually expensive to sink, and the value of pure easily accessible water need not be stressed. Unfortunately at present innumerable villages draw their supplies from contaminated streams and wells. Irrigation is a separate problem. Usually this means the damming of streams. The provision of water for animals must also be considered.

Special Areas

The problems of the location of villages, the provision of water supply, the use of the land and soil erosion are inextricably linked. The end papers show the main areas where similar types of problems may be expected.

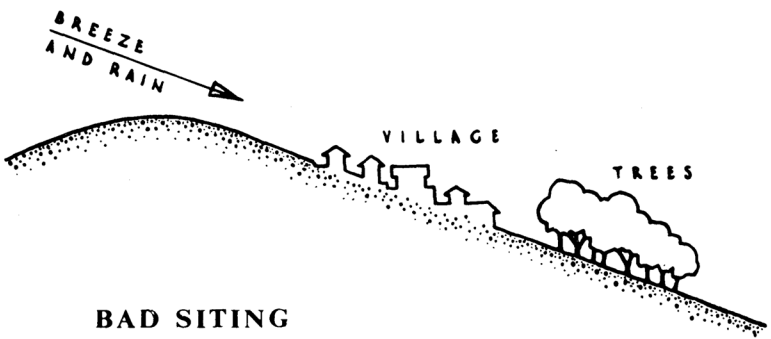
(i) The Northern Areas, or Territories.
(ii) The Forest Belt.
(iii) The Coast.

Northern Areas

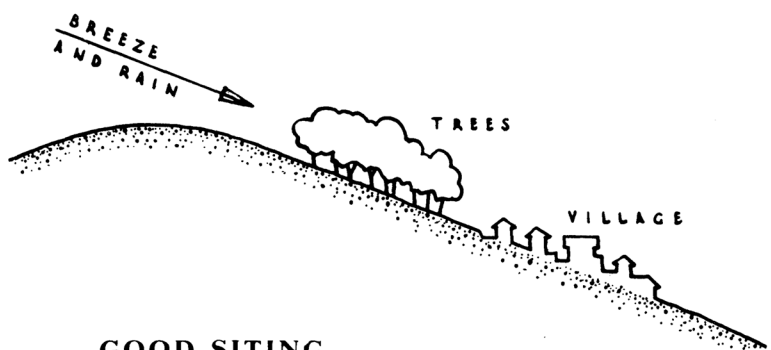
In the Northern areas the problem of water supply is acute. The land is used largely for grazing and wind erosion is an especial problem. Villages should be sited with a view to their protection from wind erosion by means of a special reserve of trees and by being sited on the leeward side of hills (*see* Illustration 1). The problem of storing water for the dry season is also more important here, the evaporation being heavy.

The size of villages in relation to their agricultural area is another important factor. There is a tendency for areas near water supplies to be over-grazed.

1 PROTECTION FROM WIND EROSION



BAD SITING



GOOD SITING

Forest Belt

The location of villages in the Forest belt or bush areas complicated by the presence of insect breeding bush. Generally speaking the high land to be avoided in the Northern Territories is here the healthiest.

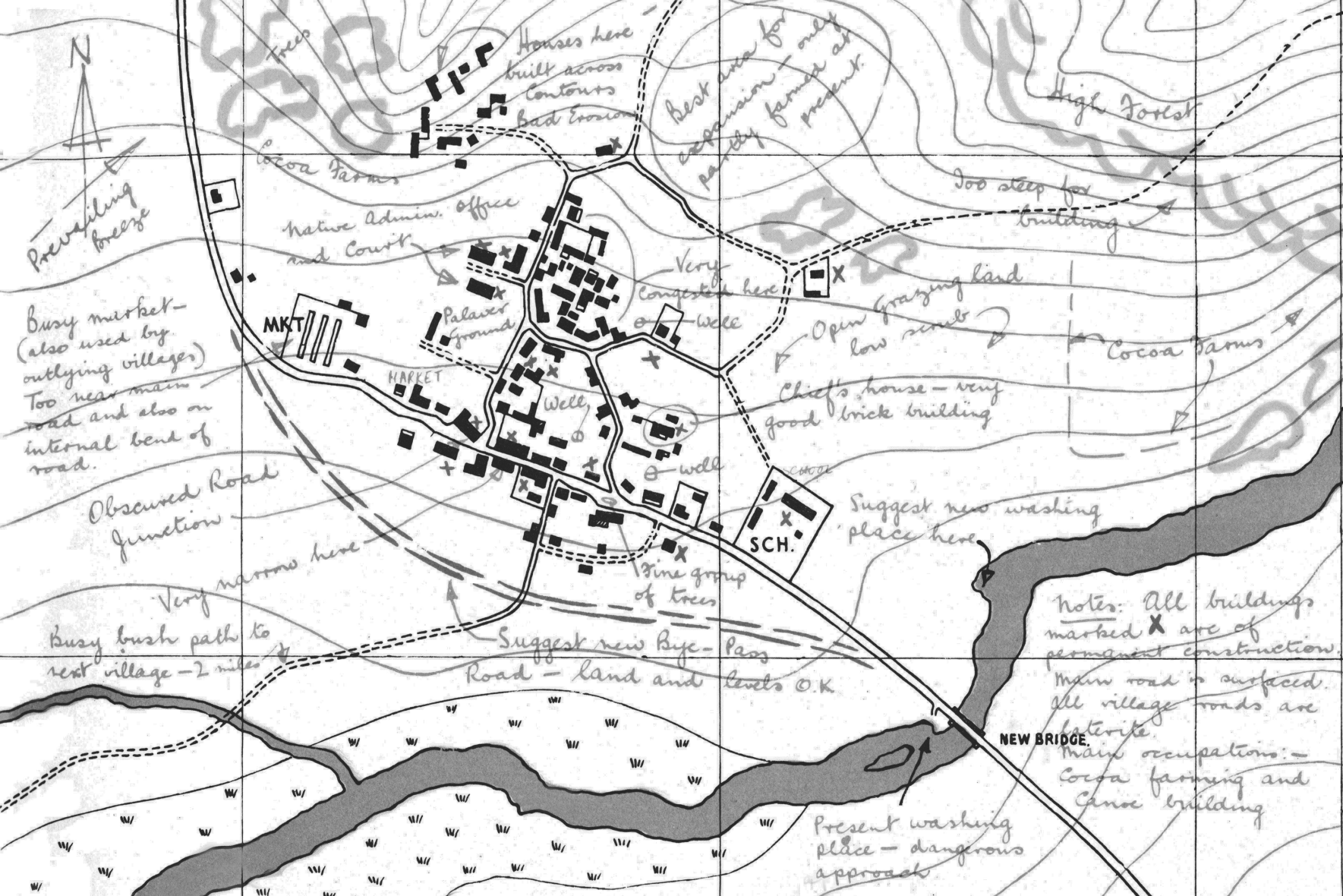
Coastal Areas

Here it is a problem of lagoons and swamp with coast erosion as a further possible evil. Over-population and exploitation of the land cause erosion by denuding the land of its vegetation, especially by burning bush and cutting forests.

Need for Preliminary Survey

This outline leads to the planner's essential preliminary, which is a survey. This survey must be inclusive not only of the land contours, but also of the proximity of farmland, the means of communication to other villages and towns, the direction of the breeze, the duration and extent of the rainfall, the nature of the soil and its liability to erosion, the nearest firewood reserves, the sources of water, and if these are not from concreted wells or deep bore holes, the extent of the catchment area to be kept free from pollution.

Illustration 2 gives a possible plan resulting from such a survey with the essential points noted. The planner would in addition describe in his note-book the condition of individual buildings, the type of soil, data as to population, volume of traffic, and all relevant information which will help in the preparation of a new planning scheme.


N
Prevailing breeze
Trees
Houses here built across contours bad Erosion
Best area for expansion – only partly farmed at present
High Forest
Too steep for building
Cocoa Farms
Native Admin. Office and Court
Very congested here
Well
Open grazing land low scrub
Cocoa Farms
MKT
Palaver Ground
MARKET
Well
Chief's house – very good brick building
Busy market – (also used by outlying villages) Too near main road and also on internal bend of road.
Well
Obscured Road junction
Very narrow here
SCH.
Suggest new washing place here
Fine group of trees
Busy bush path to next village – 2 miles
Suggest new Bye-Pass Road – land and levels O.K
NEW BRIDGE.
Present washing place – dangerous approach
Notes: All buildings marked X are of permanent construction.
Main road is surfaced. All village roads are laterite.
Main occupations:– Cocoa farming and Canoe building

Facts Emerging from Survey

Following this survey the village can be more exactly located, together with its human water supply, as near to it as can be, always provided the purity of the water is not impaired. Deep wells or boreholes may often be sited in the village itself so long as they are protected from pollution.

1 *Water*

The water supply for the animals is better drawn from separate wells a little away from the village and provided with drinking troughs.

Dams required for irrigation can be located.

2 *Soil Erosion*

The soil is our most precious heritage and should be valued as such to be treasured and developed, not exploited and left.

The accompanying illustrations 3 and 4 show an example of gulley erosion, a result of the insidious system of shifting cultivation. See also how in illustrations 5 and 6 the tree roots in this village are exposed through lack of proper precautions having been taken to control the continual leaching away of the soil by wind and rain.

The map of the West African coast on the inside cover pages shows those areas most liable to erosion. The causes of erosion are many and mostly man made. According to experts the Sahara was once forest land.

The principal causes are outside the scope of this book and are the concern of the agricultural and forestry departments, but they include the following:

3

4

5

Denuding the soil of its natural cover by over-grazing; cutting the forest without re-afforestation; burning the bush for shifting cultivation; over population; planting and building on hillsides without taking precautionary measures such as terracing to hold the soil; building on areas liable to wind erosion without screening. The soil itself varies in its liability to erosion, and its nature must be taken into account.

Following the survey of the land surrounding the proposed village, the following are the main precautions to be taken in siting the village to prevent undue erosion and soil impoverishment.

In the areas liable to wind erosion, sheltered spots should be chosen and, if required, artificial wind breaks such as tree belts and earth breaks built. The slope on which the village is built should be fairly gradual or if steep should, unless on a very firm rocky soil, be carefully terraced. The contours of the land should be followed so that as much building as possible is on the level or on a gentle slope. Illustrations 12 to 15 illustrate these points.

The details of village layout and anti-erosion precaution will be dealt with later.

Soil Erosion in the West African Colonies

In general, the position in the four colonies is as follows:

Gambia: Not a serious problem, though deforestation has taken place.

Sierra Leone: The pernicious system of shifting cultivation has degraded the soil in the upland regions of the Western

6

and Southern parts of the territory. Degradation is progressing rapidly and erosion is now severe on the hills and slopes, the position in the Colony being particularly bad. The problem is being met as in the Gambia by excluding shifting cultivation on hill slopes, and in consequence the policy has been adopted of trying to relieve pressure on the uplands by encouraging the cultivation of river flats and valley bottoms, which by lowering the demand for upland farms will help the declaration of forest reserves on the hills and slopes and the replanting of denuded areas with suitable forest trees. It is obviously important in such areas that villages be encouraged below the framework of shelter belts and forest reserves.

Gold Coast: Soil erosion is not yet serious in the Colony and in Ashanti. The main causes of the erosion on the coast is deforestation, shifting cultivation, bush fires, in some areas over-population, and the cultivation of steep slopes without the precaution of terracing them. In some areas the sea is causing coast erosion, and here the causes are complex and need special measures being taken. In the Northern Territories sheet erosion is a menace, and shelter belts and wind breaks are needed; also precautions against bush fires and over grazing. The contours in some parts need ploughing.

Nigeria: Soil degradation and erosion are taking place over much of the savannah country of Northern Nigeria and in the more densely populated areas of Southern Nigeria.

Much of this information has been taken from *Soil Erosion and Soil Conservation in the Colonial Empire*, by H. A. Tempany and G. M. Rodden.

3 *Siting of Villages in relation to Winds and Rain and Aspect generally*

Wind, rain, and sun assume particular importance in tropical regions and, as with erosion and water, the problem alters with the topography and latitude.

Villages should be sited so that they have good fresh air, plenty of ventilation without excessive breeze, are not exposed to the scorching sun or storms, and that all foul areas are to the leeward side of the village.

The general survey will have demarcated the direction of the wind and storms and, so far as other considerations will allow, the village should be located to catch the breeze and be sheltered from heavy storms. Obviously, in areas liable to wind erosion, protection from the wind should be the rule.

Agriculture, grazing, arboriculture, are the over-riding factors in the siting of the villages, together, of course, with the need for water. But where there is any matter of choice, æsthetics should be considered: a lovely view will do much to gladden the hearts of people and sweeten life, and it is usual for this to go with good fresh air

4 *Fuel wood*

The need for the provision of fuel wood reserves varies with the district. Where head loading is the method of transport it is important that the reserves should be within easy walking range of the village. As with water, the most acute shortages are experienced in the northern areas of all colonies, and especially in the Mamprussi district of the Gold Coast and in northern Nigeria. Here the need for fuel wood and

building pole reserves must be considered, together with the location of the village. It should be borne in mind in siting them that they may also be useful as erosion screens. A rough estimate of requirements for firewood for larger towns worked out at 0·1 to 0·4 acres of quick growing copping species per head of population. The large variation in areas required is due to the variation in average rates of growth of the firewood in different areas. Plantations may also be considered in some cases as a screen against mosquitoes carried on the wind from swamps.

5 *Siting of Villages in relation to Main Roads*

Villages are to a large extent self sufficient, but with the inevitably increasing contacts with the rest of the world, trade is increasing, and with it the need for wheeled transport. This transport and the higher standard of life available in towns has caused a drift in population from rural areas, which is not always desirable. The mobility of labour in West Africa is astonishing to those used to the more settled development of other countries. Much of this mobile labour is agricultural and therefore seasonal. The movement of labourers from the northern territories to Ashanti for the cocoa harvest is, in the Gold Coast, an instance of this. It is estimated that some 60,000 labourers travel south each year.

There is no doubt that in the future there will be an increasing use of lorry traffic for goods and also for labour, and that the main roads which take this traffic will affect the location of villages. It is important that both village and main roads be placed to serve those areas where development will be most profitable for the general good. Main roads are expensive both to construct and maintain; the villages should be sited conveniently near them, or, conversely, where there is an excellent village site main roads should be taken to it; it is a two-way affair. It is important at the same time that the main roads should not traverse villages but by-pass them, for motor traffic is at present, and will become increasingly, a danger to life and limb. It is a sobering thought that as many persons were killed in Britain during the world war by motor traffic as merchant seamen were sunk by enemy action.

As a general rule the main road should be at least a hundred feet from the village, and the access village roads so designed that they are as few as possible and have good visibility. Where practicable, one-way traffic should be adopted for these village access roads, and the angle they make with the main road such as to make the junction with the traffic stream safe.

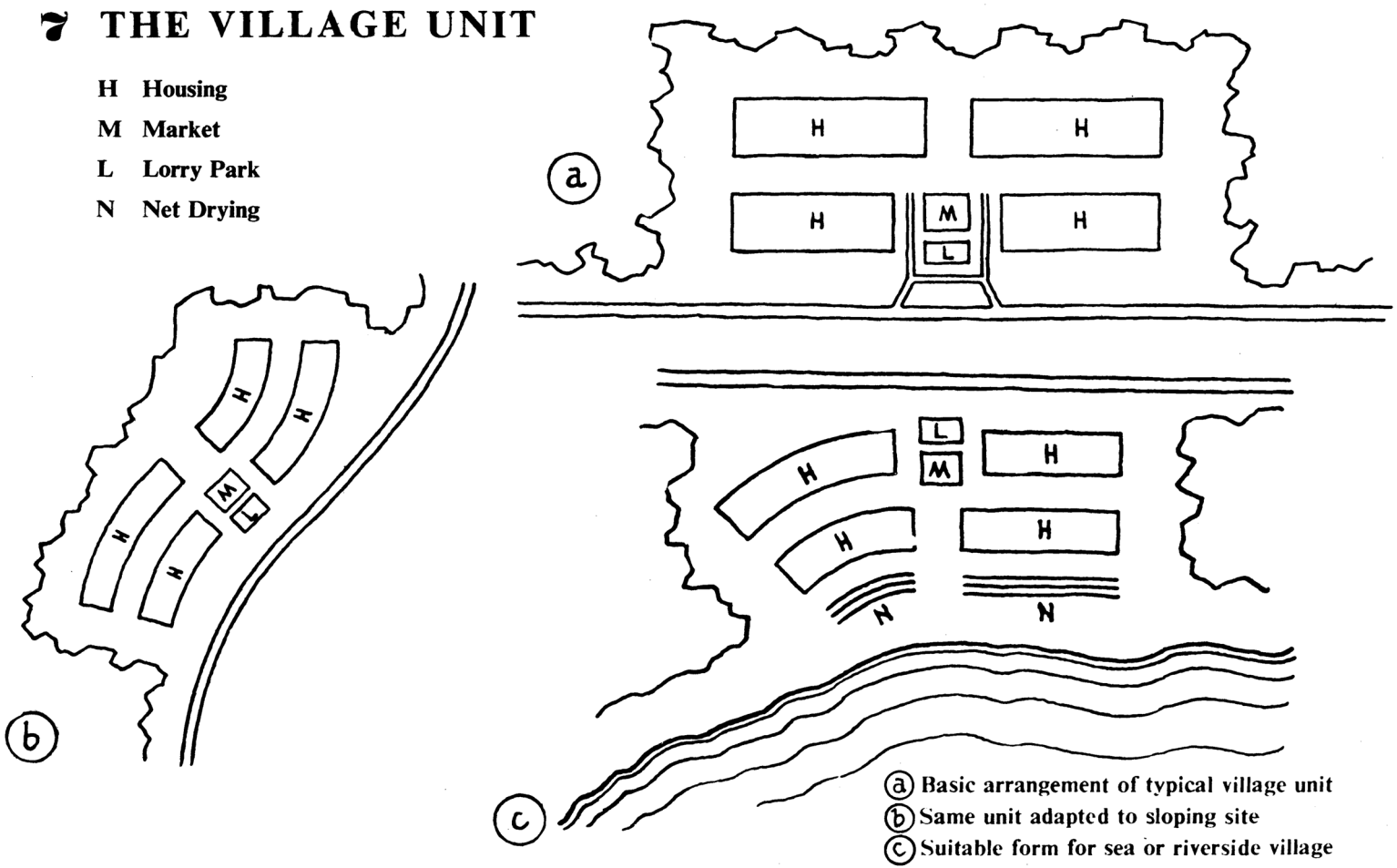
6 *Siting Villages in Relation to Savannah or 'bush'*

The relation of this to the village can be decided to some extent after the village has been designed, the most important point being that no insect breeding bush should be allowed near the village. The distance depends on the force of the wind and the intensity of the insect breeding. An idea can be gained from the fact that in Tsetse breeding areas 440 yards is usually considered a safe belt. This cleared area can be used for many village purposes: such as playing fields and for vegetable growing, etc. (*see* illustration 7).

The clearing of bush does not mean that there are to be no trees. Trees of a "clean" type, particularly flowering and

7 THE VILLAGE UNIT

H Housing
M Market
L Lorry Park
N Net Drying



ⓐ Basic arrangement of typical village unit
ⓑ Same unit adapted to sloping site
ⓒ Suitable form for sea or riverside village

shade trees, are a great asset to villages. They are discussed later.

There are exceptions to this rule, an example of which are the villages of the overcrowded Ibo country, adapted to a complicated village field agriculture.

The Village Itself

Villages vary considerably in kind; a few are mining or fishing villages, some are purely marketing stations, but the great majority are farming villages. Under this wide heading are included grazing, subsistence farming, and the cultivation of cocoa, palm oil, ground nuts, etc. The village plan will always be qualified by wind, weather, and topography, and except in land-hungry districts its size will not be fixed, as it must be considered as a living thing capable of growing and declining, but always in need of a form which will make it pleasant to live in and easy and economical to run.

Its form and junction with the main road are important.

The Village Form

The hub of the village is its market and its various public or communal buildings. The number and kind of these will vary with the size of the village: in the smaller villages just a market place and lorry park; in the larger, shops, police station, administrative buildings, courts, bank, post office clinics, and so on. Whatever the size of the "hub" it is this which requires easy access to the main road, on the one hand, and to the residential part of the village on the other; whereas housing, schools, churches, and children's playgrounds are usually better away from the main road.

Junction of Hub and Main Road

This junction of the hub and the main road should in a new village be arranged so that the main road skirts the village. In some villages, however, the main road already goes through the centre and cannot be diverted, and in others the village is a terminal to its own approach road. Here are two photographs (Nos. 8 and 9) showing a main road running through a village. Petty traders sit at the road side, their customers straggle out into the carriageway, animals and chickens wander aimlessly across the road and, in fact, the roadway becomes the meeting place for the whole village. Whatever the case, the principle is that there should be a buffer to protect the village from the road traffic, and, it may be added, the traffic from the village!

Possible uses of buffer space

Generally 100-ft. should be regarded as a minimum buffer. This green space need not be wasted. It can be used for garden, for a sitting-out space under shady trees, or a cemetery. Sometimes it can be used as part of a playing ground for grown ups (but here it will need a small protecting area between it and the main road). Where it is used as a village parade and palaver ground, or wherever it is used by a large number of people, care must be taken to preserve good visibility at the junction with the main road, and planting at this point should be avoided.

Planning the Hub

Usually the market and lorry park should be placed near the approach road, with the lorry park nearest,

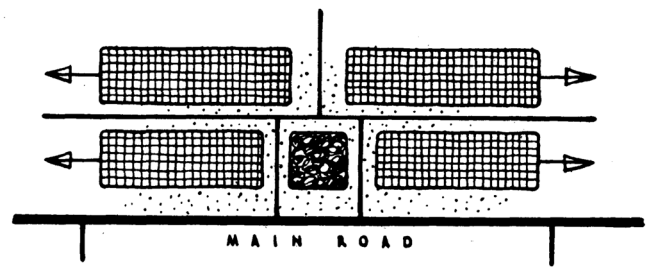
thus keeping lorries as much as possible out of the village itself. Round the market should be grouped the police station (this as near the main road as possible), the post office, clinic, the larger shops, and so on. Since the market tends to be a busy and sometimes a smelly place, it should be arranged to have plenty of space around it. This also gives it the necessary room to expand.

This hub should be on the central axis of the village, and round it should be the housing, together with the churches and schools and the village open spaces, for some villages are big enough for internal open spaces to be important for health and fire prevention as well as for pleasantness. On the perimeter should come the green belt, and beyond this the fire-wood reserve, grazing areas, farms or forest, dependent on the district.

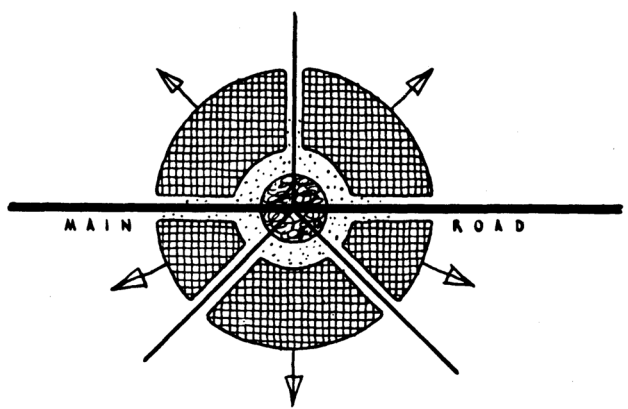
The Village Unit

Assuming a level site, without the complicating factors of weather and topography (a situation rarely, if ever, met with) illustration 7 shows the principles of arranging the main parts of a village unit. The village is shown set back from the main road, with two access roads which should be controlled as a one-way traffic means of entrance and exit. The "hub," consisting of market and lorry park, is shown at the head of the access roads and, on either side extend the housing blocks, separated both from the main road and from each other by generous belts of open space. The two other drawings on the same page illustrate the village unit adapted to suit the slope of the site, and also as a suitable form for a sea- or river-side village.

10 DIRECTION OF EXPANSION



(a) THE LINEAR FORM



(b) THE RADIAL FORM

Room for Expansion

It is important that all the main areas of a village should have room to expand, especially the expensive areas, with ready access to the road. This "growing room" can be achieved more easily in a horizontal oblong-shaped plan running parallel to the main road than in one placed at right angles to it; but probably the most difficult shape of all to enlarge satisfactorily is the circular form with roads converging towards the centre (*see* illustration 10).

Since it is usually the centre which is difficult to expand when the village grows, it is well to leave room for expansion in the design. It is difficult to foresee the future and any estimate will be a guess, but this extra open space left for expansion will be a pleasure in the centre of the village, even if it is not taken up.

Neighbourhood Houses

The detailed planning of the components of a village will be discussed later; their grouping will depend on the size of the village. Usually there is but one market, but sometimes several schools and churches. Housing, together with its complementary water supply, latrines, schools, animal pens, allotments, playing fields, etc., may use certain common facilities both inside and outside the village—cemeteries, firewood reserves, market, lorry park, etc. On a flat site, without considering weather and other complications, the lorry park and market would ideally be placed near the main road and the housing in the case of a small village, and the groups of houses or neighbourhood units in the case of bigger villages, so as to be equidistant from common internal and external village services and facilities. In illustration 11 we have assumed an imaginary site and applied the "Village Unit" described above.

Open Spaces

Not only village building but village open space must be planned, as has been mentioned earlier. Open spaces in villages are needed for many purposes and will to some extent depend on the planning of the individual housing.

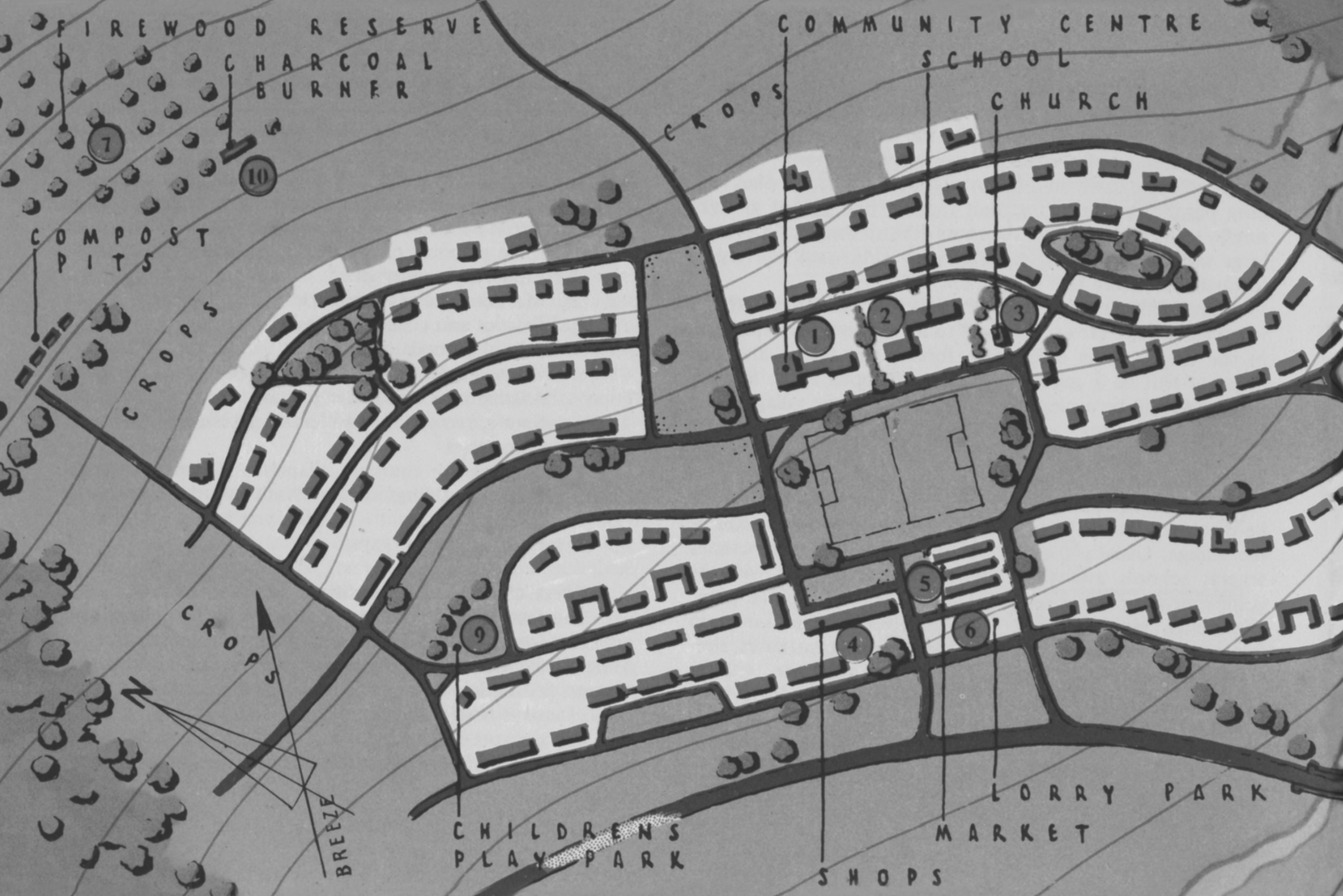
Generally they consist of:

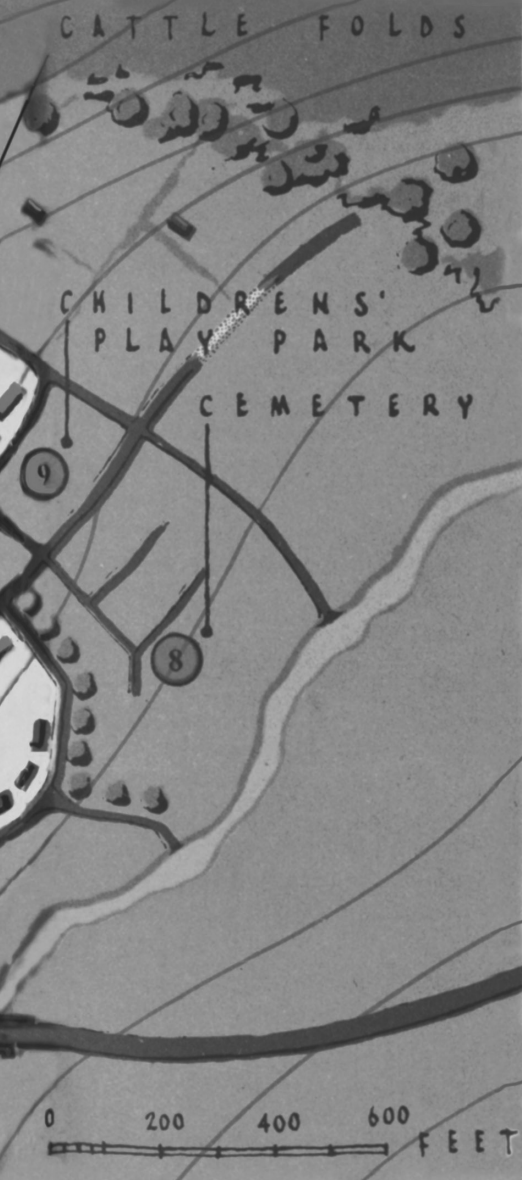
Market car and lorry park
Palaver and parade ground
School grounds
House gardens and market gardening
Animal pens and grazing areas
Sports, recreation, and leisure grounds
Cemeteries
Grounds for churches, chapels, and important community buildings such as Native Authority Courts, Courts, etc.
Fire protection gaps.

Effect of Particular Conditions on 'Model Plans'

The factors which govern the location of a village also affect its form. Those which are of paramount importance in West Africa are the need for good drainage and healthy conditions, prevention of soil erosion, and an efficient and economical layout both in first cost and maintenance.

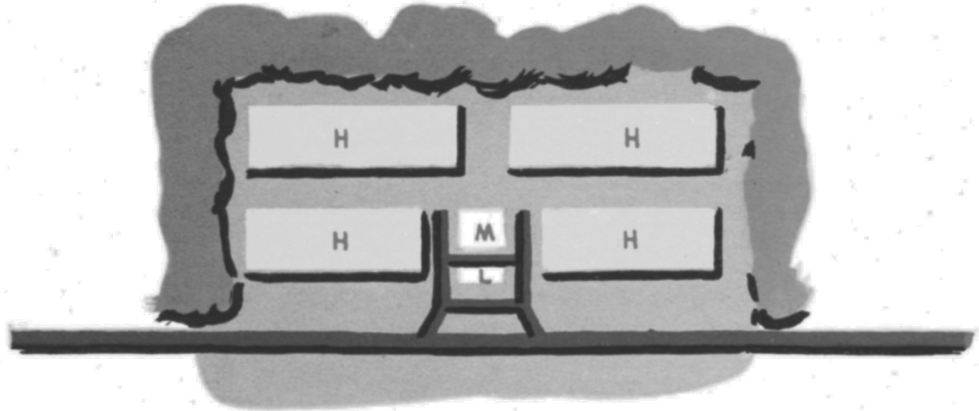
We are met at first with an apparent contradiction; a very level site would be ideal from a soil erosion point of view,


FIREWOOD RESERVE
CHARCOAL BURNER
COMPOST PITS
CROPS
CROPS
CROPS
CROPS
COMMUNITY CENTRE
SCHOOL
CHURCH
1
2
3
4
5
6
7
9
10
N
BREEZE
CHILDRENS PLAY PARK
SHOPS
MARKET
LORRY PARK



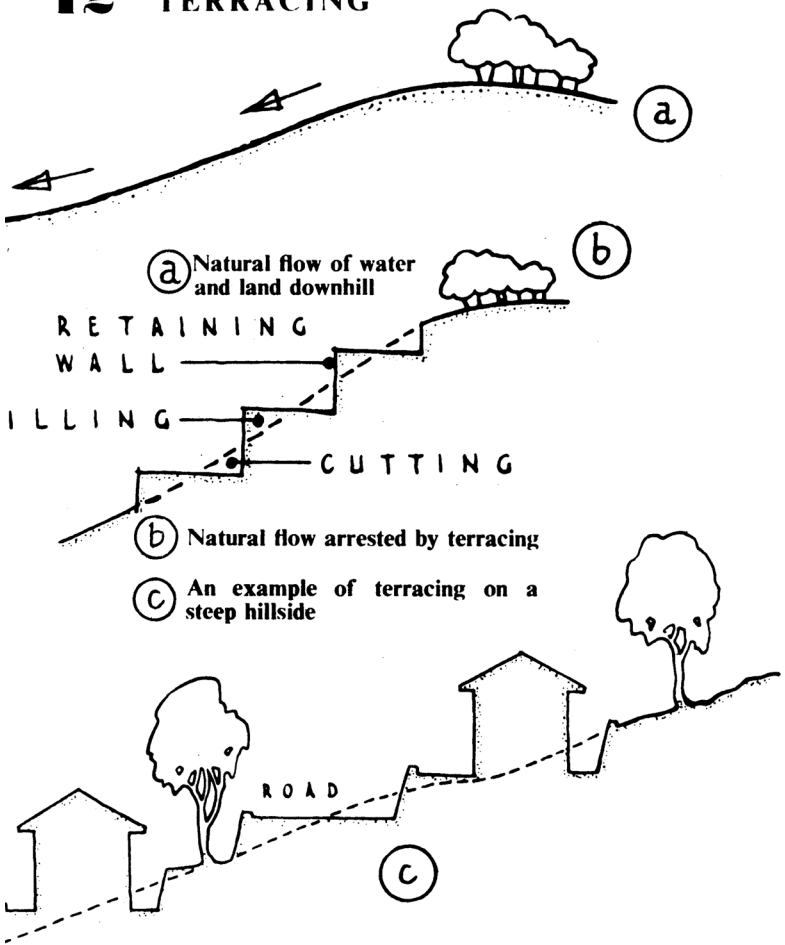
11

THE VILLAGE UNIT

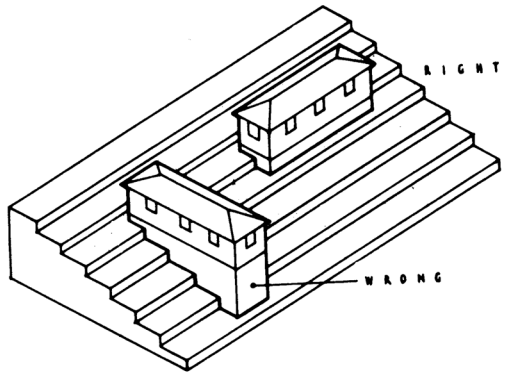


1. Community Centre
2. School
3. Church
4. Shops
5. Market
6. Lorry Park
7. Fuel Reserve
8. Cemetery
9. Children's Park
10. Charcoal Burner

12 TERRACING



13 BUILDINGS ON SLOPING SITES



Two houses both of the same size shown built on a series of steps in order to illustrate wastage involved when building against the contours

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but in fact it would be either swampy or difficult to drain; a very sloping site is easy to drain but liable to erode. To overcome these two the answer is a slowly sloping site which can both be terraced and drained, or, if not actually terraced, where the contours can be followed in building. Illustration 12 illustrates the principles of terracing on sloping sites, and illustration 13 shows the effect of building in relation to contours. illustration 14 shows a building in the Gold Coast which has been erected across the contours. In this case an attempt has been made to reduce the excessive cost involved by sloping the roof line, but this has only complicated the structure with

14

little saving in money. Had this building been constructed parallel to the contours the expensive concrete steps would not have been necessary, the main cost would have been considerably reduced and a far pleasanter building achieved.

Erosion and Internal Village Planning

This following of the contours saves also in foundation work. The general problem with soil is that it should be held and fertilised, and in town or village planning the important point is that bare earth or poorly covered earth should not be exposed to the weather, which in building means surfaced roads, paths, drains, and planted compounds. The house in illustration 15 is built on a sloping site, and the crumbling foundations here are entirely due to the effect of soil erosion. The top soil has completely disappeared, and now the exposed laterite is slowly being worn away by the rain. From a soil erosion point of view bush in the village would be ideal, but not for health reasons. Again the answer is a compromise—shade trees of a "clean" type and certain shrubs and grasses which will be detailed in a later chapter.

