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The Modern Abattoir as a Machine for Killing: The Municipal Abattoir of the Shanghai International Settlement, 1933

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Abstract

This paper tells the story of the production of a public abattoir in Shanghai, an extraordinary series of multi-storey concrete structures, functionally dictated by slaughter, set behind an art deco façade.

Biography

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On-line abstract

The public abattoir emerged as an institution across the industrialized world in the mid-nineteenth century to centralize and control animal killing and meat processing that had traditionally taken place in private slaughterhouses. The modern idea of the abattoir, however, is more than a place where animals are killed for human consumption. Designed to optimize a *disassembling* process that efficiently took apart the livestock into small pieces, the modern abattoir is one of the earliest building types where the production line was incorporated into the spatial layout. Modern abattoirs also separated livestock from people, and production from consumption, into special places removed from public view.

This paper is concerned with the production of a public abattoir in 1930s colonial Shanghai. The Shanghai Municipal Abattoir, completed in 1933, was deliberately designed to effectively apply the production-line principles for efficient slaughtering as a ‘machine for killing’. The result of this functionalism was an extraordinary series of multi-storey concrete structures, dictated by the bloody business of slaughtering animals and processing their carcasses, set behind an art deco façade. In this paper we seek to tell the story of the production of a building that has previously been little researched, with most of the archival material in Shanghai Municipal Archives (SMA) and the limited published material available only in Mandarin.

The Modern Abattoir as a Machine for Killing: The Municipal Abattoir of the Shanghai International Settlement, 1933

Introduction

The public abattoir emerged as an institution across the industrialized world in the mid-nineteenth century, a facility intended to centralize and control animal killing and meat processing, processes that had traditionally taken place in private slaughterhouses.¹ The modern idea of the abattoir is more than a place where animals are killed for human consumption. It is also designed to optimize a *disassembling* process that efficiently took apart the livestock into small pieces. The modern abattoir is one of the earliest building types where the production line was incorporated into the spatial layout, preceding by decades Henry Ford's *assembly* line for the automobile.² Modern abattoirs also separated livestock from people, and production from consumption, moving production into special places removed from public view.³

This paper is concerned with the production of a public abattoir in 1930s colonial Shanghai. The Shanghai Municipal Abattoir, completed in 1933 and located in the International Settlement of Shanghai (1854 - 1943), was deliberately designed to apply production-line principles to the efficient slaughter of animals, in a 'machine for killing'. The result of this functionalism was an extraordinary series of multi-storey concrete structures, the organisation of which was dictated by the bloody business of slaughtering animals and processing their carcasses, set behind an orientalised art deco façade. The principal abattoir building consisted of two structures; an outer rectangular building for holding stock and chilling carcasses and an inner cylinder building for killing animals. The combination of these two structures consequently forms two voids within the building envelope, with a series of bridges at different levels spanning across the two voids, connecting the animal stalls to the slaughter halls, and from there to a vertical circulation core. This was no anonymous warehouse but sophisticated architecture and concrete sculpture.

In this paper we seek to tell the story of the production of a building that has previously been little researched. We draw on archival material in Shanghai Municipal Archives (SMA) and the limited published material, which is available only in Mandarin. First though, we provide some context on the development of the modern abattoir, describing the early emergence of public abattoirs in the nineteenth century and the later evolution of the building type toward a sophisticated multi-storey slaughter machine.

The Nascent Modernism of the Abattoir

The development of the modern idea of abattoir was a post-Enlightenment and Romantic-era project. Following the writings of thinkers such as Jeremy Bentham, and subject to cross-

national exchange and study, the modern abattoir increasingly became the site of an industrial and mechanized process, fascinating to the nascent modernism of the architectural profession around the turn of the twentieth century. In this short account we focus on the development of the abattoir, its mechanization, and the efforts that were made to promote model templates for abattoirs before considering the development of the multi-storey abattoir, including schemes by significant progenitors of modern architecture –Tony Garnier and the young Le Corbusier.

