

the seventeenth to the nineteenth centuries. It also appears in both British and American carpenters' manuals. In the roofs of a number of Connecticut churches, however, the tie-beam is divided and arranged in the form of a scissors. This type of structure has a structural advantage when used in association with light walls of brick or timber. These roofs form a group associated with Ithiel Town, who was probably responsible for the design.

Book Reviews

Constructing Chicago

DANIEL BLUESTONE, 1991

London and New Haven Conn. Yale University Press.

235pp. illust. £28.00

ISBN 0-300-04848 3

Daniel Bluestone's book constitutes a significant contribution to a large literature on Chicago's urban development and architecture. *Constructing Chicago* focuses upon public architecture, examining the development of parks, churches, skyscrapers, civic architecture and the City Beautiful movement. These themes taken together embrace the period from the city's founding in 1830 to the 1909 plan for Chicago. Bluestone challenges the popular conception of nineteenth century Chicagoans as entirely consumed by materialism, arguing that wider cultural sentiments motivated public building development and park layout. By situating Chicago architecture within its wider social context Bluestone argues that the skyscraper ceases to be conceptualised as the modernist product of the 'Chicago School' architects but, rather, fits comfortably with contemporary civic design.

The clear social and cultural emphasis of Bluestone's central thesis is rigorously expounded in the six chapters of his book. Beginning with urban parks the author traces their expansion during the latter half of the nineteenth century. He reveals the continuity between the early devotees of private horticulture, the tradition of public promenading and the development in the late 1860s of public parks. He argues that the provision of parks reflected an urbane ideal as much as a nostalgia for rural life. They were designed to provide an alternative realm to commerce, where class conflict in the sphere of production could be mediated, while simultaneously raising the land values of surrounding affluent residential neighbourhoods. Bluestone emphasises the extent to which the intention of park promoters to integrate all social classes and to create civic unity was never realised, the park movement serving to establish the cultural ascendancy of bourgeois values.

The addition to the social and economic function of parks Bluestone elucidates their physical significance in the physical planning of the city. He argues that the park and boulevard system helped to define a new physical and metaphorical boundary for the city, containing and excluding commercial activity. In Chapter Two this planning theme is pursued further in examining different park designs. The author examines the ways in which park planners shaped nature as a commodity, producing an idealised urban environment where social activity could be channelled and influenced. Beginning with the 'prairie-like simplicity' of the South Park plans produced in 1870, Bluestone traces the developments in park design to the more formal designs of The West Parks and the boulevard system. He concludes that divergent interests were at work in the nineteenth century park movement between the provision of landscapes for solitude and the allocation of space for the massing of large crowds.

Bluestone's thorough analysis of the nineteenth century park movement is provocative in challenging the conventional interpretation of urban parks as 'retreats'

from commerce to pre-industrial patterns of urban or agrarian life. He situates the park movement firmly within its social context by examining the social meaning of park provision. Perhaps the only criticism of Bluestone's approach is that the impact of parks upon land values could have been more systematically pursued.

The theme that wealthy Chicagoans sought urbane and polished symbols to counterpoise commerce and reflect their urban lifestyles is developed in Bluestone's analysis of ecclesiastical architecture. Grand churches, like large landscaped parks, involved the commitment of capital to ostensibly non-pecuniary activities. Bluestone traces developments in ecclesiastical architecture from the unspecialised forms of vernacular architecture of the 1830s to the later generation of large Gothic revival structures. He argues that ostentatious church architecture reflected the materialism of middle class and upper class Chicagoans. The movement of churches away from central to suburban locations is meticulously traced. He notes that churches were 'pushed' by the monumental form and visual dominance of tall commercial buildings, while they were 'pulled' by the large pew rentals and rising land values of wealthy new residential areas. The suburbanization of churches, it is argued, underscored the separation between commerce and other urban activities.

This analysis of church architecture is concluded with an examination of a minority of churches which remained within the central area through the building of commercial edifices which housed both commercial and ecclesiastical functions. Bluestone argues that the leaders of these churches were prepared to blur the physical and theological distinctions between secular and religious forms, recognising in the tall office building images and expressions of spirit, refinement and uplift.

