Analysing Building Construction

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Analysing Building Construction in Time, the ABC Research Matrix

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ABSTRACT

It is necessary to analyse the existing before changing it. That is the only way to regenerate buildings, parts of cities and urban landscapes with conscience. New applied research methods are needed to develop a sustainable environment including our heritage. In my research I concluded: Continuity + Changeability = Durability. Apart from studying relevant literature and other sources I studied seven buildings to develop a method for analysing these buildings.
Past, present and future are all relevant to the buildings. Three levels of analysis have been used to cover these phases. The objective of my research was to identify the qualities of buildings which are relevant when trying to shift from decay to preservation. The influence of construction engineering, the way we can learn from it now, and the way in which a building is able to accommodate change determine the chances of a building's long term survival – the outcome of the interaction of continuity and change.
My research method starts with the contextual aspects: commission; location; architect; typology and design process. The information obtained in the observation stage is reduced to the contextual information which affected the design, creation, existence and preservation/decay of the building. The later sections, which consider the building(s) itself in greater detail, are initially ordered by time: creation, existence, and preservation/decay. Within these, the elements of the building(s) are analysed at three levels: space (interior and exterior); structure (load-bearing elements and elements which determine the structure); matter (shaping the space through materials which affect light, colour, texture, surface, sound, impression, smell, size and weight); building services (climate control, comfort, maintenance and communications). In this way the ABC Research Matrix was created.
The ABC research method will be illustraded by the case study of the Rijksverzekeringsbank ((National Insurance Bank) in Amsterdam.

KEYWORDS

Regenrate, durability, analysing, buildings, time.

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1 INTRODUCTION

In 2006 I finished my dissertation named: Building Construction in the Netherlands 1940-1970, Continuity + Changeability = Durability. This resulted in the research method: Analysing Building Construction in Time. This method was guided by the following themes: Observation - with an engineer's eye, Research analysis and Regenerative conclusions. It is a method to analyse the existing before changing it. That is the only way to regenerated buildings, parts of cities and urban landscapes with conscience. The main result of my research was this new research method. Also one of the conclusions of this research maintains that a new building typology will be needed to develop a sustainable environment including our heritage.

2 RESEARCH THEMES

Architecture is about more than just constructing buildings. Architecture adds meaning to buildings created by technology. In principle, buildings should be durable (in terms of time as well as finance) objects and therefore changeable, flexible. The lifespan of buildings, i.e. architectural objects, is inextricably linked with their ability to accommodate change. Being aware of this, learning from this, considering this when working on completely new design commissions or commissions concerning existing buildings (where technology will always be needed to implement the design) are all challenges associated with modern building practices which take a long-term view.

2.1 Observation - with an engineer's eye

I considered engineering and technology and the views of both architectural critics and practising architects about technology by studying the relevant literature and sources. Technology evolved after the Second World War as a result of the use of new materials, changes in legislation and standards, and the industrialisation of the construction process. Comments about the contribution, or lack thereof, of technical progress to a higher architectural quality were always personal visions primarily shaped by personal taste and habits. Architects developed from supervisors to architect-managers of the entire construction process. Time schedules became an important instrument and working together with structural engineering and building services consultants became steadily more important. The best results were developed on the basis of synergy between the different disciplines.

2.2 Research analysis

When designing either completely new objects or objects to be incorporated into an existing structure it is important to learn from the past. Not to copy it, but to analyse it and apply the lessons learned while respecting the present context. We have to evaluate knowledge and methods and develop our own design method. This learning aspect is emphasised when a design commission concerns an existing building, but even a new build project always has a context. When dealing with an existing building that building provides the primary context and immediately becomes an element of the key points of the architect's brief. In my view, studying criticism, experiences and interviews, and thoroughly analysing the work of others is not adequately included in the education and training of architects as designers yet.