Both surfaced roads and terraces are expensive in first cost and upkeep, but the failure to provide them where needed is in the long run disastrous. The best thing that can be done is to cut down the supply to meet only the real needs. Many villages (and towns) are over-roaded, but alas these roads are often too narrow and unsurfaced. Few villages are terraced at all, and often are built across the contours. The road drain conditions are largely due to the misuse of the typical "grid-iron" plan. Surfaced paths for purely pedestrian access can be more used.

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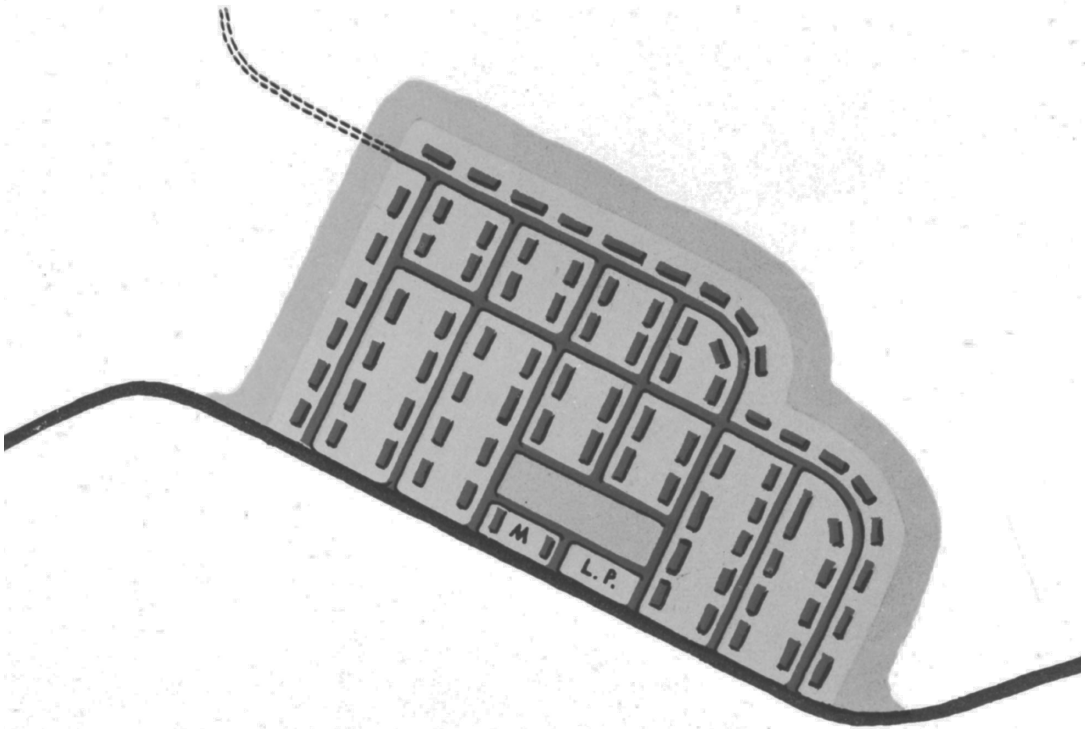
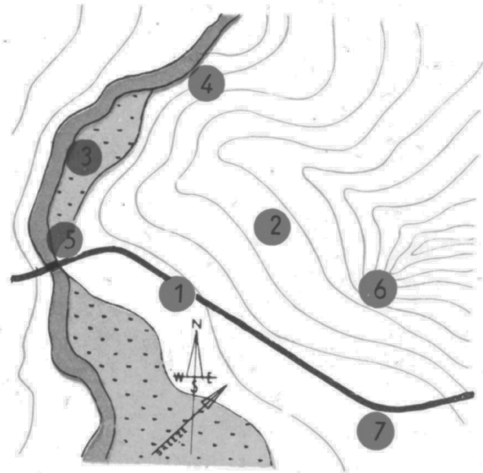
16 THE WRONG WAY

M. Market

L.P. Lorry Park





THE SITE

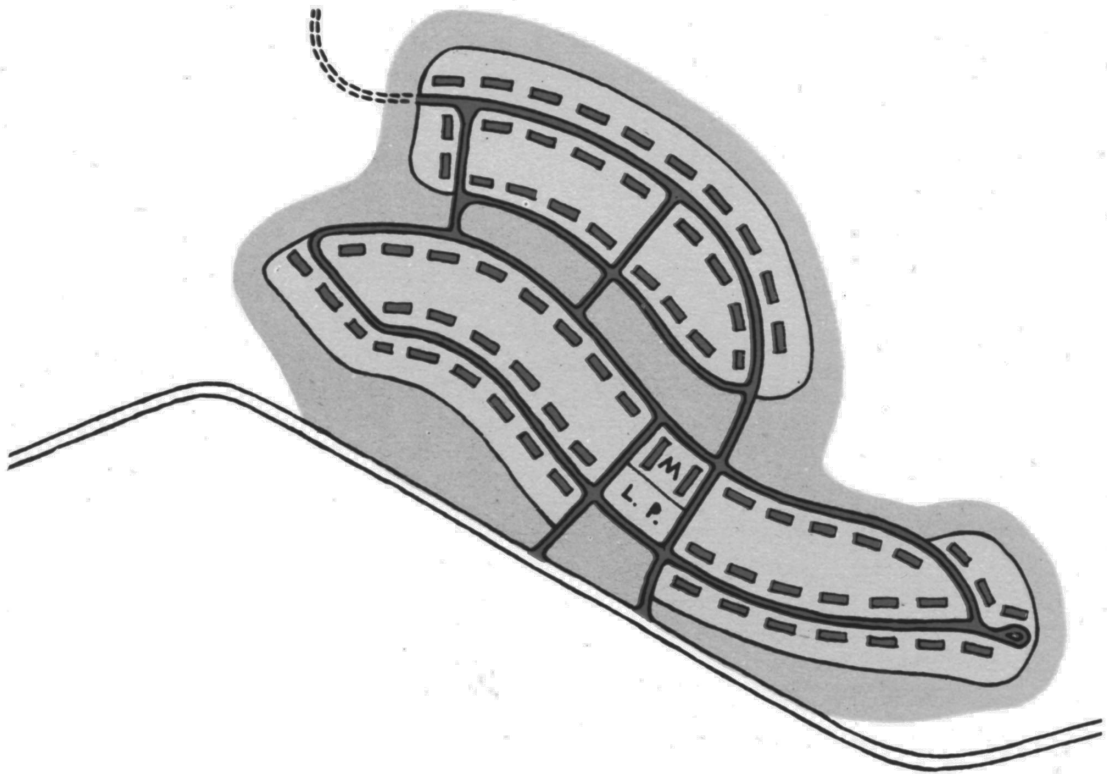
1. Main road carrying large volume of traffic.
2. Note direction of contours in relation to direction of prevailing breeze.
3. Swampy land.
4. Two places where access to river can be obtained if required.
5. No. 5 is too near main road for general use.
6. Steep bluff, to be avoided.
7. No road junctions should be planned near this bend in the main traffic route.

17 THE RIGHT WAY

TYPES OF DEVELOPMENT

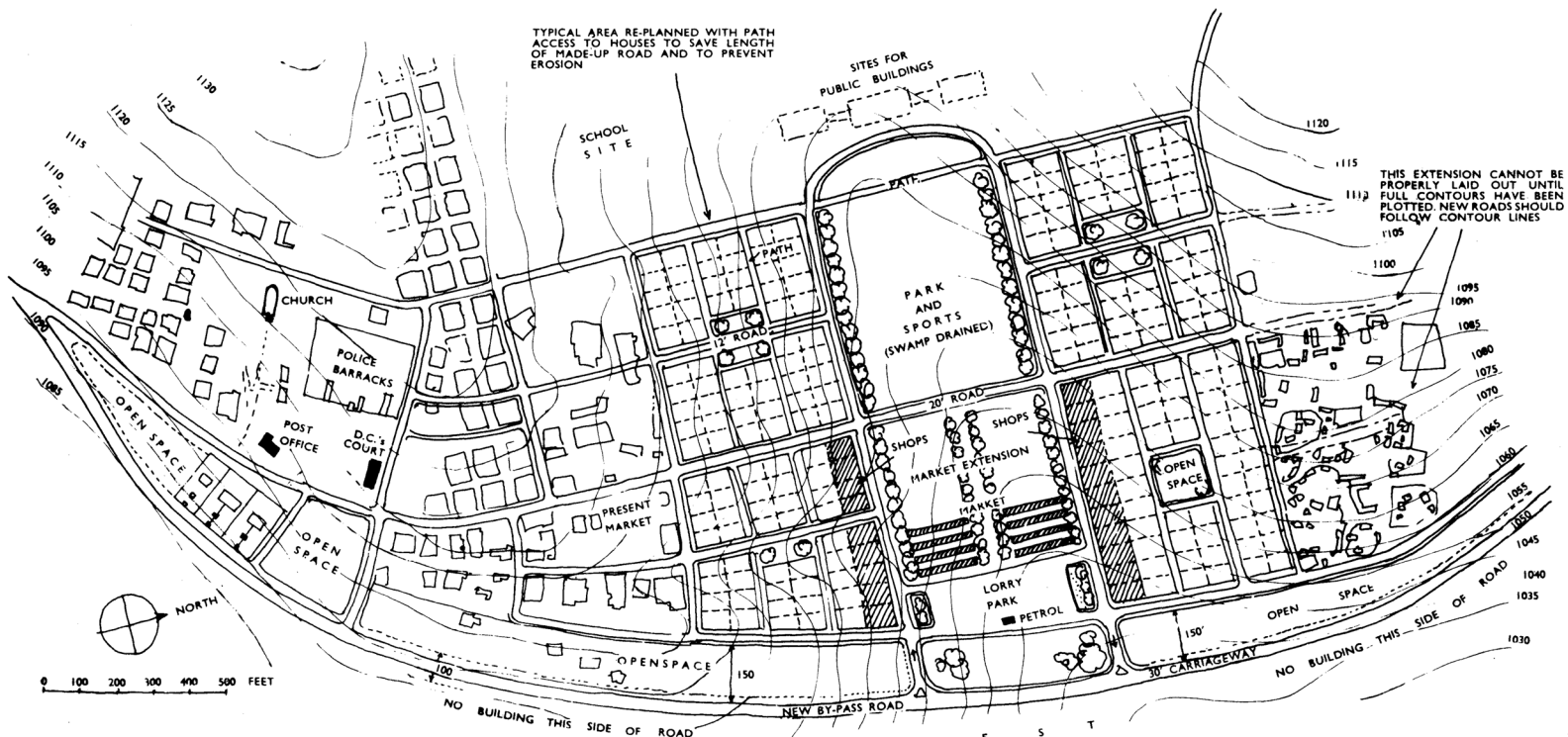
Illustrations 16 and 17 show, respectively, the wrong and right types of development for a site such as this. In illustration 16 there are too many roads entering the main road, including one which is very much too near a dangerous bend in the main road. The market and lorry park are fronting on the main road. There is no "buffer" open space between the main road and the development.

The development is laid out so that houses will automatically be built across the contours and, incidentally, will obtain very little advantage from the prevailing breeze. The provision of open space is concentrated at one spot. Illustration 17 is a suggested alternative which overcomes these faults and, in addition, will produce a more pleasing layout avoiding, as it does, the monotonous geometrical pattern of illustration 16.



18 MAMPONG, ASHANTI, AS EXISTING

19 MAMPONG RE-PLANNED



Fresh Air and Breeze

Beside earth and drainage there is the problem of fresh air in the village. The houses, so far as other considerations allow (the reader will have already grasped the principle of taking the various different considerations into account at the same time and weighing their importance), should face the breeze and be designed so that it can traverse the rooms easily.

All forms which tend to enclose small pockets of air which may become stale should be avoided. Unfortunately the present form of compound house, no doubt adopted for social and security reasons, often encloses stagnant air, and in the larger form of "blocks" with sanitary lanes, a series of narrow and insanitary areas are created. Individual house plans are dealt with in the next chapter. In this chapter it is important to see that their grouping is arranged to make airy pleasant forms.

Social Groupings

No doubt social structure should also be taken into account in the main groupings of housing. It is a subject of which insufficient is known by us to write helpfully, but such modifications in arrangement as are dictated by the importance of different sections of the community and their religious and tribal distinctions can be arranged locally. It is important that each area should be well served. Unfortunately, Zongos or strangers' quarters are often little better than separate slums. Special views and features must be taken into account in village planning, and important buildings placed on naturally important sites.

There may seem so many factors to be taken into account at the same time that the amateur architect for whom this book is written is puzzled, but an actual example will probably help. Mampong, in Ashanti, may be taken. The village is (i) in its original form; (ii) the Architect's plan resulting from this village's needs (see diagrams 18 and 19).

Grouped Villages

Sometimes, as in the Owerri districts in Nigeria or in the Krobo country in the Gold Coast, there are very clear demarcations of grouped villages. In these cases, one village, important by virtue of its central position or site, should be chosen as parent to the others, and the principal communal amenities, such as a small hospital, technical school, or the like, concentrated here together with the central courts. The problem of decentralisation of services should be followed as far as possible. In all colonies there is at present an unhealthy concentration of these in large towns. The principle of centres to rural areas will help to counteract it.

SUMMARY

Siting of Villages and Water Supply

1 *Sources of supply:*
Well, borehole, pipe borne from wells, dams or streams.

2 *Sources of danger:*
Swamps, stagnant ponds, gulleys containing stagnant water.

3 *Measures needed for protection of supply:*

	Approximate cost in 1945
Concreted well holes	(£200–£300)
Borehole with hand pump	(£300–£500)

Dams, zoning of water sheds to prevent pollution of streams, separate supplies for animals.

In a larger regional scheme the maintenance of sufficient vegetation to ensure continuance of supply.

Siting of Villages and Soil Erosion and Impoverishment

1 *Districts liable to wind erosion:*
The siting of villages on the sheltered slopes of hills or of the planting of shelter wind breaks or the creation of bunds—Northern Nigeria, N.Ts Gold Coast, North Sierra Leone, waterless country generally.

2 *Villages in areas where erosion is due to over-grazing*
Here there is a need to relate the size of the village and its live stock to the area of land capable of development. The removal of extra population and herds to other districts. Animals should be penned.

3 *Villages in areas where erosion is due to deforestation:*
The encouragement of silviculture and firewood reserves which will protect the village.

4 *Villages with sheet and gully erosion due to development of steeply sloping sites*
The encouragement of broad base terracing, building on contours, planting of economic trees and shade trees and natural fallow grasses such as androposon gayanus (lemon grass).

Siting of Villages in relation to Wind, Rain, and aspect generally

1 The village should be sited so as to have sufficient fresh air, but be protected from storms and winds. Especially in districts liable to wind erosion.

2 Where possible a beautiful site should be chosen in preference to an ugly one.

3 Villages should be sited on the windward side of foul areas, whether these be swamps, refuse dumps, or man-made mines or workings.

Siting of Villages and Fuel and Pole Wood

1 The siting and creation of fuel wood and pole wood reserves together with villages (particularly in Northern Areas).

2 The location of these as wind breaks in areas liable to wind erosion.

3 The use of forest as possible insect breaks where the wind blows these from swamps and bush.

Siting of Main Roads and Villages

1 Villages should have a main road reasonably near.

2 Main roads should not traverse villages but by-pass them, the village being set back at least 100 ft.

3 Access roads from the village to the main road should be few in number, and one way, where possible, inclined so that their junction with the flow of traffic in the main road is easy and gives good visibility.

Relation of Village to Savannah or Bush

1 There should be sufficient farmland available to maintain the village unless it has other industries.

2 The bush should be cut down round the village to make a green belt unless (*a*) in a district with land hunger (*b*) in a district with such severe erosion that planted shade trees and grass or vegetable cover will not hold the earth.

The First Principles of Village 'Town Planning'

1 The village should be set back from the main road.

2 Its "hub" should be on the central village axis nearest to the main road.

3 The hub consists of lorry park to be placed nearest main road, market, and public buildings such as community centre, shops, police, native authority courts, post office, cinema.

4 Neighbourhood units, or in the case of a small village, the village itself, should be grouped round the hub so as to be equidistant from the axis.

5 A neighbourhood unit consists of a group of houses sharing communal facilities such as gardens, kitchens, water, washing, and clothes washing places, schools, animal pens, etc.

6 The extra village facilities such as refuse disposal, firewood reserves, grazing, cemeteries, sports grounds, farms, should be arranged to be equidistant from the neighbourhoods.

7 All areas should be planned with room to expand. (See diagrams.)

8 Open spaces should be planned as well as building.

Qualifying Conditions of Village Town Planning

1 Need for terracing of slopes liable to erosion.

2 Need to "follow the contours" with building lines rather than to "cross" them.

3 Main internal roads to be as few as possible but wide enough and surfaced.

4 Paths to be used rather than roads where possible.

5 No unsurfaced earth liable to erosion to be left bare, but to be planted with non-insect breeding grasses and trees and bushes, or well surfaced.

6 Houses and blocks of housing to be arranged in airy forms to catch the prevailing breeze.

7 All drains and sanitary lanes, if employed, to be surfaced.

8 Separate groupings caused by social conditions, notably Zongos to be planned as neighbourhood entities.

9 Natural "views" or features must be taken into account in laying out villages, and the design modified accordingly. Important buildings placed on prominent sites.

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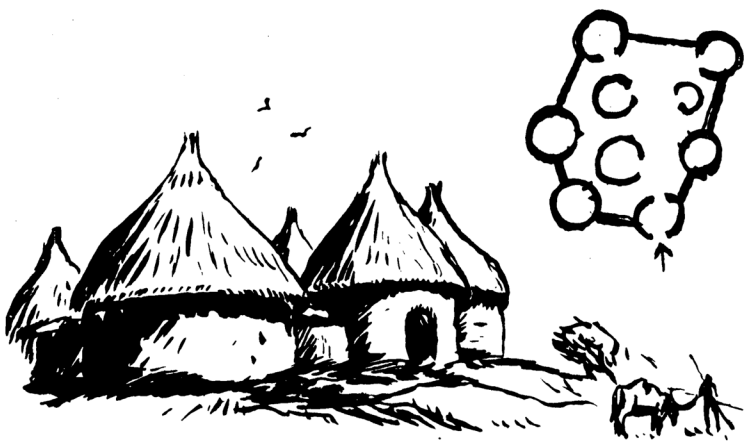

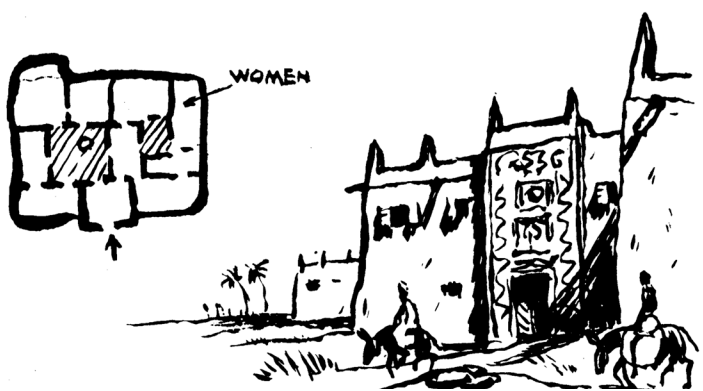

2. HOUSING

Present Situation

There is a wide range of dwelling types to be found in West African villages, from grass and mud huts to elaborate houses in the European style.

The compound, usually the family compound house, predominates. In its simplest form it consists of a number of round huts joined by a wall. In Northern Nigeria it is a series of rooms or huts grouped round one or more courtyards. In Ashanti, in the Gold Coast, it is a rectangular court with rooms on two or more sides.

There are, besides, all manner of variations to be found, from single rooms with small additions to the large self-contained houses of chiefs and other important people.

The size of compound depends on the religious and social development of the people, on their family sizes and tribal customs: those of the Emirs of Northern Nigeria who have many wives and retainers, being much bigger than those of the more democratic and monogamous south.

The compound house was intended for and is still largely used to shelter a compact family life with its belongings guarded from danger and thieves. In the days of tribal warfare and no police it no doubt served its purpose well, but it

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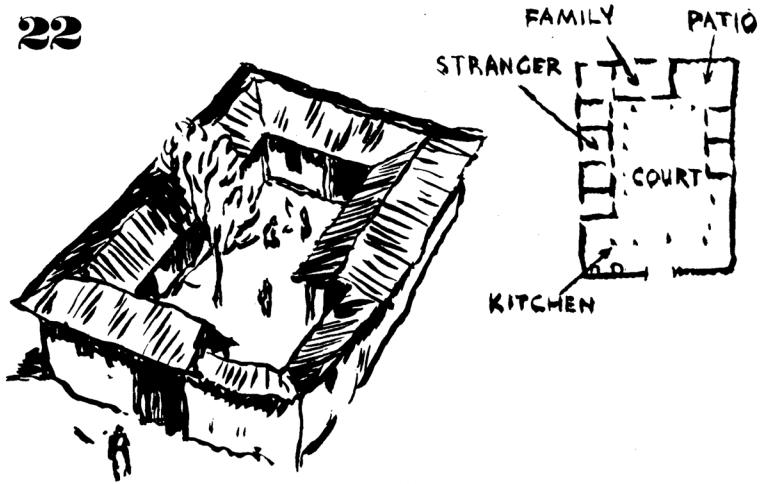

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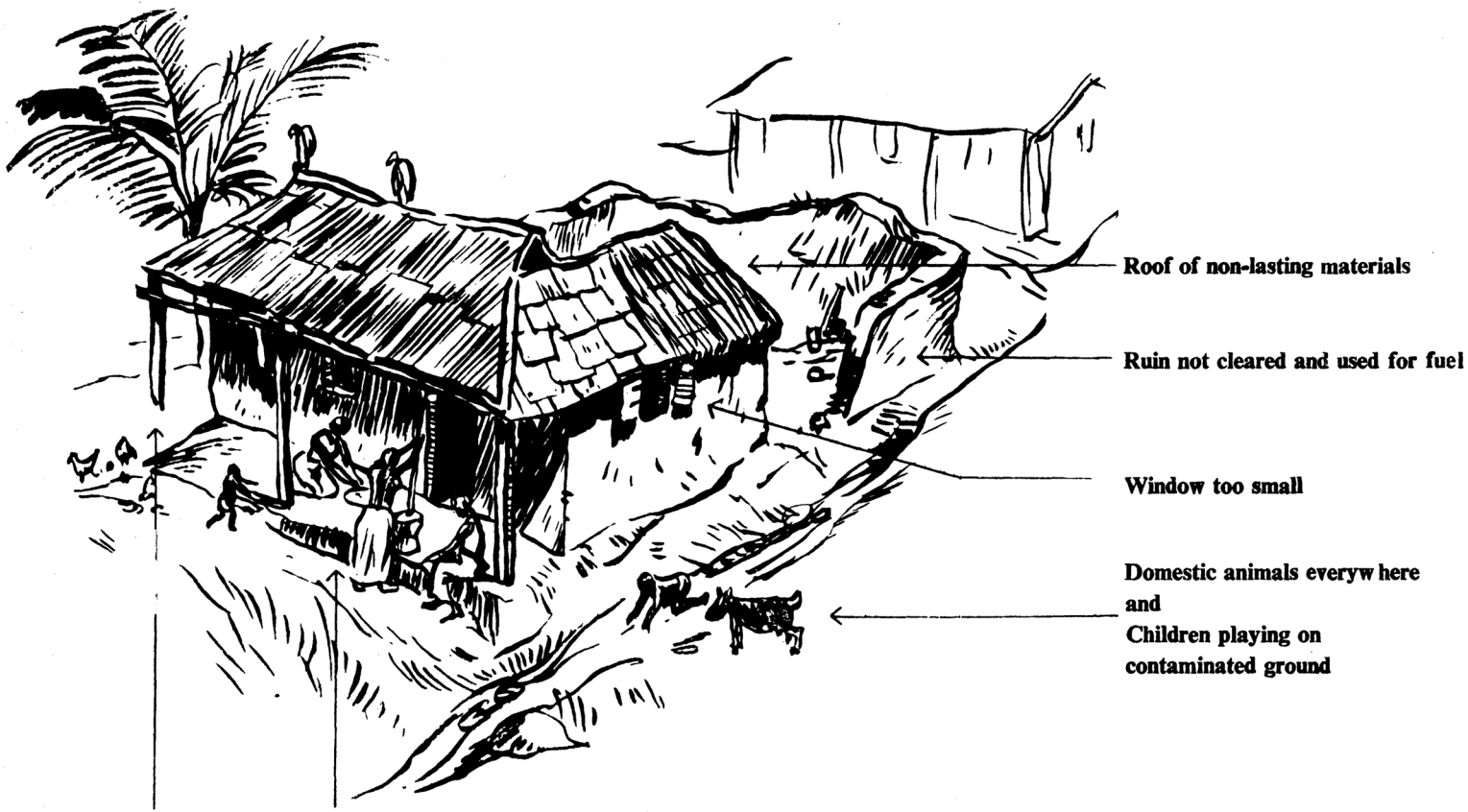
is not a healthy form. It leads to overcrowding as families grow and relatives or followers increase, and the rooms are difficult to ventilate. The courtyard, which is often used as the family kitchen, is badly ventilated and is frequently dirty.

Except for very big forms of compound, 50 ft. by 50 ft., or more, we advise that the compound house be abandoned and that dwelling types better fitted to the climate and the present tendency towards more individual family life are developed.

Present House Design and Construction in Villages

Not only is the plan form of most houses unsatisfactory from health and hygiene viewpoints, but the houses are often too dark, damp, and under-windowed. This is the result of poverty, primitive methods of construction, a need for privacy, and a fear of thieves. Such housing is generally built of mud or laterite, sometimes reinforced with sticks, and the roofs of thatch, leaves, or mud, none of which materials remains rainproof without constant attention and repair. The kitchen and food store are not vermin-proof, nor provided with a chimney. The ground surrounding the houses is often used as a latrine, and goats and other animals are kept in the houses at night and during the rains. We are aware that better conditions exist in some areas, but generally speaking this is still a fair picture. The problem is to provide suitable houses within the incomes of the villagers, answering present-day needs in the transitional stage of their development.

TYPICAL POOR VILLAGE HOUSE 24



Village Housing Needs

The first problem is to define village housing needs. The house is used primarily as a shelter in bad weather, for security, and privacy. Verandahs are used for shade and shelter, as sitting out places, and for housework and cooking. The compound is used for open-air cooking.

Rooms are often used as stores and for animals, and there is frequently a room for strangers. Compounds vary according to tribal habits, and the sequence and arrangement of the rooms are related to the kinship of the family. Wives, in some parts, have separate houses, and in others separate rooms.

Some form of latrine and wash place is needed, a kitchen, a store, also a place for housing animals and storing firewood. A garden or private sitting place is an asset.

The construction of housing is dealt with in a later chapter. For the present, before considering the possible plans which can be substituted for the usual compound types, we will consider the special needs of the separate rooms.

Bedrooms

In tropical housing this is often the room in which most time in the house is spent, and it is important that it should be big enough and well ventilated without being draughty, and that its walls should be such that they do not "heat up" in the sun.

Ventilation

The room should face the breeze and have windows on opposite sides. It should be cool by day and night, and dry. Great benefit will be derived from a sufficiently high and well insulated ceiling. The roof should not harbour vermin, and this and the wall and floor should be kept smooth so that they may be easily cleaned.

Windows

Windows should be thief proof so that they can be opened or partly opened at night without fear. Some form of airy screening for privacy, either louvres, trellis work, open work matting, or muslin curtaining is required for screening the lower part of windows. Some of the windows can be made sufficiently narrow, or high up, or barred, to give security. It is hoped that with efficient policing this undesirable stress on security can be reduced, but at present it is a real need and probably the major cause of the shutting of bedroom windows at night.

Furnishing

It is essential that the sleeper's bed be raised at least 9 in. off the floor. The chapter on health will give the detailed reasons for this. It is also essential that clothes should be kept off the floor and away from the walls. A wardrobe is expensive and beyond the means of most villagers, but bedroom walls could easily be staggered (*see* illustration 25) to give neat clothes recesses across which a bar could be fixed and cover cloths and other clothing hung. Alternatively, a bar or pegs could be fixed to take them.

It is undesirable that bedrooms for children or wives should have doors straight into the open air. An added sense

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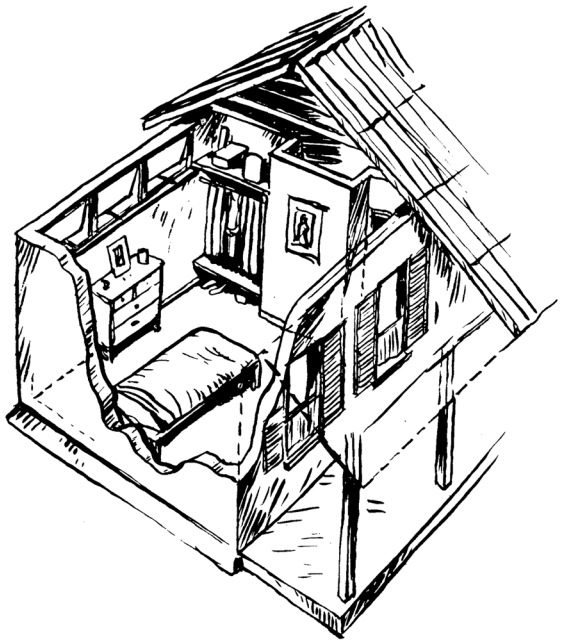


of security and privacy is given by opening the bedroom off another room. The details of the degree of sun protection and rain required in the different latitudes and zones are given in Chapter IV.

The illustration shows a bedroom incorporating these points. Some villages, of course, will be able to have still better bedrooms.

Verandahs

Verandahs are the outside rooms of houses and are pleasant to live and work in. The design of verandahs in village housing can be improved. In the tropics the verandah should always be regarded as an essential room. It has two particular and separate functions besides its use as a covered way and a weather-shade for other rooms, *i.e.*, as a social meeting place and outdoor shaded sitting room, and as a place on which to do the housework. These functions are so separate that most houses should have two verandahs; one at the front, the other at the side or the rear of the house.

To take each separately: the social verandah is usually placed at the front of the house so as to be welcoming to visitors and to give the occupant a good view. It should be a social shape and not, as often built, a passage shape. It should give a sense of community without being so deep as to destroy the open-air feeling.

It should give a sense of privacy. This can be got by recessing it slightly into the house shape or by a low wall or railing. This sense of privacy will be increased if the verandah is raised above the garden or road level. The social verandah could make much more use of trellis work, ferns and flowers than is at present usual. There is no reason why it should not be decorated with trellis and climbing plants such as Morning Glory and Bourgainvilia as commonly as the South of France and Italian verandahs are decorated with vines.

The housework verandah performs a different function. It is often called upon to do the duties of both verandah

and covered way. It is probably more useful passage shaped. It will protect the house windows from driving rain and the walls of the house from sun. As with the social verandah, it should be raised above ground level and given a firm hard surface.

A detail in the furnishing of both back and front verandahs which would save much floor cleaning in wet weather, and which it should be possible to provide locally, is a coconut mat. Verandahs should, of course, be slightly sloped so that they drain away from the house.

Kitchens and Stoves: Present Situation

The kitchen is probably the room which can be most improved. The village kitchen is at present symbolic of the general lack of higher education among the women. It is often open to the four winds of heaven, and to the rain as well. It is perforce smoky and difficult to keep clean, though the women make great efforts. There is no provision for water storage nor place to empty slops. Plates and cutlery are still a luxury, and eating is from the general pot. Firewood is seldom stored in a dry place, or, if so, it is stored on the rafters of the kitchen roof, with the consequent fire risk.

The low kitchen stove made of laterite earth which is in common use in all four colonies is probably ideal for open-air cooking, but unsuited to internal cooking, and the range of meals that can be cooked on it is somewhat limited.

The time and labour spent on fetching water, firewood, and pounding "fu-fu" and "gari" are very great, and it is small wonder the women have little time or energy left for other things.

Kitchen Requirements

A kitchen for internal cooking—a necessity in the wet season—should be light, airy, and cool, and should contain or have adjacent a good store for food and pots, lockable if possible. It requires a basin for washing food and pots, and of importance, though often omitted, a good drain to take dirty water, etc. away; also an oven with a flue, and some form of bench on which to prepare food.

The floor should be hard and easily washable, constructed so as to discourage ants and vermin. The whole should be as fireproof as possible.

The kitchen should be near the eating place, and the junction between the two should be by covered way.

The firewood store should be near the kitchen. Water is best stored in a water cooler, to be fresh for drinking. Filtered rain water, possibly from the roof, stored in a tank or butt or oil tank, is useful nearby for washing purposes.

Kitchen Store

Large quantities of food are rarely kept by villagers, but grain and some food is stored against the dry season. It is likely that certain tinned and dried food, especially of those things often lacking in a balanced diet such as fish, meat, and milk, will be increasingly kept in small quantities. Corn and gari are often kept. As in kitchens the world over a small store or larder is needed insect-proof, and rodent-proof.

Muslin is a cheap but perishable substitute for metal mesh, but this or any open meshing small enough can be used for the larder window. A high shelf can be of stone, concrete, hardwood, or any stout sheeting available. Vermin and white ants dislike light and moving air, as do many microbes. Good ventilation and light, but not sun, are needed.

The drawing (illustration 27) gives suggested kitchen and store arrangements. Ideally, each house should have its own kitchen, but since this cannot always be afforded, shared arrangements are also shown. It is better to have a higher standard of kitchens shared than individual low standard ones. The preparation of food is all important to health, and the kitchen is therefore the most important room in the house.

Care of Animals

Animals rove the village street fouling it and scavenging, and are a real danger to the increasing motor traffic, and *vice versa*. The animals are seldom properly fed or cared for and are often mangy, matted, and covered with sores and flies. They sleep in village houses, sometimes with the human inhabitants. Fowls are not much better kept than cows, goats, sheep, etc. They, too, foul and scavenge freely in the streets.

This state is bad both for the animals and the villagers.

It is questionable how near any animals should be kept to housing. It is difficult to clear their manure frequently. Animals are a great benefit to villagers, and their manure to farming. Where it can be arranged, villagers should keep their animals in specially constructed pig sties, byres, goat sheds, and the like, on the outskirts of the village proper, fitted with suitable drinking water troughs, etc., with floors that are hard and drain easily to facilitate the removal of muck, and with clean feeding troughs, preferably off the ground.

Human needs of ventilation, dryness, and shelter from sun and intense heat are true for animals too. Their homes should be light, clean, and airy.

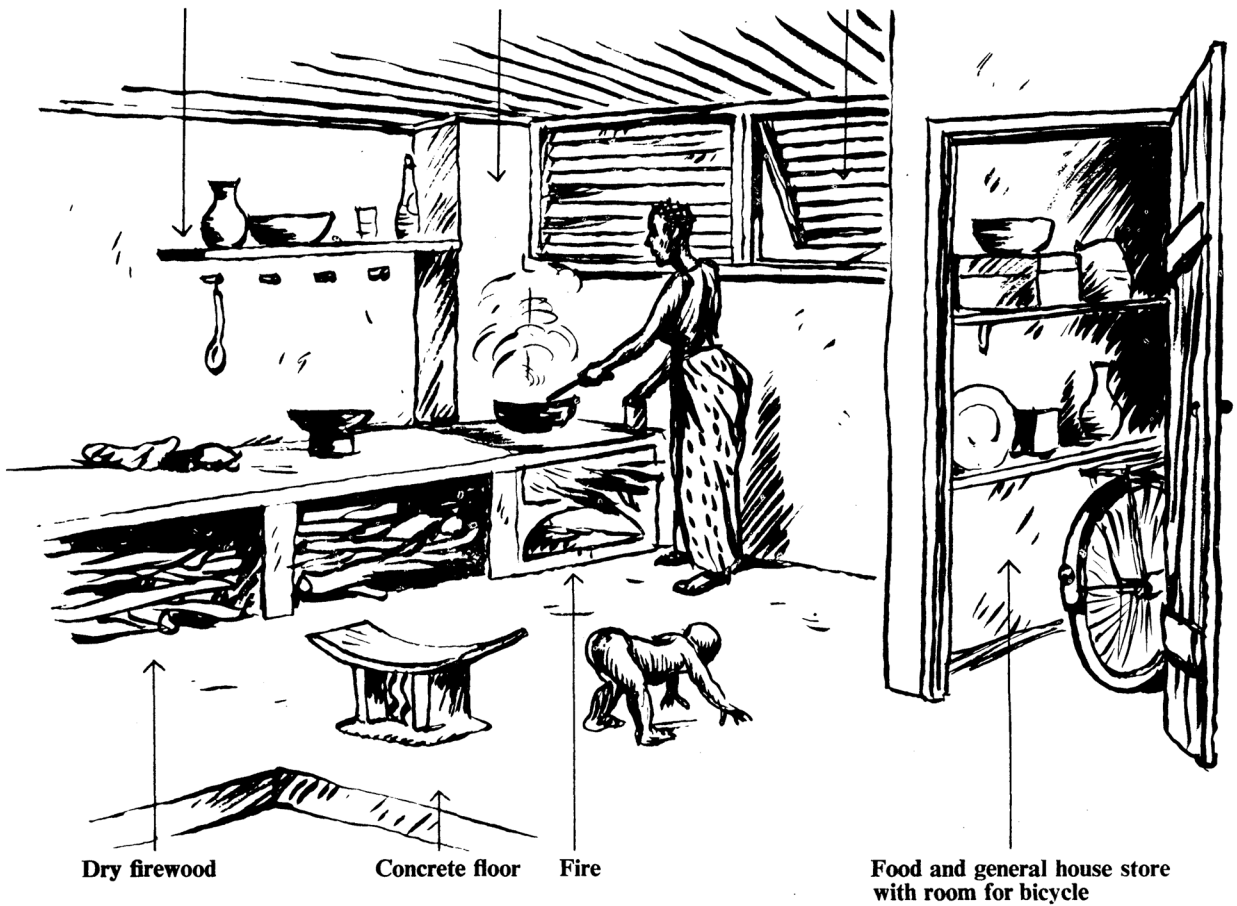
If houses are sufficiently widely spaced and have big gardens, goats could be kept in sheds at the far ends of them. Pigs are far more dangerous to keep near houses.