This theme provides a fitting sequel to Bluestone's subsequent chapter on skyscraper architecture where he argues compellingly that this building type symbolised the sanitization of urban commerce. He examines the 1880-1895 skyscraper boom and comments that the skyscraper represented the reformulation of business imagery as office work became physically separated from industrial production. It is argued that an important element of the separation and sanitization of office work was the creation of an appropriate architectural symbolism through the use of rich interior decor, highly embellished lobbies and elevators and emphatically monumental and ornamented entrances. The level of services in the new skyscrapers compared favourably with older office buildings, while from building layout to facade design careful attention was afforded to the provision of natural light. A cultural definition of the office environment was achieved which was distinct from industry, forging a conceptual link between the skyscraper and the parks movement. These 'refined' environments with their restaurants and rooftop gardens constituted an acceptable arena for middle class men and women.

Bluestone's analysis of skyscraper architecture confronts the mainstream approach of architectural historians which views the 'Chicago School' architects as producing functionalist designs, thus anticipating important elements of the modern movement. Yet while Bluestone provides a stimulating analysis of the rich architectural detailing of these early skyscrapers, and links this to the functional division between industrial production and office work, the reader is left with the feeling that the economic processes surrounding the development of these buildings remain opaque. After all, why should such developments in office architecture have occurred in such a short time period. Perhaps the onus was on the promoters

of these massive and costly enterprises to ensure that they were effectively marketed. The cost of not doing so would surely have been considerable.

From an analysis of skyscraper architecture Bluestone considers the civic landscape of Chicago, arguing that the skyscraper served to focus Chicagoans' commitment to the creation of a civic realm. Chapter Five examines the efforts of Chicago city builders, from the city's founding to the 1880s, to develop a civic sphere. Four civic buildings are selected as expressing the unfolding of the philosophy underlying civic architecture in Chicago at the end of the century — the Chicago Public Library, the Art Institute, a proposed new City Hall and a new federal building. Bluestone argues that the expensive classical facades of these buildings expressed prominent Chicagoans' sense of cultural ascendancy. In this context he discusses the opposition there was to a 14 storeyed 'commercial style' design for a new Chicago City Hall and Cook County Courthouse.

In Chapter Six the City Beautiful movement is presented as a resolution of the tension between monumental civic architecture and the commercial skyscrapers of the central district. While skyscrapers dominated the air the city beautiful plans called for an architecturally harmonious ensembles of civic buildings which were articulated horizontally. The chapter examines a variety of civic centre plans that were produced in the 1890s and culminated in the 1909 plan. Bluestone challenges the role that many scholars have afforded to Burnham in the formulation of the original lakefront plans. He argues that the Chicago Municipal Improvement League and the Commercial Club of Chicago, which comprised prominent Chicagoans, were influential in formulating lakefront plans. In advocating City Beautiful designs these groups were addressing pressing class relations. The formal civic space of the lakefront was designed to unite the community in a similar way to the less formally structured spaces produced by the city parks movement.

The analysis of the City Beautiful movement is concluded with a discussion of the collapse of its social and aesthetic aspirations, leaving only fragments of the 1909 plan — the Lakefront Park and the parkway system. Bluestone points to the unwillingness of civic institutions to relocate to a civic realm, arguing that the bureaucracies of these institutions had expanded so that their building requirements were more analogous with business. The design for the new courthouse is discussed in this context since it combined the more ornate facade of civic architecture with the internal requirements of a modern tall office building, combining the images of dignity and utility. As Bluestone observes it was the beginning of a conflation between civic and commercial form which became marked in the early twentieth century with the commercial appropriation of refined images of civic architecture.

Bluestone's book provides a thought-provoking analysis of nineteenth century public architecture in Chicago, exposing the broad cultural context of public building development and civic design. It constitutes essential reading for the student or scholar of architecture or urban studies since it provides a fresh interpretation of a fascinating period of Chicago's history, challenging the 'Chicago School' consensus of much published work. The book is well structured, beautifully illustrated and a pleasure to read.

JANE BONSHK, *University of Manchester*.

Robert Maillart and the Art of Reinforced Concrete

DAVID P. BILLINGTON, 1990

Cambridge Mass. and London. MIT Press.