2.3 Regenerative conclusions

Regeneration concerns changes which add a new period, a new generation, to the lifecycle of a building. Life means change and the past means that we progress in a spirit of tradition and memory. Furthermore, change cannot happen without continuity. Changes to buildings are affected by both financial and technical considerations. The existing adds a layer of history which can never be created in a true new build project. During the design and construction of the Trade Union Museum in Amsterdam, housed in the building of the former Dutch Diamond Workers' Union (ANDB), I was introduced to issues related to National Monuments and making changes to such buildings. Fig. 1.
The examples by architects such as Piano, Foster and Herzog & de Meuron demonstrate that leading architects can produce excellent results when regenerating buildings [Powell 1999]. Figs 2 and 3.
The opinions aired by the original architects whose buildings are being changed make it eminently clear that some of them object to any changes to their buildings. Around 1950, architecture critics still felt that architecture amounted to an inviolable work of art. Optional changes were therefore considered an anathema. Architects also resisted changes to their work and event went to court to defend their copyright - it appeared that demolition was not prevented by this copyright but that changes to a building were.
Views about changes also changed themselves. In some cases the original architects are engaged to regenerate their own work. This requires them to take enough distance from "their building" to be able to accept it as a new commission. Of course, this is more likely to happen under legislation which allows listing after 30 years, than under the Dutch system where the period is 50 years.
'Refurbishment is the hard-headed business of making use of what is usable in the ageing building stock; the skilful adaptation of a building shell (which is valuable in its own right and not due to any historic mystique) to a new, or an updated, version of its existing use. The existing building, once refurbished, should be equally as efficient in its new role as a purpose-designed building would be, given the usual number of restraints which always impede the designer realising the ideal in new or refurbished merit and will, by its preservation, improve the amenity of the environment, so much the better.'[Marsh 1983].
To give regeneration a real opportunity, it is particularly important that those initiating projects are prepared to consider regeneration and do not automatically choose demolition. Bringing about this change in attitude is particularly relevant with respect to buildings dating from after 1940. There are definitely opportunities for such buildings in both the near and distant future.
Demolition amounts to a waste of energy and is neither durable nor sustainable, while reuse, changes in use and regeneration of buildings are.
Without a past there can be no future, and changes can only occur if there is continuity. The "creative re-use" advocated by Latham can produce a built environment stratified in time and therefore rich in appearance and the way it is experienced [Latham 2000]. Demolition is sometimes the best option and there is no need to preserve everything. However, a careful assessment which gives serious consideration to repurposing, reuse and regeneration provides many opportunities for creating a rich spectrum of buildings.

Figure 1. The ANDB building in Amsterdam from erected in 1900 by architect Hendrik Petrus Berlage. Regenerated in 1988 by the author at the office of Atelier PRO The Hague.

Figures 2 and 3. The Tate Modern in London, erected in 1963 by Sir Giles Gilbert Scott. Regenerated in 2000 by Herzog & de Meuron.

3 ANALYSING BUILDING CONSTRUCTION IN TIME

Past, present and future are all relevant to buildings. Three levels of analysis have been used to cover these phases. Where buildings are concerned, we have to look at creation, existence and preservation/decay. The objective of my research was to identify the qualities of a building which are relevant when trying to shift from decay to preservation. Main issues for redevelopment are: space and structure. The influence of construction engineering, the way we can learn from it now, and the way in which a building is able to accommodate change determine the chances of a building's long term survival – the outcome of the interaction of continuity and change. Research can provide data for careful and imaginative observation and analysis. The conclusions which can be drawn in this way may help us make discoveries to understand a building when either designing or redesigning it. Fig. 4.
My research didn't only result in relevant conclusions, but also in a research method which will be applied to the subjects covered by the Faculty of Architecture of Delft University of Technology and could be used on international scale. It is a method to analyse the existing before changing it. That is the only way to regenerated buildings, parts of cities and urban landscapes with conscience. Analysing Building Construction in Time aims to discover the qualities of a building, rather than its value. Observation, the first stage of the research, aims to obtain information from the literature, the building itself, archives and interviews with stakeholders. The second stage, analysis, includes structuring, analysing and interpreting the information. In the third stage, conclusions can then be drawn on the basis of the research themes discussed above. The information is structured in accordance with the research brief. In the long term, it will be possible to identify connections (concerning both buildings and building construction) between the results of Analysing Building Construction in Time, using the research themes defined by me. The information obtained in the observation stage is reduced to the contextual information which affected the design, creation, existence and preservation/decay of the building. Context is the title of the first section in which the contextual aspects are discussed: commission; location; architect; typology and design process. The later sections, which consider the building itself in greater detail, are initially ordered by time: arising, continuing and expiring. Within these, the elements of the building are analysed at three levels: space (interior and exterior); structure (load-bearing elements and elements which determine the structure); material (shaping the space through materials which affect light, colour, texture, surface, sound, impression, smell, size and weight); building services (climate control, comfort, maintenance and communications). In this way the actual research ABC Research Matrix was created. Fig. 5.