Fowls

Good eggs are a useful addition to diet, but chicken runs are, unfortunately, not much used but should be encouraged, together with the use of proper fowl houses which can be easily cleaned. Details of these can be obtained elsewhere. In some places it is worth considering the layout of these with that of the housing. In no case should any animals or fowls occupy space directly adjoining bedrooms, kitchens, or food stores.

Wash Place and Latrines

Wash places can be divided into several groups—places for clothes washing, for personal washing, and for washing food, such as cassava, etc. Latrines can be divided into urinals and receptacles for fæces, such as bore-hole latrines. In addition there are septic tank latrines, pit latrines, pan latrines, and water closets.


Concrete shelf and hooks below
Chimney flue taking smoke away
Louvred windows for cross ventilation
Dry firewood
Concrete floor
Fire
Food and general house store with room for bicycle

Clothes Washing

It is a common sight at present to see women washing clothes by a stream and laying them on the ground or nearby bushes to dry, ignorant of the contamination the water and ground may bring (*see* Chapter IV on Health, illustration 51).

The ideal would be to provide every house with washing basins, running water in taps, and a clothes line and, in the very few cases where pipe-borne water is freely available, this could be done. The washing-room should be airy but sheltered from the sun and rain and with a well-drained hard floor so that there is no danger of the washer standing in water. As well as a wash place, an ironing place is needed. These requirements apply more to villages which have a long and heavy rainy season, such as those in the colony of Sierra Leone, and where the wearing of clothing is increasing. A clothesline for drying clothes is needed under shelter here, as well as out of doors.

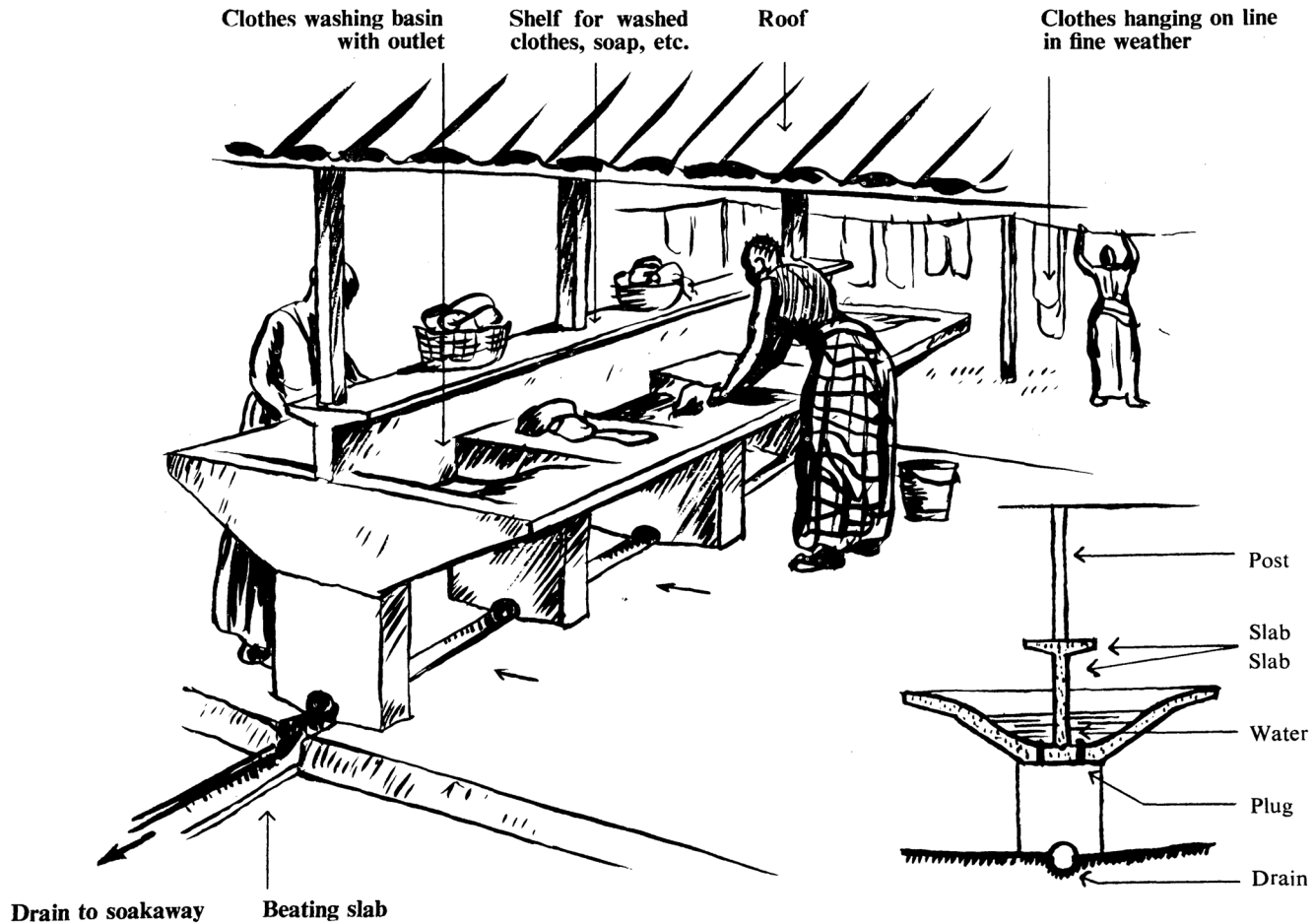
Alas, even in Government housing, wash places have generally been insufficiently considered, and quite commonly wet clothes may be seen drying in bedrooms in housing in the wet season, there being nowhere else to put them. This is both unsightly and unhealthy.

Unfortunately, very few villages have a pipe-borne water system, and those who have good wells in the village are at present lucky. It is easier to take clothes to the water, as a rule, than water to clothes; but it is certainly cheaper to build a communal washhouse than many individual ones. This washhouse may be by stream or well, or by hole and pump. Whatever the source of water it should consist of a range of basins shaped so that the washers can easily wash standing (this being usually preferred, possibly from habit, but a sitting wash may become popular in time). These basins, as shown in the accompanying drawing (illustration 28) should have a place where the soap may rest when not in use, and a flat place in front and between the basins where clothes may be rubbed and put when soapy and nearly ready for rinsing. They can most easily be made of concrete, but stone roughly shaped would do. A really important point is that there should be a good drain or soakaway for used water so that it does not lie, wetting the feet of the washers and breeding mosquitoes.

Between the individual washing place of the house and the grouped village wash places are minor grouped arrangements dependent on the wealth, water supply, and layout of the village. Illustration 28 suggests an arrangement that may be used when wash places serve small groups of housing. It has been placed in what may be called the working compound, as opposed to the leisure or garden compound. Here it can be grouped with services such as communal kitchens and places of personal washing. In the same compound can be placed latrines and refuse bins. This division of compounds and their planning is further discussed under Gardens and Compounds. The same division is inherent in the smallest garden and compound: the useful and the pleasure part.

Personal Washing

Again the ideal is that each house should have its own bathroom whether the body be washed from a pail, as is usual, or from a shower, or from a bath. This last is usually


Clothes washing basin with outlet
Shelf for washed clothes, soap, etc.
Roof
Clothes hanging on line in fine weather
Post
Slab
Slab
Water
Plug
Drain
Drain to soakaway
Beating slab

only possible where there is a good piped water supply. At present the situation is that villagers wash whenever they can find water; standing in gutters, in stagnant pools, or by streams. The evils of using stagnant and impure water are outlined in the section on Health, but the results, alas, are obvious to all, though the cause may not be understood. It is rare to see a group of African village children without sores, worms, or other troubles due to their contact with contaminated water and earth. Sometimes screened washing places are provided. These are usually ugly, and barren of even a seat or a dry shelf on which to place the precious soap. The floors of these places are often not well drained, and there is no convenient peg on which to hang the cover cloth or other clothing.

Public bath wash-rooms should, where possible, be provided with showers with an automatic water-saving device. The ground should be sloped to drain easily. There should be a low tap to fill buckets—again with a water-saving device—a small seat, a little soap ledge, and a peg to take clothing and towels. Since many villages have no running water supply, a simpler bath washing place must be provided near the water source. These should be as above, but without the shower (illustration 29).

All public washing places should be divided according to sex, and the entrances well screened. They should be roofed, but very well ventilated. The interior walls will look more cheerful if slightly tinted. The floors should be tarred or concreted. If tarred it is advisable to carry the tar to a high skirting unless the walls are of concrete. Privacy is needed in washing

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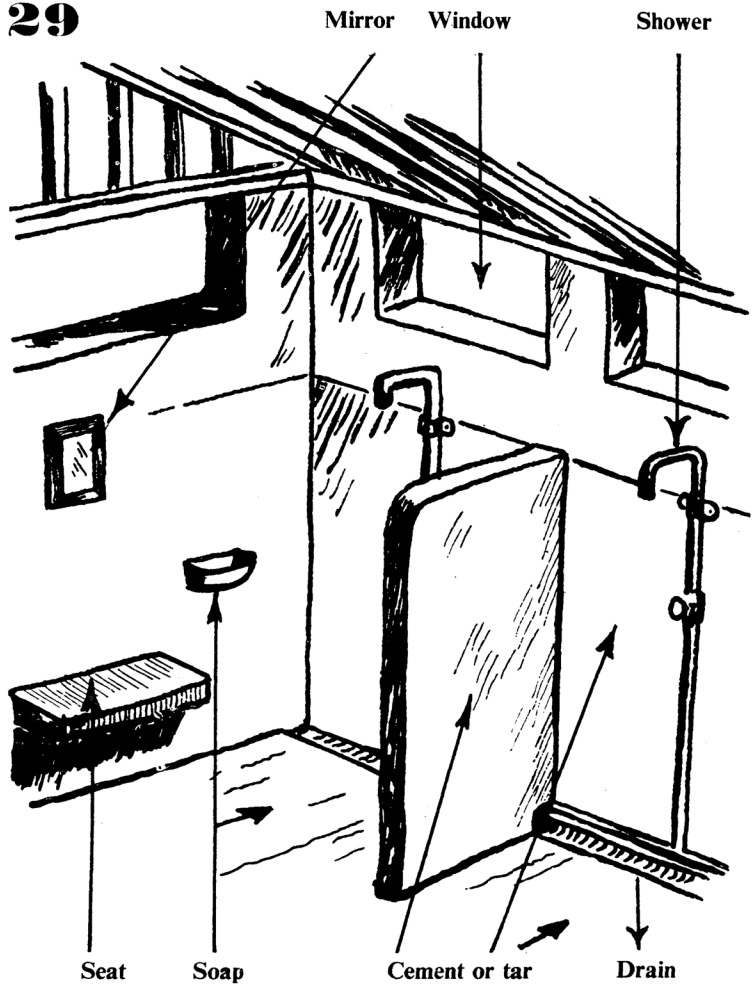

rooms as well as plenty of air and even sunlight. This may be obtained by placing the windows high in the walls, and only shutters in the lower section. Mirrors are still expensive and beyond the income of many village authorities, but even a small fixed mirror in a communal wash-place would be very much appreciated: a full length one ideal. Both men and women would welcome them. Many villagers might become conscious of their persons and personal defects if mirrors were provided, and would then take more pride in their appearance.

Latrines

We know of no villages at all in West Africa with water closets and a proper water-borne sewage disposal system. The commonest method is still to use the bush or forest as a latrine, and fouling the earth brings its toll of disease. The situation becomes increasingly worse as the population becomes concentrated, and there is the added danger of water pollution. It is true that numbers of villages have public latrines, but these are at such a distance from the housing that they cannot be used at all times, and are often of a cesspool type and rarely emptied.

The whole problem is fraught with the difficulties of cost and of maintenance, and complicated by the need in some districts to make use of all possible compost for the soil, especially in the arid north.

The normal form of latrine in the urbanised villages is the pan latrine, with its sanitary men and so-called sanitary lanes. It is the usual answer to the problem of trying to provide the best latrine accommodation possible, one to each house near the dwellings. Nobody can call the creation of a class of sanitary labourers desirable. It is work usually done by strangers to the village. Yet until efficient water supplies are available no better answer has been devised for the individual house, except in those areas where borehole latrines can be built, and here, though a fly-trap borehole latrine of the proper depth is sanitary, there is no possibility of the night-soil being composted.

If it is decided to give separate latrines to each house and a water-borne system is impossible, bore holes, pit latrines, and pan latrines are the economical answers. If the last is chosen, good access to the latrine from the path is essential. This path should be airy and well surfaced. It is frequently at the back of housing and tends to become an eroded dirty drain. Its sides should be planted with lemon or other grass. If this ''lane'' is also used as a drain for the kitchen and wash-place it will be necessary to give it a properly concreted open drain or a covered drain, with gullies from the kitchen, bathroom, and wash-house. A proper system of waste water disposal must be faced for a densely populated urbanised village.

It will be a considerable time before villagers will be able to afford separate borehole latrines or pan latrines and the cost of sanitary men; therefore some form of latrine grouping is more practicable. In new layouts these latrines can be grouped with the houses in the layout so as to be easily accessible to them (*see* illustration 30), and usually septic tank latrines will be the most suitable form—ten houses containing about a hundred persons could use a six-seater septic tank latrine (*see* illustration 57). These latrines require very little attention and are

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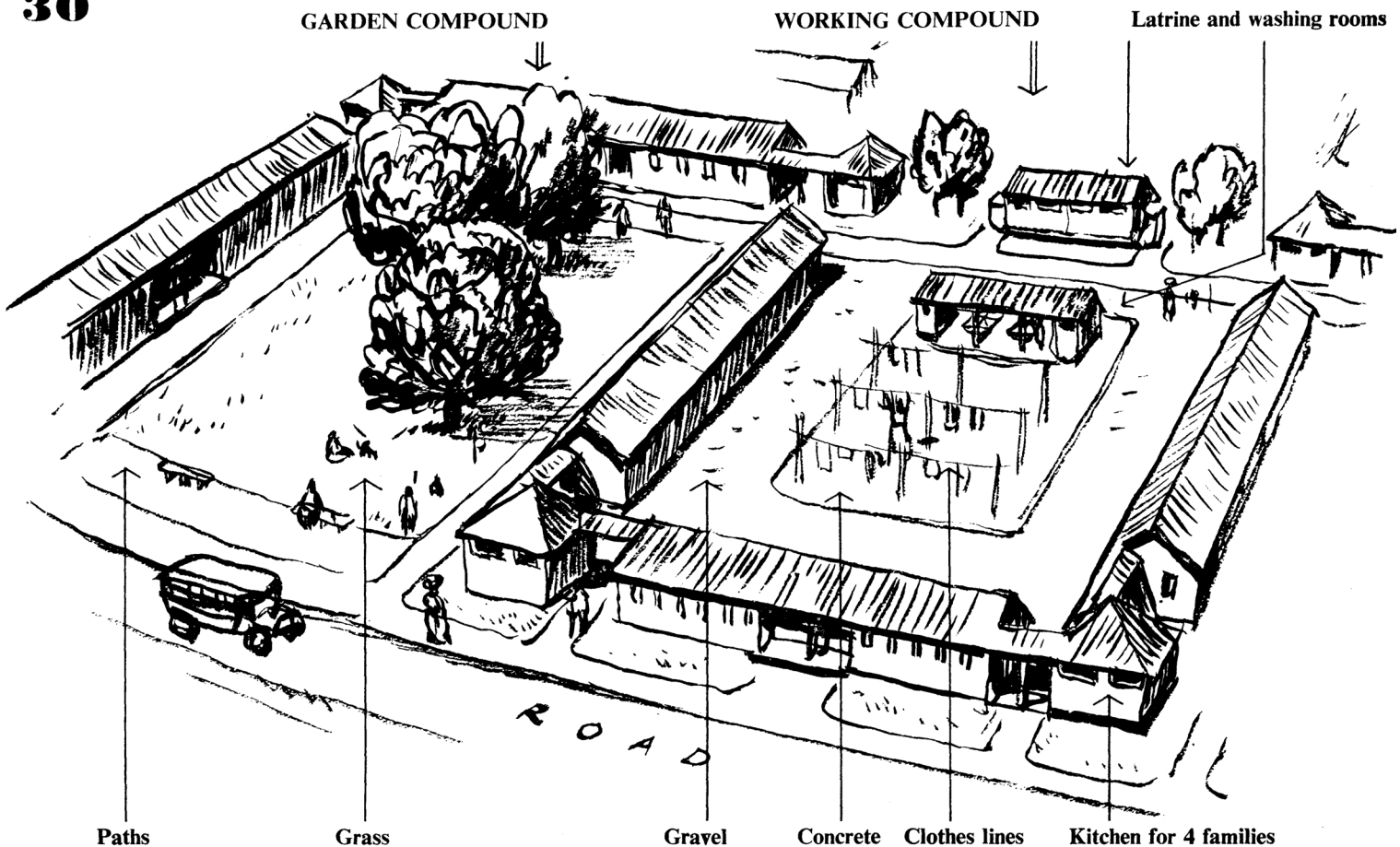

GARDEN COMPOUND
WORKING COMPOUND
Latrine and washing rooms
ROAD
Paths
Grass
Gravel
Concrete
Clothes lines
Kitchen for 4 families

generally satisfactory. A little of the effluent drips into a can or pail daily and needs removing, but desludging takes place only annually. Septic tank latrines, like all public latrines, should be divided as to sex.

The borehole latrine is a very cleanly affair, but unfortunately it cannot be used in all soils. In rock or swampy land it is useless.

Urinals should be provided in the village. This is common practice in Europe, though neglected in big cities and villages in England and America. They are needed both for men and women. Urine is an excellent manure and could be collected in rural districts as it is much easier to collect and utilise than fæces. Alternatively, open-air screened urinals can be used, designed for the urine to soak away and the sun to act as the good disinfectant it is.

Sanitary areas with latrines are needed in the market place and any other public gathering place, such as the sports ground, as well as in the housing. They should be slightly apart from building or market, and on the downward breeze side.

Little gardens and climbing plants near them will help to sweeten their precincts. They need very clear labelling, in good lettering; usually MEN and WOMEN in English and the local language is sufficient.

The design of the latrine itself, wherever it may be, needs attention to see it is well ventilated and dark. Light attracts flies, and this is a part of the housing which does not require to be over-lit. A good way of ensuring good ventilation is to leave a space between the top of the latrine walls and the roof. Windows should, of course, be in positions where they do not expose the occupant to view.

Where pan latrines are used a box must also be provided full of earth, sand or wood chipping, ash, etc., so that the pan can be kept sweet and clean.

A problem in septic tank latrines which may well be mentioned here is the type of leaf, etc., used by the occupier for cleaning purposes. Corncobs are sometimes used and tend to foul the latrine as they do not dissolve in the chemical action. In districts where these are likely to be much employed the users should be warned.

Composting

The subject of latrines can hardly be considered in rural areas apart from the kindred subject of composting. The great success of Sir Albert Howard's Indore System in India and elsewhere is now well known. Many varieties have arisen and are already in use in some of the colonies. Kano, in Northern Nigeria, for instance composts its town refuse, market sweepings, stable manure, and night-soil. Some composting is practised in the Gambia and the northern territories of the Gold Coast. Chapter IV, on Health and Hygiene, will give details of various possible systems. The importance of composting to the soil in question must be settled when deciding the system of latrines, and also a fair estimate of the health risks involved—both by commission and omission—the possibility of infection from faulty composting, the risk of poor soil and poor diet from omission to compost. It is a subject about which the authorities tend to have extreme

opinions: sanitary authorities are either ''compost minded'' or *non compos mentis!*

Refuse

House refuse is at present chiefly vegetable; it consists of corn husks, cassava, and yam peelings, etc. Market refuse is of much the same nature. There is also refuse from slaughter-houses. Whatever its nature, refuse collection in most villages in the west coast is haphazard. In the enlightened villages incinerators are used and no doubt save much sickness bred from insect-borne infection from decaying refuse. In some villages refuse is collected in containers and composted.

Europe has learnt much in the war period about the nature of refuse. It has by law been divided into vegetable and animal; tins and glass; rags, paper, and bones. This division of refuse at the household end has been a great saving to those authorities responsible for dealing with it, and has much reduced the volume of collection. Pig and chicken food bins have been provided for groups of houses. This division is a matter of education. Refuse bins should be provided in sanitary areas to suit the village needs, these being separate for offensive refuse such as tins and bottles, etc., and animal food or refuse fit for composting. Offensive refuse can be burnt and the resulting clinker used for making up bad ground, etc. The provision and design of incinerators will be referred to in the chapter on Health.

Refuse containers should be washable and shut tightly so as to keep out flies. For housing that can afford individual containers, galvanised or iron dustbins are ideal, but cheaper expedients may be used. Wicker baskets, which can be cheaply replaced, are suitable if they have good lids; or wooden boxes. These are better lined with leaves to keep them sweet.

Sitting-rooms

A sitting-room is still a luxury in most village housing. The bedroom is used for this purpose indoors and the verandah and compound outside, but the demand for sitting-rooms will grow, and since we wish village housing to be as good as the best town housing (if not better), and since villages perforce lack some of the diversions of town life by way of recreation, good sitting-rooms will add to home life, especially in the wet season and at night. The days of village electricity are still some way off, but candles and good lamps can be obtained. If farming improves, the increased wealth can well be spent on better diet, homes, and education.

The sitting-room will be used as a place in which indoor occupations of a pleasant kind, such as sewing, knitting, games, homework, are done, and guests received. It should open on to the social verandah and will frequently be the room from which other rooms are reached, such as the bedroom and back verandah. It need not have the same privacy as bedrooms. The sitting-room may sometimes be arranged so that a section of it is used for dining. A separate room for this is luxurious and not essential.

Dining-rooms

Food is at present eaten in most villages in a primitive way, by hand from a common pot. Plates and cutlery are

beyond the income of most villagers. Clean hands are probably the best precaution that can be taken at present, but use of calabashes as separate dishes is both hygienic and practical.

For those who can afford plates, cutlery and dining-rooms, the dining-room should be near the kitchen and food store. It may well open on to a verandah.

The habit of the family eating together is a pleasant one.

Separate Rooms or Houses for Wives

The present customs for polygamous families vary considerably. The need for separate rooms or houses will depend on particular customs, but when planning for polygamous families these must be faced. Separate houses or rooms may well be planned as a larger unit; the number of wives and children must be taken into account. Religious considerations may and do affect the position of wives' housing. The purdah regulations of the strict Mohammedan mean that his wives' housing together with its ancillaries must be screened from public view and access. An interesting plan meeting these requirements has been worked out for the staff of the Zaria Literature Bureau.

Gardens

Gardens are great ornaments to housing, and all layouts should include them. At present the cultivation of flower gardens in villages is difficult owing to the free scavenging of the animals.

Some compounds have flower gardens and shade trees, which greatly improve them. The cultivation of flowers and vegetables, shade, and fruit trees in house gardens will vary with the topography, but is needed everywhere. Formal gardening would improve the appearance of villages, and a great variety of flowers and trees can be grown. (For details of these *see* Chapter VII on Horticulture and Agriculture.) Trees for house gardens should be ornamental, such as flowering cassias, shade trees, or fruit trees. Mango trees tend to attract flies and are messy when the fruit is ripe. Citrus fruit trees are cleaner.

Paths to housing should be surfaced and the rest of the garden planted to prevent soil erosion. Two or three (although they can often be combined in one) types of garden are needed: the pleasure garden, the useful garden, and where chickens, refuse bins, firewood stores, and so on are kept. There is also the vegetable garden. The part of the garden destined for utilitarian tasks is best surfaced with gravel, stone, concrete, etc., depending on the district. It is wiser to screen this area by hedges or walling from the rest of the garden to confine its area. Corrugated iron is often used for garden walling, but is unsightly. Round the yard or court area a proper wall is sometimes needed, or a railing. Protection against thieves is a problem here for which no good cheap solution has yet been evolved. A high wall of a pleasant material such as stone or brick or even hardened mud, whitewashed, can be used.

It is not possible to provide private gardens to all village housing, and sometimes communal gardens or compounds will be a better answer. Here it has already been suggested

that these be divided into pleasure and working areas. Sometimes a further division of pleasure gardens, working garden areas, and allotment gardens in the village green belt will be required.

The pleasure garden needs shade trees, flower beds, lawns, and possibly climbing frames and the like for children to play in, or seats for the old people to sit on. The working garden should accommodate any shared services to be kept away from the houses, such as kitchens, wash places, bathing places, latrines, refuse bins, fowl coops, animal sheds, firewood sheds, etc., and clotheslines. They may also include vegetable gardens if these are not sited elsewhere, together with grain stores and other stores for farming implements, etc., these preferably to lock.

SUMMARY

Summary of Present Position of House: Plan Types

1 There is at present a wide range of dwelling houses in African villages built of grass, mud, and timber.

2 The majority are built on some form of "compound" plan but vary in type from round huts joined by mud walls to elaborate many storied buildings as in North Nigeria. The shape of the houses is often dependent on the roof construction.

3 Generally speaking, the compound house is designed for family privacy and protection, both of which it gives, but is often overcrowded and badly ventilated.

Main Defects in the Design of Village Houses

1 Construction is generally unsatisfactory, being impermanent and not waterproof.

2 Windows are too small and rarely opened.

3 Rooms are too low.

4 Kitchen and food storage are especially unsatisfactory, there being no provision for smoke removal or protection from vermin.

5 The surrounding ground is often used as a latrine.

6 Goats and other animals are often kept in the houses.

Housing Needs

1 Bedrooms—the number depending on size of family.

2 Verandahs both for sitting out and housework.

3 A kitchen.

4 Kitchen food store.

5 Firewood shelter.

6 A shed for animals, if kept.

7 A wash-place, latrine, and refuse collector.

8 A sitting room in houses which can afford it.

9 Separate rooms for different wives, or in some cases, separate houses.

These to be solved in a way which:

(a) *is structurally sound and healthy;*

(b) *within the resident's means.*

(c) *secure from thieves;*

(d) *agreeable to his social and religious belief.*

In some districts these needs will be more elaborate, and there will in addition be visitors' rooms, dining rooms, and garages.

Bedroom requirements

1 Should be sufficiently large.

2 Should, generally speaking, face the breeze and have windows on opposite walls.

3 The walls should be smooth and protected from sun heating or damp transmission.

4 The floor should be smooth and easily kept clean.

5 The ceiling should be smooth and the roof be damp-proof, and designed so as not to harbour vermin.

6 Windows should be capable of letting air in while giving privacy and thief protection.

7 Beds should be lifted at least 9 ins. above floor height.

8 Provision should be made for clothes hanging.

9 Where extra provision for safety is required bedroom doors should not open directly from the open air but from other rooms.

Verandah requirements

1 There are two kinds of verandah—social and work. Usually the social is better at the front or side; the work at the rear or side.

2 The social requires to be room-shaped rather than corridor shaped, but with its long side facing the exterior.

3 The social may be designed in with the garden, and given some privacy.

4 The work should be near the kitchen, and is usually more useful corridor shaped.

Kitchen requirements

1 A covered kitchen essential for wet weather cooking.

2 Structure to be light and airy, the floor hard and easily cleaned. The walls and roof such as to protect the kitchen from sun and rain, and to keep it cool.

3 A cooking stove, preferably with an oven and flue.

4 A food store, preferably lockable, which must be insect and vermin proof.

5 A store for firewood to keep it dry.

6 An easily washable bench for food preparation.

7 A water cooler, basin, and drain.

8 A convenient supply of water for food washing; pipe borne if possible, but if not, from a filtered rainwater tank.

Care of Animals

1 Animals and other domestic pets should not be kept in houses.

2 They should preferably be kept away from housing areas, with their own drinking water supply.

3 Animals should be provided with special housing suited to their needs, with water, drains, and food boxes. This housing to be watertight and light, well ventilated and insulated.

4 Animals to be kept away from village streets and to have proper feeding places, grazing areas, etc.

5 Fowls to have proper fowl houses. This may be near but never in housing. Fowls to have fowl runs and not to be allowed to scavenge and foul the streets.

Design of Clothes Washing Places

1 Ideally, each house should have its own laundry room complete with basin, drain, water supply, indoor and outdoor clothes drying line, ironing board; and should be shaded from sun and rain and well ventilated. The floor should be of hard material and easily drained.

2 The drying of wet clothes in bedrooms should be discouraged by providing better places elsewhere.

3 Villages where individual family washing places cannot be provided should have either a communal wash place near the water supply with the facilities listed above, or communal wash places near to groups of housing.

4 Whatever the communal wash place, the basins should be designed in ranges with room beside them for soap, scrubbing, and placing soapy clothes awaiting rinsing. Normally the basins should be at standing height. The floor should drain itself and be of hard material. Clothes lines should be both under cover and in the open air. There should be a good drain or soakaway so that there is no standing water.

5 Women should be shown the advantage in soap economy by washing in a basin of soapy water.

Personal Washing Places

1 Ideally each house should have its own room. This should be conveniently situated near bedrooms and the kitchen so that hot water may be obtained easily.

2 Where this cannot be provided owing to poverty or water difficulties, communal bathrooms should be provided, divided into two groups with well separated and screened entrances for men and women.

3 Where possible these "rooms" should be divided so that each individual has his or her own recess, shower, tap, seat, clothes peg, and soap rest. The floor should drain itself and be of hard material; the rooms well ventilated and sheltered from rain. They may be sunny, but privacy is essential; windows should be louvered or high. Good ventilation is essential.

4 If all water is brought by head load the same arrangements without taps or showers.

5 A fixed mirror is an asset.

Latrines, Refuse Disposal, and wash places

1 Latrines may be W.C's., septic tank latrines, bore hole latrines, pit latrines, or urinals. Refuse bins are needed.

2 The contents may be collected, buried, burnt, or composted.

3 Water closets are the cleanest system and the best. But only possible where there is an excellent water supply and where the capital cost of the first installation can be met. In upkeep the system is cheaper than pan latrines.

4 Bore holes are only possible in certain soils. They are very cleanly and to be recommended where no collection and supervision is possible.

5 Pan latrines are a useful expedient. Care should be taken that sanitary lanes used in conjunction with these are surfaced in areas liable to erosion.

6 Septic tank latrines which will take groups of people and can serve a hundred or more people are good for use for groups of houses or in market places. They require little upkeep and are cleanly.

7 Refuse bins should be provided for both waste fit for feeding animals and composting, and also for waste for incineration, etc.

Wash Places, Latrines, Refuse, etc.

8 Wash places are needed for clothes washing, bathing, and food. Latrines for urine and fæces, refuse bins for waste and rubbish.

9 Individual provision of these for each home is ideal but cannot always be provided on grounds of cost of buildings, difficulty of water provision, costs of collection.

10 Where they can be provided for individual housing the ideal solution is a water closet, a small laundry room, a bathroom, two small dust-bins for animal food and rubbish.

11 A pan latrine may be substituted for a water closet, and the laundry room and bathroom combined where cost allows of individual provision.

12 Where individual provision is not possible, either a village provision should be made for them or they should be in sanitary compound areas, arranged to be convenient to the housing. The sexes should be separated. For suggested layouts see diagrams for details of incinerators and compost methods, latrine types, etc., see Chapter IV on Health.

Sitting-room Requirements

1 This room should preferably open on to the verandah.

2 It may also be arranged to serve as a way to other rooms.

3 It can be shaped so as to serve as both sitting and dining-room.

Dining-room Requirements

1 These should be near the kitchen and may open on to a verandah.

2 The dining-room may be adjacent to the sitting-room or entrance hall.

Wives' Housing

1 The separate housing of wives must be taken into account when planning in certain districts.

2 It must be remembered that ancillaries must be provided for separate housing.

Garden Requirements

1 The amount of house garden will vary with circumstances, but an area of garden round the house will serve to make the house airy and give a pleasant appearance.

2 An open-air work area and a pleasure area are needed in both private and communal housing.

3 The work garden to house the latrines, firewood store, kitchen, washing place, bathing place, fowl pens, and so on, also sometimes for vegetable gardens and stores.

4 The pleasure garden for flowers, ornamental trees, shade trees fruit trees.

3. HOUSING LAYOUTS

We have now considered in Chapter I the main factors governing the choice of village sites and the form of plan the village may take under varying conditions. In Chapter II the needs of individual rooms have been considered, and the immediate conveniences that go with housing. This chapter will discuss possible dwelling types resulting; their layout, the design of streets, and the problem of converting existing villages.

Dwelling Types

These may be graded according to size of families, from the single labourer to the large Mohammedan family. They may also be graded according to wealth: the rich villager who can afford all conveniences, to the poor villagers who wish for the best housing possible, compatible with income. There are other divisions that depend on the nature of the land, the type of farming, or other occupation undertaken by the village.

Labourers' Dwellings

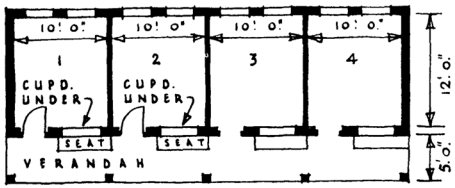
These are probably the simplest kind of communal housing needed. We are assuming a small income.

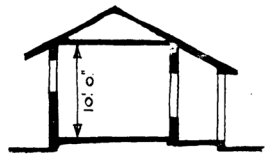
Many people require one or two rooms, and some of the conveniences of life, who cannot afford a house of their own. Everywhere in West Africa people can be found ''lodging'' in the houses of other families or living in poor housing. One of the great arts of life is to have the best time possible with what money you have, without running into debt.

If people cannot afford everything themselves the best thing is to have privately the things that really matter, and to share the other essentials where private ownership is not so important. All men and women need a room of their own (preferably two rooms) and a verandah. This is a low minimum. A room costs the price of its foundations, floor, walls, and roof. It must have four walls, but if two of these can be shared with other rooms the cost per room is lowered.

A ''terrace'' arrangement of rooms is one of the cheapest good solutions, and illustration 31 shows simple alternatives of the single- and double-room types of houses. Another example is included in illustration 35. The room should, of course, follow the contours of the ground and face the breeze as far as these things are possible.

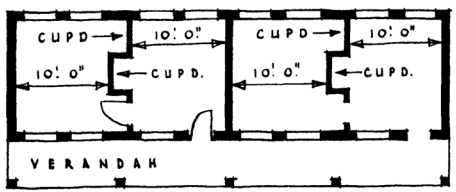
Kitchens, latrines, wash-rooms, bath-houses, lock-up stores, etc., may be grouped or shared with others. A suggested arrangement for this type of housing is shown in illustration 32, which illustrates the relation of the ''single-room'' terraces with the kitchens, latrines, etc. There are many advantages in this form of sharing. Septic tank latrines can be used. Water



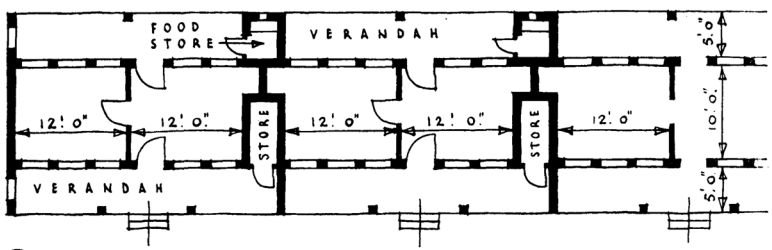


SECTION

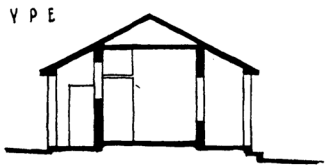
(a) SINGLE ROOM TYPE



(b) DOUBLE ROOM TYPE



(c) IMPROVED DOUBLE ROOM TYPE



SECTION

31

can more easily be collected in tanks from roofs, kitchen flues can be shared, the same drains may be used for communal wash-places, and if these shared facilities are grouped in a garden there will be a pleasant feeling of community, much like that experienced in the compound, but with plenty of ventilation. Such things as children's playground fixtures and seats for elders can be shared by many families. Illustration 33 shows two examples of this communal form of housing; the first being on a level site and the second on a sloping site where the terrace blocks have been planned to follow the contours.

Labourers' compounds may well be divided into work and pleasure compounds, and the latter carefully planted with shade trees and flowering trees and shrubs. The work verandahs can be used as covered ways, and further use of covered ways between "blocks" will be of great convenience.

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31 SINGLE AND DOUBLE ROOM TYPES HAVING COMMUNAL FACILITIES FOR KITCHENS, LATRINES, ETC. Plans based on rooms of 120 ft. sup., which is the minimum area permissible.

Type (a) has utensil cupboards under the verandah seats.

Type (b) provides for clothes recesses with hanging rods and high level shelf over.

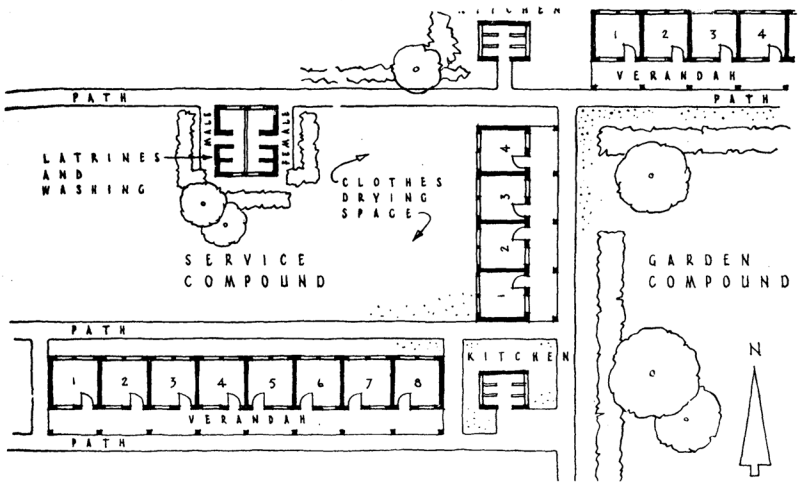
Type (c) has a double verandah, a ventilated food and utensil store, and a store large enough for bicycle, etc. These stores are both lockable. A recess for hanging clothes is provided.