151pp. illust. £53.95

ISBN 0-262-02310-5

Professor Billington's earlier work was largely on the mathematics of thin concrete shells. It took the conventional academic line that engineering science is the core of engineering understanding. But he then started teaching architecture students about structure and found, as many of us have done, that valid structures can be designed and understood without the use of symbolic structural theory. The students challenged him to find ways in which they could learn from the structures and engineers they admired, including the structures of Robert Maillart. Again as many others have done, Professor Billington perceived qualities in Maillart's works which could not be discussed within the reductive approach of academic engineering.

Engineering is not a linear rational problem-solving matter: value judgements are inevitable in the creation of an engineering artefact. Billington perceived that one influence is aesthetic, and that some engineers have exercised their aesthetic judgement to greater effect than others; and that it is possible to discuss this aesthetic component of engineering creation.

Professor Billington's first book in this direction was *Robert Maillart's Bridges: the Art of Engineering* (1979), whose primary goal was to 'explore structural form as it arises out of aesthetic feelings and scientific ideas.' In *The Tower and the Bridge* (1983) he expanded this line to include the work of many other designers but also focused his research 'to show how that tower and that bridge (Eiffel and Brooklyn) are only two of the numberless works of engineering that constitute a new art form, structural art, which is parallel to and fully independent of architecture'. In that book Maillart was seen as a mature structural artist in reinforced concrete. Now comes the present volume, which apparently only just precedes his biography of Maillart, *The Engineer as Artist: A Life of Robert Maillart*.

The book has three stated motives. First it is 'a visual demonstration of the purest engineering structure as art... focussed on Maillart'; to this end it contains new specially-commissioned colour photographs of the structures. Alongside this perhaps 'coffee-table' aim is a desire 'to explain by detailed analysis how his ideas unfolded from the first major work, the Zuoz bridge of 1901, to his last one, the Lachen bridge of 1940.' Behind this is Billington's belief that 'Maillart's structures hold the key to new and untried forms for the future of both structural engineering and architecture'. For this last motive he effectively presumes, but does not state, that the argument of *The Tower and the Bridge* is accepted. The present book cannot then be properly reviewed except in relation to the previous two.

In the present book Billington repeats his thesis from *The Tower and the Bridge* that structural art 'has three basic ideals: efficiency, economy, and elegance.' He claims that 'For Maillart, efficiency meant the use of as little material (concrete and steel) as possible consistent with a large margin of safety'; economy was the 'integration of form and process' to produce 'competitive construction costs as well as freedom from future maintenance'; and elegance was 'the maximum personal expression of the designer's vision consistent with efficiency and economy'. These ideals sound like a Modernist engineer's restatement of 'firmness commodity and

delight', and the Modernist feeling is reinforced by his view that structural art has political and social aims reminiscent of a 1920's 'zeitgeist'. In the 1983 book he wrote that, 'Structures... provide a key to the revival of public life', and 'when structure and form are one, the result is a lightness, even a fragility, which closely parallels the essence of a free and open society.' In the present book he writes that, 'The vision represented by these works expresses ideas central to our age to no other; conservation of natural resources, parsimonious use of public funds, and images that symbolise the designer's search for a balance between discipline and play.'

Robert Maillart's development of concrete in Switzerland in the first 40 years of this century resulted, amongst other things, in some unprecedented and beautiful precisely formed bridges juxtaposed against the sublime wild grandeur of the Alps, their small scale in comparison to their mountain setting balanced by their clarity and power. These forms were made in the cause of opening-up mountain communities to a freer, more public, democratic life. Therefore Billington can place them unhesitatingly within structural art as he understands it, and his analysis of them occupies the bulk of the book.

Maillart also developed the flat slab concrete floor as we know it. In the book, his work on flat slabs is represented by interior views of two early buildings which have prominent column heads, yet it was the experimental floors of 1908-14 without heads which proved both most efficient and economical. They have been of most interest to architects and subsequent generations of engineers for the possibilities for elegant play they opened up. After Le Corbusier's early exploration of its potential in the 'Dom-ino' houses project of 1914, the flat slab became a key structural form in his inter-war work, as well as in that of Mies van der Rohe and others. So the expressive possibilities of Maillart's development were first realised by architects, not engineers. And yet Billington claims that 'the ancient principles of architecture, so deeply embedded in Western culture, could make no room in their canon of modern design for the new forms arising out of utterly different materials, especially one with such baffling qualities as reinforced concrete'.