Figure 4. Palace of Justice in Arnhem. Renovated and extended with an extra floor in 1996.

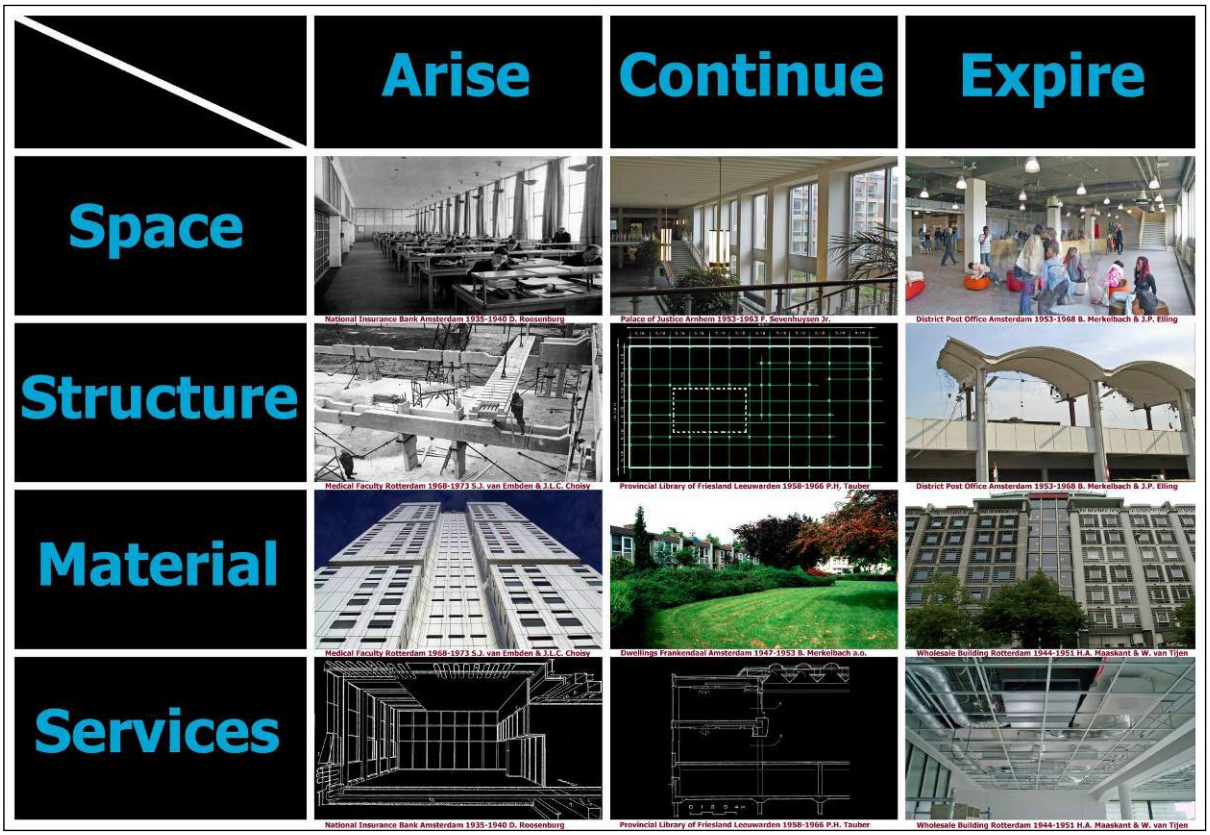

Figure 5. The Analysing Building Construction in Time Research Matrix.