Small Individual Housing Sharing an Adjoining Wall and Some Facilities

The next stage in housing is the small ''terrace'' house which is more completely self-contained, having its own bedroom and living-room (or two bedrooms), its own pleasure and work verandah, food store, and kitchen, but still sharing grouped latrines, bathing and washing places.

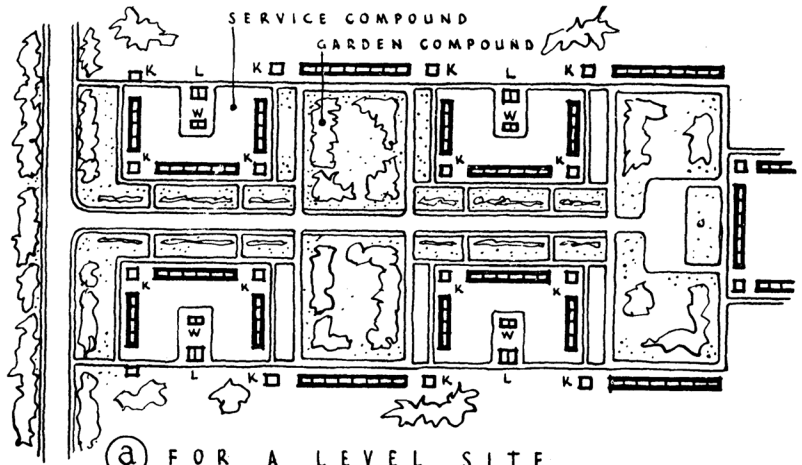
The next stage has latrine, bath, and wash-place within the house, but adjoining walls are shared between neighbours. A suggestion for this type is shown in illustration 34. By omitting the projecting wing of outbuildings this plan could be adapted for the type with grouped latrines, described in the preceding paragraph.

Obviously a number of variants of this type of housing

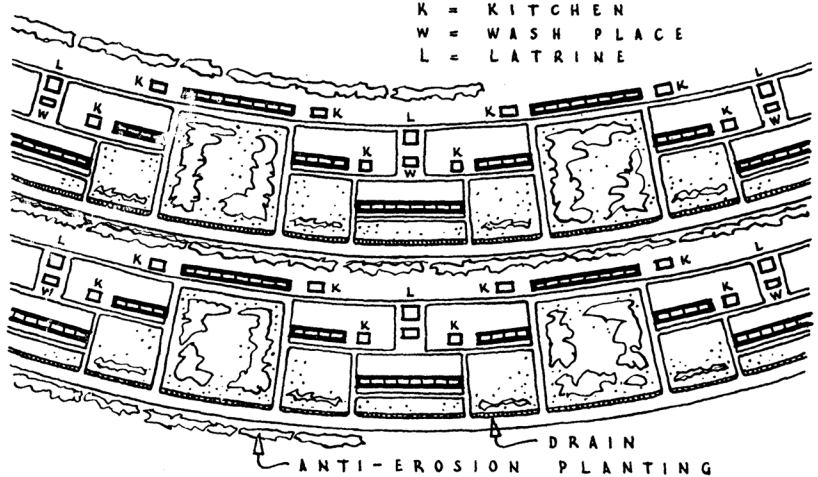


32 OPEN COMPOUND LAYOUT FOR SINGLE ROOM HOUSES

33 SINGLE ROOM OPEN COMPOUND LAYOUTS

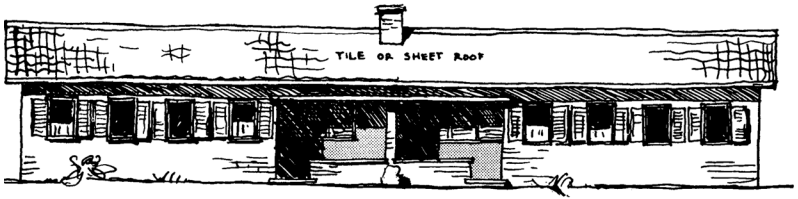


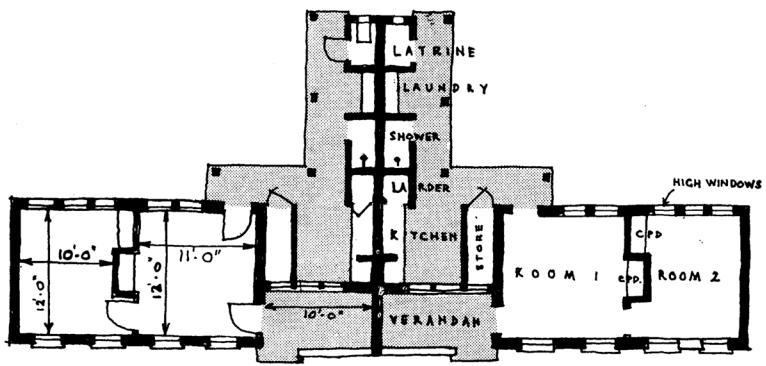
(a) FOR A LEVEL SITE



(b) FOR A CONVEX SLOPE

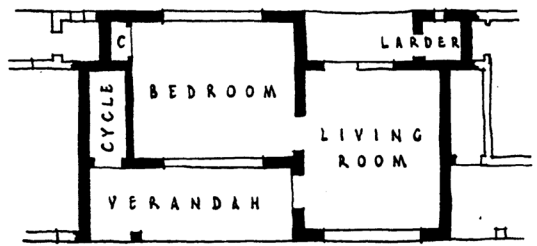
34 TWO ROOM TYPE COMPLETE WITH KITCHEN, STORE, LATRINE, ETC.

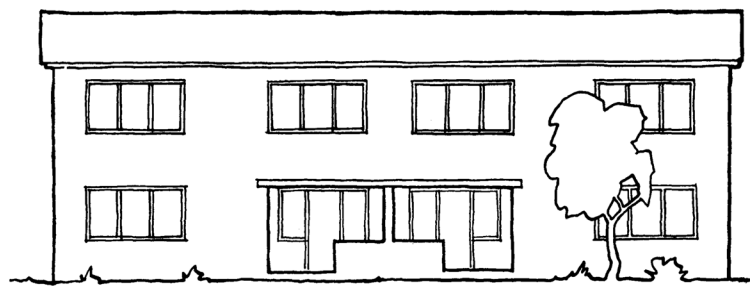




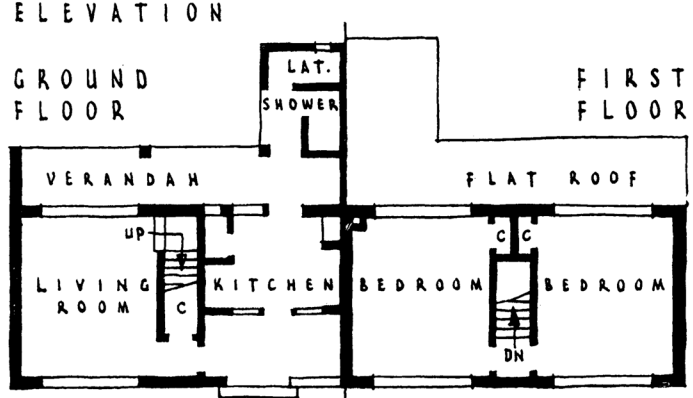
is possible as, for example, by the addition of extra rooms, or perhaps by building in two storeys as shown in illustration 35. Terrace housing is particularly useful on sloping sites where layouts should follow the contours. Considerable cost in road-making and upkeep may be saved. The size of the block should not be too big. Four, six, and eight "groups" are possible. This is so that there should be plenty of air round the blocks.

35 TWO ROOM TERRACE TYPE





ELEVATION



TWO STOREY TYPE

36 SOME SUGGESTED DESIGNS FOR DETACHED HOUSES

Small Individual Detached Houses

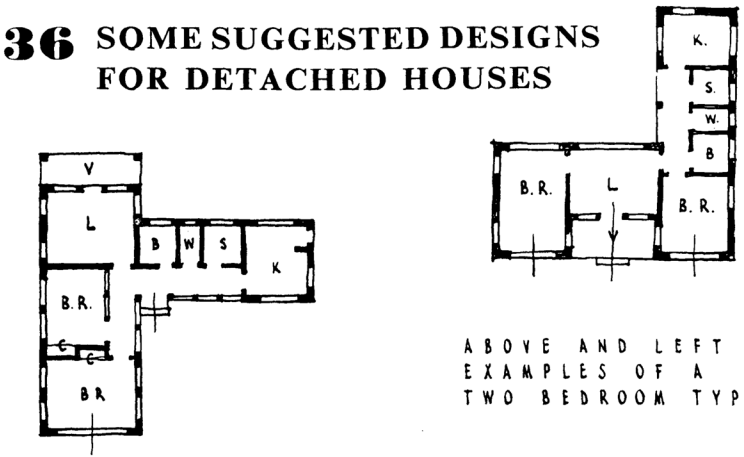
Detached houses are more expensive to construct and also take up more road and path frontage than attached houses. They are, however, to be preferred in some respects. More air can circulate round them, and for bigger houses side windows are possible.

There are more arrangements possible for detached houses but, except at corners, they should avoid being two rooms thick. Although the double-room thickness cuts down walling costs, it prevents cross ventilation. L-shaped and even T-shaped or cruciform plans can be used, but square plans with internal courtyards should be avoided.

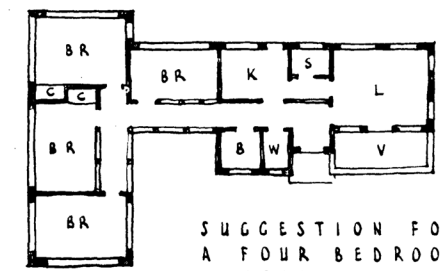
Illustration 36 shows some suggested arrangements. A good arrangement for an individual detached house is to keep its working sheds for animals, fowls, and so on, at the bottom of the garden. If kitchens are well designed, with flues, there is no reason why these should not adjoin the house together with the bathroom, wash-room, store-room, etc.

Some richer villagers may keep servants, in which case the servants' quarters should have the same facilities as labourers', but boys' houses may be planned on the same plot as the bigger house.

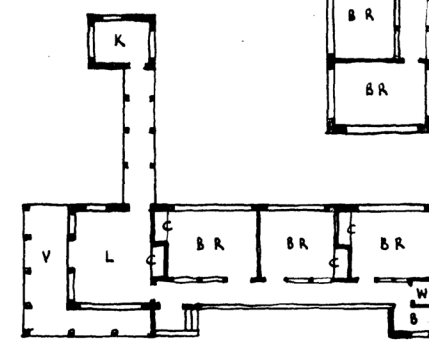
Certain detached houses, such as that of village doctor, postmaster, schoolmaster, etc., should be sited in easily-found positions, and village carpenters, blacksmiths, tailors, etc., should be near their workshops.



ABOVE AND LEFT EXAMPLES OF A TWO BEDROOM TYPE



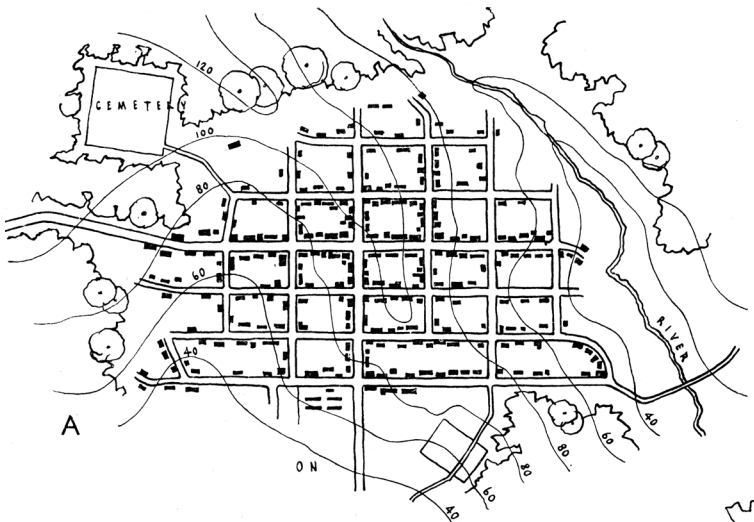
SUGGESTION FOR A FOUR BEDROOM BUNGALOW

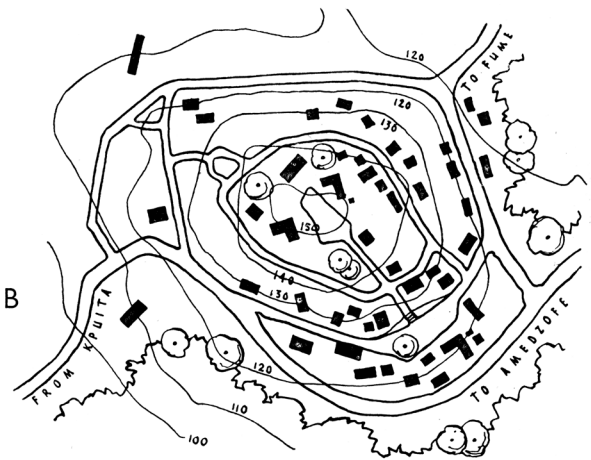


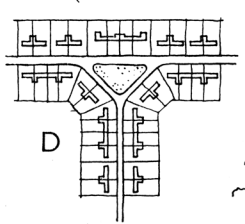
THREE BEDROOM BUNGALOW WITH DETACHED KITCHEN.

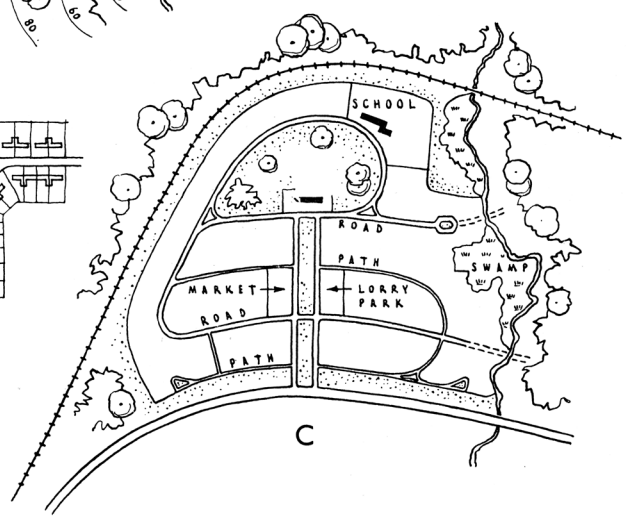
BR. BEDROOM
L LIVING ROOM
K KITCHEN
B BATH
W LATRINE
S STORE
C CUPBOARD
V VERANDAH

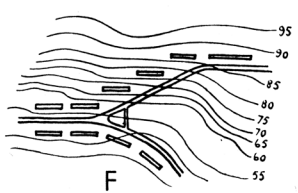
37 SOME VILLAGE LAYOUTS

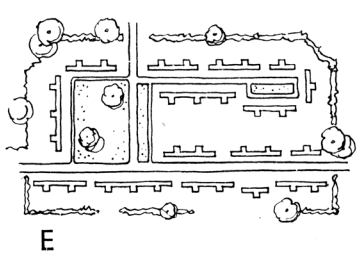


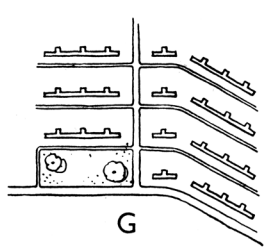












37 SOME VILLAGE LAYOUTS

A **A grid-iron plan taken from an existing village in the Cameroons. The contours have been ignored, resulting in undulating roads and thus creating difficult building sites.**

B **A village from Togoland in a very hilly district. This example shows how the villagers have laid out their roads on the contour lines. These roads have easy gradients and are economic in construction.**

C **Suggested layout for an actual site in Southern Nigeria where the land was bounded by the main road, railway, and river. Note the use of paths.**

D **Suggested layout of houses at a road junction.**

E **A possible grouping of terrace type housing at a road junction and cul-de-sac.**

F **Echelon form of siting houses to avoid building across the contours.**

G **Houses shown built fronting on to a system of paths to avoid the cost of road construction.**

Houses with Work-places Combined

There is no reason why house and work-place should not be combined with living-rooms—''over the shop'' as we say in England—or next to it. But the ''shop,'' whatever it may be, will need cross-ventilation as much as any living-room or bedroom, and although a verandah may be planned behind it, rooms should not be allowed here, but beside it or over it.

Certain obnoxious trades should not be combined with living-houses, but should be separately housed. The actual design of shops and markets will be discussed later.

Street Layouts

Present Position

Most villages have not been laid out at all. They have just grown in a higgledy piggledy fashion, with no attention paid to contours, road drainage, breeze, or anything else, save that of grouping the houses together.

Existing ''Grid-iron'' Street Plans

Some villages *have* been laid out, but on what is called the ''grid-iron'' plan (illustration 37 includes an actual example of this), and as no attention has been paid to contours, breeze, or natural beauty, the resulting erosion, combined with the mechanical layout, is hardly more pleasing than the previous muddle. The grid-iron plan uses too many roads of equal importance and is expensive.

Principles of Street Layout

In Chapter I the relation of the main trunk roads to villages was discussed. Inside the villages themselves, the roads may well be thought of as the branches and twigs of a tree of which the main road is the trunk. As stalks are capable of holding leaves, so are paths sufficient to serve most housing needs. The roads, like branches, should only be used when there is a weight of leaves or housing to support. Motor traffic will be confined to the market-place and civic building areas in most villages. The small sketch G in illustration 37 shows the principle of using paths, and at C in the same diagram is an actual example of the use of paths for a proposed new development in Nigeria.

Other principles of village layouts, in particular the careful consideration of contours, were discussed in Chapter I, and are now furthered by sketches in illustration 37. Of special interest is sketch B, which shows an instance where the village road builders have, in fact, conformed to the contour lines.

Assuming that a new village is under consideration, or the new part of an old one, roads can be grouped under different categories.

Main Roads

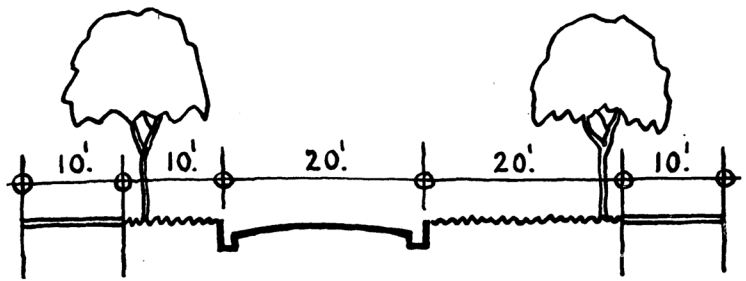
The main trunk road which by-passes the village. This will have its protected parkway of green on the village side of it.

Village Main Roads

These will probably be round the market area, and they must be designed for the volume of traffic likely some ten years ahead (as nearly as this can be guessed). This does not mean that this width of road must be built up, but must be kept free of building for future use. This is important, as it will determine the building frontage of the shops and other buildings. It would obviously be expensive to pull down buildings if the road needed widening in ten years' time, and one of the big things which village planning does is to safeguard future development.

This main street should be thought of both in section and plan. It must be surfaced and drained, be shady along its paths, and, if there is any electricity available, well lighted. It must have good sign-posts, and if there are any dangerous corners these will need special attention, as will any major road crossings. A suggested section for such a main street is drawn in illustration 38, and shows that the width to be occupied by future roadway may be taken up by part of the grass or earth verge at the side of the pavement. The carriage-way width in this example is shown as 20 ft., with provision for widening to 30 ft. These widths will, of course, vary according to the size of the village and the volume of traffic anticipated, but a minimum of 20 ft. must be provided to allow for two traffic lanes. Arcades make pleasant covered ways for shoppers to walk under, as do projecting canopies. These need to be designed with the street, and to be continuous. Indiscriminate marketing in these arcades tends to drive the pedestrian out on to the pavements or road again, but this is a matter for village management. Every shopping street should have a pavement.

38 SECTION OF A VILLAGE MAIN STREET



Carriage-way shown of minimum width and is capable of taking only two lines of moving traffic.

Trees shown planted at edge of verge in order to give shade to footpath.

Verge shown as 20 ft. on one side so that 10 ft. of it can be added to carriage-way if required at some future date.

Minor Roads

Minor village roads can be narrower than the main roads but, like them, should be surfaced and where possible planted with shade trees. In illustration 38 we have shown some suggested standards for road width, and have given 20 ft. as a useful width of minor village streets. This again will depend upon the size of the village, but this suggestion is also based on two traffic lanes. If, however, there is only a small amount of traffic anticipated a narrower carriage-way can be planned, but adequate passing spaces must be provided.

Access Paths

Access paths to housing and so on, and paths leading to the latrines, refuse bins, incinerators, etc., need surfacing, but paths leading to latrines, etc., need especial care. They should be well ventilated; that is, open at both ends or at one side. On grounds of economy no paths should be wider than necessary, and the rest of the ground should be paved or planted. It is advisable to keep an ample width each side of the paved path free of fences, trees, etc., so that there is

GENERAL ROAD INFORMATION

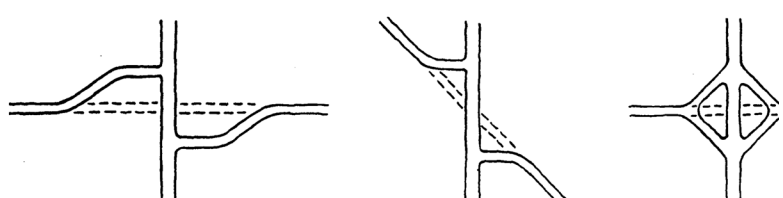
SUGGESTED STANDARDS:

Minimum Unit Width of Traffic Lane	- 10 ft. 0 ins.
„ „ „ Pedestrian „	- 3 ft. 0 ins.
„ „ „ Cyclist „	- 3 ft. 3 ins.
„ „ „ for Grass Verges	- 5 ft. 0 ins.

SUGGESTED CARRIAGE-WAY WIDTHS:

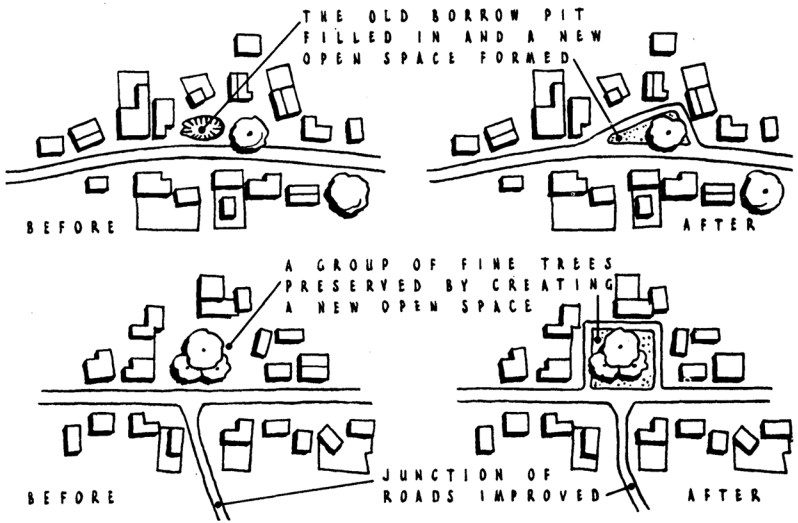
Village Main Street - -	20 ft. 0 ins. to 30 ft. 0 ins.
Village Minor Streets	- 20 ft. 0 ins.
Village Access Paths	- 6 ft. 0 ins. to 10 ft. 0 ins.
Street Footpaths - -	6 ft. 0 ins. to 10 ft. 0 ins.

NOTE: Add drainage channels as necessary.



39 SOME SUGGESTED TREATMENTS AT CROSSROADS

40 EXAMPLES OF STREET DOCTORING



sufficient room for an occasional motor vehicle. A point worth noticing is that sometimes when paths perforce run contrary to the contours, it is worth terracing and stepping them.

Existing Village Streets

The existing village street offers a separate problem. Badly eroded lanes will have to be reclaimed and the number of the streets reduced. Probably the main street will need widening. This may often be done by only demolishing buildings on one side of the street, though sometimes both have to suffer. Rigidly straight lines need not be adhered to as long as gradients are good and no dangerous bends are introduced. Street doctoring should be imaginative, and take advantage of awkward little pieces of land by incorporating them as greens or gardens. Examples are shown in illustration 40.

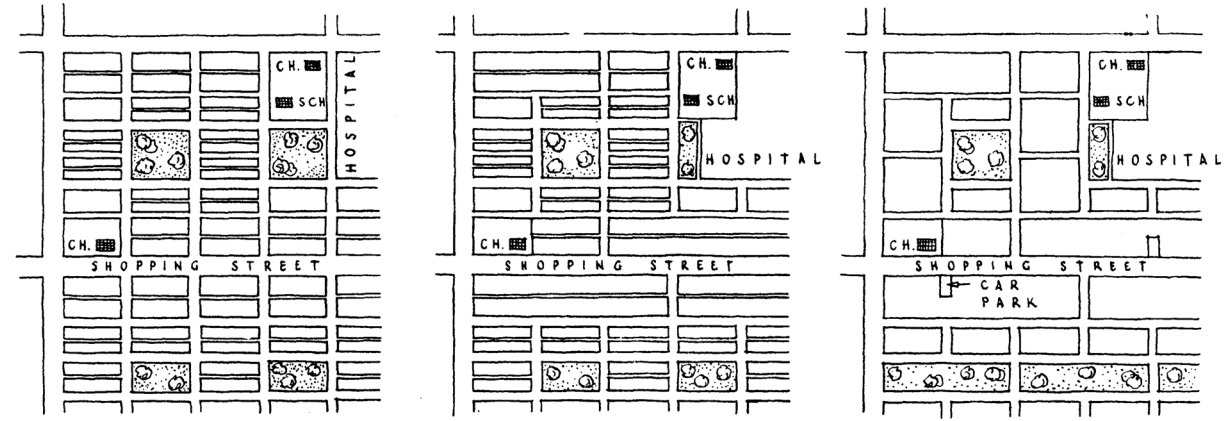
Main Roads Traversing Existing Villages

A special kind of road widening will have to be done where the main road passes through the village and a detour or by-pass is impracticable. Here it may sometimes save the village and in no way impair the efficiency of the road if it is split into two one-way roads, thus saving the village some costly road widening.

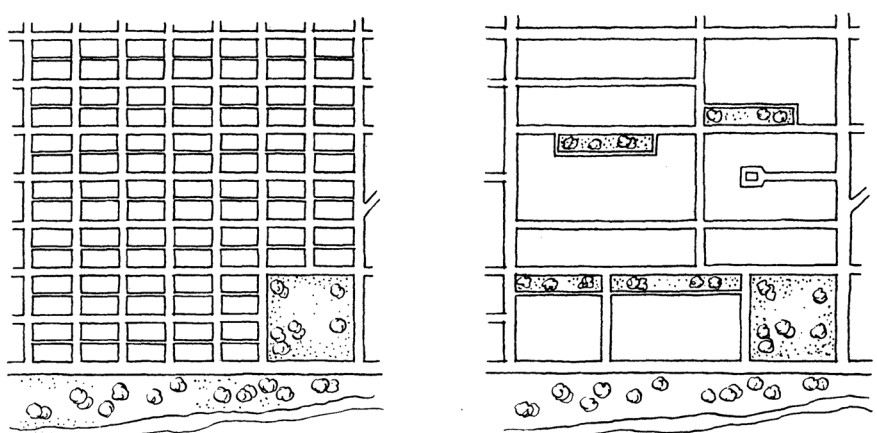
Sanitary Lanes and Existing Grid-iron Layouts

A special problem exists in West Africa through a certain type of grid-iron and sanitary lane plan having been adopted in the past. Two examples are shown in illustration 41, and show how the monotony of the existing grid-iron can be relieved. In each case the sanitary lanes have been abolished in the final conversion, but this stage cannot be achieved until water-borne sewage disposal has been provided. These lanes serve as access passages for sanitary men emptying pan latrines and also as drains to kitchens, wash-houses, etc., and therefore an adequate alternative must be provided before their use in existing housing can be discontinued.

41 THE GRID-IRON PLAN AND ITS TREATMENT



THIS NIGERIAN EXAMPLE SHOWS TWO STAGES IN RE-PLANNING



A GOLD COAST GRID-IRON AND ITS CONVERSION

These are two actual examples on fairly level sites and show

1 **Number of crossroads reduced.**

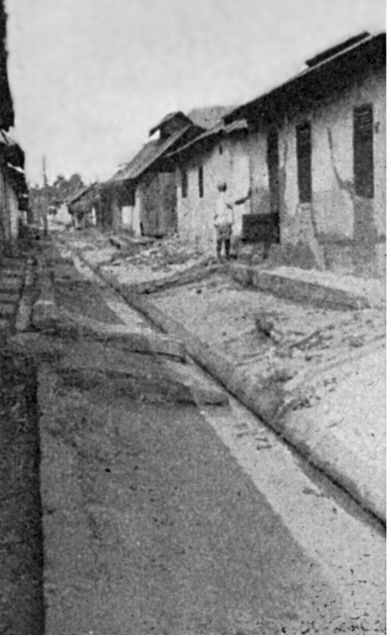
2 **More open spaces provided.**

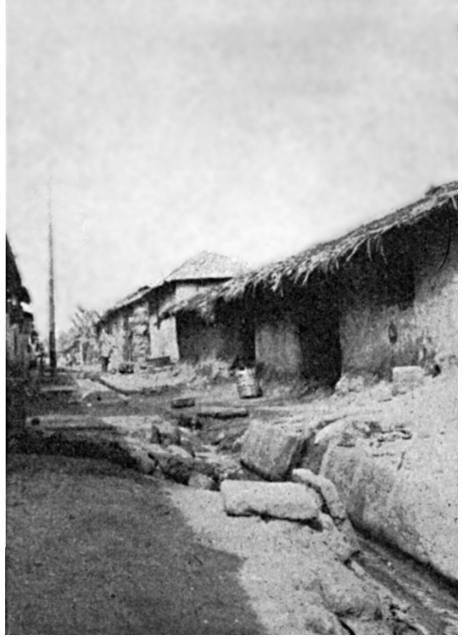
3 **Monotony of street layout relieved.**

4 **Exclusion of all sanitary lanes.**

5 **Relief of crowded housing areas.**

6 **Shopping street freed of numerous road junctions.**





The two photographs show quite typical sanitary lanes, and it will be readily seen that they can become a menace to health. Until such time as they can be abolished, a pipe drain of a large diameter should be laid so that the surface of the lane could be kept clean. If only open-channel drains can be afforded then it is really essential that a durable surfacing to the lane is also adopted. Open channels are seen in the photographs but without proper surfacing each side, and consequently the natural laterite has been leached away and insect breeding holes and depressions have resulted.

A common problem with this type of plan is that compounds of the enclosed type have been laid along the

42

street front, and that between these compounds is a strip of land which in fact belongs to neither house and is used as a path and quickly erodes. Illustration 43 shows means of using these in existing layouts by filling in the gullies with soil, planting them, preventing their use as passages, and adding them to the garden areas of the compounds. In new layouts we advise the elimination of these strips of ''no-man's land'' between houses.

First Aid and Cure in Village Planning

It may seem to be putting the cart before the horse to discuss first aid in village planning before we have discussed the detailed grouping and design of buildings other than housing within the village, but the problems of streets, villages, and housing are ones on which early decisions have to be made, though decisions which will be modified by detail planning.

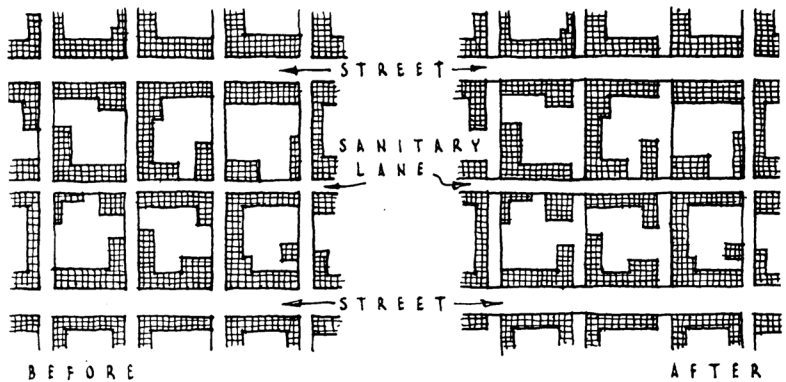
The existing village will be most probably at one of the following stages:

1 Be quite elementary, grouped without order or relevance to road planning, and possibly have many borrow pits and half-decayed houses standing.

2 Be mostly as above, but have a few really good buildings worth preserving, such as the church, schools, courts, stores, etc.

3 Be laid out on a grid-iron plan, the roads unsurfaced and too closely spaced with little relevance to contours, and eroded.

43



These sketches show a grid-iron layout of enclosed compounds and indicate the first stage of improvement by closing the side passages and including their area into the compounds.

Alternative Methods of Redevelopment to be considered

The problem which first confronts those responsible for the village is whether to choose a new site for it and build a good village there, transferring the population as it grows, or whether to impose a new layout on the existing village, and if it is not practical to choose a new site for the whole village, whether part of it can be destroyed and a new village centre planned or whether, as is often practical in a rapidly growing village, the centre can be placed on undeveloped land at the side of the existing village with the idea that new village development will take place beyond it so that it will become the centre of the future village. In the case of a village with a few buildings worth preserving, these may well be considered as the nucleus of a scheme. It is a good idea to start considering such a scheme by having a contoured survey of the district prepared and on this to mark only the buildings, streets, and trees worth preservation. This will enable remodelling to be considered in a far more open-minded way than if all existing roads and buildings were shown.

In the third case considerable amelioration of existing conditions may be obtained on congested sites by considering the order in which buildings are demolished and recreated elsewhere (or, to give the correct order, new buildings should be erected prior to the demolition of old ones). If in a congested grid-iron plan, instead of destroying half the village *en bloc* and relaying it out elsewhere, each alternate row of houses is destroyed and rebuilt, the old housing will be much improved as well as the new, by having twice the original plot sizes. This principle has been adopted in sections of the two examples of grid-iron conversions shown in illustration 43.

If an old village is big enough to justify it, it can be much improved by destroying houses in such a way as to create swathes of open space in the congestion.

Sometimes it is better to accept local features, such as trees, street lines, and so on, rather than create a regular and geometric road pattern.

There are some other particular evils in existing village streets that need obviating. These are "borrow pits," decaying old houses left standing, and haphazard advertisements.

If a hole is dug in the earth for building material it must be filled in or it will be both unsightly and dangerous, and a breeding place for insects when it fills with water.

The failure to demolish disused houses is a particular menace to the amenities of a village, as will be seen from the two accompanying photographs. In the first (illustration 44), a new house has actually been built within the outer walls of the old building. The second example (illustration 45) shows the new house built alongside the tumbling walls of its predecessor. Decaying old houses are often left to mark land tenure, but villagers should evolve a more sightly method; probably the best method is to have a village plan and keep proper records. This would, by the way, save considerable litigation. A building once finished with should be demolished and the site cared for.

Street visibility is often a trouble in existing villages, as the corners of the streets have been so built up that they are dangerous. The accompanying illustrations 46 and 47 show two dangerous corners. Where such corners are a menace to safety the corner houses should be demolished and a splayed line substituted so that visibility is increased.

Advertisements

Alas, there are signs that the same vulgarisation and criminal spoliation of villages by advertisements may take place here as is so often seen in villages without local pride in England. It is a real form of vandalism, against which strict protection must be taken or all carefully-planned attempts at beautifying villages will be brought to nought.

44

45

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The Place for Information and Advertisements in the Village

A village information bureau is an excellent thing where real information can be posted and seen, preferably under cover. Shops selling wares should be designed with display boards. Papers, magazines, and shops, are the proper places for advertisements. The individual may choose whether he wishes to look at them or no; but in the same way in which Britain wisely set a lead in banning advertisements in broadcasting, the same lead might be given by the Colonies by banning advertisements on roads except in conjunction with shops, etc., selling the produce advertised.

Street Furniture

Street furniture such as seats, sign-posts, shelters for lorries or standing traffic policemen all need careful designing so that they are ornaments to the village, and serve their purpose well.

If there is no one to design the lettering used on street furniture, good Roman letters or Gill sans-serif lettering may well be used as being clear and well designed.

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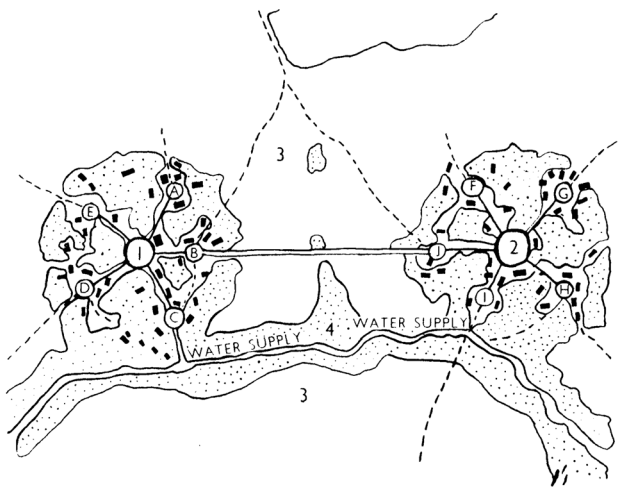
Ibo Village Planning

We are indebted to Mr. G. I. Jones for suggestions on planning villages for the Ibo and other tribes of the eastern provinces of Nigeria.

In brief the agricultural development of these villages means that it is customary for the houses to be immediately

surrounded by garden land used by the women for their shade crops and for livestock, and planted with trees, mainly economic ones, oil palms, raffia palms, oil beans, African breadfruit. Outside this housing area is the farmland. The diagrams below show Mr. Jones' suggestions for the development of such villages to meet expansion.