Maillart also designed a number of sizeable buildings, including the Magazzini Generali in Chiasso of 1924. The catenary supported and Vierendeel braced pitched roof frames are discussed, but the much larger plain serviceable warehouse building, which the roof serves and which dictated its spans, is never mentioned. Billington's structural art cannot encompass buildings, for there the ideals of efficiency, economy and elegance come up against other powerful ideals and functions. These may be just as rooted in a desire for freedom and democracy, but value judgements have to be made to balance one ideal with another. The elegance which may well result is consistent with more than just efficiency and economy as Billington defines them.

Maillart also designed bridges in urban settings which visually conform more to older forms derived from masonry construction. Billington omits them from this book, despite discussing them with intelligence in his first book, just as he has never shown the exterior of Maillart's urban buildings. It appears that Billington's structural art is compromised by juxtaposition with other artefacts of a similar scale and by an urban setting.

Even within his self-imposed limits, Billington's discussion is incomplete. For instance, when discussing Maillart's different arch and beam bridges, he does not mention the influence of ground conditions on the choice of an economic and efficient structural type and its span, and on the reconciliation of sub- and super-

structure. In consequence, he cannot properly discuss the problem posed by the arch bridges. They clearly gave Maillart difficulty in how to design the primary springing of the arch from the abutment so that the secondary vertical supports to the deck are also accommodated elegantly. He is also selective in the aspects of the favoured few bridges that he does discuss: for example his dislike of the edge thickening of the cross walls of the Valtschielbach bridge emerges in a note which can be read to imply that it was not by Maillart.

I agree with Billington that the pursuit of the ideals which he posits for structural art can lead to powerful aesthetic qualities, but I would disagree with him that these distinguish structural art from architecture. The qualities he admires can be found in architecture from many periods of history but it is usually their fusion with other qualities, rather than their exclusive presence, which gives that architecture its power. It seems to me less helpful to engage in the semantic discussions which his definitions of structural art and architecture require than to recognise that buildings and structures require their designers to synthesise a range of ideals which will be given different weightings by different designers in different artefacts. I think it is more useful to see the artefacts that he claims for structural art as part of a continuous spectrum which includes civil and structural engineering and building, as well as what we call architecture.

Returning to the first of the book's motives, my own reaction was that the contemporary photographs and Billington's own amateur photographs in the earlier book aroused more curiosity than the rather undramatic colour views that were commissioned for the present book. I also thought that the line drawings of the earlier book were more apposite: for instance the two drawings of the Aarburg bridge in the present book explore a point of detail which I suspect many people will find trivial. As an analysis of the unfolding of Maillart's ideas, this new volume is highly selective in the works it discusses and it refers to few of the primary sources, but to much more of Billington's own output. However the book does discuss some of Maillart's bridges which did not appear in the earlier volumes, particularly the beam bridges. It also does try to include most aspects of each work in the analysis, and so is a proper attempt at structural criticism. More the pity that it started from a predetermined stance which has slanted the whole book.

My overall advice would be to read Billington's earlier books to get a taste of how inspiring and yet infuriating he can be. If you admire Robert Maillart you can buy this new volume, or you can save up for Billington's forthcoming biography of him. Let us hope that the biography will give an open, unprejudiced account of Maillart's life and works, based on Billington's unique knowledge of the relevant sources. But of course the most important thing to do, if at all possible, is to go and look at Maillart's structures in the raw and think about them without the burden of preconceived theories.

ANDREW SMITH

Aesthetics of Built Form

ALAN HOLGATE, 1992.

Oxford. Oxford University Press.

290pp. 99 illust. £40.00

ISBN 019-856336-1

This book, the author claims, 'was conceived as a brief introduction to the aesthetics of built form for those who have not had time to discover the subject for themselves', and was 'particularly intended for busy structural engineers'. While Holgate has provided a good overview of a wide range of different attitudes to the aesthetics of built form, I fear that it will not be widely taken up by those, especially the structural engineers, who have been too busy to read anything on the subject hitherto; nor will it rival any of the standard academic works on the aesthetics of architecture.