4 CASE STUDY: RIJKSVERZEKERINGSBANK AMSTERDAM 1935 – 1940

Architect D. (Dirk) Roosenburg (1887-1962) designed the Rijksverzekeringsbank (National Insurance Bank) building for the Plan Zuid (South Plan) in Amsterdam drawn up by H.P. (Hendrik) Berlage (1856-1934) who also made the first sketch design for the building in 1925.
The premises of the Rijksverzekeringsbank, the body responsible for the implementation of social security legislation in the Netherlands since 1901, were to be built at the site of the Kunstenaarshuis. At the time the commission for this building was being defined, Roosenburg worked at Berlage's office where he worked on Holland House in London which has some similarities with the later Rijksverzekeringsbank. In 1916 Roosenburg set up his own practice in The Hague, which now operates under the name LIAG.
The high-rise section of the Rijksverzekeringsbank intersects the site diagonally and was placed on top of a round building housing the archives. The ring shape was imposed by the 'adressograeph', the machine transporting the filing cards. The shipping department and plant rooms (accessible by truck) were located in the basements. Fig. 6.
The above-ground part had a prefabricated steel structure. The entrance to the office block was placed in the middle, the section at the front was wider than that at the back and the floor-to-floor height was 4.95 metres. The hydronic heating system installed in the ceilings could also be used for cooling. There was an innovative ventilation system installed, all in accordance with the overall design. Fig. 8.
Originally, the building was clad with ceramic tiles, in 1968 LIAG architects replaced these with smooth travertine cladding. Unfortunately this meant that the original texture and relief effect were lost. Based on insufficient research the decisions were made. All the architectural drawings, including those of the ceramic facade tiles, are archived at the NAi. Similarly, the roof terrace was replaced by a large plant room.

The building was extensively modified in 1993. The ring was demolished and then rebuilt with a car park underneath it. The ring also gained a floor level and was used as offices. The steel window frames were replaced by a reasonable alternative in aluminium. In the office section, a floor was inserted in the double-height space at the front of the building and a new stairwell was built, intersecting the structure. The interior was furnished with precious woods, dark colours, suspended ceiling and high-pile carpet for a law firm which left the building after only five years. The service systems have been removed completely. They functioned very well, but described as 'out of date'. Ceilings were covered by suspended tiles, creating a space for new ducts of one and a half meter height. The next refurbishment was undertaken in 2002. However, the sense of light and openness of the past would never return. Fig. 7.
The technical options are those of just before the Second World War; the steel structure was partly prefabricated; the plant engineering was innovative; part of Berlage's Plan Zuid for Amsterdam. For this study, the building of the Rijksverzekeringsbank was analysed as offices and archives.
The Rijksverzekeringsbank was a technically impressive and beautiful building. It was an example for the technical possibilities just before the Second World War started. Its exterior was seriously affected by the 1968 refurbishment. If a more serious research should have made the reasons for the problems and the qualities should have been recognised. Later, too much money was thrown at it to remove the internal structure and it was pretentiously furnished, resulting in a complete negation of the building's original lightness and neutrality. In 2008 the building will be left again from the nowadays tenant, maybe an opportunity to get back to some of its original ideas that were an example of durable use of materials and services. The unique techniques could be analyzed by the ABC research method. Some of the conclusions out of the research are:
The height of the floors to 4.95 m, is one of the most important factors for possibilities in future change of buildings. As a starting point of the design of new buildings, in consideration of the regeneration of buildings, it is necessary to create an excess of measure in length, depth, height, tolerable load and infrastructure. The future is always unknown so it is better not to waste money on options for future modification as change is always unpredictable, but instead invest in space, dimensions, permissible loads and avoid the unnecessary use of elements which are specific to the building and difficult to reproduce. Examples to support this include the envisaged expansion of the Rijksverzekeringsbank with two floors which never happened, however the roof was fully occupied and the floor loads throughout the building allowed its use as archives.
The results of the ABC research of the facade of the Rijksverzekeringsbank proved that mistakes were made during refurbishments because the technical aspects of these buildings had not been studied in sufficient detail. Construction engineering research is an instrument to show what changes have been made so far and how the building was originally intended to look. Identifying these essences requires a study of the design history of the building. Decisions should not be taken lightly just because generous funding is available. [Zijlstra 2006].