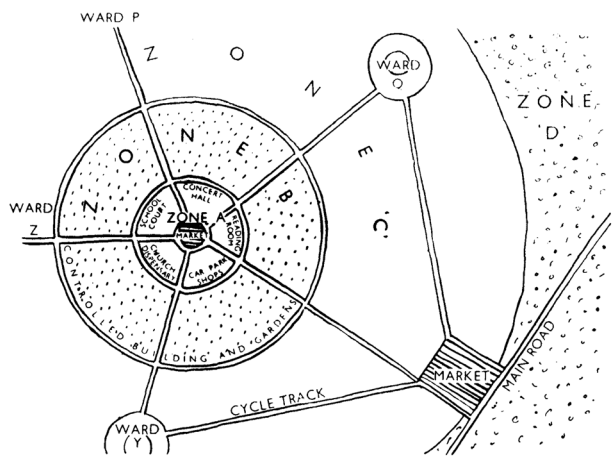
Plan of existing Ibo village showing ward system.



1 & 2. Centres surrounded by house land and gardens.
A.B. etc. Ward centres. 3. Farm land. 4. Swamp land.

From a town-planning viewpoint there is no objection to this maintenance of a horticultural village plan where better suited to the traditions and soil fertility of the locality; indeed, this last factor, from which the wealth of the worker comes, must be a prime consideration in all village planning.

Plan showing proposed method of adapting plan to modern needs.



Zone A—Public land and buildings. Zone B—Controlled buildings and garden plots. Zone C—Free buildings and gardens. Zone D—Farm land.

SUMMARY

Suggested Labourers' Housing

1 Each labourer should have a minimum of one room and verandah to himself.

2 Preferably two rooms and verandahs.

3 Kitchens should be individual but grouped to save cost of walling. Lock-up stores for food and for implements, bicycles, etc., are necessary.

4 Latrines should be septic tank latrines and grouped a little way from other services in the working compound.

5 Clothes washing and bathing places should be in the working compound.

6 Firewood stores and fowl coops, etc., should be in the working compound.

7 The pleasure compound to include shade trees, seats, and possible play fittings, such as see-saws for the children.

8 Use should be made of covered ways where possible, especially for housing where there is a long or heavy wet season.

Small Individual Attached Houses

1 These may be quite self-contained, merely sharing walls or they may share some services. Most benefit may be obtained by sharing latrines since this enables septic tank latrines to be used.

2 Terrace housing should be laid out so as to prevent erosion. Methods of grouping are shown in the diagrams.

Detached Houses

1 Detached houses are more expensive than attached.

2 More plan variants possible.

3 Are usually planned with all services and outhouses complete, but in some cases may share latrine accommodation with others.

4 If houses have servants' quarters these should be complete with services.

Houses Combined with Work Places

There is no objection to combining housing with work places provided that both get proper through ventilation and light, and that the work places are incidental to the housing

Village Street Layouts

1 Roads should be designed especially for their purpose, should be properly surfaced and drained, and whilst being wide enough to take present and future traffic, should only be put where essential.

2 Paths should be used to serve areas where there will be no motor traffic.

3 Roads where the volume of traffic may increase in years to come should be designed their full future width, and the part of the width not at present needed protected from building and used as an earth or grass margin.

4 Pavements, grass verges, shade trees, and arcades in shopping and business areas should be imaginatively used in designing road layouts. If pavements are to be properly used they must be fairly continuous.

5 Where existing roads have to be widened it should be considered whether this widening can be effectively made byt aking land from one side only, thus saving the costs of demolition and the general dislocation so caused.

6 Where badly eroded streets have to be reclaimed this can be done by infilling with earth and surfacing or planting or terracing, or in some cases by cutting out the use of the street as a street, as being unnecessary. The street width can be added to the town as a garden.

7 Street doctoring should be imaginative and not stress straight lines. Awkward pieces of land can be taken up as greens (*see* illustrations).

8 Where the main road cannot by-pass the village, use of one-way roads will sometimes save expensive road widening and demolition, and add to the safety of the village.

Measures for Improving Existing Grid-Iron Layouts with Sanitary Lanes

1 Sanitary lanes must be surfaced and ventilated. When these occur as passages behind housing, there must be an opening at either end of the lane, or good cross ventilation.

2 Unnecessary roads on grid-iron plans in existing layouts should be eliminated. Especially those which "cross" the contours. Roads to be surfaced.

3 Unnecessary roads can either be turned into public or private gardens for the housing.

4 Existing eroded gullies, where possible, to be reclaimed by either (*a*) installing proper surfaced drains, or (*b*) infilling with earth and planting. The choice depending upon whether a drain is needed or not.

5 Small open strips of land between compounds to be closed as traffic ways, and the land, if badly eroded, reclaimed where possible and the ground added to the housing as gardens (*see* illustrations).

6 In future planning, strips of no man's land between housing and grid-iron planning generally to be avoided.

First Aid in Village Planning, Village Street Evils, and Furniture

1 An early decision to be made whether village is worth relaying out on its present site or whether a new site should be chosen.

2 In considering replanning a village, part may have to be destroyed to form a new centre. It should be considered in planning a rapidly growing village whether the new centre cannot be placed on the outskirts with the new village extension beyond, so that "the centre," though now on new ground, will be the eventual centre of the village.

3 In the case of the village with a few buildings, etc., worth preserving, it is suggested that only these be marked on the contoured survey map when considering replanning.

4 In congested villages, especially those laid out on the grid-iron plan, the layout may be improved by removing alternate rows of houses when replanning. In very congested villages it is suggested that open swathes of planted green be cut into the village.

5 It is emphasised that a geometric layout is not essential. No bad corners should be created, and where possible contours should not be unduly steep.

6 Borrow pits should be filled in and planted.

7 Buildings no longer habitable should not be left in a decaying state, but destroyed. Land tenure records to be kept.

8 It is suggested that no advertisements be allowed in village streets other than in shops selling their particular produce.

9 Street furniture, sign-posts, lorry shelters, shelters for standing policemen, seats, etc., to be carefully designed.

10 Erosion precautions, surfacing, street drainage, and planting, etc., must be followed here as for a new village.

11 For notes on designs and construction of shelters, etc., *see* Chapter 6 on building construction.

4. HEALTH AND HYGIENE

Many facts affecting the health of the village have already been touched on in a general way: good diet, good air, good water, good light, and dry vermin-proof housing are the fundamental requirements. This chapter will outline the particular causes of village ill health and their prevention in greater detail.

Good Diet

This subject is rather far outside the realm of the town planner, yet like many other problems outside his sphere its solution affects his layout. The experts have considered, and are still considering, diet in villages. We have consulted them where possible, and have received a few definite conclusions that there is at present too much starch in most villagers' diet and not enough fresh green vegetables, fruit, eggs, milk, meat, and fish. This, in terms of village planning, means more facilities in the layout for growing green foods and fruit trees, better facilities for keeping and feeding animals, and more irrigation.

Good Air

This is a real necessity to life. Good fresh air and plenty of it. To obtain this the village has to be well sited, the buildings within the village arranged so as to catch the breeze; and for there to be plenty of green open space in the village, the houses designed to take advantage of the breeze by having apertures for good cross-ventilation. Those places, such as latrines, likely to foul air, to be placed where they can do least damage.

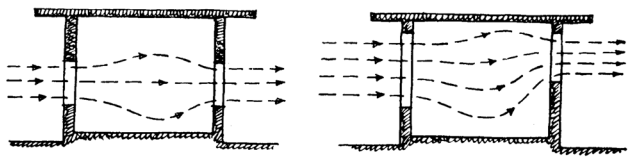
The Principles of Ventilation in Tropical Housing

For good ventilation, not only must rooms as nearly as possible face the breeze, but the shape of the rooms and the relative size and position of the doors and windows have to be correct. Hot air rises; it is important that there should be ventilation fairly near the ceiling, high up in the walls, or actually in the ceiling, to let this air escape. The side of the building facing the breeze needs to have plenty of window space; this may be quite low in the wall. The side the breeze blows out needs also plenty of ventilation, though it may have less than the side opposite. It should not have much more or suction may create a draught. The outlet side should preferably have its windowing raised. The drawings in illustration 48 show the principle of this cross ventilation.

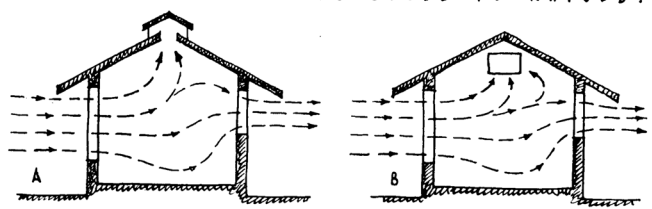
Fresh air is desirable in a room, but rain and sunshine are not. A little sunshine may be allowed, but not much. This means that windows and doors must be protected from rains and sun.

48 NATURAL VENTILATION

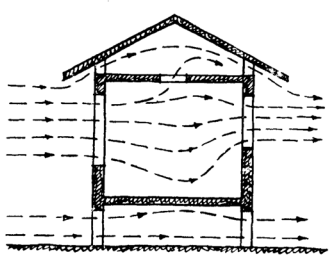
Details of construction are given in Chapter 6.



FLAT ROOFED BUILDINGS WITH SOLID FLOORS SHOWING THE EFFECT WHEN LOW WINDOWS ONLY ARE USED AND THE IMPROVED VENTILATION WHEN THE WINDOW-HEAD LEVEL IS RAISED.



HOUSES WITH UNCEILED PITCHED ROOFS AND SOLID FLOORS SHOWING GOOD VENTILATION ACHIEVED BY [A] A ROOF EXTRACT AND [B] BY EXTRACTS IN THE GABLE ENDS.



LEFT: A HOUSE WITH CEILED PITCHED ROOF, TIMBER FLOORS AND RAISED ABOVE GROUND LEVEL ON PIERS. IN THIS CASE THE ROOF, CEILING AND FLOOR TIMBER IS PROPERLY VENTILATED.

Since rooms generally aim at receiving the maximum of fresh air (other things being taken into account) it is best for the sides facing the breeze to have sufficient projection by way of eaves, canopy, etc., to shade their windows, or else for the window shutters to be so designed to shade when desired. There are other ways in which the same desired effect may be obtained, such as sunblinds. (These are usually expensive.) Useful data as to angles of sun, etc., are given in illustration 50.

Need for Light and Air in Roofs

Not only the room but the roof and (if there is a wooden floor construction) the floor need good fresh air and light. There are different ways in which this can be obtained, dependent on the form of construction. It must be remembered that destructive vermin and white ants like dark places and that mould flourishes in stagnant air.

Details of Window Design

Windows are often best opening in two parts. The lower part to let in all the air possible, the upper part arranged so that it is (*a*) shaded by the roof from rain and so can be left wide open quite safely in wet weather, or (*b*) arranged so that it slopes inwards, hopper fashion (*see* illustration 49), thus letting in the air while throwing off the rain.

Air bricks can be used to ventilate the upper and lower parts of walls when windows are not desired or are likely to be kept shut.

Room Lighting and Ventilation

The louvre window is much used in the tropics in many forms and has the advantage of letting in air and throwing off rain and sun at the same time. It has the disadvantage that it lets in but little light; though deep louvre blades, widely spaced, are better. Where glass cannot be afforded, windows can be arranged in two sections with the upper designed to be shaded from weather and yet left wide open and let in light. White eaves or overhangs will much improve the quality of this light, which is largely reflected.

Roof and Floor Ventilation

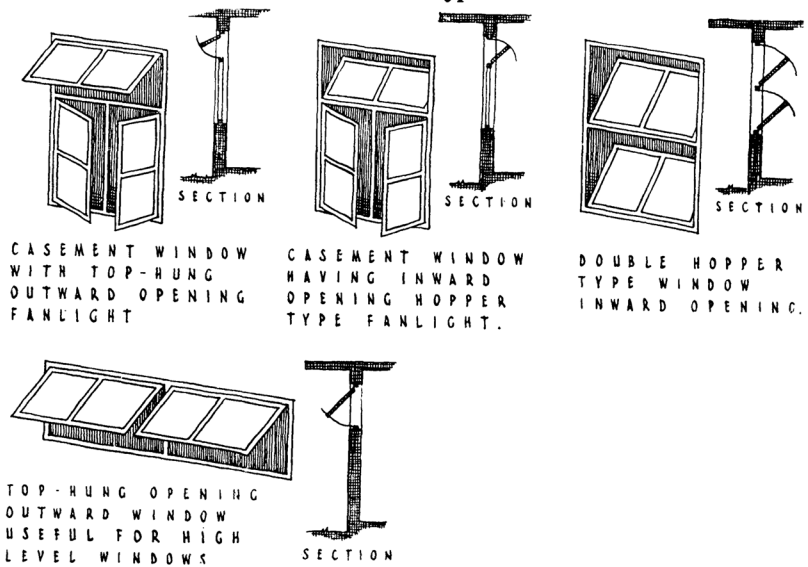
Fresh air in the roof can be arranged by direct through ventilation from gable ends, by openings in the eaves or by raising the base of the roof a little above ceiling level and ventilating from the vertical walling on either side (*see* illustration 48). Ventilation below floor level can be achieved by raising the whole building on to piers above ground level so that there is a good current of fresh air everywhere below the building, or by large air bricks. Where multi-storey buildings are erected and the upper floor timbers are sealed, the enclosed space requires ventilating.

Spacing of Houses on Sloping Sites

In spacing houses to catch the breeze there is sometimes a danger on sites which slope away from the breeze that houses in the front near the breeze will prevent houses behind getting it. To prevent this the house blocks should be arranged so that there are open spaces opening directly to the breeze

49 WINDOW TYPES

Many variations may be obtained by using combinations of these and other types of window.



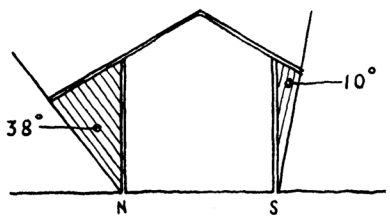
which penetrate deep into the housing, and, also, the houses are staggered.

Another precaution is to arrange blocks of housing with good air gaps between them.

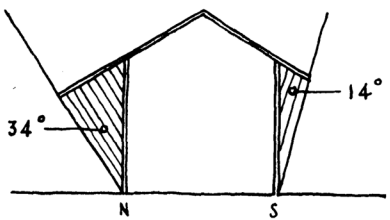
It should be pointed out that the common practice of leaving a breeze opening of 6 ft. or 10 ft. between houses does not really help much in achieving the desired end. Usually this space between houses becomes an eroded gulley, and the

50 ANGLES OF SUN

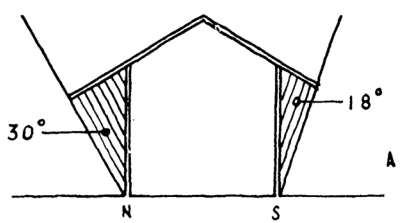
TO KEEP THE SUN OFF WALLS AT MIDDAY



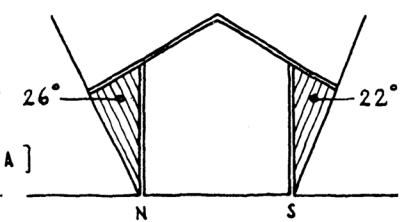
GAMBIA
EXTREME N. NIGERIA
LATITUDE 14°



N. GOLD COAST
MID N. NIGERIA
LATITUDE 10°



S. GOLD COAST
MID. S. NIGERIA
LATITUDE 6°



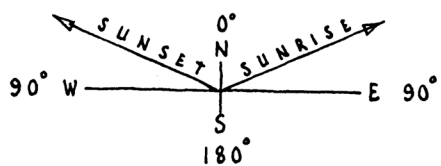
EXTREME S. NIGERIA
[PORT HARCOURT, VICTORIA]
LATITUDE 2°

NOTE: An overhang of 31° on the south side will not allow the sun to reach the foot of the south wall at any point in British West Africa, at midday, except during the months of December and January.
An overhang of 30° on east and west walls will not allow the sun to reach the foot of the wall within two hours of midday on any date at any point in British W. Africa.

DIRECTION OF SUNRISE AND SUNSET

DATE	BEARING				
1st January	SUN RISES / SUN SETS		113°	E. OF NORTH / W. OF NORTH	
1st February	,,	,,	107°	,,	,,
1st March	,,	,,	98°	,,	,,
1st April	,,	,,	86°	,,	,,
1st May	,,	,,	75°	,,	,,
1st June	,,	,,	68°	,,	,,
1st July	,,	,,	67°	,,	,,
1st August	,,	,,	72°	,,	,,
1st September	,,	,,	81°	,,	,,
1st October	,,	,,	93°	,,	,,
1st November	,,	,,	104°	,,	,,
1st December	,,	,,	112°	,,	,,

NOTE: The above table is correct within 1° at any point in British West Africa. The example at right is for 1st July.



DIRECTION OF SUN AT MIDDAY

[In terms of its angular distance north or south of the zenith]

DATE	LAT. 2°N		LAT 6°N		LAT. 10°N		LAT. 14°N	
1st January	25°	S	29°	S	33°	S	37°	S
1st February	19°	S	23°	S	27°	S	31°	S
1st March	10°	S	14°	S	18°	S	22°	S
1st April	2°	N	2°	S	6°	S	10°	S
1st May	12°	N	8°	N	4°	N	0°	.
1st June	20°	N	16°	N	12°	N	8°	N
1st July	21°	N	17°	N	13°	N	9°	N
1st August	16°	N	12°	N	8°	N	4°	N
1st September	6°	N	2°	N	2°	S	6°	S
1st October	5°	S	9°	S	13°	S	17°	S
1st November	10°	S	20°	S	24°	S	28°	S
1st December	24°	S	28°	S	32°	S	36°	S

air, far from being fresh, becomes foul. Alternatively the area becomes appropriated by the houses on both sides of it, in which case a wall is often built down the centre, and fencing front and back, and the value of the site as a ventilating space is lost. It is better to terrace houses and have a really good ventilating air gap of some 40 ft., or, if houses are detached, to space them 30 ft. apart with garden room between.

Besides these gaps between houses, open spaces are needed in the town. There should be no large concentrated areas of building. A glance at some of the model diagrams will give an idea of the concentration sizes suggested.

There is a need for special measures to be taken in the case of housing for tubercular families. Unfortunately, this disease is a prevalent one, and infection is airborne. If the sick person can be so persuaded he or she should be housed in a separate bedroom away from the main building, preferably some 15 ft. or 20 ft. from the nearest bedroom.

Water

Acknowledgments are made for considerable assistance in preparing this section of the book to Mr. J. H. F. Sharkie, B.A., M.Inst., C.E., etc., director of Temporary Water Supply Department of the Gold Coast, and to Mr. F. Dixey, director of Geological Survey, Nigeria; also excerpts have been taken from *Village Health*, a pamphlet for teachers issued by the Director of Education, Gold Coast.

Water is generally the guiding requirement in village planning. It comes from wells, deep boreholes, springs, streams, off roofs into collecting tanks. The importance of it need not be stressed, and it has already been mentioned that a great deal of villagers' time is spent head-loading water. It may be added that very many diseases now common among villagers are caused by infection *via* the mouth from water, and others from water *via* the skin. Cholera, typhoid, dysentery and guinea worm are all caused by drinking impure water; and hookworm, strongyloides infection, and bilharzia from placing the skin on polluted earth or in infected water. These evils can be prevented or lessened by taking various precautions such as boiling and filtering doubtful water. Standing water for a short period, twelve hours to a fortnight if it is well protected, does much to help its purification; many injurious forms of life such as typhoid dying in the standing water. There is much in this sphere that lies outside the province of the village planner, but also much he can do both in general and detailed design to ameliorate conditions.

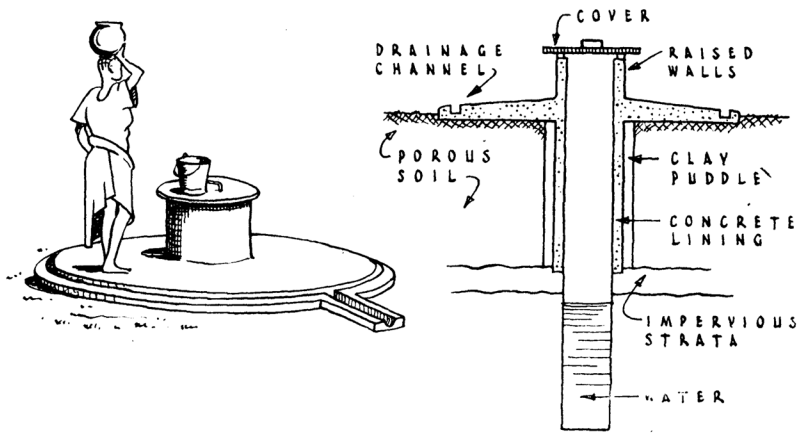
It will help to prevent mosquito breeding in running water if the channels are constructed so that their sides are vertical.

Distribution of Water

There are many stages in water supply between head-loading and a tap in the kitchen! With the improved roads and, we hope, in post-war years, a greater supply of vehicles, the water cart can be used to transport water in bulk with less time and energy spent than head-loading. Improvised water carts might be made from disused kerosene tins.

Where the supply is from a stream it may pay for it to be pumped to some place more convenient to the villagers where collection will not involve standing in infected water.

52 SIMPLE FORM OF WELL



Infection from Standing Water

Standing water which is not inhabited by fish, or covered, is the great source of insect and mosquito breeding.

The most frequent man-made sources of standing water are eroded gullies, pits dug for laterite (often called borrow pits), dye pots left standing, juju pots, etc. All these sources can be avoided.

The best way of curing is to prevent; and the best way of preventing gullies is to follow all the precautions already outlined concerning prevention of soil erosion. Sometimes the infilling of gullies is a job beyond the purse of the village. Barriers built of stone or stick across existing gullies which still leave room for the water to drain through will help the gully to sift and close up on its own by trapping the earth, etc.

Standing water round wells, water-pumps, clothes washing places, and bathing places, etc., can be avoided by careful design. The diagrams show recommended precautions to be taken against water pollution in each case.

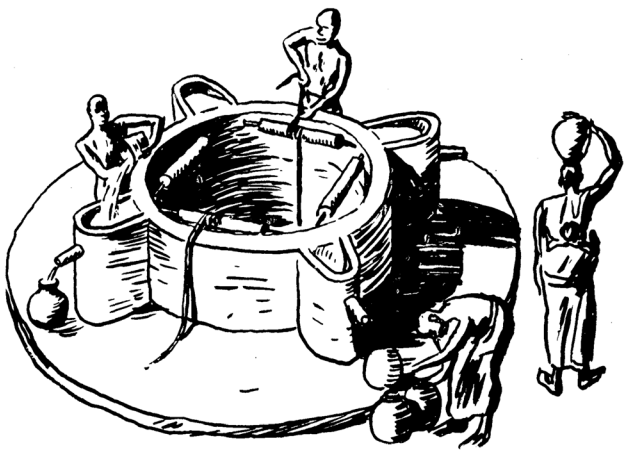
Water is the most important item on which outside expert advice should be sought. Both siting and constructing wells and dams are highly technical matters. It is probable for some time to come that water supply to the majority of the villages will be by the simpler type of shallow well. Wells are in general the cheapest, the most convenient, and with due care the purest of the untreated forms of water supply.

It is a common belief that if you sink a hole in the ground anywhere you are bound to find water. Unfortunately, this is *not* the case, and even very experienced people consider themselves fortunate if they are successful with some 70 per cent. of the well sites they select, unless the aid of geophysical exploration is called in, when the figure might go as high as 85 per cent. An untrained person might have as low a percentage of success as 15 per cent. to 20 per cent., so that when it is realised that the cost of excavation of unsuccessful wells is at least as high as that of successful wells, the waste of funds is not difficult to foresee.

Wells

Wells should be surrounded by a wall sufficiently high to prevent street dirt from being blown in. They should have a

53 NIGERIAN WELL



cover which shelters the water from airborne rubbish. The ground round the base of the well should be so designed that any water spilt will drain away to a soakaway, as shown in illustration 52, which illustrates a very simple form of well. A very useful form of well is that designed by the Geological Department of Nigeria, shown in illustration 53; this well is designed for bucket delivery by several persons at the same time. The buckets are lowered and raised on four sets of rollers by means of a cord, the water emptied into four shaped concrete troughs with a pipe outlet enabling the water to be safely received by narrow-necked jars. A separate trough is provided for watering cattle.

The same principle of a concreted and well-drained base, arranged so that the spilt water will drain away from the feet of prospective clients, should be used for water pumps and clothes washing and washing places. The diagrams show suggested designs for these.

Roofs

A point which may well be noted in connection with village water supplies is that with the increasing use of water-collecting roofs, such as asbestos, concrete tiles, and corrugated iron, water may more readily be collected from roofs into tanks. Gutters, however, should be either forbidden or kept scrupulously free from blocking. The yellow fever mosquito (aëdes aegypti) in particular breeds in gutters if care is not taken. Tanks for water collection should be protected by metal mosquito netting or really close fitting lids.

Water from roofs should be filtered and then boiled before use. There are many places where the local supply is liable to disappear in the dry season, and in these places, especially, a reserve supply collected from the roofs of houses will be useful. It is a sobering thought that Freetown, with a rainfall of about 150 in., has at present such a poor supply of water that taps are only opened for an hour or so a day towards the end of the dry season. In Africa it is not the case of saving up for a rainy day, but for a dry day!

It will be seen that it is essential to have available the services and advice of some person or persons who have been trained in the type of work required. The person in charge of the work should be an engineer with some knowledge of

54 PERENNIAL SPRINGS

geology and he should, preferably, have had experience in the locality in which he is expected to work. The advice of this "expert" should be sought *before* and not *after* the sites for the villages have been selected. Much money and disappointment will undoubtedly be saved by so doing. There are, for example, many parts of West Africa where wells are likely to give only the very poorest of supplies, and where some other source must be sought, *e.g.*, reservoirs or deep drilling. This fact should be known and faced in advance, as thousands of pounds may easily become involved when some source of supply other than wells has to be selected.

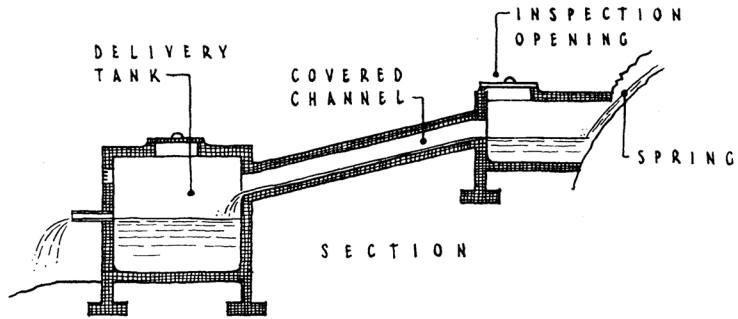
Water tanks require to be built so that they cannot be polluted from adjoining ground, so that they have overflows and ventilation. An estimate of the amount of water needed daily per head is roughly fifteen gallons, although two is a minimum. To find the volume of water and size of tank required the number of days in the dry season must be worked out. One cubic foot of water equals 6·25 gallons.

Perennial Springs

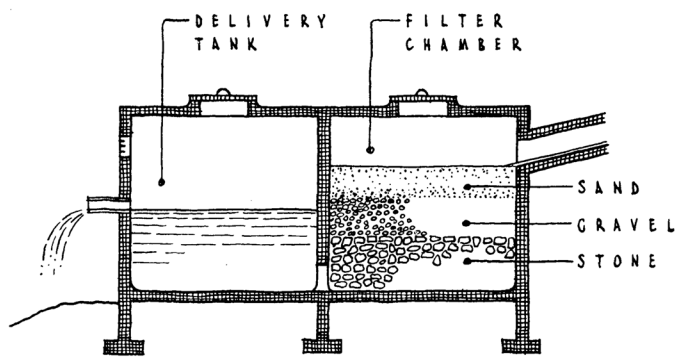
Springs may rise from clefts in rocks or from the ground; the water as a rule is clear, having passed through porous layers underground, but the water does not always come from the spring in a convenient form for collection and springs are notoriously difficult to keep free from contamination by puddles.

Springs from Rocks

If there is sufficient fall in the ground the best thing is to build a small covered concrete tank with delivery pipes, and



SPRING OF ROCKY ORIGIN CONNECTED TO A DELIVERY TANK



FILTER CHAMBER AND DELIVERY TANK CONNECTED TO A GROUND SPRING

an overflow is built slightly downhill from the spring, as shown in illustration 54 (information taken from *Village Health*, a pamphlet for teachers, issued by the Director of Education with the co-operation of the Health Branch of the Medical Department (Gold Coast)). The spring is boxed in with a small concrete chamber and the water is carried down from this box by means of a short concrete-covered channel into the delivery tank at a lower level. The water from these rocky springs, as a rule, requires no filtration.

Springs Arising from the Ground

These are rather more difficult, for sometimes it is hard to find proper foundations for the tank, but the principle is the same as before. The spring is boxed in and the water led by means of a short covered concrete channel to the delivery tank.

In this type of supply it is advisable to make a filter chamber in the delivery tank, and a suggested arrangement is shown in illustration 54. Thus the water has to pass through a layer of sand and gravel before it passes into the delivery side of the tank and out through the delivery pipes. The filter is very crude and does little, if anything, to remove micro-organisms, but it will hold up coarse particles of matter in suspension and thus plays a useful part.

A third and very simple method can be used sometimes in dealing with cases where a series of springs open into a basin and there is a good slope of ground leading away from them. The springs are all brought into the same filter basin to fill the tank.

Ideally the tanks should house at least two gallons of water per person drawing per day so that the water may stand; but this is rarely possible owing to the size of tank needed.

Perennial Streams

In all cases obviously the watering point selected should be upstream of the village so as to lessen contamination.

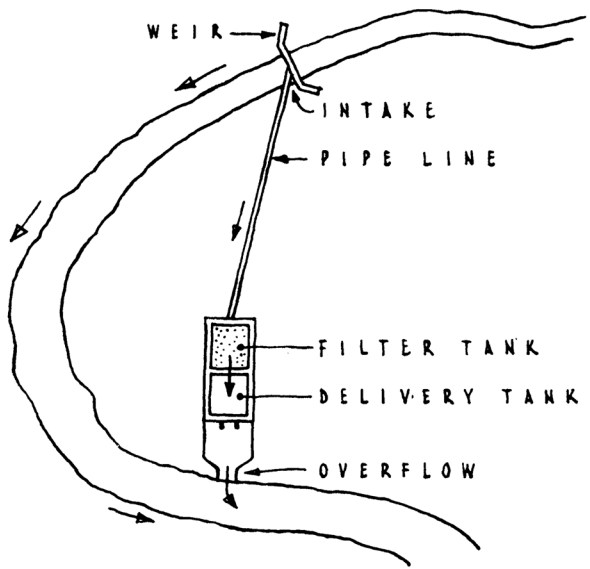
Some provision should be made to enable the people to obtain their requirements without walking into the water. A stream that runs over rock with a good fall is the easiest to deal with. Methods of dealing with more sluggish streams are as follows: (*a*) unfiltered (*b*) filtered.

(*a*) This can best be done in the case of larger streams by making a concreted pool, and in the smaller streams by forming a concrete dam with $1\frac{1}{2}$ in. or 2 in. pipes passing through it and by-passing the main stream. This dam should not be less than 2 ft. 6 in. to 3 ft. high so that the pipes are high enough to permit a kerosene tin (the commonest vessel) to be placed below them.

It is generally necessary to have a fence of some kind round the pool formed by the dam to prevent the people from dipping into or walking in the pool, particularly during rush hours.

(*b*) Points are taken on the course of the stream, usually on a bend. A weir is thrown across the stream at the upper of these two points. A screened intake is constructed at the weir and the water from this intake is run by means of a covered channel or pipe line to a pipe where it is filtered before being stored in a tank, situated near the lower of the original

55 WATER SUPPLY FROM A RUNNING STREAM



points. The water overflow is carried by gutter back into the stream (*see* illustration 55).

Dams and Reservoirs

The construction of dams and reservoirs is no job for the layman. A knowledge of geology, of surveying, and of engineering construction is essential, not to mention the ability to interpret rainfall and run-off data and to calculate the discharge capacity of channels and weirs.

On the whole, dams should be avoided unless the population to be served is large and concentrated. If these factors are present then the ideal conditions are:

(*a*) a large uncontaminated catchment area;
(*b*) a narrow valley neck, with impervious subsoil upon which a dam may be built;
(*c*) a wide flattish valley, upstream;
(*d*) there must be a good depth in the water impounded to allow for heavy evaporation. In the northern regions loss by evaporation amounts to some 10 in. in the dry season, which, if it is long, may account for several feet of water to be written off as dead loss.

Conservation

The general existing state of village conservation has already been described. Taking everything into consideration we consider that the desirable answer for most villages in agricultural areas is to compost both night-soil and rubbish. (In fairness we must admit that experts differ about this.)

Direct composting of night-soil is possible where there are pan latrines and collection by sanitary men, but composting can also be done from pit latrines and from the sludge from septic tank latrines. This has the advantage of being a safer product than new fæces, which, when fresh, contain most of the live organisms which render it normally so dangerous.

Latrines are liable to give rise to certain illness from fly-borne infection; therefore unless a water-borne system is possible they should be kept well ventilated, but shaded. Flies are attracted by the light. Both bacillary and amœbic dysentery are latrine diseases. The result of polluted soil is hookworm and strongyloides infection.

Description of Various Types of Latrine

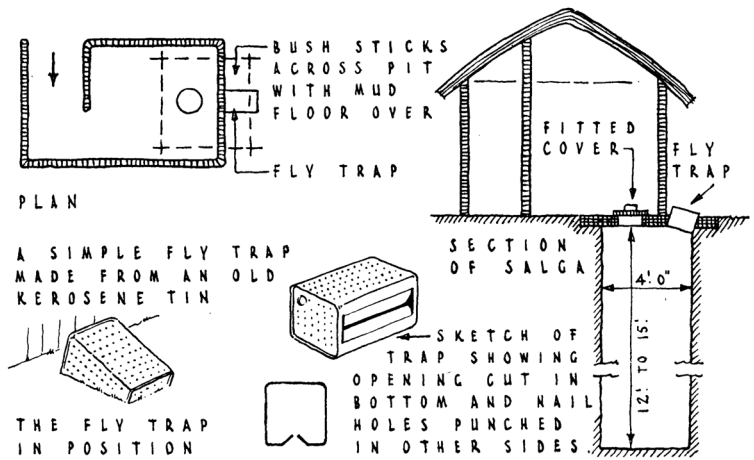
1 *Borehole or Salga*

A bore-hole latrine proper is bored out with an augur and is about 16 in. diameter, with walls supported by wire netting or wicker work. It should preferably be 20 ft. deep or down to the subsoil water.

A common type known often as a salga is dug out, up to 4 ft. square, with walls of smooth clay or laterite, concrete being usually too expensive, carried from 12 ft. to 15 ft. down. It should have a squatting slab cover of concrete, boards, or bush sticks and clay, strong enough to bear the weight of an occupant. It should be light-proof.

The salga requires a small house with a light-trap entrance. The whole interior of the salga should be as dark as possible, and a fly trap be exposed to the light. The fly trap can be made from an old petrol or kerosene tin by opening one long side with a matchet and then perforating the side opposite with a nail. The flies attracted by the light will enter the trap but will have great difficulty in finding their way out, and so will die. The salga shown in illustration 56

56 A SALGA as used at Benin



is a type used in Benin, Nigeria, and incorporates the fly trap described above.

In an earlier chapter it was mentioned that bore-holes or salgas cannot be constructed in all soils, and their use is, perforce, limited. They preclude the possibility of composting, but can be used for individual houses.

2 *Pit Latrines*

These latrines are the simplest form of latrine possible where a number of people use the same latrine. They are not convenient in that for health reasons they must be placed at least 40 yards away from the nearest dwelling.

The size of the latrine is not fixed and will depend on the number of persons using it. It should be about 6 ft. to 10 ft. deep, covered by planks, two of these being fastened by cross beams 9 in. apart, forming the opening to be moved along as the pit fills up. The pit should be 6 ft. wide.

Rubbish and earth should be thrown over the night-soil under the planks, and when the pit is full it should be left to rot and ferment. When this has taken place and the contents are like fine earth they should be used as manure.

A screen or wall should surround the latrine to give it privacy. Bore-hole and pit latrines should not be allowed within 100 ft. (preferably more) of a well. They pollute subsoil water.

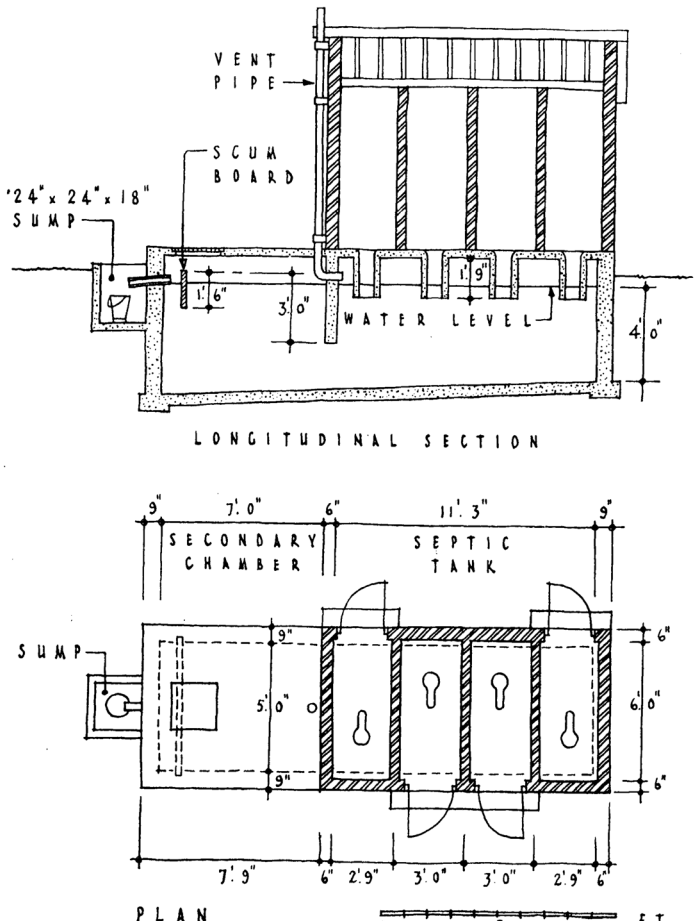
3 *Septic Tank Latrines*

This is an intermediate type between the pit latrine and a water-borne system requiring the minimum of daily attention and emptying at periods of twelve to eighteen months.