After two introductory chapters on the nature of aesthetics in general, Holgate devotes the next six to presenting some of the different attitudes which architectural critics have developed in order to describe their feelings about the beauty and quality of buildings throughout history. He begins by considering formal analysis in terms of perceptions and the subjective response to them. The following chapters then consider the building as a means of communicating ideas between the architect and the user or viewer of a building: first the notion of architecture as a language with structure, syntax and grammatical rules is discussed; then the political and moral content of buildings and the functionalist view of the built form.

The book concludes, by way of addressing the particular reason for the author having become interested in aesthetics and having written the book, with a discussion of '*Aesthetics and the Philosophy of Structural Design*'. Sadly, this part, which should be a major contribution to the book, fills a mere five per cent of its pages.

The subject which Holgate has tackled is an important one. It is essential for all of us who are interested in or involved with buildings and other structures which we see around us to be able to criticize them constructively and to evaluate them, whether they be our own work, the work of our contemporaries, or of our equivalents in our past. Only in this way can one build up the sense of identity which results from the ability to justify a view or opinion about the fruits of one's work. Holgate's interest in the subject is particularly significant since he writes from the point of view of a structural engineer. This is rare in a field overrun by architectural critics and historians.

Unfortunately, I find that Holgate has not given us a book which I would happily recommend to a friend who is a 'busy structural engineer' wanting an introduction to the subject of aesthetics in relation to buildings. Such a book should draw my friend in by dint of its inherent interest and the benefit which he might be able to derive from architectural critics' views about architecture in developing his own attitude to buildings. (I would, by the way, recommend my friend to read *The Aesthetics of Architecture* by Roger Scruton, or *Architectural Judgement* by Peter Collins).

The long list of references indicates that Holgate has read quite widely in his exploration of a difficult and very profound subject. However, I was most disturbed to note that he seems not to have encountered Hegel, Kant, Adrian Stokes, Wittgenstein, Wittkower or Wollheim, or Collins' book mentioned above, all of which

I would consider essential reading for anyone wishing to make a useful contribution to the debate about aesthetics in general, and the aesthetics of architecture in particular.

For most of the book Holgate's style is that of academic reportage – 'Bloggs (1965) claims that...' or 'Smith, in his such and such work, tackles the ...'. I would have been more tolerant of what becomes an annoying mannerism if the frequent references to other authors were part of a tightly-argued logical thesis which depended on the cited authors for its coherence, validity or rhetoric. This is unfortunately not the case, and the reader is likely to suspect either a tendency to academic name-dropping, or a belief that the validity of a text is somehow enhanced by frequent citations.

At the heart of these difficulties there lies a rather more fundamental one – namely that the author is attempting little more than to describe the route which he took on his journey of discovery through the subject of aesthetics related to architecture. In writing about it, however, he seems to have fallen between two stools and has provided neither a record of his sense of discovery, growth in understanding and the development of his ideas about the subject, nor an authoritative guide to the aesthetics of architecture founded on first-hand mastery of the subject.

Despite Holgate devoting his concluding chapter to structural design, he manages to leave me with only a weak idea of what his views on the subject really are; and I am not consoled by the possible reply that the book was not intended to present his views, but rather to provide an overview and introduction to help others to form their own views. In a book aimed at engineers I would like to have seen rather more space devoted to discussing the *works* of engineers like Nervi, Maillart, Calatrava, Arup, Torroja, Candela and Peter Rice, and discussing *their* view on aesthetics, rather than merely reporting a few of the opinions of architectural critics about such engineers. Nowhere in the book is the notion of engineering elegance or the *engineering aesthetic* (as Peter Rice called it) discussed. This is often fundamental to the way engineers see structures – in terms of the skill with which a material has been used, or a joint detailed, which shows at once a great understanding of the material's properties, its processes of manufacture, fabrication and assembly, the 'laws' of structural engineering science within which the engineer must operate, and the very labour which lies behind the fact of a piece of a building being just how it is and where it is.

Given the title of the book and the background of the author, one would also have expected much more discussion of the nature of engineering, such as the concepts of structure, form, force and so on, and the different ways in which different people (engineers, architects, the general public) see, or don't see, the engineering aspects of buildings. There was room also for a similar discussion about the different perceptions of historical buildings by ourselves and our ancestors (taking into account the contemporary 'engineering' understanding and knowledge) – Viollet le Duc's and our modern attitudes to the Gothic would have been a good example to study.