Figures 6 and 7. The Rijksverzekeringsbank in Amsterdam the exterior still under construction in 1939 and the original interior in 1941.

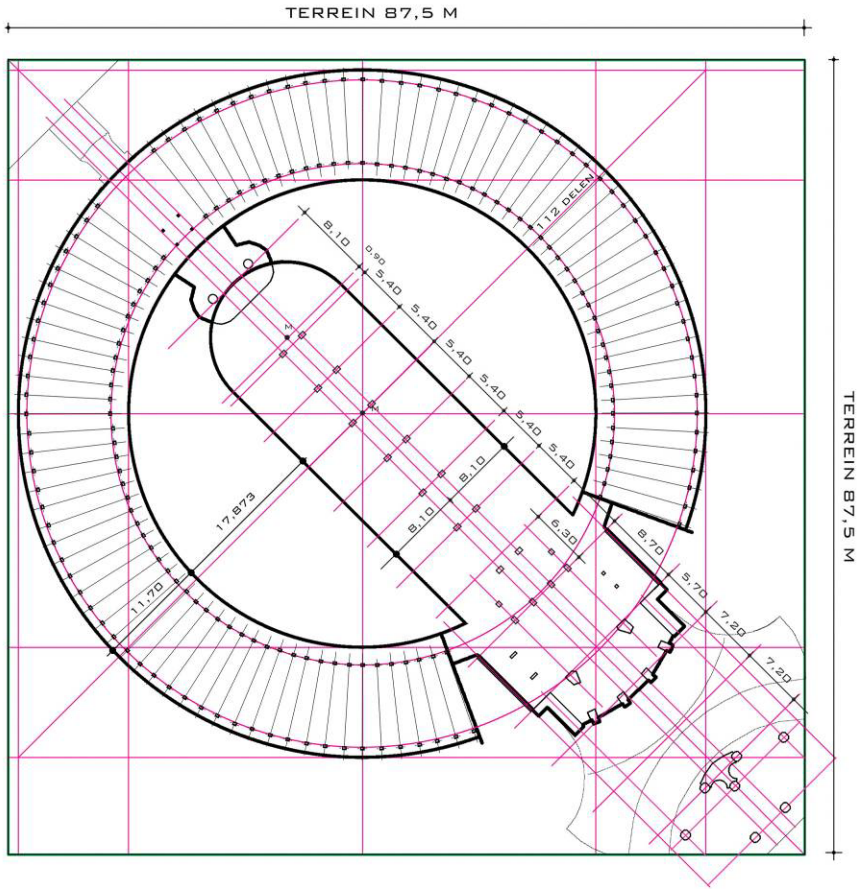

Figure7. The Rijksverzekeringsbank in Amsterdam reduction drawing of the floor plan.