As will be seen from illustration 57 it consists of a main tank some 5 ft. deep with sloping water-tight concrete or stabilised laterite floor to allow sludge to run out easily. The reinforced roof of the tank is pierced with squatting holes and forming the floor of the latrine. The dimensions of this chamber are calculated on the basis of 2½ cu. ft. per user, governed also by the number of squatting holes required. The usual sizes are from ten to twenty squatting holes. A ten-hole latrine will serve from two hundred and fifty to three hundred persons.

57 SEPTIC TANK LATRINE

(Suitable for approximately 80 persons)



At one end the tank is carried beyond the outside wall of the latrine, separated by a baffle wall from the main chamber, and provided with an overflow pipe and an inspection opening with a heavy well-made lid.

In use, the whole is filled with water, and the secret of success lies in the fact that each squatting hole is in the form of a pipe (about 12 in. diameter), carried down below the level of the liquid so as to exclude all air, the anærobic action taking place away from the light.

As soon as this action has been started by the addition of sludge, etc., to the water, all that is required is a few gallons of additional water daily to keep the level right, and this amount can be gauged by watching the overflow which should drip only and fill a petrol tin daily. The addition of creosote or any disinfectant is fatal to the action, but it is important that the latrine attendant should plunge each squatting hole with a wooden plunger to break the crust of the liquid under each hole and thereby lessen smell and fly nuisance.

Septic tank latrines, if properly cared for, do not smell and may therefore be placed nearer housing than pit latrines.

A point worth remembering is that the value of the septic tank latrine lies in the tank, which should be well made. The walls, divisions between squatting holes and roof, may be made in cheaper or even temporary materials if money is short. A watertight roof and high windows are important considerations.

4 *Pan or Bucket System*

This system is the most expensive system known to man and creates a class of sanitary men—a social evil. The construction of the bucket latrine trap-door to give the sanitary man access to the bucket and seat is so simple as to require no comment. The latrine room should be separated from the house by a ventilated lobby or open space.

5 *Water-borne System*

This system, of which an elaborate description is out of place in a village book, can be used in conjunction with a septic tank (not a septic tank latrine) as well as with a proper sewage disposal plant. Such a septic tank might be well worth considering in the case of, say, a small village hospital, as the cost is not considerable. Where pipe-borne water supply is available and there is no water shortage, the ideal system is a proper water-borne sewage disposal system. This will be found to be cheaper than the pan latrine system (when all running costs are taken into account). All public latrines need separating as to sex.

Composting

The form of composting will vary with the form of latrine used. There is some conflict between the interests of agriculture and health.

The agricultural purpose of composting is for its manurial value; the health purpose is for safety of disposal and cheapness. Where very good supervision is available the best compost for agricultural purpose is from fresh night-soil, vegetable rubbish, animal manure, blood, etc., but where good supervision is not available it is safer to compost "sludge," since the only pathogenic life contained in it

would be worm eggs. The choice must be made by weighing all factors. But most authorities agree that the solution generally best suited to West Africa is the septic tank latrine, with the sludge therefrom and village refuse composted. Since septic tank latrines are not in use everywhere and agricultural needs are pressing, different methods of composting will be described, some of which are already in use in the Colonies.

Indore Method

Process

This is shown in illustration 58.

The method of charging consists of:

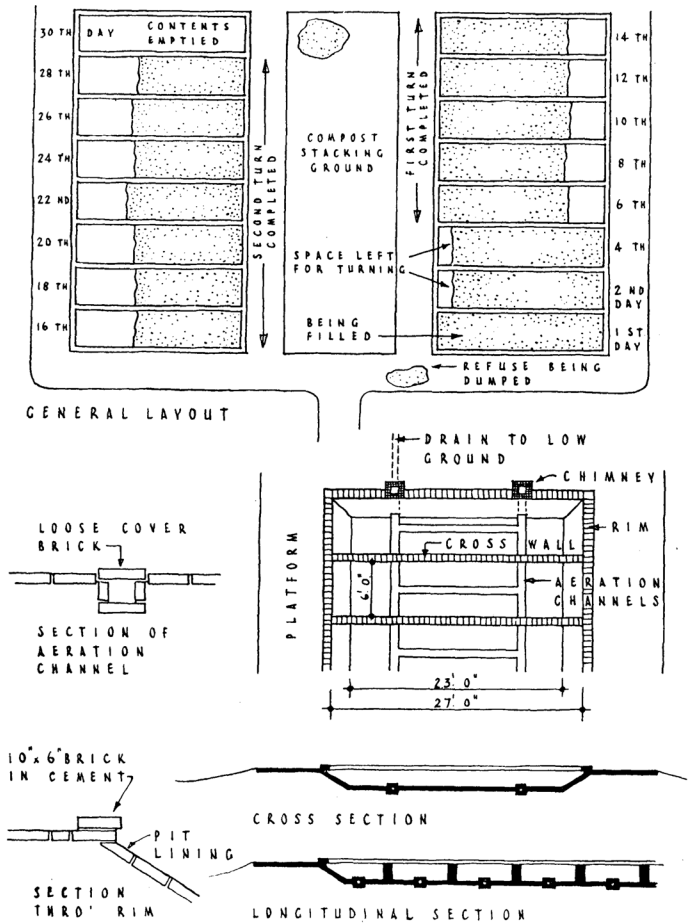
1 Cartload of unsorted refuse is tipped into the pit from charging platform, and spread by drag rakes to make a layer 3 in. or 4 in. thick.

2 Another cartload of refuse is then tipped on this layer and raked into a slope reaching from the edge to the middle of the pit and occupying its whole width. The surface of this slope is slightly hollowed by raking a little refuse from the centre to the sides.

3 A little refuse is raked on to the sill at the road edge to receive any night-soil spilt on it by tipping.

4 Half a cartload of night-soil is then tipped on the slope, and with the moistened refuse below is drawn by drag rakes in small lots until the breadth of the pit is covered. This done, the remaining half-load of night-soil is poured on the freshly exposed surface of the slope and distributed by raking

58 THE INDORE METHOD OF COMPOSTING



repeatedly until the slope (and the refuse on the sill) is altogether removed and forms a layer over the whole of pit being charged.

The whole group of operations is repeated until the pit is charged. This takes two days. The last operation on the second day is to make a vacant space at the end of each pit for subsequent turning and also for assisting drainage after heavy rains. This is done by drawing up two feet of the contents at one end over the rest. The surface is then raked level and covered with a thin layer of dry house refuse.

Equipment

Brick-lined pits 2 ft. deep. The edges of which are protected by a brick curb. Each compartment of the pit has a capacity of 500 cu. ft. and channels for aeration and drainage are made in the floor. The area round the pit is protected by brick soling. For details *see* illustration.

The equipment consists of long-handled drag rake and forks.

Statistics

It is interesting to note for comparison that, using this method, a population of 5,000 in India yields 250 cu. ft. of house refuse daily; requires sixteen pits of 500 cu ft. each, one pit being filled in two days. One year's sale covers working expenses. The labour consisted of a permanent staff of five.

Labour

Four men for filling and mixing.
Half man for the first turn.
Half man for the second turn.
Five men for removing and stacking.
These figures could be reduced.

Work involved

The work consisted of:

1 Tipping.
2 First turn five days from start.
3 Second turn ten days from start.

Watering in dry weather. Contents must be kept damp, not wet.

Ripening of compost

After two more weeks. Material removed from pit to platform for ripening. (One month for whole process.)

Sorting of glass, etc.

Then used as manure or top dressing.

Village Type Indore Method

Process

When first filling, a 4-ft. space is left for subsequent turning, and the rubbish and night-soil, usually from baskets and buckets are deposited in layers across the whole width of the trench, roughly mixed, and finally piled up as a heap 2 ft. high extending the whole width of the trench.

The next day's material is similarly mixed and piled up against this, and so on from day to day. After five days the first day's material is turned over, mixed, and piled up in the

empty space adjoining left for this purpose. This provides a similar space for the next batch to be mixed and piled on the morrow.

When the mass is fifteen days old it is turned over again to occupy the opposite side of the trench, and when it is one month old it is removed and stacked.

Equipment

An open trench, 2 ft. deep. Sufficiently long to take thirty-two days' supply of refuse. The floor should slope gently to the centre line, where an aeration channel 6 in. wide should be cut. This should be continued to the nearest low-lying land to allow water to get away after continuous heavy rain.

Buckets, fork, and long-handled drag rake, as usual.

The difficulty with unlined pits is the escape of fly larvæ which breed in the walls of the trench.

This disadvantage can be overcome either by bricking the vertical walls or by keeping fowls, which thrive on the larvæ.

Gold Coast Health Service Method

This is a variant on the original Indore method in which organic refuse from dustbins is composted with sludge from septic tanks. This is done in large central units supervised by a highly trained staff, since in the opinion of this department it is better to do this and to use tank lorries for the transmission of the sludge to the depot than to run the risks of infection through poor composting by untrained staff.

Maidenhead System

This is excellent for composting sludge and rubbish for a larger village using septic tanks. I therefore give an exact description of the system as used at Maidenhead.

Process

1 The separation of ash, cinders, etc., by screening.

2 The salvage of all saleable materials, such as paper, textiles, glass, metal (other than tins), and bones, by hand picking. (*Note:* In pre-war days the paper and bones were not removed, but glass and metals must be or the fertiliser will not be acceptable to farmers.)

3 Pulverisation of the residue.

4 Magnetic separation of tins. These are not removed at Maidenhead before pulverisation, since with the particular crusher in use their presence aids mastication and, incidentally, the passage through the crusher materially reduces their bulk.

5 The deposit of the pulverised matter into beds about 4 ft. deep, where a short period of rest is allowed to promote heating.

6 Impregnation of the bed of pulverised refuse with crude sewage sludge and further resting to allow additional heating under anærobic conditions.

7 Occasional turnings of the impregnated refuse under cover to promote aerobic bacterial action.

8 Removal to dumps in the open for further fermentation and maturing.

Equipment

1 Receiving hopper for the refuse.

2 Screening plant, preferably of the rotary type, giving separation of fine ash and dust from cinders, etc.

3 A pricking belt.

4 A crusher of the type usually used for refuse pulverisation.

5 A magnetic separator.

6 Composting bays having impervious floors and sides with means for draining away filtered sludge water and delivery pipes for the discharge of crude sewage sludge.

7 An impervious floor on which the impregnated refuse can be turned.

All the foregoing should preferably be under cover, but the stock heaps may be in the open and merely need a hard but pervious surface.

The proportion of sewage to refuse can be varied within wide limits.

Rubbish and Dirt

Fleas, maggots, flies, ticks, and bed-bugs all flourish in dirty surroundings and are encouraged by a dirty floor, which is usually a dark or broken one.

Generally speaking, ceiling, floors, and walls should be smooth and light and not touched by the skin where possible or by clothing. Beds in particular should be lifted off the floor.

Rats breed in badly constructed roofs and sub-floors. The sides of roofs and sub-floors should also be smooth, light, and clean. The two greatest sources of danger are inefficient rubbish bins which are not kept closed, and dirty animal sheds. Rubbish which will not or cannot be composted should be burnt and the ash used to fill in bad ground. In some cases where the rubbish is buried under clean earth it can be used without being burnt.

Good designs of incinerators can be obtained from the Public Works Department of Sierra Leone, Gold Coast and Nigeria, and are not shown here.

Sometimes common refuse bins are most practical for use in villages from which the rubbish can be carted to the compost pits. These should be sited some distance (at least 40 yards) from the nearest dwelling. Wheelbarrows for carting rubbish can be made from old tar barrels.

Bush Clearing

Bush should never be allowed near the village, but this is most important in the tsetse fly belt. Nor should bush be allowed near places where people congregate, such as landing places, ferries, wells, or roads. This bush means low bush, not high trees or forest. The reason for this is that tsetse flies, which are the conveyors of sleeping sickness, like low bush to live in. The distance to be cleared should be 230 yards round places of permanent habitation and 30 yards from traffic spots, such as wells. One of the best kinds of clearing is cultivation or grazing, as this ensures the area being kept clear.

SUMMARY

Summary of Good Diet Requirements

1 Planning must allow for increased growth of green vegetables.

2 Housing for animals to be provided.

3 Fruit tree planting encouraged.

4 Irrigation provided where required.

Summary of Good Air Requirements

1 For summary of requirements affecting the location of the village, *see* Chapter I.

2 All sources of air contamination within the village, such as latrines, refuse bins, etc., should be sited so that they are away from the direction of the prevailing breeze, and surrounded by open space.

3 Rooms should be designed to face the direction of the prevailing breeze, where possible to present their long sides to it. Opposite sides of the room to have free access to the open air where possible.

4 Rooms require ventilating at all times—wet and dry seasons—and this without direct sunshine or rain. Sides of rooms having windows and external doors to have large verandahs and eaves sufficient to give good shadow, especially at midday. Window openings to be arranged to be open or partly open, and shielded from rain.

5 Roofs, wood floors, and ceilings require ventilation. This may be done by using gable-ended roofs and ventilating from the end, or hipped roofs and ventilating at the top (*see* illustrations), or lowering the ceiling below eaves level and ventilating along the protected high part of the wall. Floors can be ventilated by raising them well above ground level on a frame construction, the air passing beneath, or by air bricks.

6 Ventilation between blocks of houses, to be efficient, needs a width of at least 30 ft. A few big air gaps in rows of terraced houses one room thick—better than little gaps between individual houses (usually two rooms thick).

7 Tuberculosis is accelerated by poor diet and overcrowding, and it is suggested that the bedrooms housing affected persons may well be at some distance from the rest of the inhabitants. The affected persons may be urged to do this through their fondness for the children.

Summary of Water Supplies, etc.

1 Water is a technical matter and for whole village schemes; those responsible are advised to get in touch with the colony water authority to be advised as to the availability of a water engineer.

2 Since shallow standing water is responsible for much disease, designs should eliminate the possibility of shallow standing water at well heads, water taps, wash places, etc.

3 Channels with running water should be concreted with straight sides. Large ponds should breed fish or be oiled. Borrow pits and gulleys liable to contain standing water, eliminated.

4 Water can be collected off certain types of roof into concrete tanks, through filters. Amount of water required for dry season dictates size of tank. Great care must be taken against mosquito

breeding here, but this method of water collection is useful in districts far from a natural all-the-year water source.

5 Tanks and filters can also be constructed in connection with streams and springs.

6 Shallow wells are usually the most convenient and economical source of water supply but need most care.

7 Streams, springs, and reservoirs are other possible sources.

Summary of Conservation

1 Pollution of ground and by flies gives rise to many illnesses. Bacillary and amœbic dysentery are fly-borne. Hookworm and strongyloides infections come from polluted earth. Proper latrines should always be provided.

2 Boreholes are the safest unattended type of latrine. Septic tank latrines are the best type to use generally, and require extremely little attention. De-sludging only every year and a half.

3 Pit latrines are good where agricultural manure needs are great, as are pan latrines, provided the composting is well supervised by trained personnel.

4 Composting can be by pit, Indore process, or by many other systems. Sludge effluent is best composted on a large scale by a variant of the Maidenhead system.

Summary of Bush Clearing

Clear bush in the fly belt 200 to 300 yards from housing and 30 yards round traffic spots, *i.e.*, each side of roads, round wells, etc.

5. NEIGHBOURHOOD CENTRES AND SPECIAL BUILDINGS

This chapter deals with the structure of the neighbourhood or residential unit within the village, with the special buildings needed.

In order to make life convenient certain buildings and spaces used daily should be near at hand. Occasional needs may be further away. Small markets, shops, and schools are daily needs and should be near housing, but it is more important that junior schools should be nearer home than senior schools, for bigger children can walk further.

It is important for shops to be grouped together so as to save the shoppers' time. The opposite principle is true of recreation places. These should be spread out among the housing, so that they are within easy reach of all homes. This division of needs into daily, weekly, or occasional use will help to decide the structure of the village. The immediate requirements of a neighbourhood are its housing, washing places, latrines, market or store, gardens, recreation places, junior schools, etc.

Less immediate requirements are: clinics, senior schools, community centres, churches and mosques, cinemas, bus stations, lorry parks, large markets, police, courts, slaughter houses, compost pits, post offices, etc. Many villages will themselves be no larger than a neighbourhood (which may be roughly defined as a thousand families), but where there are several of these grouped together there will have to be a village centre.

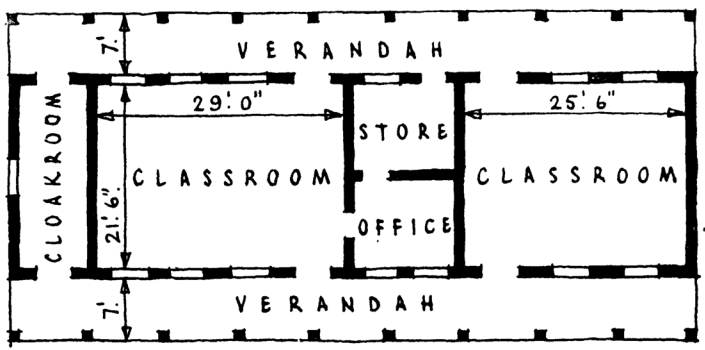
The above-mentioned individual buildings have special planning and siting requirements of their own.

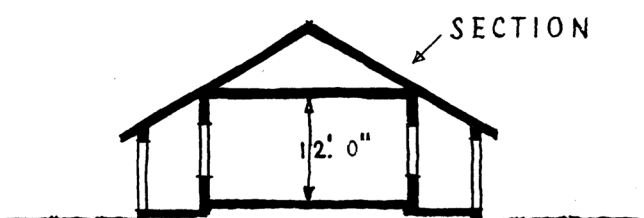
Junior Schools

Infant and junior schools should face the breeze and be planned with their own recreation grounds, or near a common village recreation ground which they can use. They consist usually of three or four classrooms with verandahs, store, washing places, and latrines. They should be sited away from traffic and in pleasant places. Illustration 59 shows a standard type two-classroom school as adopted in the Gold Coast, and by repeating the sizes given it can be enlarged to give further classrooms as required. The minimum size of classroom as now recommended by the British Board of Education is 480 sq. ft., based on classes of forty pupils. This standard should, if possible, be increased for use in the tropics, and the room size shown on the Gold Coast example of 25 ft. 6 in. by 21 ft. 6 in. should be regarded as the minimum standard for forty-pupil classrooms. The grounds should be planted, and are better for games if fairly level.

59 SCHOOLS

A Gold Coast Standard Plan for a School having two classrooms





Senior Schools

These should preferably be near farmland and can be further away from the centre of the village.

Although in some cases the schools should provide room for expansion, the maximum desirable sizes of schools have now been fixed and the amount of land required by them can be accurately assessed. In the past schools, fearing considerable expansion, have taken more land than necessary, often to the detriment of the village.

Playing field areas suggested for senior mixed schools are two to three acres for one hundred and sixty pupils, four to five acres for three hundred and twenty pupils, and six to seven acres for four hundred and eighty pupils. To these areas must be added the site area required for the school buildings themselves, together with such land as is necessary in front of the school for protection from the roadway.

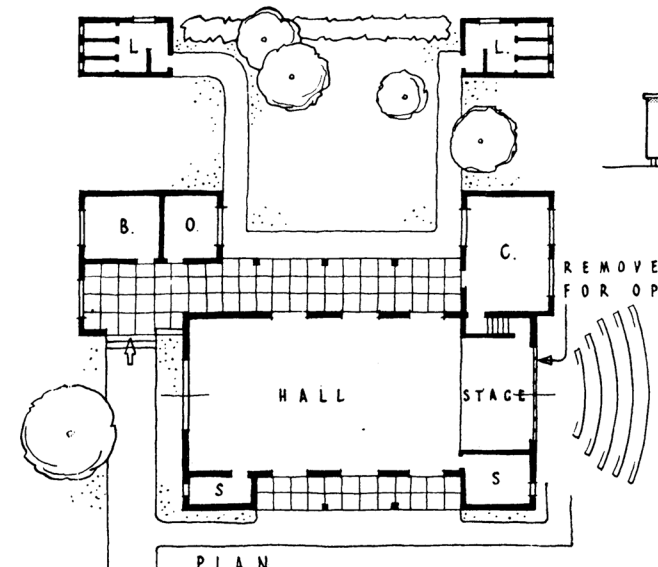
Clinics

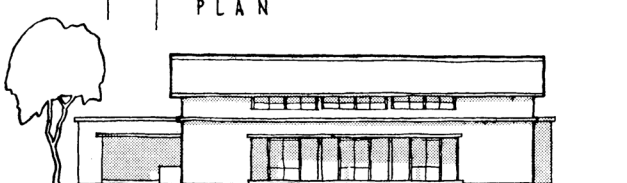
These require to be sited in quiet, accessible places. They should not be sited on steep inclines difficult for sick persons to climb. They are often conveniently designed in conjunction with small dispensaries with a room for the visiting doctor. If a community centre is being provided for the village, the clinic can well be held in one of the rooms attached to the centre.

Community Centres

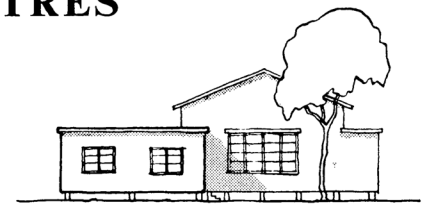
The general sizes of these are shown in illustration 60. The two suggestions shown in the diagram indicate the essential requirements for community centres, and alternative plans are possible according to the size and requirements of the particular village. The hall itself should be planned on a

60 COMMUNITY CENTRES



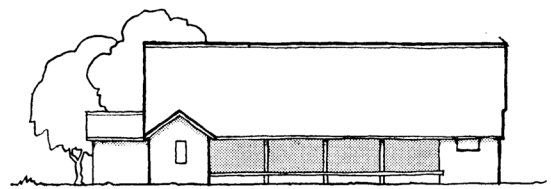


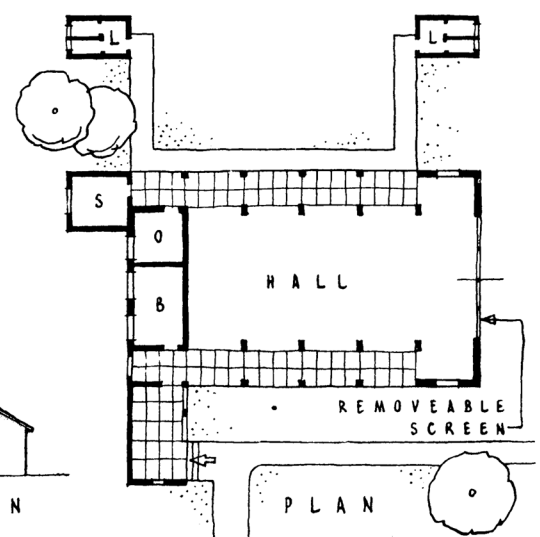
ABOVE: VILLAGE CENTRE WITH A HALL TO SEAT ABOUT 200 PEOPLE.

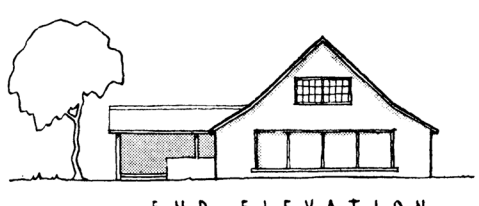


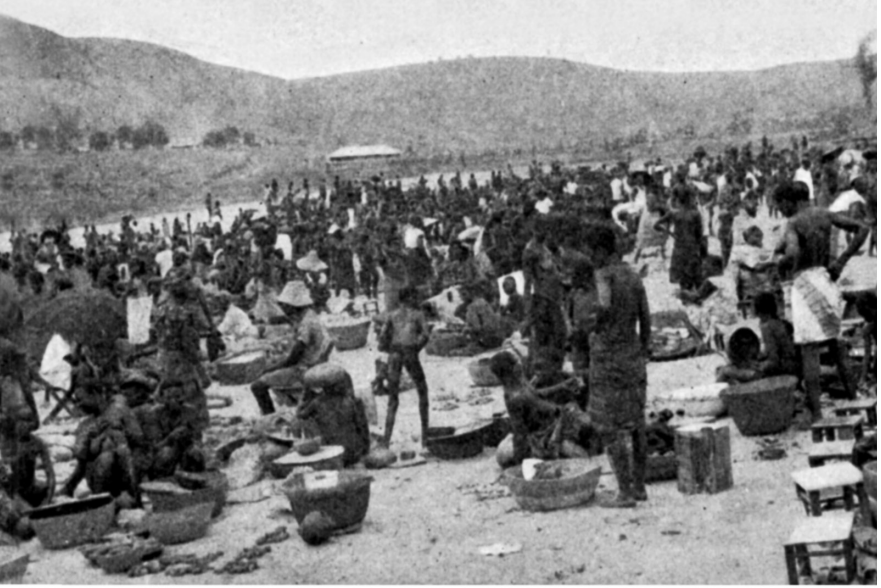
LEGEND
B LIBRARY
O OFFICE
S STORE
L LATRINE
C COMMITTEE ROOM

BELOW: VILLAGE HALL SEATING ABOUT 150 PERSONS AND HAVING ROOM FOR LIBRARY OR CLINIC, OFFICE, ETC









61

basis of allowing 6 sq. ft. per person in calculating seating space required. If the end wall of the hall is provided with removable screens, as shown in the diagram, the stage can then be used for outdoor performances and, of course, considerably larger audiences can be accommodated.

A small committee room in the community centre is always an asset, as it can be used for a clinic, a meeting room for the chief or council, a room for adult education, etc.

Community centres should, when possible, adjoin the main recreation space of the village.

Police and Post Office

The police and post office should both be near the main road approach to the village. Room should be left when siting them for possible future expansion.

Lorry Parks

A lorry park should be sited near the main road or village entrance road and adjoining the market. It should be planned on a one-way system, with clear IN and OUT signs. The petrol pump should be placed there, and a seat or shelter, and refuse bins, should not be forgotten. Tree planting improves its appearance.

Markets

A market should be near the entrance or the centre of a village adjoining the lorry park which serves it, and be capable of expansion.

62

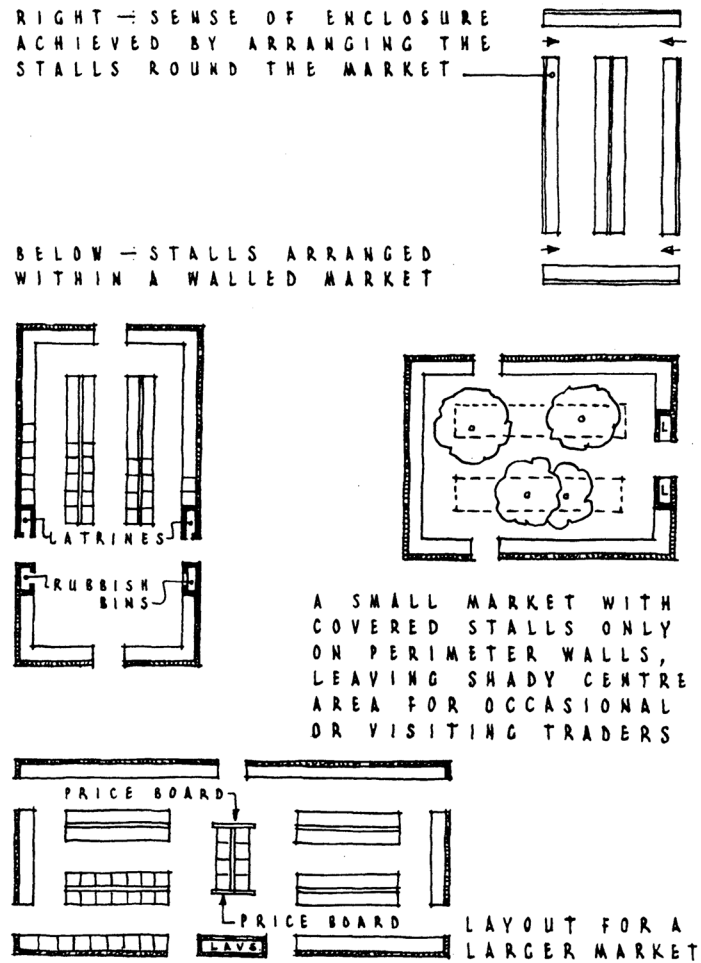
63a MARKETS

The stalls should be regularly arranged with a space between rows of stalls wide enough for at least two streams of traffic. Covered sheds should be provided if the village can afford them; in small markets round the outside to give a sense of enclosure; in the large markets, in several alternative arrangements. Illustration 63 shows some alternative layouts for small markets, and the suggestions can be adapted to larger areas as required. All surfaces should be tarmatted or paved, and well drained; refuse should be collected and removed daily for composting or incineration. Cleanliness is of the greatest importance.

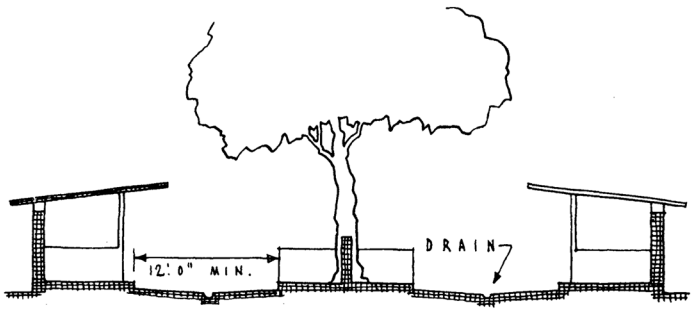
This is demonstrated by illustration 61, which shows a large open market which has no distinctive confines and accordingly is allowed to straggle over a vast area. In this particular example there is also quite a large area of covered market stalls, but if only they had been laid out to enclose the general market ground a much tidier arrangement would have resulted and more control over the daily cleaning up could have been exercised.

Shade trees are a true blessing, and every advantage should be taken of existing trees when laying out a new market. An example of a small market planned around an existing shade tree is shown in illustration 63 (b). A latrine should be considered necessary, and if a "control price" board is erected it should be high, so as not to be obscured by the crowd, and should form part of the design.

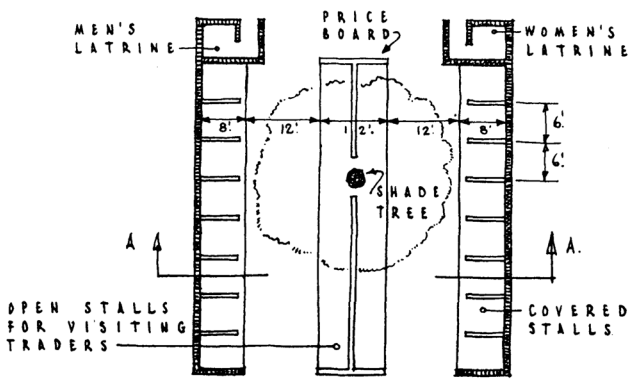
There are, of course, many variants in the designs of covered stalls, and illustration 63 (c) is but one of many such examples. In this instance the roof over the back-to-back



63b MARKETS

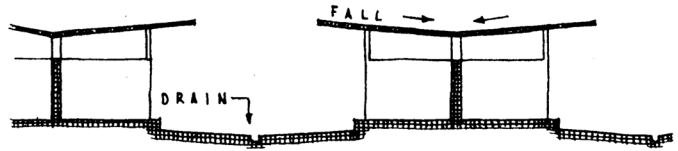


LARGE SCALE SECTION A-A

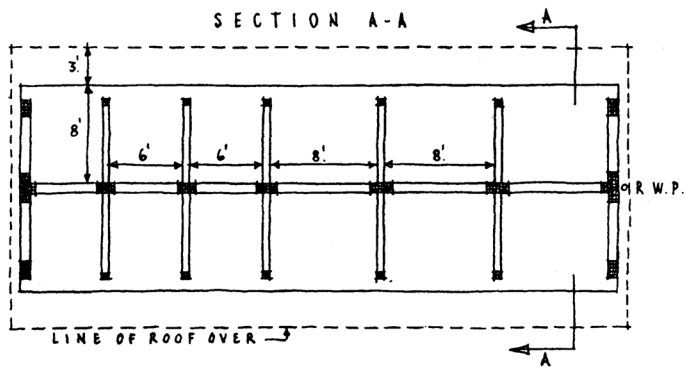


LAYOUT FOR A SMALL MARKET PLANNED AROUND AN EXISTING SHADE TREE.

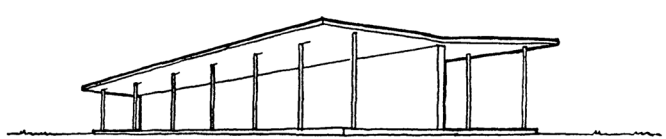
63c MARKETS



SECTION A-A



AN ISLAND BLOCK OF MARKET STALLS



SKETCH OF BLOCK WITHOUT DIVISION WALLS

stalls is given a fall to the centre to avoid rain dripping into the gangway and also to avoid the necessity of providing two eaves gutters. Whatever form of construction is adopted plenty of shade and open, airy space is necessary in the design of covered stalls.

Shops

Shops are best grouped round or near the market, as this saves the purchasers' time. Arcades and shade trees are welcome, as are pedestrian pavements, which, if they are to serve their purpose, should be kept clear of street markets or else the true shopper is again driven into the road. Arcades could be designed to provide for street markets.

Cinemas

The cinema is increasing rapidly in popularity, and it will not be long before its use will spread to the larger villages. It is best at least partly covered so that it may be used in the wet season, but to begin with will probably need siting in the open air. The special points required in the site selection are:

(*a*) it should not be in such proximity to housing as to disturb sleeping people;

(*b*) the ground should preferably slope gradually towards the screen;

(*c*) it should be away from the market or other place where there will be a great source of noise.

Churches, Mosques, etc.

Mosques and churches should be sited with reverence. They should have good precincts, and will often much improve the silhouette and sculptural form of the village if they are placed on high land.

Emirs', Chiefs' Houses, Courts, etc.

These buildings require a dignified setting in keeping with their importance. Where there are several of them, they may form a second centre somewhat removed from the market. The senior school, clinic, etc., could be grouped with it.

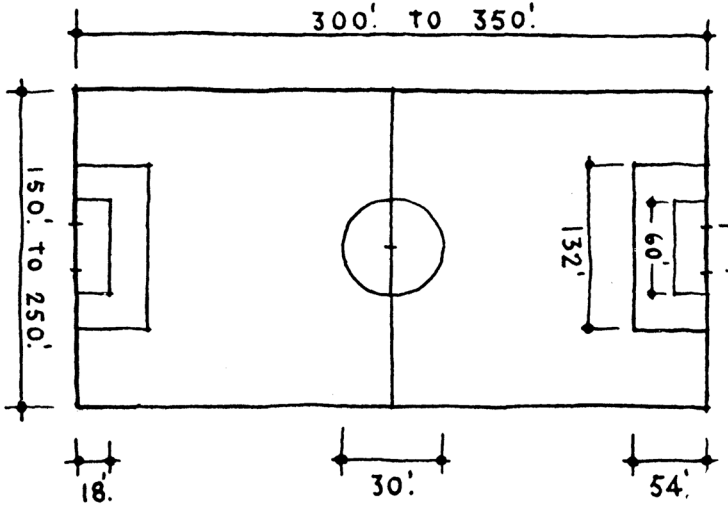
Industry

Sometimes a village has a "special" industry such as weaving, basket making, jewellery, brick making, etc. The siting of this may be geographically fixed but, if not, it might well be combined with a native industry showroom. This should be in or near the market centre to be readily accessible to strangers.

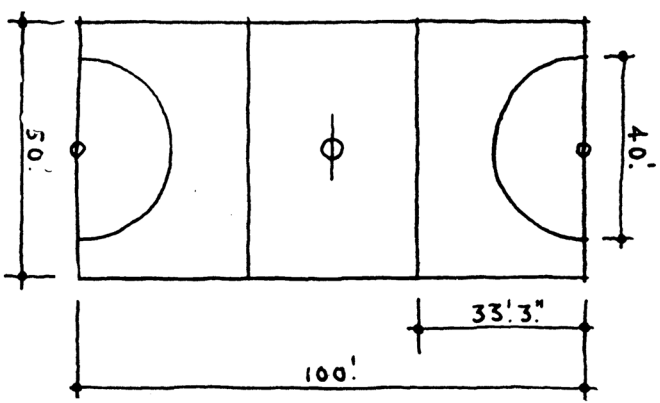
Museums and Libraries

It may seem looking a long way ahead, to suggest that villages should have their local museums of wood carving, metal work, weaving, flora, and fauna, photographs of different kinds of trees and plants, with useful facts about them in the local language, etc. Yet we believe that as in England, these museums would form an excellent means of education and encourage local pride. They might be combined with libraries and information centres. The lending library has proved extremely popular in England. This building might be sited in the secondary section of the village.