It is a lack of discussion concerning such matters which, to a great extent has led us into the position we engineers now find ourselves in, and which Holgate rightly identifies, such as when the engineer feels so very much at sea listening to an architect talking about what his or her building means. Ultimately Holgate has done little to show the way to raising the structural engineer's self-awareness; in

discussing only the architect's idea of aesthetics and built form he has pandered to the traditional role of engineer as subordinate to the architect. It would have been so much more valuable for a book to have been written which might challenge the architect's monopoly on aesthetic judgements.

Finally, an important point has failed to come across in Holgate's book – aesthetics is not simply a body of knowledge or series of facts about people's views on buildings: it is a process, and is inextricably bound up with the idea of criticism. It forms a crucial part of the way young people *become* architects, and is almost entirely lacking in the structural engineer's education. The most pressing message about aesthetics for engineers is that there is considerable reward to be gained by studying buildings, and other structures, both old and new, and learning how to articulate one's feelings and opinions about them, both to other engineers and non-engineers alike.

Despite my reservations on the aesthetics of buildings, especially ones written by engineers, are too rare to ignore. Everyone interested in the interface between architecture and engineering, and the history and philosophy of ideas, should look at this book. It will, at the very least, stimulate them to think again about an important and fascinating subject.

BILL ADDIS, *University of Reading*

The Making of the Urban Landscape

J.W.R. WHITEHAND, 1992.

Oxford UK, and Cambridge Mass. Blackwell.

239pp. illustr. £35.00

ISBN 0-631-17634-9

When the Construction History Society was founded it was designed to appeal to a broad constituency, embracing those working directly in the construction industry, associated professionals, and academics amongst others. The need for a forum for the exchange of views among wide ranging interest groups is clearly exemplified by a book such as this.

Jeremy Whitehand is one of the leading members of a group of geographers who have turned their attention to the built environment of our towns and cities. Their base is the Urban Morphology Research Group at the University of Birmingham. The use of the term morphology, borrowed from the biological sciences, to describe their subject is indicative of their interest in the processes whereby our urban areas acquire their physical form, and how that form changes over time. Indeed, in this work Whitehand is particularly concerned with the agents of change – property owners, developers, builders, architects and planners – whose activities produce the buildings which surround us. As he puts it, his work could well be called 'The Makers of the Urban Landscape'. With such subject matter and such an approach, there should be a good deal of common ground between the urban morphologists and those interested in construction history.

It is there, however, that the difficulties begin to occur. This is a dense work, steeped in the concepts and terminology of a sub-discipline that one does not immediately associate with construction history. The average reader of this journal faced with a plethora of graphs, diagrams and maps, many of which are by no means easy to interpret, and with sentences like, 'Lorenz curves relating to the cumulative percentage of competitions to the cumulative percentage of assessors suggest that between 1850 and 1914 this source of influence on 'town hall' design was highly concentrated and that there was only a marginal change towards greater dispersal during the second half of that period...', might be forgiven if his attention span fatally wandered, and he put the book down never to take it up again. This is a pity because if he persevered – as a reviewer dutifully must – he would find both some genuine insights and a good deal of interest.

Yet even in its own terms the book is curiously uneven. It is more a series of studies connected by a tenuous thread than a coherent whole. It takes three types of urban area – commercial cores, institutional and public areas, and residential areas – and examines the processes and agencies of change in each case. Each section contains a brisk historical introduction, followed by a number of case studies, some based upon secondary sources, such as Cunningham's work on town halls or the *Survey of London* volume on the museums area of South Kensington, and some on original research. This second category includes an analysis of over 900 building applications in Watford and Northampton, which produces some fairly unsurprising conclusions about differences in the timing and nature of change in the commercial cores of such contrasting urban centres, and also a somewhat incomplete study of the campus of Birmingham University. Once again one has the feeling that his conclusion that such large scale schemes implemented over a long period of time are subject to the vagaries of changes in architectural style and

fashions in planning, and are constrained variations in the wider economic climate, could have been arrived at by a shorter road.