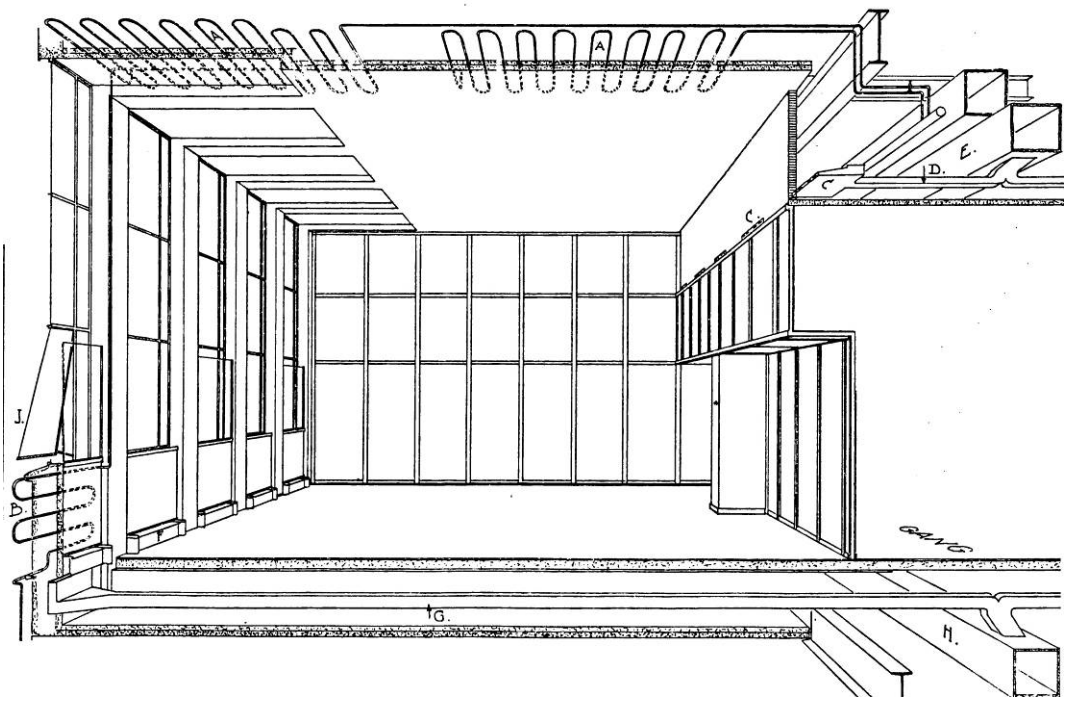

Figure 8. Section of the Rijksverzekeringsbank Amsterdam with the concept of services for heating and ventilation.

5 CONCLUSIONS

The influence of Analyzing Building Construction in Time, the way we can learn from it now, and the way in which a building is able to accommodate change determine the chances of a building's long term survival – the outcome of the interaction of continuity and change. Research can provide data for careful and imaginative observation and analysis. The conclusions which can be drawn in this way may help us make discoveries to understand a building when either designing or redesigning it. A careful assessment which gives serious consideration to repurposing, reuse and regeneration provides many opportunities for creating a rich spectrum of buildings.
Past, present and future are all relevant to the buildings I have investigated so far and those which I will be investigating in future. I use three levels of analysis to cover these phases. Where buildings are concerned, we have to look at creation, existence and preservation/decay. The objective of my research is to identify the qualities of a building which are relevant when trying to shift from decay to preservation. Change and durability appear to be intimately linked to guarantee a degree of continuity of our built environment:

CONTINUITY + CHANGEABILITY = DURABILITY

Engineer-architects should not only be familiar with architecture (as the art and science of designing and constructing buildings) but also with building engineering (as the science of what is needed to construct buildings). However, architecture is about more than just constructing buildings. Like the case study of the Rijksverzekeringsbank in Amsterdam proved. Architecture adds meaning to buildings created by technology. In principle, buildings should be durable (= able to exist for a long time without significant deterioration in terms of time as well as finance) objects and therefore changeable, flexible. The lifespan of buildings, i.e. architectural objects, is inextricably linked with their ability to accommodate change. Being aware of this, learning from this, considering this when working on completely new design commissions or commissions concerning existing buildings (where technology will always be needed to implement the design) are all challenges associated with modern building practices which desires a long-term view to produce real durable buildings.

ACKNOWLEDGMENTS

Figures 1-5 and 7 by the author.
Figure 6 from: Liag Architects.
Figure 8 from: Geneeskundig tijdschrift der Rijksverzekeringsbank, (1940) 3.

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