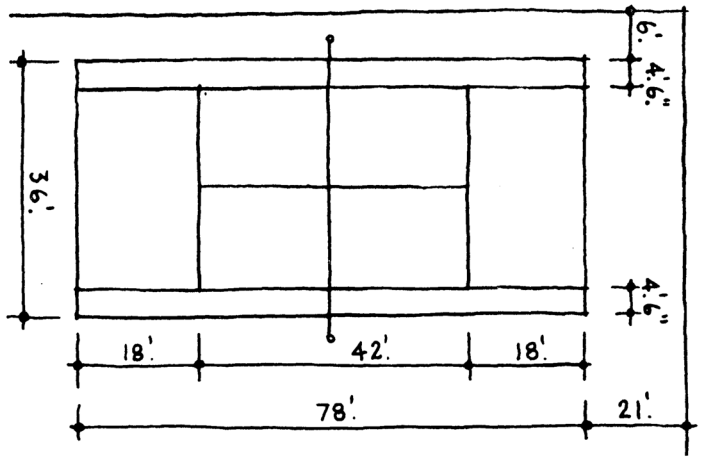
64 SPORTS GROUND SIZES



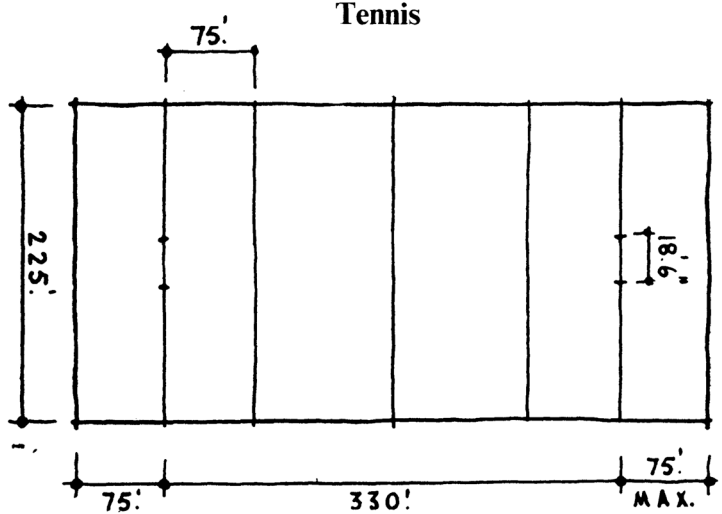
Football



Basket Ball

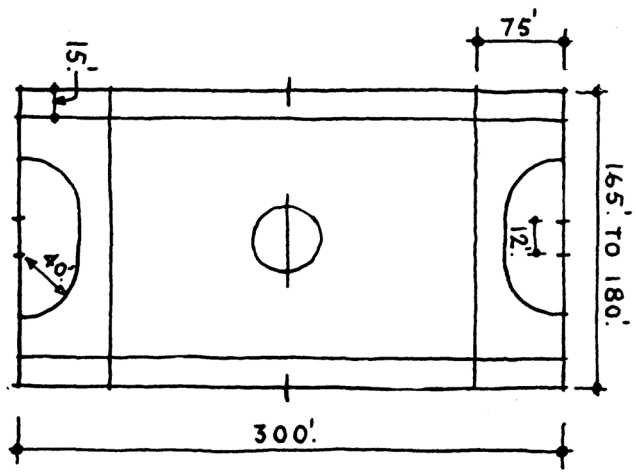


Tennis

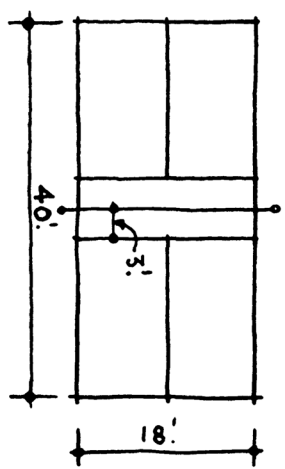


Rugby Football

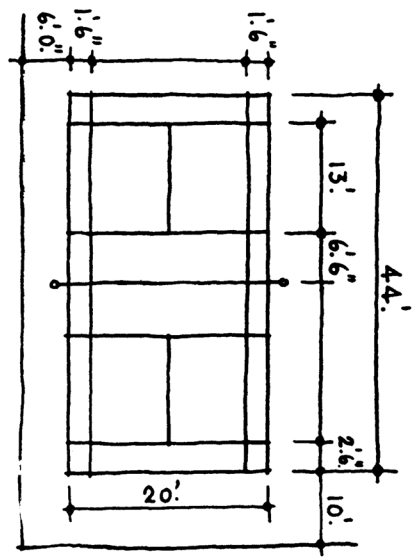
SPORTS GROUND SIZES (continued)



Hockey



Deck Tennis



Badminton

Village Recreation Spaces, Palaver Grounds, etc.

Recreation spaces and palaver grounds are often usefully combined with the traffic set-backs needed between the village and the main road. Sometimes the palaver and parade ground, and the recreation ground, may be combined.

Recreation grounds for specific games, such as football, are of certain standard sizes and are best on flat ground. For information, the various sizes of sports grounds are given here (illustration 64). Room for the spectators should be added. Some seats and shade trees planted round the edges of the playing field in such a way as to shade the onlookers but not screen the play would be appreciated.

If a recreation ground and palaver ground are to be combined, this should be remembered on the layout.

Village Streets

Village streets may be divided into the following classes: main road which by-passes the village or sometimes unavoidably traverses it; the main shopping street; residential roads; paths, sanitary lanes. In addition to these there may be minor and major special roads as, for instance, the road to the church, which may be specially designed.

Except for main roads, few village streets are surfaced, planted, or drained, at present.

The following suggestions should not be regarded as rigid, as local conditions will vary.

1 *The main road which by-passes the town*

This road to have a reservation of at least 100 ft. of green on the village side. Its use has been outlined elsewhere. When it passes through the village the buildings bounding it should be set back as far as is practicable.

2 *Main shopping street*

The width of the carriage way will depend on the volume of traffic expected, but it should normally be 24 ft. to 30 ft. wide, slightly cambered, and surfaced with tarmac or else concreted, though this is more expensive. The gutter should be of concrete and properly laid to a fall and drained to an outlet. Either side of this main road, so as to shade it and make the street look fresh and pleasant, should be verges of grass about 15 ft. wide, planted with shade and ornamental trees. These strips of grass should frequently be crossed by paths from the pavement, which should be 10 ft. to 15 ft. wide, surfaced and sloped slightly towards the grass verge so that it drains.

The shops should, if possible, be arcaded to a uniform frontage line, and the arcade surfaced continuously with the pavement. It will form a good shelter in wet or sunny weather.

The main shopping street should be designed as a whole and not left to individual fancy.

3 *Residential roads*

A residential road should consist of from 12 ft. to 18 ft. of road, and about 11 ft. of pavement also surfaced either side. This surfacing may seem a big capital outlay, and so it is, but less costly by far than the evils resulting from erosion. A minimum residential road might have 10 ft. carriage way with occasional swelling to allow for turning and passing.

4 *Paths*

Where paths are used as access ways to housing they should be about 4 ft. to 6 ft. wide, and surfaced. The sides of the paths should be planted with lemon grass or other suitable grasses or bushes to stop erosion, and shade trees planted along them would make them pleasant places to walk along. Paths crossing steep slopes to be terraced and stepped. The places where stepping occurs will need special protection.

SUMMARY

Neighbourhood Structure

1 Village buildings, etc., to be grouped according to daily, weekly, or occasional use.

2 Large villages to be divided into neighbourhoods, each served locally for daily needs.

3 More important buildings grouped in convenient settings, *e.g.*, markets, lorry parks, and shops together.

Schools

1 Junior schools to be as near housing as possible, and to have playground spaces.

2 Senior schools to be near farmland.

Clinics

1 These should be in accessible quiet places, not up sharp inclines.

2 Often best combined with doctor's room and dispensary.

Village Streets

1 Roads and paths should be designed to follow the contours as far as is practicable. Where roads cross for motor traffic the gradient should not exceed one in twenty.

2 Motor roads for main road traffic should be protected by a reserve of 100 ft. on the village side. Main village shopping streets should be 74 ft. to 90 ft. wide over all, even if the surfaced and drained area is only 24 ft. This will allow for expansion. Residential roads should be about 40 ft. even if surfaced and drained area is only 18 ft. or less. 4 ft. to 6 ft. is the minimum of surfaced area for paths.

3 All roads and paths should be surfaced and drained. Also the sides of roads and paths should be planted.

6. BUILDING MATERIALS, CONSTRUCTION AND DESIGN DETAILS

The architecture and layout of any village and town are obviously influenced by the building materials which are readily available, and which thus limit the number of alternative forms of construction. The traditional types of building construction in West Africa are, of necessity, based upon the natural products of the soil and, in fact, upon the soil itself. The laterite earth, found almost everywhere in the West African Colonies, is used in various forms, sometimes for floors and walls and, in some of the northern areas, for roofs; timber, laboriously pit sawn or used in its natural form, is used for roof construction and frequently for walls; straw thatch, leaves, and matting are usually the only local materials available for roof covering.

However intelligently these indigenous methods of construction are handled, they can only be regarded as temporary. They seldom remain water-tight, and though they may be given almost continual maintenance, they have but a limited life against the ravages of termites and weather. To the farmer who engages in the policy of ''shifting'' cultivation, referred to in an earlier chapter, this temporary form is not, however, without its virtues, for its very cheapness causes little hardship when old buildings are abandoned and new buildings can be erected quickly on a new site. To the planner, however, the virtues of temporary construction lie in the fact that, a stimulus having been given to ''planning'' in its truer sense, demolition and alteration of existing buildings can be more easily and cheaply carried out.

It is hoped that with the fixed village will come the desire for greater permanence and general resistance against termites and storms. Corrugated iron, asbestos cement, sun baked and kiln burnt bricks, and some form of clay roofing tiles have been used in many places throughout West Africa, and this chapter will describe the virtues and vices of various building materials, both ancient and modern, including those already in use and those which might be introduced to improve the general standards in village building.

Laterite

In this section we have assumed the word laterite as a generic term to include the many forms of laterite earth, as found throughout the Colonies. In the Gold Coast the word ''swish'' is used, while in Nigeria ''mud'' sufficies to cover the various forms of earth building.

A laterite floor, mixed to the right consistency with just sufficient moisture to permit satisfactory ramming or treading, can produce an excellent floor which, under use, can

attain almost a polished surface. It must be well beaten to ensure that it becomes both waterproof and antproof. It has the disadvantage that it cannot be washed; only brushed.

For walls, it is the material most commonly used and construction may be in mass form, possibly reinforced with bamboo (illustration 65 shows such reinforcement before application of the laterite), or in large blocks and, for a better class of building, by forming into bricks. Whether or not these bricks should be sun dried or burnt will depend on the nature of the clay, and a rough test is given under the sub-heading of "Bricks."

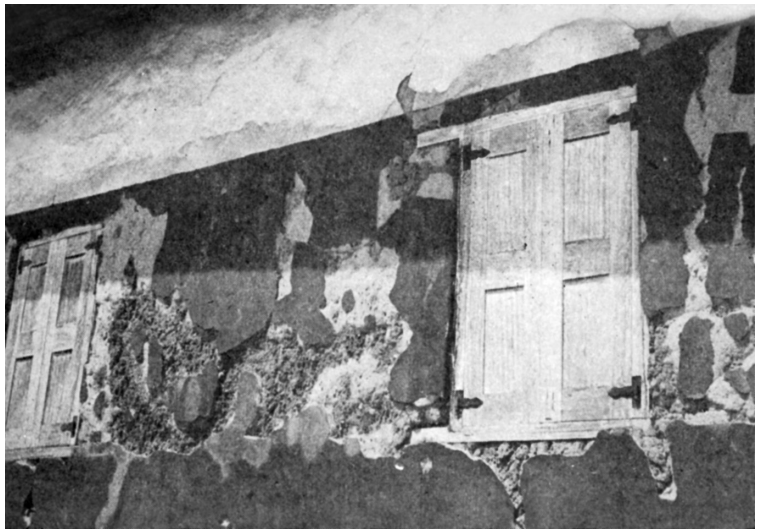
A mud or swish wall should generally be not less than 8 in. thick. For most village building 12 in. is a suitable thickness. It is simple to construct and is cheap and cool, but does not last more than ten or fifteen years and is not fully termite resisting. It is a material which shrinks rapidly after erection and, unless precautions are taken, cracking of the walls soon occurs. This is particularly noticeable in the mass form of construction where "dumplings" of mud are laid in coursed joints and the rough ends trimmed off with a cutlass, giving the appearance of a monolithic material. In building with the smaller units, either blocks or bricks, cracking is reduced, as the initial shrinking, at least, has occurred before the units are placed in the wall.

Methods of Building Mud or Laterite Walls

The following method of building a wall in "swish" will further reduce the danger of cracking. Lay a good foundation 18 in. wide by 4 in. deep of ten to one swish and cement, and then start building the wall in the ordinary way until one course 18 in. high is completed. Then insert pieces of tin shaped thus: ‾V‾ at intervals of 3 ft. Smooth both faces of the wall with a trowel and then leave to dry out. The next day withdraw the tin, but do not fill up the joint. Start the next course staggering the joints, and continue daily up to plate level. Fill up the joints after shrinkage, which takes at least two weeks, by working in as much mortar as will go, and pointing both sides.

In all such buildings it must be remembered that certain parts are particularly vulnerable, such as those parts of the walls nearest the ground, the external corners, and the door jambs. If these parts could be built of a more durable material such as stone or burnt bricks, the building would have a much better chance of a longer life. Such a combination of materials, however, requires careful workmanship as each material will probably have a different coefficient of expansion, and cracks will rapidly appear at the junction points between the two materials. Therefore the mud walls should be constructed in comparatively small areas and considered as a form of panel filling. Also they should be built in small sections at a time and the whole building should be left for at least two weeks before rendering or plastering in order that any cracking which occurs may be filled.

In whatever form mud may be used for building, its life can be further lengthened by a good rendering, up to an inch thick, either of puddled earth or of a cement mixture, trowelled smooth and finished with an application of native distemper. This should be adopted both externally and



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internally. From our experiments we have found that a rendering of the same material as the wall, *viz.*, laterite mixed with a small amount of cement or slaked lime, has proved satisfactory. Illustration 66 shows a typical example of bad rendering, being too thin in application and probably too much cement. The wisdom of using materials of a like character cannot be overstressed.

An additional and wise precaution which is often taken in the building of mud walls is the widening of the base of the walls.

In the Gold Coast experiments have been carried out in the use of ''stabilised laterite,'' a mixture of laterite and cement. This new form of building material has been tried out on a large housing scheme in Kumasi and, so far, appears to be a great success. It gives a wall which is cheaper than sandcrete block and which in so far as it has been possible to test it, has a permanent life and is termite resisting. The method of making it is as follows:

(*a*) Find and dig good red swish (the term used in the Gold Coast for laterite earth), not too clayey and not too stoney; the same as that which makes a good village house by ordinary methods.

(*b*) Mix twenty headpans of swish with one headpan of cement as thoroughly as possible by turning it over with a spade, shovel, or hoe.

(*c*) Tread the mixture well.

(*d*) Squeeze a little in the hand into a lump, and open the hand:

(i) if the lump sticks together no water is required and the mix is ready for building;

(ii) if the lump falls apart add a *little* water, tread the mixture thoroughly, and try again until, on squeezing a lump, it just, *and only just*, hangs together.

(*e*) To make blocks use wooden moulds 16 in. long by 8 in. wide by 7½ in. deep, and ram the mixture in hard, especially at corners, using a pear-shaped rammer. Smooth the surface of the block in the mould with a trowel. This will be the outside face of the block.

(*f*) To build, lay blocks in the ordinary way and joint with mortar made of ten parts of sand to one part of cement. If sand is not available use swish screened through a sieve, say, a tin with nail holes in the bottom.

(*g*) The inside may be plastered with sand and china clay, but if cement is used the plaster may be sand, china clay, and cement in the proportions 20—4—1.

The use of laterite earth for mass construction, in the accepted ''pisé de terre'' form, should prove a very convenient method of construction for simple building in outlying villages. A wood shutter is required, and the walls are built at about one foot ''lifts'' at a time, and the shutter raised after each ''lift'' has dried sufficiently to support it. By this method a more monolithic structure is produced, because the mud can be well rammed into the shutter to form a really tight and consolidated material. As with the making of mud or swish bricks, the essential point to remember is to avoid the material drying out too quickly, which increases the liability to crack. Each course should be covered with moist sacking or damp straw to retard the drying process.

Bricks

Brick making by burning is found only in a few localities, though clay fit for brickmaking has been located fairly commonly, but rarely in large quantities. Few clays reach a standard approaching that of the English clays, but nevertheless some of the bricks produced are of very good quality and prove a satisfactory form of construction, except that they sometimes need a protective coat of cement rendering or other waterproofing agent, when used for external walls. A rather old but reliable damp-proofer for brickwork is soft soap. One pound of soft soap is placed in a bucket of boiling water, allowed to stand overnight, and sprayed freely over the brickwork next morning.

Technical advice in brickmaking and clays should be sought at an early stage from the West African Institute or other competent authority. As a rough guide the following test can be adopted:

Take a sample of the clay in question, add sufficient water so that you can mould it into a roll about 1 in. thick and 9 in. or 10 in. long. If it can then be turned up into a ''U'' shape or knot, without cracking, the clay is probably suitable for the making of burnt bricks, and is usually referred to as a ''fat'' clay. If it cracks on turning or knotting, it is short and should only be used for sun-dried bricks. These are best cast in wooden moulds and dried slowly under cover before the final drying in the sun.

A rough test of the strength of bricks is by seeing whether they crumble if picked at or if they break easily if dropped from shoulder height.

The warm colour of natural brickwork is not entirely suitable to tropical climates, but a coat of distemper or colourwash can quickly and cheaply be applied.

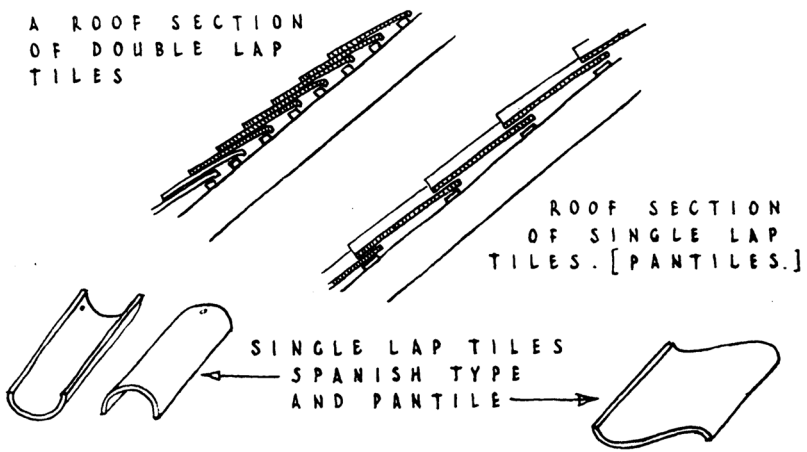
Useful data: A rod of brickwork equals 408 sq. ft. of wall, one brick 9 in. thick or 272 sq. ft. of wall, one and a half bricks thick, and contains about 4350 bricks.

Clay Hollow Blocks

The hollow clay block or hollow brick tile is still in its infancy on the Coast. They can be obtained in one centre in the Gold Coast but their expense prohibits them from being used in villages for anything but the most important buildings. The blocks we have seen are produced from brick-making clay, kiln burnt, and are 9 in. long by 5 in. by 5 in. and grooved on all four sides for jointing and rendering in cement. The advantage of these blocks is that they are strong, light, easy to handle, and have a good resistance to heat, provided by the hollow cavities. They are normally rendered or plastered on both sides and colour-washed. We have inspected another form of clay hollow block made on the Coast which is a T section, is interlocking and can be laid dry. For village work, we are a little sceptical of any block other than a simple square shaped form, and we should recommend that the most suitable size for use in villages would be 18 in. by 9 in. by 4 in. or 6 in. This size of hollow clay block was used extensively in England during the war and was proved speedy to erect, cheap to use, and most efficient. This larger block is still light to handle, it can be picked up in one hand without the bricklayer putting down his trowel—and saves mortar.

Clay Roofing Tiles

The clay required for roofing tiles must be of a superior quality to that used for burnt bricks. It is, at the moment, an expensive covering for small village houses, and there are real difficulties in manufacture to be overcome before it can be usefully employed.



The small plain tile, usually $10\frac{1}{2}$ in. by $6\frac{1}{2}$ in., which is the simplest to produce, must be fixed with a double lap (*see* illustration 67), and consequently makes a heavy roof covering, needing suitably heavy supporting timber. On the other hand the larger form of interlocking tile, which can be laid to a single lap and is thus lighter, is a difficult tile to produce from the clays available. The larger the tile the more it will twist under burning. A tile which is too light will tend to shift in a violent storm.

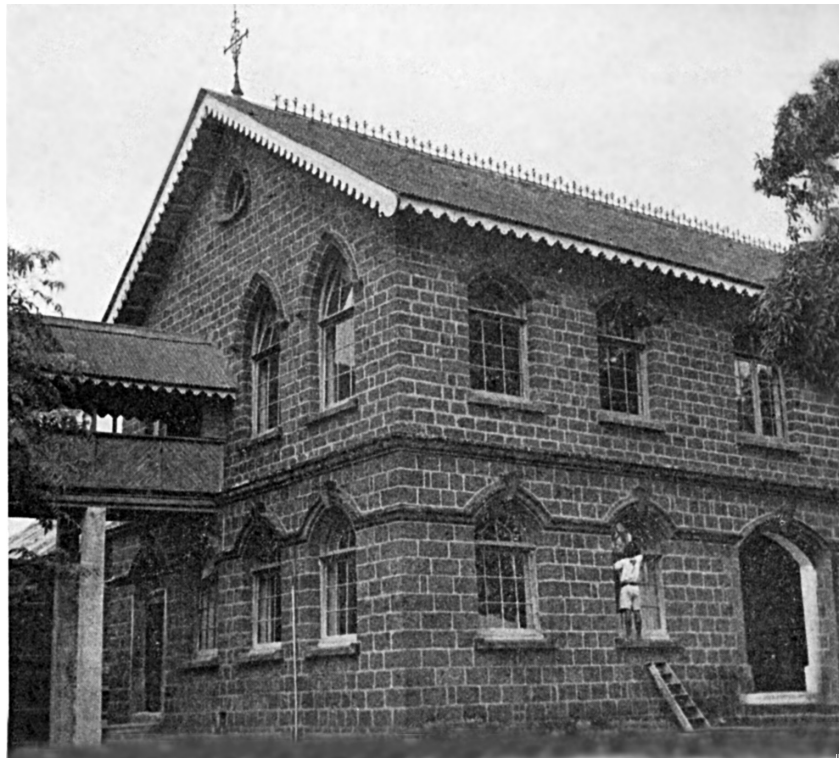
Considerable experimental work is therefore required before a really suitable design of tile is found to serve as an economical and permanent form of roof covering. So far, the pantile and the Spanish (under and overs) tiles have been found the most satisfactory (*see* illustration 67), but there is room for considerable improvement.

Useful data: About 550 plain tiles, laid to 4 in. gauge and $2\frac{1}{2}$ in. lap, and about 300 ft. run of battens required to cover one square (100 sq. ft.).

Stone

A great variety of stone is to be found in the four Colonies: granites, sandstones, limestones, in fact a wealth of excellent building stone. Considerable use has already been made of this material as, for example, in the Gold Coast church shown in illustration 68 and the school at Freetown, built of laterite stone, shown in illustration 69. Far more use could, however, be made of stone for building in order to produce more permanent dwellings. As with clay, stone requires an expert's advice in the first place to determine its usefulness as a building material, to advise on the best methods of working it, and the size and shape suitable for walling. Stone quarrying is a heavy labour, and consequently a poor outcrop or earthy stone is frequently used, whereas a lower strata would provide far better and more durable stone for building purposes. Transport is a serious drawback to its use; head loading is slow and laborious, and stone is therefore little used away from its source. As motor transport becomes available, this condition will be improved and the more general use of stone will add to the appearance of village buildings.

Generally speaking, big roughly squared blocks should be used; something between twice to four times the size of an ordinary building brick. It should be laid on its natural bed. In



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most cases the stratification of the stone will indicate the natural bed, that is, the bed on which the stone lays in its natural state. Walls should be about a foot thick, and properly squared stones will save money and mortar and make a stronger wall.

A fault we have noticed in many stone-built village houses is that there are too many little stones used, as can be seen in illustration 70, and too much mortar "buttered" over the face of the wall, destroying the natural character and beauty of the stone.

Stone can be used by itself or backed with other materials, such as brick or laterite, but whatever form of construction is adopted, some of the stones should be bonded right through the wall.

Cement

Cement is the first of the imported materials we have mentioned, and a very necessary one. Unfortunately it is an expensive commodity in West Africa, and its basic price is considerably increased when it has to be transported overland for long distances. Thus, for village work, methods of construction should be employed which require the minimum amount of cement, but this does not mean that in products requiring cement it should be skimped.

Useful data: One cubic foot of cement weighs about 90 lbs.

Concrete

Floors and foundations will be the main use for concrete in village work. A concrete floor is pleasantly cool but hard to the feet. It must be laid on a good, sound solid foundation or it will crack, unless reinforced. It should be brought to a smooth finish, preferably with a steel trowel, and the edges slightly coved up against the walls to permit easy washing. In buildings with mud walls the concrete floor should be taken through to the outside of the wall, which should then be erected thereon. The mix of concrete will vary according to the job it is required to do, but never more than ten parts of coarse aggregate to one part of cement should be used. A usual mix for foundations is one of cement, three of sand

and six of coarse aggregate; and for floors, one of cement, two of sand, and four of coarse aggregate.

Concrete Tiles

Concrete roofing tiles have been produced in West Africa, and with success, but they are expensive. They have to be artificially coloured by dyes, unless the natural grey cement colour is used. They do not weather so pleasantly as clay tiles.

Concrete Blocks

The sand and cement block, or as it is frequently called, the sandcrete block, is used to a great extent in the towns of West Africa and particularly in public buildings. It is a mix of six to eight parts of sand to one of cement, cast in wood moulds to produce hollow blocks 9 in. deep by 15 in. or 18 in. by 6 in., 9 in., or 12 in., according to the thickness of the wall required.

It makes a good, strong weather-tight wall, and in its hollow form has fair insulation against heat, but is expensive for rural work. It has the advantages, however, that it can be made on the site, and a block wall requires no rendering.

Timber

Most timbers, unless specially treated, are subject to destruction by ants, and the few timbers that are ant-resistant are too hard and difficult to work. Timber is of the utmost importance in village building as it is readily available in most districts, and is almost unique in being a medium which can be used for an entire building without any additional material, apart from a little ironmongery. Therefore, a satisfactory solution to the problem of finding a suitable protection from the white ant pest is urgently needed. Creosote and most of the other coal-tar products have proved a distinct deterrent, and there are proprietary brands of termite-resisting paint on the market which, by our somewhat modest tests, have so far been successful.

Impregnation under pressure with one of these solutions would probably produce resistant timber, which needed no periodic maintenance, but for village work a paint or liquid which can be simply applied by brush is required.

Modern experiments in the treatment and use of timber has opened up a new future for timber construction—the latest types of veneers and plywoods, glued with special plastic glues, the laminated beams for roofing over large spans, the production of building boards by using compressed wood shavings and sawdust—and the post-war years are bound to further this development. We may anticipate that many of the new techniques will be applicable for use in the tropics, but research on the spot, with practical experiments to try out the modern discoveries under extreme conditions of heat and humidity, is a first necessity.

Useful data: A standard of timber is 165 cu. ft.
A simple formula for calculating the breaking weight on a wood beam, supported at the ends and loaded in the centre, is:

$$W = \frac{B \times D^2 \times C}{L}$$

where W = breaking weight in cwts.
B = breadth in inches.
D = depth in inches.
C = constant.

C for English oak—5 cwts. Local Forestry Departments for each Colony would give constants for their own timbers. At least three times the breaking weight should be allowed for and a beam with its load equally distributed along its length will carry twice the load concentrated at the centre.

A useful rule of thumb for calculating floor joists is to halve the span in feet, add two, and the result will give the depth of the joist in inches, assuming 2 in. thickness timber is used. *Example:* Span equals 12 ft., then joists depth is $\frac{12}{2} + 2 = 8$ ins.

Wood Shingles

The use of wood tiles or shingles for roof covering is becoming increasingly popular.

Both machine-made and split shingles are available and, for use in village work, the latter could no doubt be produced locally. Shingles form a fair and cool roof but are liable to warp and twist under heavy exposure to sun, rain, and wind, and are also inflammable. They need creosoting and should be laid to a pitch of not less than 30 degrees.

Useful data: Shingles are usually 16 in. long, in random widths varying from 4 in. to 12 in., 2/5 in. at butt, tapering to the top. Usually sold in bundles, and one bundle covers about 25 sq. ft., laid to 5 in. gauge and 6 in. lap.

Corrugated Iron

Though used mainly for roofs, this material is used for walls, and it is difficult not to sympathise with the poor villager who does so, for here is a relatively cheap, easily erected, watertight material, impervious to ants. As a roof covering it is not unsatisfactory, requiring only light supports and, provided it is painted regularly, has a reasonable life. Maintenance is essential as the zinc protection given to the material in manufacture does not last long in the damp, hot climate of the tropics. As soon as rust sets in, deterioration is rapid and it becomes very unsightly. Corrugated iron can be laid to roofs of a very flat pitch, even as low as 15 degrees or 1 ft. rise in four, but below 20 degrees it is safer to seal the joints with a waterproofing compound. Used for walls, corrugated iron is unsightly even when new, and will in time corrode, especially when it is in contact with the ground. It is also difficult to fenestrate and, except by very ingenious and usually costly methods, it is impossible to obtain good con-

structional details at window and door openings. The use of corrugated iron for walls should be discouraged except in those areas where no other suitable materials can be obtained by the villagers which they can afford to buy.

Corrugated iron makes a very hot building and is very noisy in rains.

Useful data: Corrugated iron, usually in 2 ft. or 2 ft. 6 in. sheets; any length up to 10 ft. sold by the ton, according to gauge: 18 (the heaviest), 20, 22, 24, 26, and 28 (the lightest). One ton of 18-gauge sheets covers about 800 sq. ft., and one ton of 26-gauge covers about 2100 sq. ft.

Asbestos

This is slightly dearer than corrugated iron at present prices, but it is rust-proof, reasonably cool, and requires no maintenance painting. It makes a very satisfactory roof covering but is somewhat brittle for walling and liable to crack if given a hard blow. Consequently, it is only used in conjunction with timber for walls above first-floor level.

Corrugated sheets are stronger than flat and, for roofs, should be used with deep corrugations to cope with heavy rainstorms. The roof pitch can be kept as low as 15 degrees, but below 20 degrees it is safer to seal the joints with a waterproofing compound.

Asbestos roofing slates make a sound weathertight roof, but are more expensive than corrugated sheets and require more roof timbers for fixing.

The painting of corrugated asbestos roofs adds much to the appearance, though it is not technically necessary.

Plastics

To-day, no treatise on building materials is complete without reference to plastics, a word which embraces a multitude of widely differing materials, However, the plastic material which is most popularly associated with building construction—that is, the material used for electricity fittings, door furniture, etc., and more usually known as Bakelite—has most useful application in the tropics. This type of plastic has been considerably developed in recent years, and wall-boards, partition blocks, and floorings are now being produced. It is an inert material and is impervious to white ants and other vermin.

Grass, Palm Leaves, etc.

Grass thatching and palm-leaf roofing are used throughout the Coast. They are cheap and, if renewed seasonally, are waterproof. They are highly inflammable and harbour insects and vermin.

It is possible that an improved method of using palm leaves for roofing might be achieved by processing the individual palm-leaf mats or tiles before fixing. Experiments should be carried out by dipping the "tiles" in a bituminous solution, or even in a cement slurry, in order to increase their life and reduce the danger of vermin. The fire hazard, too,

might be overcome if a suitable "dip" could be procured—possibly with a cement base.

Wall and Ceiling Linings

The question of lining walls and ceilings is a difficult one as the creation of enclosed spaces by fixing, for example, internal lining to a timber-framed wall, is a source of potential danger, the harbouring of vermin and the risk of an invisible decay of deterioration. Ceilings cause less danger as the space thus enclosed can usually be entered by means of a trap door, and periodically inspected.

Compressed fibre boards and asbestos cement sheets are probably the most satisfactory but are expensive and, at the moment, have to be imported.

Wood boards must be creosoted or otherwise protected by a preservative or ant-resisting paint, but make a pleasant and suitable ceiling.

Matting is attractive in appearance when new, but quickly becomes verminous and harbours insects.

Colour and Decoration

Many colour-washes and delightful ways of using them already exist in parts of the Colonies. In some places there are good frescoes and ornament and, in general, colouring of walls is to be encouraged, both as a protection and to improve appearance.

Light colours help to divert strong sunlight and keep a building cool but, if too light, have the disadvantage of reflecting the sun to such an extent as to cause discomfort to the eyes. Light buff and ochre shades, both of which can be easily obtained from local sources, are two of the more suitable colours in this respect. The use of tar on walls, externally, produces a cool and watertight building and, provided that only a limited number of buildings in any one area is so treated, gives a pleasing contrast with the lighter tones. Tarred plinths afford protection at a weak point in the wall structure and look well on colour-washed buildings, particularly on hilly sites where considerable æsthetic effect can be achieved.

The traditional low-relief forms of plaster decoration used in some of the Northern Nigerian towns and villages can be very beautiful, as seen in illustration 71, and the degree of technique and skill reached by the Nigerian craftsmen would be well worthy of study by the artisans of other colonies; not, however, merely to reproduce the designs themselves, which in any case are indigenous and even symbolic of their locality, but to adapt the craftsmanship in order to create new forms of decoration compatible with modern design.

Research

There is a real need for the setting up of a building research station, rather on the lines of that at Watford, in England. Local materials could be tried out in an endeavour to find new methods of application to improve, simplify, and cheapen building costs. Such an institution would presumably be a matter for the individual governments and, in any case does not really concern the reader.

Nevertheless, local builders can carry out their own experiments, and if a central or area research station is founded, the experience gained in various districts could be submitted thereto and, after investigation, transmitted to other districts which may be up against similar problems.

Preliminary Operations

It is customary in most villages for the houses to be constructed by the family owners, and in this respect a few points on the preliminaries necessary for successful building, though elementary, may nevertheless be found useful to the unskilled builders in outlying places. Frequently have we seen buildings out of square, with their roofs awkwardly fixed in consequence, walls out of the vertical, and even floors sloping to the natural fall of the ground. Care in setting out and in keeping buildings square and level will not only produce better-looking houses, but will make building easier and, in many cases, cheaper.

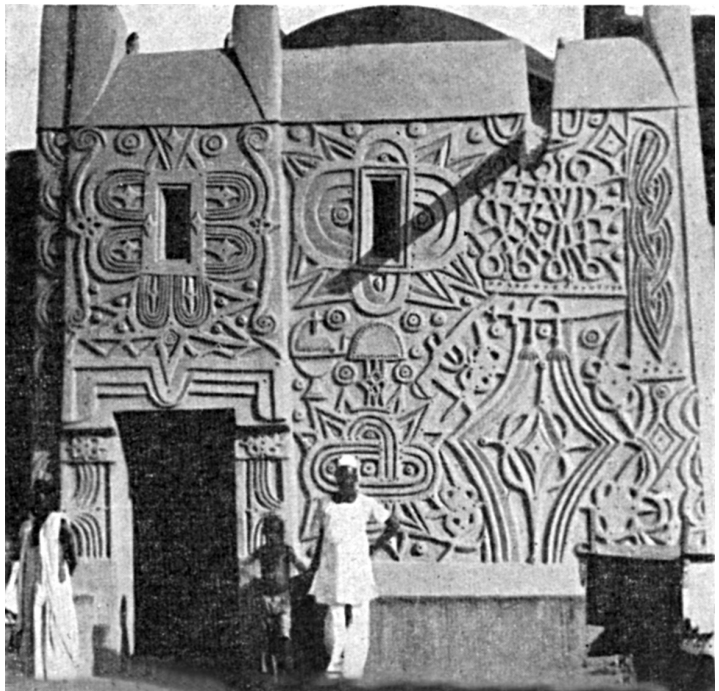

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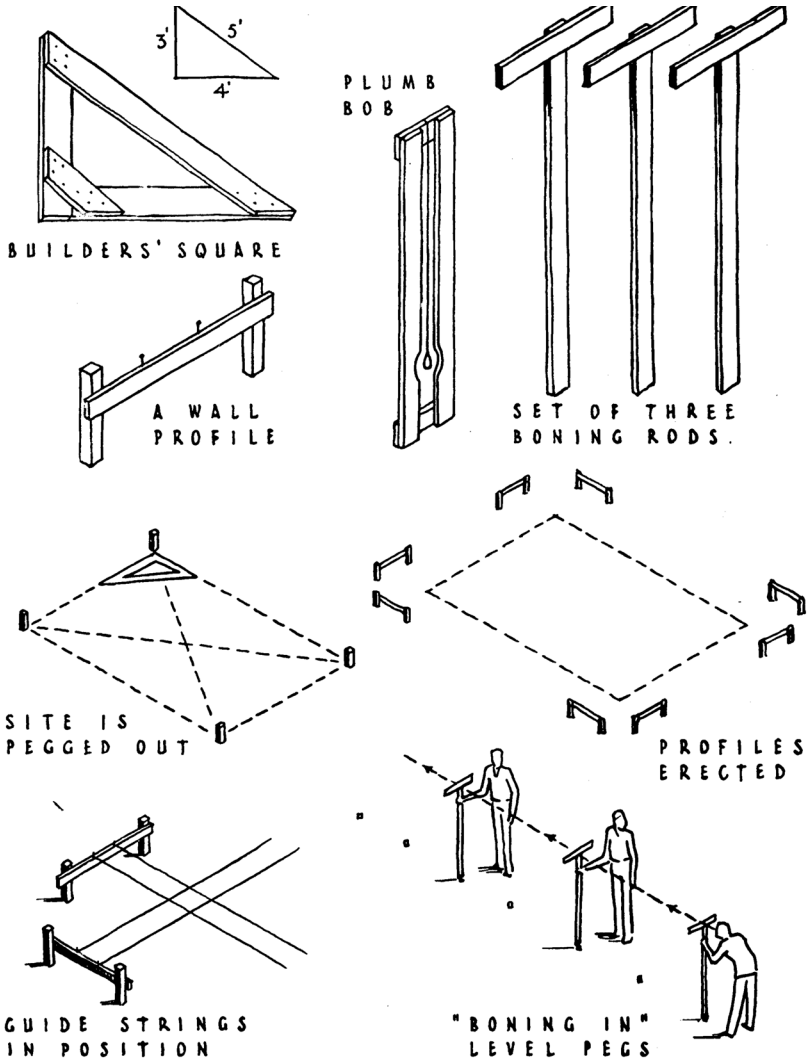
Illustration 72 shows some of the tools and plant required and in use in these preliminary operations.