In its last third, dealing principally with residential areas, the book springs to life. One reason is that it is only in this section that Whitehand can examine in detail the impact of the planning process on urban development and ask searching questions about the subject that appears to concern him, namely whether the complex system of planning controls introduced after the Second World War aids or hinders what he describes as 'urban landscape management'. His interest in this is by no means purely academic; indeed it has an emotional cast to it. He is a follower of a school for whom 'the past holds the key to the future'. In this view, any new development in an area should harmonise with, and be an organic growth from whatever already exists; that its essential starting point should be the *genius loci*, which is the sum of past experience. In other words, Whitehand adopts essentially a conservationist viewpoint.

To examine how far this philosophy is borne out in practice Whitehand analyses in minute detail the progress of a number of residential developments in Amersham and Epsom. Some of his findings are predictable, such as that owner occupiers, even if they are about to move, show a greater respect for the *genius loci* than outside developers, and that financial considerations are a powerful determinant of the final shape of any development.

By contrast his scrutiny of the role of the local planning authorities does yield some very interesting results. He shows that even in those instances where an application is successful in that it leads to some form of development, only in a minority of cases does the development proceed as first planned. In the remainder, as the result of sometimes protracted intervention by planning officers, the end result is often substantially different from what was first proposed. But, and this is Whitehand's crucial point, in very few cases can it be said that what is eventually built is an improvement on the original proposals. In terms of harmonising with the existing environment it is frequently far less satisfactory. For Whitehand the impact of the planning process, with its adversarial structure and concentration on technicalities, far from being beneficial, often militates against new developments which fit in with the existing landscape.

In expressing such a view, Whitehand is basing his judgement on matters which are not really subject to quantitative analysis, such as architectural style, and he understandably strays into areas where other academics would fear to tread. But he presents arguments which should be taken seriously and deserve wider currency. He bemoans the fact that the theories to which he subscribes have been 'largely overlooked outside academe', but that is chiefly a problem of communication. It is incumbent on the urban morphologists to venture more outside their academic fastness and seek to explain their ideas to those of us less well versed in the arcane mysteries of their discipline. It is no less incumbent on us to provide the means for them to do so through our seminars and journal.

VICTOR BELCHER, *English Heritage*

Civil Engineering 1839-1889: A Photographic History

MIKE CHRIMES, 1991

London. Alan Sutton Publishing with Thomas Telford.

181pp. illust. (including 96 contemporary photographs of engineering works).

£18.00

ISBN 0-86299-933-2

This is a compact treatment of a very broad subject, and therefore good value at its modest price. The title might mislead, because this is not a history in photographs. It is a fully-researched history of Victorian civil engineering, illustrated by about one hundred photographs most of which were specifically taken for project records.

After opening chapters on the origins of civil engineering (long before 1839) and photography (just about 1839), attention is focussed on the expansion of railways as the most visible work of the Victorian engineers. Separate chapters then describe works designed and supervised by officers of the Royal Engineers, which include such buildings as the Royal Albert Hall; Victorian bridge-building; London's railways and termini; harbour and dock engineering; and the least evident but perhaps most beneficial contribution to the nation's life, public health engineering. Then turning to British engineering as an export, together with indigenous engineering in some parts of the world, Chrimes includes chapters on Australia, Europe, India, North America, Latin America and Africa.

No such synoptic history of the world's civil engineering in the Victorian period has existed before. Chrimes writes fluently on every topic, and his reading has clearly been voluminous. The book bears the stamp of one who has long held responsibility for historical and archival materials, including much expansion of the collection, in the library of the Institution of Civil Engineers, where he is now the Librarian. That background has also enabled him to include valuable and extensive bibliographies for every chapter.

As always in a book so full of facts, one finds a few things to quibble at. Occasional errors seem to have crept into the organisation or proof-reading of the text – doubtful dates of publications and photographs, for instance, and a quite incorrect caption ('Glasgow Central station under construction c.1877') to a picture of part of Waverley Station, Edinburgh about 1896, with demolition of the North Bridge in progress in the background.

The photographs are a wonderful collection, at least one third being of construction processes rather than finished works. More than half will be new to all but the most knowledgeable of readers. It is therefore a pity that they have been subjected to so much reduction. Only four are allowed to fill a whole page and many more deserved it.

It is very good news for construction history that the library and archives of the civil engineering profession are in such very good hands.

TED RUDDOCK, *University of Edinburgh*