A tape (or even string can be used equally well), a square, and some pegs are required for setting out. The square is easily made from boards and using the triangular form with sides 3 ft., 4 ft., and 5 ft. Set out the building with corner pegs, using the square to obtain the right angles, and check by measuring the diagonals, which should, of course, be equal. Next set up the wall "profiles." A profile is nothing more than two pegs, with a board nailed across them and two nails driven into the top of the board to the correct width of the wall, 6 in., 9 in., 12 in., or whatever it may be. The profiles are placed in position one each end of each wall, but erected clear of the actual building area. String lines are then tied from nail to nail, thus indicating the actual position and width of each wall. The profile must remain until the wall itself has been commenced, after which, of course, the wall is sufficient guide.

The foundation trench is first dug, and depth and width will depend upon the conditions of soil and height of wall. For most small buildings it need only be twice the width of the wall. The bottom of the trench must next be levelled, and



for this a set of three "boning rods" are required, and a spirit level. The boning rods are simple things to produce, but the level is a different matter. However, a flat metal tray, filled with water and laid on a straight and solid board is a suggested substitute, or possibly water in a bottle in an open topped box fixed to a board.

First drive pegs in the centre of the trench bottom throughout its length. Level up at least three of these, using the spirit level, so that they project up above the trench bottom equal to the depth of the foundations required. Other pegs can then be boned in. Three men are necessary, two of them holding boning rods on two of the levelled pegs and the third sighting across the top of the rods and driving down the remaining pegs to the correct level. Once one or two pegs have been corrected and levelled with a spirit level any further pegs can be inserted by using the boning rods.

When the concrete has been placed in the trench, the level pegs should be removed. After the concrete has set the walls are commenced to the string lines tied between the profiles; now the straight edge and "plumb-bob" are required. The latter can be made from wood, string, and any small weight, and should be continually used by the builder to check that his wall is rising vertically, while the straight edge should be used for checking the straightness of the walls.

Throughout the building of the walls the spirit level should be used to ensure that level beds are obtained for each course.

In this way the construction of the roof will be simplified, as the walls will be true both vertically and horizontally.

Design Details

A few simple sketches in illustration 73 show some of the points covered below, together with a few other useful constructional items in connection with village house construction.

Foundations

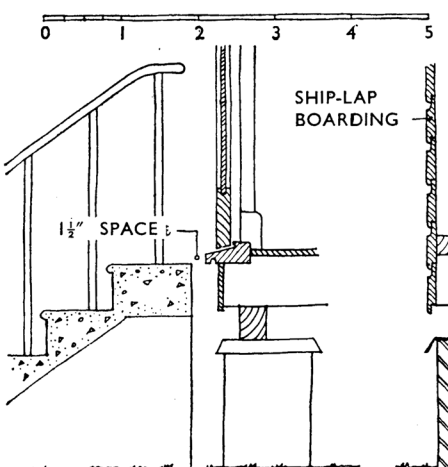
Foundations have been partly dealt with under a preceding sub-section. They will vary according to the load-bearing qualities of the soil, but generally the sub-strata of West Africa is fairly hard and solid, except for districts such as delta areas and desert zones. In fact, in many cases foundations are not really required at all, and all that is necessary is a certain amount of levelling up. Foundations must be homogeneous and must evenly spread the weight of the walls above, to avoid uneven settlement, and subsequent cracking. Settlement is frequently unavoidable, but any such subsidence must be uniform.

For sites on soft ground, or for sites which have been filled and not properly consolidated, reinforced "raft" foundations are necessary. In effect, this will be a large flat slab of reinforced concrete 4 in. to 6 in. thick, according to its size, which will act as the floor of the house and on which the walls are built.

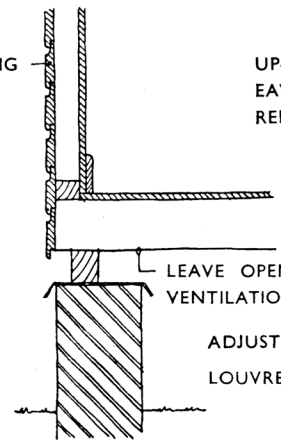
Plinths and Ant-proof Courses

A plinth, constructed of hard and durable material, is a logical protection to the base of a wall. It is this lower part of a wall which is most subjected to attack, whether it be rain, damp, kicking, or by rodents and insects. Concrete is the ideal material to use, as it can be homogeneous and avoid the necessity for joints, which are the danger points in unit construction—say, by brick or block. These latter materials are next in value, after concrete, for plinths, but care must be taken to see that all joints are properly filled with mortar. These plinth walls should be built directly off the foundation concrete and taken up some 6 in. above the floor level.

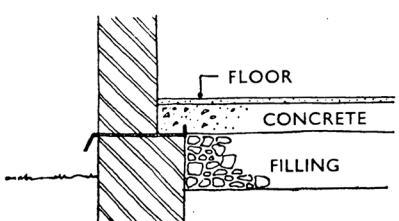
Ant-proof courses are preferably made from one of the metals, such as zinc, lead, or copper, and serve also as a damp-proof course, though the latter is rarely a necessity on the West Coast. Zinc is the cheapest of these and should be wide enough to project beyond the external face of the wall, at least 2 in., and turned down to form a drip. It has been proved that the sharp edge formed by this drip is a real deterrent to the white ant. For buildings raised up on brick or concrete piers, the same form of metal capping should be adopted as shown in the sketch in illustration 73, so that at no point will the ants have access except by first negotiating the projecting edge of the metal capping. The sketch shows a timber-framed building on brick piers, which is not an ideal form of construction for West Africa, as the cladding to the framing will conceal from view the ravages of termites and other insects. In this case it is imperative that adequate precautions are taken to keep out such pests. Steps up to the building should be entirely divorced from the main structure so that a gap of about $1\frac{1}{2}$ in. between the top step and the main walls or floors, as shown in the diagram. In the same way it is essential that overhanging trees or shrubs do not touch any part of the building.



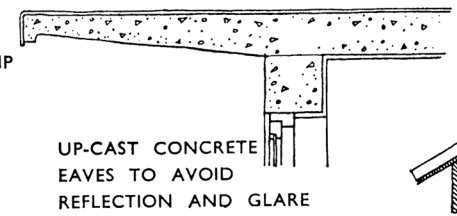
ILLUSTRATING STEPS BUILT INDEPENDENT OF MAIN STRUCTURE

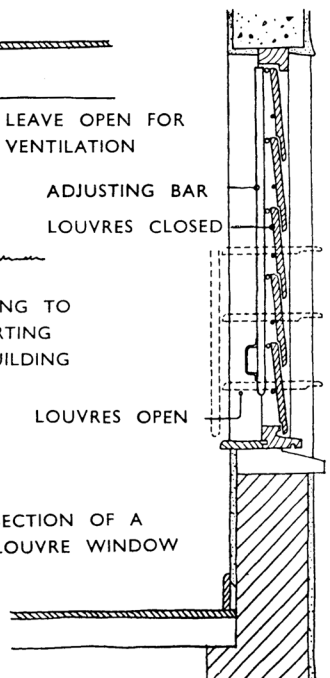


METAL CAPPING TO PIERS SUPPORTING A TIMBER BUILDING

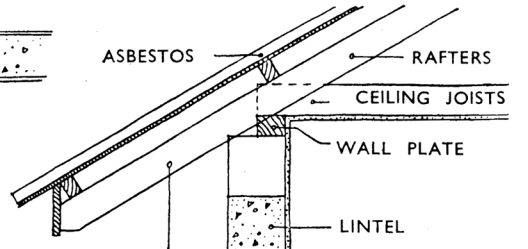


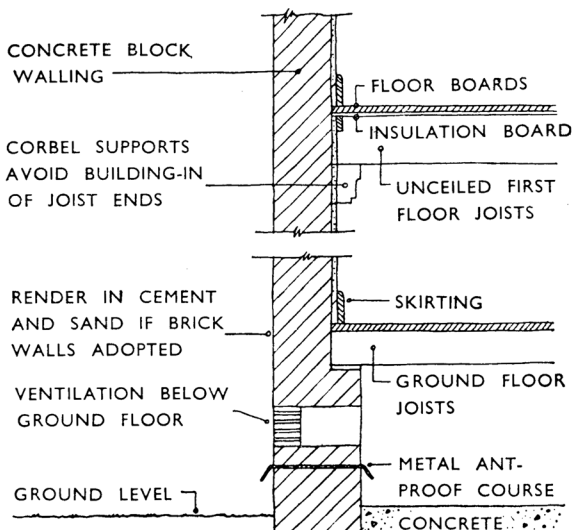
SECTION OF A WALL WITH METAL ANT-PROOF COURSE





SECTION OF A LOUVRE WINDOW





SECTION THROUGH EXTERNAL WALL OF TWO STOREY HOUSE SHOWING ROOF AND FLOOR TIMBERS VENTILATED

A periodic inspection of all buildings is necessary to ensure that termites have not found some means of getting into the main structure.

Eaves

A generous projection of eaves is now universally accepted in tropical countries as being a necessary feature in roof construction. A free overhang of 3 ft. is not excessive, but if supported to form a verandah, may be increased considerably. For most of the day the angle of the sun is so steep that a fairly wide eave will ensure a shady wall, keeping it cool, and keep out glare from a room. With flat roofs care must be taken with the soffits, as reflection from the sunlit ground often causes a glare inside the building. This can be overcome by painting in dull shades or, in the case of flat concrete roofs, the eaves can be sloped upwards. When flat roofs are extended to form wide eaves, a useful rule of thumb is that the cantilevered position (or overhang) should not be more than one-third of the length of the wood joists or the concrete slab, as the case may be.

Windows

As glazing is so expensive, windows in village buildings are usually covered with a wood shutter or screen. A ventilated louvre shutter is obviously preferable, from a health point of view, over the solid types. The window must have some form of shutter which can be locked at night to prevent thieving, and the louvre form will still admit a current of air, even when the window is closed. Wire mesh or iron bars across the windows are an additional precaution against the thief.

Where there is a wide eave immediately above the window opening, the casement form of shutters, *i.e.*, the side hung type, are the pleasantest form as they can be opened fully, leaving the entire window opening free to catch the breeze. If there are no protecting eaves, then the top hung form is preferable as it will keep out the sunlight but still let in light and air.

The size of windows is most important. Modern building by-laws insist on a total area of window equal to one-tenth of the floor area, and at least one-half of the window area should be capable of being opened. With the present lack of glazing, only the first part of the above regulation can really apply to most village building. Wherever possible, window openings in any one wall should be kept the same size and should be arranged so that their heads and sills are level. In adjoining walls, where different sizes of windows have possibly to be used, they should be arranged so that either their heads or their sills line up with their neighbours. Door heads also should be level with window heads, and where the latter are too high to permit of this, then a small fanlight can be added to the top of the door to achieve the same effect. These are points of design concerned mainly with appearance, but are important though simple, and do not effect cost.

A building which is satisfying to the eye—and it may be an entirely unconscious sense of satisfaction in the mind of the onlooker—is a comfortable building to live in and to live with.

Doors

Standard sizes of doors, say, 6 ft. 6 in. by 2 ft. 6 in. and 6 ft. 8 in. by 2 ft. 8 in., should be adopted where possible. Not only do they look very much better than a series of doors of odd shapes and sizes, but their construction is cheapened, simplified, and speeded up.

Chimneys and Flues

These should be of fire-resisting material, brick, concrete, iron, asbestos—the latter being the cheapest form. A flue should have a hood over the source of the smoke and rise at lest 3 ft. above a tile roof, and more if the roof is of timber or thatch.

7. GARDENS, TREEPLANTING, WALLS, VILLAGE STREET FURNITURE AND SIGNS

One of the main causes of village unsightliness is the general lack of gardens. This is the more to be regretted because of the profusion of tropical flowers and climbers available and the general pleasure taken in sitting out of doors. Many a village could be greatly improved at once by the householders realising the delight and pleasure a garden can give. The fencing of compounds and such gardens as exist is often lamentable, with beaten-out kerosene tins, decaying walls of laterite, sagging basket work, etc. Too little use is made of trimmed hedges.

Walls, gardens, and tree planting, together with terracing and steps, where needed, could be a great addition to the beauty and convenience of a village. This chapter gives guidance on what kinds of trees and shrubs can be used and how they should be cared for.

Trees and Shrubs

Trees will vary according to the locality, but it should be remembered that the Agricultural Department is always willing to give advice on the trees available in the district. Where there is only foot traffic low shady trees and flowering trees, such as cassia, acacia, etc., are useful, but for the more important parts of the village more impressive trees should be chosen.

For the village green a cotton tree, for example, will look fine, or an avenue with Royal Palms (if they will grow on the particular soil) will add dignity to the surroundings of the local community centre. Shade trees are most essential in the market. They will need protection when young.

Reference has previously been made to the importance of preserving good trees when laying-out roads and buildings, but it is a principle which cannot be overstressed. The preservation of the famous cotton trees in Freetown adds considerably to the appearance of the town streets, as will be seen in illustration 74 of Westmoreland Street. In illustration 75 of a Gold Coast village street, an attempt at tree preservation has been made, but in this instance the carriage-way has actually been narrowed in order to avoid the trees. This has not only created a danger on the road but, also, has caused the roots of the trees to become exposed due

to the surface water from the road draining in their direction. It would have been far better in this instance to build dual carriage-ways round the trees, leaving the latter in a central reservation. While on the question of street trees it is most important that the spacing of avenue trees should be considerably increased where the road curves as their vertical trunks will form an impenetrable barrier to visibility when seen from an approaching vehicle.

Planting of flowers and flowering shrubs, both in private gardens and public open spaces, will do much to beautify the village. Plants like morning glory and bourgainvillia grow with little trouble.

Village Signs

Village signs can be painted, or carved, giving very clearly the name of the village and any details symbolic or characteristic of the occupation or the history of the village.

Ornamental and Shade Trees

Ornamental trees are planted mainly:

1 Along highways and main streets—large trees in avenues mainly for shade.

2 Along town roads, paths in gardens, etc., medium and small trees in avenues for ornament and shade.

3 For planting in groves or singly—for shade or ornament.

1 *Large trees suitable for avenues*

Shade is the main factor and this must not be subordinated to other considerations.

(*a*) Must be truly evergreen, nearly evergreen, or at least in leaf in hot weather.

(*b*) Species should develop clean boles, and above that a spreading and reasonably dense crown. Trees branching upwards or horizontally are better than those branching outwards and downwards.

(*c*) Species must be fairly hardy, fast growing, wind firm, and not brittle.

Species worth consideration include:

Mahogany
Cedrella Odorata (West Indian Cedar)
Palmæ spp.
Peltophorum Ferrugineum
Bombox
Lagerstrœmia Flos Regina
Terminalia catappa
Spathodea campanulata
Araucaria sp.
Poinciana regia
Chrysophullum sp.
Hymenea sp.
Parkia sp.
Homalium dolichophyllum
Ficus sp.
Hymenostegia Afzelii
Khaya Senegalensis

Spacing and arrangement: Varies with species and local conditions. Best distance for fairly large trees is 10 ft. from edge of road, *i.e.*, for 20-ft. road trees are 40 ft. apart; 30 ft. between trees is a good average distance. Spacing should allow continuous shade but not be close enough to necessitate removal of some trees subsequently. On fast roads it is best to avoid trees with edible fruits to obviate accidents.

2 *Small avenues planted mainly for ornament*

Space is often limited and trees must not be too large. Avenues should combine shade with ornament. Greater attention can be given to these, and less hardy species can be grown.

Species worth consideration include:

Cassia spp.
Cæsalphinia Pulcherrima (Pride of Barbados)
Saman Saman (Rain Tree)
Plumeria Acutifolia (frangipani)
Casuarina equestifolia (whistling pine)
Nim
Lignum vitæ
Bauhinia spp.
Acacia spp.
Palmæ spp.
Eucalyptus
Bauhinia sp.
Tabebuia
Murraya exotica
Cupressus sp.
Monddora tenufolia
Securidaca sp.
Barteria nigritiana
Dalbergia sisoo
Glicidia maculata
Sclerocarya birrœa
Spondias mangifera
Azidarachta indica

3 *Shady groves, clumps, and single trees*

Trees ornamental for only a brief period, or of interest for any special reason, and not suitable for use in avenues, are best planted in clumps. A planting distance of 15 ft. to 30 ft. will be found most suitable. For single trees, only species of permanently pleasing appearance should be used; the large ones for shade, etc., the smaller ones for lawns, etc.

Species worth consideration include:

Cordia
Casuarina equestifolia
Lagerstrœmia Fos-Regina
Cassia spp.
Palmæ spp.
Milletia spp.
Plumeria Acutifolia (frangipani)
Punica granatum
Ochna sp.
Ourates sp.
Distrostachys glomerata

Baphia nitida
Erythrina altissima
Erythrina senegalensis
Milletia sp.
Ficus sp.
Chrysophyllum sp.
Holharrhena Wulfsburgii
Rauwolfia vomitoria
Spathodea campanulata
Stereospermum sp.
Tabebuia sp.
Eucalyptus sp.
Hymenia sp.
Parkia sp.
Aurucaria
Anogeissus leiocarpus
Lonchocarpus Griffonianus
Moringa pterygosperma
Oncoba spinosa
Combretum abbreviatum
Nerium oleander
Allamanda spp.

4 *Hedges*

A great deal of the untidiness in the look of vegetation is caused by the lack of proper hedges. Tree species have been planted as hedges and have not been kept trimmed. Properly kept hedges might probably do more than any other measure to improve the surroundings, as can be seen in illustration 76, which shows a pair of houses of a Government housing area in the Gold Coast.

Species worth consideration include:

Pithecolobum dulce (Madras Thorn)
„ unguiscarti (bread and cheese)
Eugenia spp. (Pitanga Cherry)
Bougainvillea spp.
Panax fruticosum
Thevetia nerifolia
Bauhinia refescens
Casuarina equestifolia (whistling pine)
Thespesia populula
Hibiscus spp.
Lawsonia alba (Henna)
Acalypha tricolor
Nim
Flacourtia flavescens
Eugenia sp.
Coffea sp.
Fluggea virosa
Baphia nitida
Sesbania ægyptica
Connarus africanus
Carissa edulis
Acalypha vars
Duranta plumieri
Punica granatum
Murraya exotica

Lagerstrœmia indica
Balanities aegyptica
Zisyphus spp.
Commiphora africana
Quisqualis indica

Pruning: Pruning of lower branches often produces more shapely trees and allows free air circulation. The object should be to have high shade. A lot of trees would benefit from pruning off the lower branches. As a general rule cutting the tops off trees should not be done.

Thinning out of trees is beneficial. Self-sown trees appear in quantity.

Firewood Reserves

Every village and site must be treated on its merits. Fuel wood reserves should be located as near as possible, but the distance will be dependent on whether head loading or motor transport will be the method used, the incidence and effect of tsetse, and the type of soil and rates of growth to be expected on the available site.

As regards types of trees, in most cases it is hoped the indigenous forest or woodland can be silviculturally treated to yield the supplies required without recourse to the heavy capital expense of planting. Where planting is necessary it is not possible to generalise as the particular site must be considered. As regards the rate of growth of such plantations interesting data is given in a recently published pamphlet by the Forestry Department of the Gold Coast, called *Notes on some Gold Coast Trees.*

Over the whole of the forest belt ample supplies of firewood for villages exist within their own farm lands and, as over the greater part of the area the secondary growth is woody and servicable for firewood, this condition will remain until there has been a very great increase in population and a change over to mainly permanent cultivation. The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Gold Coast Forestry Department have recognised this and has a plan of reservation to ensure future timber and fuelwood supplies for the closed forest belt, which is almost complete.

It is in the Northern Territories, especially the Mamprussi District of the Gold Coast and Northern Nigeria, that there is an acute demand for firewood and poles.

Garden Walls

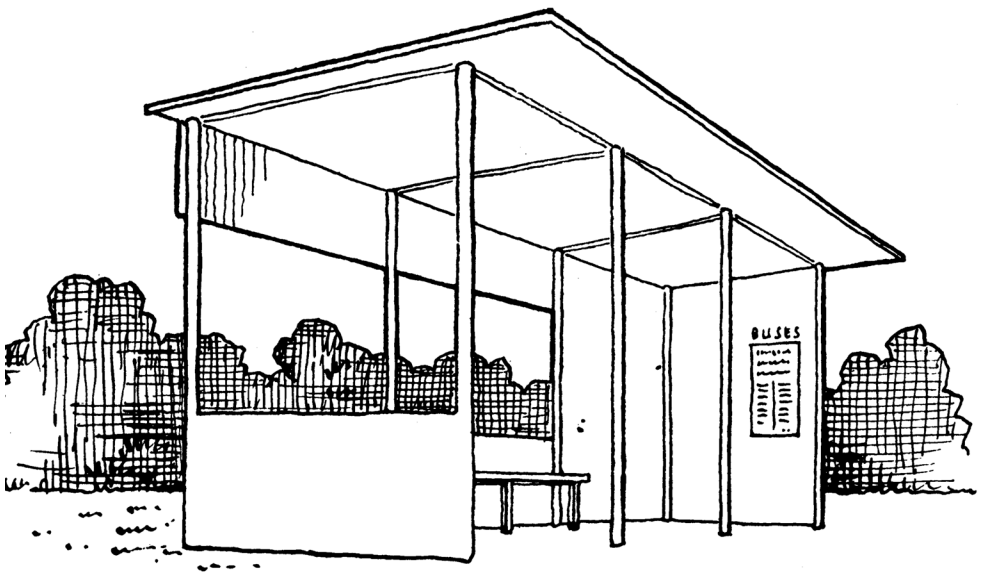
When of laterite, walls will look better and be more stable if they are slightly battered from top to bottom and protected with a surfacing and distempered or colour washed. The top needs extra protection. Cement and brick walls can often be honey-combed, which saves material and allows for ventilation. Also honey-combing makes for variety in appearance. Hedges and trees make delightful garden walls and can be grown thick enough to withstand animals.

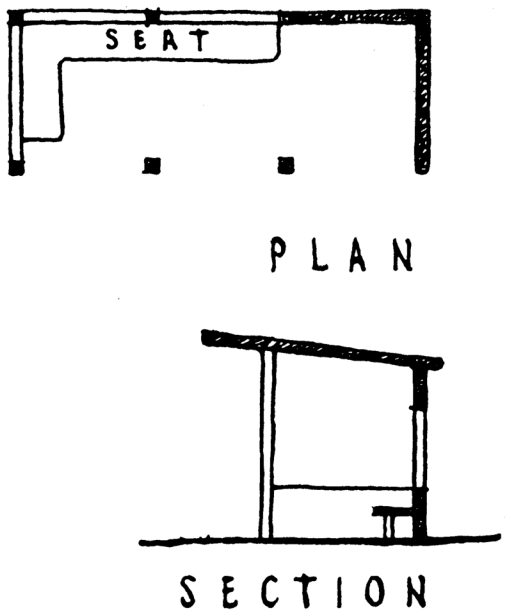
Street Furniture

By this is meant the various pieces of equipment such as lamp standards, public seats, shelters, signs, monuments, fountains, etc., which are additions to the purely practical layout of streets and open spaces, but should be considered as part of the whole. With the coming of motor transport, electricity, etc., these items must be provided and should be most carefully considered not only as to their design but as to their situation in relation to buildings, pavements, and carriage-ways.

The importance of siting can be readily seen in illustration 77, which shows a bus shelter situated in a most

79 A SIMPLE BUS SHELTER





dangerous position on the bend of a main road. The overtaking lorry cannot possibly see approaching traffic beyond the stationary bus. Had the shelter been erected a little further along the next straight length there would be no such danger. Illustration 78 shows another instance of bad siting; in this case, a water stand-pipe which is not only too near the road but is also on a curve of the carriage-way. Thus, when during a busy period, people tend to spread out into the road they are not seen by oncoming traffic until the very last moment.

The illustration 79 shows a simple form of bus shelter which could be erected in several alternative materials.

Street lamps, seats, and benches, etc., are better made in concrete.

APPENDIX I

GOVERNMENT DEPARTMENTS IN BRITISH WEST AFRICA CONCERNED WITH VILLAGE PLANNING

Subject	Nigeria	Gold Coast	Sierra Leone	Gambia
AGRICULTURE	The Director of Agriculture, Moor Plantation, Ibadan.	Department of Agriculture, P. O. Box 299, Accra.	The Director of Agriculture, Njala.	Agricultural Department, Cape St. Mary.
BUILDING	The Director of Public Works, Public Works Department, Lagos.	Public Works Department, P.O. Box 136, Accra.	The Public Works Department, Freetown.	Public Utilities Department, Bathurst, *or* Construction Department, Kanifing, K.S.M.
COMPOSTING AND SEWAGE DISPOSAL	The Director of Medical Services, Medical Department, Lagos.	Medical Department, P.O. Box 138, Accra.	The Health Department, Water Street, Freetown.	Health Office, Bathurst.
CO-OPERATIVE MOVEMENTS	The Registrar of Co-operative Societies, Ibadan.	Department of Co-operation, P.O. Box 906, Accra.	The Colonial Secretary's Office, Freetown.	Labour Office, Bathurst.
DIET	The Director of Medical Services, Medical Department, Lagos.	Medical Department, P.O. Box 138, Accra.	The Medical Department, Oxford Street, Freetown.	Nutrition Officer, Bathurst.
FORESTRY	The Chief Conservator of Forests, Ibadan.	Forestry Department, P.O. Box 527, Accra.	The Forestry Department, Freetown.	
HEALTH	The Director of Medical Services, Medical Department, Lagos.	Medical Department, P.O. Box 138, Accra.	The Health Department, Freetown.	Health Office, Bathurst.

APPENDIX I *continued*

GOVERNMENT DEPARTMENTS IN BRITISH WEST AFRICA CONCERNED WITH VILLAGE PLANNING

Subject	Nigeria	Gold Coast	Sierra Leone	Gambia
HORTICULTURE . .	The Director of Agriculture, Moor Plantation, Ibadan.	Department of Agriculture, P.O. Box 299, Accra.	The Agricultural Department, Njala.	Agricultural Department, Cape St. Mary.
SOCIAL WELFARE . .	The Chief Secretary to the Government, Chief Secretary's Office, Lagos.	Department of Social Welfare, P.O. Box 140, Accra.	The Assistant Welfare Officer, c/o The Director of Education.	Secretariat, Bathurst.
SOIL EROSION . . .	The Director of Agriculture, Moor Plantation, Ibadan.	(1) Department of Agriculture, P. O. Box 299, Accra. (2) Geological Survey, P.O. Box 25, Prestea.	The Agricultural Department. Njala.	
SURVEYING . . .	The Commissioner of Lands and Director of Surveys, Land and Surveys Department, Lagos.	Surveying Department, P.O. Box 191, Accra.	The Director of Surveys and Lands, Freetown.	Survey Office, Bathurst.
TOWN AND COUNTRY PLANNING . . .	The Director of Public Works, Public Works Department, Lagos.	Town and Country Planning Board, P.O. Box 1114, Accra.	The Town Planning Officer, c/o The Public Works Department, Freetown.	Department of Architect and Town Planning Adviser, Fajara, K.S.M.
WATER ENGINEERING . .	The Director of Public Works, Public Works Department, Lagos.	Temporary Water Supply Department, P.O. Box 5, Tamale, Northern Territories.	The Public Works Department, Freetown. The City Water Engineer, Hill Station, Freetown.	Public Utilities Department, Bathurst.

APPENDIX II

BIBLIOGRAPHY

Note: The prices given are only approximate and merely intended as a guide.

Agriculture

Third West African Conference Papers—Vols. I and II.
West African Agriculture, by Faulkner and Mackie.
West African Agriculture, by Irvine.
Agriculture in Uganda, by Tothil *et al.*
The Waste Products of Agriculture, by Howard and Wad.
Conservation of the Soil, by Gustafson.

Rubber (3*d.*)
Rubbers (6*d.*)
Sheep (3*s.*)
} Issued by the Gold Coast Department of Agriculture.

Agriculture
Animal Health
} Departmental Annual Reports published by the Gold Coast Government.

Farm and Forest Pamphlets—Published by the Sierra Leone Government.

Farm Measurement, by Ruston and Dawe (University Tutorial Press, London, 5*s.*).
Note-book of Tropical Agriculture, by Wood (Imperial College of Tropical Agriculture, 2*s.*).
Report on Sea Fisheries, by C. A. Steven (Sierra Leone Government Printer).

Architecture

Introduction to Modern Architecture, by J. M. Richards (Penguin Books, 1940, 6*d.*).

The Architecture of England from Norman Times to the Present Day, by Frederick Gibberd (Architectural Press, 1938, 5*s.*).

Architecture for Children, by Jane and Maxwell Fry (Allen and Unwin, 1944, 7*s.* 6*d.*).

Building

How to Build a Better House—A Handbook for African Builders (Longmans, Green & Co., 2*s.*).

Building Construction, by W. M. McKay—Vols. I, II, and III (Longmans, Green & Co., 9*s.* per Vol.).

Building Construction and Drawing, by G. A. Mitchell.
Part I —Elementary Course (16th Edition, 1944), 7*s.* 6*d.*;
Part II—Advanced Course (14th Edition, 1944), 12*s.* 6*d.*
(B. T. Batsford, Ltd.).

Reinforced Concrete Simply Explained, by Oscar Faber (Oxford University Press, 6*s.*, 3rd Edition, 1944).

Nigerian Government Public Works Department Technical Papers:

No. 3—*Native Administration Works in Katsina*, by Crook.

No. 4—*The Relative Reliability and Economy of Concrete in Varying Proportions*, by Boorman.

No. 6—*A Reinforced-concrete Bridge on the Agbarum Stream, Ijebu-Ode Province*, by Boorman.

No. 10—*Temporary Buildings in Northern Nigeria*, by Daldy.

Nigerian Government Public Works Department Publications:
Building Quantities, by W. S. Corlett.
Information Book—*Building Construction*, 1943.
,, ,, *Hospitals and Dispensaries*, Part I.
Selection of Sites for Town and Government Residential Areas.
Notes on Government and Municipal African Housing Schemes in West, East, and South Africa, by H. E. Walker.
Nigeria Public Works Specification and Notes and Data.
Nigeria Public Works Type Joinery, 1944.
Concrete Construction Made Easy, by Turner and Lakeman (Concrete Publication).
Everyday Uses of Portland Cement, by Cement Marketing Company.

Composting and Sewage Disposal

Nigerian Government Public Works Department Information Book of Sanitary Structures.
Underdrainage, by R. D. Walker.
School and Domestic Sanitation for Rural Districts.

Co-operative Movements

Co-operation in Nigeria and The Centenary Conference, 1944.
Co-operation for Economically Developed Countries, by W. K. H.
Memorandum of Co-operation in the Colonies, by Campbell (Papers on Colonial Affairs, No. 2, C.M. No. 6).
Co-operation for Africa, by C. F. Strickland.
Report on the Introduction of Co-operative Societies in Nigeria, by C. F. Strickland.
The Co-operative Movement in Britain, by Topham and Hough (British Life and Thought).
Working-men Co-operators, by Acland and Jones.
Co-operative Organisations and Post-war Relief (International Labour Office).
Co-operation at Home and Abroad, by C. R. Fay (2 Vols.).
A Social Philosophy of Co-operation, by J. J. Worley.
Collective Adventure (*Palestine*), by M. Pearlman.
The Department of Co-operation in the Gold Coast, 1944–5 (Gold Coast Government).

Diet

Food in Relation to Health
An Enquiry into the Dietaries of the Hausas in Town Fulani
Report upon Diets in Schools
Ministry of Food Pamphlets (U.K.)
} (Nigeria Medical Department)

Electric Light and Power Schemes

Sessional Paper IV of 1944 (Gold Coast Government Printing Department).

Forestry

Forest Officers' Handbook of the Gold Coast (Gold Coast Government Printing Department, 2*s.* 6*d.*).
Annual Report of the Forestry Department of the Gold Coast Government (Gold Coast Government Printing Department).
Notes on Some Gold Coast Trees, by D. Kinloch (Government Printer, Accra, 2*s.* 6*d.*).
Draft of First Descriptive Check List of the Gold Coast—Forestry Department and Imperial Forestry Institute (Imperial Forestry Institute, Oxford, Unpriced).
Exotic Forest Trees in the British Empire, by Troup (Clarendon Press, 20*s.*).
Engineering for Forest Rangers, by Lloyd (Clarendon Press, Oxford).
Forest Flora of Southern Nigeria, by Kennedy (Government Printer, Lagos).
Vocabulary of Nigerian Names of Trees, Shrubs, and Herbs (Government Printer, Lagos).
Problems in Tree Nutrition, by Rayner and Neilson Jones.

Fuelwood

Fuelwood Reserves—Sessional Paper VIII, 1945 (Gold Coast Government Printing Department).

Health

Annual Report of the Medical Department of the Gold Coast Government (Gold Coast Government Printing Department).

Health Propaganda, by Medical Health Service of Government of Nigeria, in conjunction with the Education Department.

Lagos Health and Baby Week.

Practical Hygiene in Native Compounds in Tropical Africa, by Pearson and Mouchet (Balliere, Tindall, & Cox, London, 18*s*.).

Horticulture

Tropical Planting and Gardening, by H. F. Macmillan (The Times of Cylon Co. Ltd., 37*s*. 6*d*.).

Vegetable Growing in the Tropics, by Saunders.

Plants of the Gold Coast, by Irvine (Oxford University Press, 1930, 5*s*.).

Flora of West Tropical Africa, by Hutchinson and Dalziel (Crown Agents for the Colonies, 2 Vols. at 8*s*. 6*d*. each).

Gardening Notes for Nigeria, by Pirie.

Useful Plants of Tropical Africa, by Dalziel (Crown Agents for the Colonies, 18*s*.).

Vegetable Gardening in Malaya, by Milsum and Grist (Department of Agriculture, Malaya, 10*s*.).

Social Welfare

Social Organisation of the Ga People, by Dr. M. J. Field, Ph.D., D.Sc. (Gold Coast Government Printing Department, 12*s*. 6*d*.).

Welfare in the British Colonies, by Mair (Royal Institute of International Affairs).

Youth Organisations of Great Britain, by Douglas Cooke.

The Elements of Social Science, by R. A. McIver.

The Elements of Sociology, by Wright.

Juvenile Delinquency, by Jewkes and Winterbottom.

Juvenile Unemployment, by J. H. Bagot.

The Social Servant in the Making, by Elizabeth McAdam.

Soil Erosion and Geological Survey

Report on the Geology of Western Togoland, by Robertson (Gold Coast Government Printing Department, 1*s*.).

The Geology of the Bosumtwi Caldera and Surrounding Country, by Junner and McGregor (Gold Coast Government Printing Department, 1937, 3*s*.).

Bibliography of Gold Coast Geology, Mining, and Archæology, to March 1937, by James (Gold Coast Government Printing Department, 2*s*.).

The Accra Earthquake of June 22, 1939, by Junner (Gold Coast Government Printing Department, 3*s*.).

The Living Soil, by E. B. Balfour.

The Rape of the Earth, by G. V. Jacks and R. O. Whyte.

Soil Erosion and its Control, by Ayres (McGraw & Hill Co. Ltd., New York and London, 1936, 21*s*.).

Laterite and Laterite Soils in Sierra Leone, by F. J. Martin (1937).

Surveying

Elementary Surveying, by O'Shea.

Nigeria Public Works Manual of Road Construction and Maintenance.

Town and Country Planning

Town and Country Planning, by Thomas Sharp (Penguin Books, 1940, 6*d*.).

Water Engineering

Water Supply Schemes for Towns: Sessional Paper III of 1944 (Gold Coast Government Printing Department, 3*d.*).

Government of Nigeria Public Works Department Technical Papers:

No. 1—*Enugu Waterworks*, by J. R. Roberts.
No. 2—*The Kogin Kerami at Rahma*, by Boorman.
No. 5—*Estimation of Flood Discharge and Waterways in the Nigeria*, by Pedder.
No. 7—*Windmills for Pumping in Nigeria*, by Pedder.
No. 8—*Okene Waterworks*, by Ketley.

Technique of Well Sinking in Nigeria, by Cochran.

Waterworks, by Adams (Pitmans).

Water Supply Problems, by Maxwell (Pitmans).

Emergency Water Supplies, by Beeby Thompson (Crosby Lockwood).

A Practical Handbook of Water Supply, by Dixey (Thos. Murby).

Water and the Land, by Clements and Topham (Oxford University Press, 1*s.*)

Preliminary Report on the Freetown Water Supply, by G. Howard Humphreys (Sessional Paper No. 3 of 1945).

The Practical Handbook of Water Supply, by F. Davey (Thomas Murby).

Miscellaneous

(Gold Coast Government Printing Department):

Annual Report of the Finance and Accounts Department of the Gold Coast Government, 1*s.*).

Accra Building Regulations No. 6/44, 2*s.* 6*d.*

Accra Town Council Ordinance No. 26/43, 3*s.* 6*d.*

Gold Coast Handbook, 1937, 7*s.* 6*d.*

Marriage Law among the Tallensi, by Dr. M. Fortes, 1*s.* 6*d.*

The Gold Coast Census 1931, by A. W. Cardinall, 12*s.* 6*d.*

Bibliography of the Gold Coast, 1931, by A. W. Cardinall, 12*s.* 6*d.*

Appendices Containing Comparative Returns and General Statistics of the 1931 *Census*, by A. W. Cardinall, 12*s.* 6*d.*

The Teachers' Journal (Education Department, 9*d.* per copy).

Nature Study, by J. S. Dunn, 6*d.*

Gold Coast Gazette (40*s.* per annum, or 20*s.* per six months).

Science in Africa, by Worthington (Oxford University Press, 20*s.*).

Sierra Leone Studies, I–XXII (Government Printer).

The Handbook of Sierra Leone, by T. N. Goddard, 1925.

Introduction to Geography of Sierra Leone, by H. Mitchell.

Empire Survey Review (Issued Quarterly at 3*s.* per Quarter).

Made and printed in Great Britain by Lund Humphries