Model abattoirs and the Industrialization of Slaughter

Attempts to create a template for an efficient and humane abattoir date back to the early nineteenth century. In writing on mechanization in relation to death, Sigfried Giedion started with a celebration of the Central Slaughterhouse of *La Villette* (1867), the largest establishment in France, situated in the outskirts of Paris and erected by George Eugène Haussmann.⁴ For Giedion it ‘became *the* abattoir, a prototype for the rest of the century, just as the boulevards and public parks of Haussmann’s Paris became models from which every growing metropolis of the Continent took pattern’.⁵ In Britain a modest literature in model abattoir design developed. For example, Benjamin Ward Richardson, President of the Model Abattoir Society, advocated ‘the abolition of every private abattoir ... and the erection instead of large public abattoirs, open at all times to the inspection of the public’ and detailed the main components such model abattoirs should contain.⁶ In 1908 R. Stephen Ayling published *Public Abattoirs: Their Planning, Design, and Equipment*, setting out both the component parts of a model abattoir and a range of design principles, including site selection, use of materials, good natural lighting and ventilation, and stating that animals should not be able to observe the killing of others.⁷ Particularly revealing in this work are his case studies of a series of examples in the UK and Paris, illustrated with architectural drawings and photographic images. One of the cases Ayling included, used the floor plan of a Model Abattoir, proposed by the Model Abattoir Society [1]. Designed by Richardson, the main building features three circular plans, each of which would be used for slaughtering a particular type or size of animal. Moving from the periphery to the centre, each consisted of an outer ring of lairs, a lethal chamber travelling on circular tram lines, a round slaughter hall with eight radiating bays, and a small central room where the inspector could have a full view of all the slaughter bays. Hanging and cooling rooms were detached from the main building but connected to the slaughter hall with overhead tracks so that carcasses could be conveyed with little human handling.

Mechanization was increasingly prevalent in these schemas. The mechanization of animal killing was first developed in the 1850s for the hog slaughter industry in Cincinnati. The role of Cincinnati as the largest centre of slaughter and meat packing industries in the United States was, however, soon overtaken by Chicago, known for its large slaughter premises, the Union Stock Yards. Despite its reputation for its vast size and the large quantity of meat processed, the Union Stock Yards were not purpose-built premises but incrementally

constructed to no overall plan. The growing quantity and the extended variety of animals processed by public abattoirs, such as the Union Stock Yards, necessitated the development of new instruments designed to process animals in more efficient and mechanized ways. The two decades from the 1860s to 1870s consequently witnessed the invention of various apparatuses patented for catching, killing, suspending, cleaning and scraping animals [2, 3].⁸ Christopher Otter notes that:

*The abattoir was above all imagined, planned and constructed as a machinated space. Animal and meat were to be 'handled as little as possible'; hooks, pulleys, rails, electric sausage-mincers, and hog-scraping devices made slaughter and dressing an act increasingly performed by machines rather than humans.*⁹

Total mechanization was, nevertheless, simply not possible. The inventions patented in the late nineteenth century for mechanizing and speeding up production processes in the abattoir often required direct human agency and skill to effect slaughter.¹⁰ Mass production, however, required a strict separation and a logical sequence of all the operations. The ideas and procedures tried out by the nineteenth century slaughter and meat packing industries established good precedents for Henry Ford's production line for 1908 Model-T.¹¹ Giedion asserts that '[t]he automobile industry was able to work out its own assembly line with such astonishing speed because of the extensive practice gained here in working on the moving object'.¹² We should note, however, that these two production lines run in a reverse direction. While the assembly line in the automobile factory put together simple parts to form a complex whole, the disassembling line in the slaughterhouse took apart a complex whole and made it simple.

Multi-Storey development: movement, gravity and verticality

At the time that Richardson and Ayling were working on a Model Abattoir prototype in England, Tony Garnier and Le Corbusier began to take an interest in devising schemes for abattoirs that effectively integrated the mechanized process of slaughter into the spatial layout. A slaughterhouse appeared in the 2nd version of *La Cité Industrielle* (1901-04), the renowned hypothetical plan of the industrial city proposed by Tony Garnier. The conceptual thinking of *La Cité Industrielle* informed his real projects in Lyon, with a slaughterhouse being the first project. The construction of the slaughterhouse in Lyon began in 1908, but was slow and the building was later appropriated for military use during the war. The unfinished construction work resumed only in 1924 and was completed 4 years later. Paula Young Lee comments that:

*The final version of the slaughterhouse that was built for the working class city of Lyon had, for its centrepiece, a covered holding pen for livestock that could be viewed as kind of industrial cathedral. [...] The whole unit was wrapped inside an opaque sheath of reinforced concrete and placed behind a façade that offered the geometric grandeur of a stepped pyramid dipped lightly in Art Deco motifs.*¹³

The design is very much a functional industrial building, with a one-way funneling system. Lee draws attention to the high-level control of movements of the building design and notes that:

*Through its absolute control of passive bodies being moved through space, disassembled inside a linear trajectory, and expelled as goods, Garnier's plan perfected a mode of architectural order critically centred on movement.*¹⁴

The controlled movement of the production line was one of the main design features of the abattoir that had fascinated modernist architects. This pronounced directional logic of the abattoir is cast by Otter 'as a flowchart', connecting 'a series of functionally distinct and sequential stages'.¹⁵

At around the same time, Charles-Edouard Jeanneret, i.e. the young Le Corbusier, also designed a large American abattoir at Challuy near Nevers in 1917 for a competition held by the US military. In a letter to his parents, he wrote that his design solution was 'the opposite of European methods, and ... surprisingly simple and logical'.¹⁶ With reference to the American mechanical engineer Frederick Winslow Taylor, whose *Principles of Scientific Organization of Factories* had been published in France in 1912, Jeanneret designed the abattoir as three separate buildings interconnected by bridges and conveyor belts – the first cattle stalls, the second the slaughterhouse, and the third refrigeration. Each structure was given a distinctive fenestration [4, 5]. Soon after, Jeanneret designed another abattoir for a site at Garchisy in central France [6, 7]. These two unbuilt abattoirs synthesize the key design principles of modern abattoirs that had been developed since the mid-nineteenth century and were later to be adopted widely around the world in the mid-twentieth century. They are particularly revealing about the evolution of modern abattoir designs toward multiple-floor structures, with verticality expanded to celebrate the dynamics of movement and the force of gravity.

The theatrical performance of various movements in the abattoir – of living animals, lifeless carcasses, butchery workers or transport vehicles – was already evident in the mid-nineteenth century US. Continuous movement is necessitated by the mechanized process of slaughter, which must be separated into several distinct tasks, undertaken independently and in a sequential order. In addition, the stretched movement in the abattoir was necessary to accommodate the required separation between living animals and dead carcasses (a humanitarian and hygienic imperative), and a separation between livestock and people (for the safety of both workers and food).¹⁷ Accordingly, different operational stages were both clearly separated, and prudently connected by horizontal passages or bridges, and by ramps and staircases. These theatrical mechanisms of connection staged the flows of animals, goods and people within the abattoir in strictly controlled directions. However, it was only in the twentieth century that these processes were combined with an overall architectural plan and spatial layout.

Shanghai in the 1920s and 30s

The motivation to construct a public abattoir in the foreign concession in Shanghai reflected – politically, socio-economically and culturally – the realities of life in Shanghai at that time. The city was under multilateral colonial rule and essentially cosmopolitan. From the mid-nineteenth century until 1943, Shanghai was divided into three distinct areas with three separate administrations: Chinese, French and International. The International Settlement was formed by the Americans and the British in 1863 and was managed by the Shanghai Municipal Council (SMC). Each of the areas had its own government administration and police force, and was run as an independent political entity, having with limited interaction with the other areas. The foreigners built their new enclaves around the walled Chinese city. After the 1911 Chinese revolution, the city wall was pulled down and became a boulevard, and the ban on Chinese living and working in the concession areas was also lifted. Chinese businessmen and industrialists flooded into the concession areas to buy properties and establish business.¹⁸ Although foreigners and Chinese had mixed more since the 1910s, each ethnic community mostly ‘stuck to their own language, ate their own food, married their own kind and [...] ran their own clubs’.¹⁹

In the absence of a central authority, Shanghai became a passport-free port, attracting both political refugees and job seekers from many countries. It provided sanctuary for Russian Jews from the pogroms in the 1890s, White Russians from the 1917 Revolution and, finally, a large influx of European Jews from the Holocaust in the 1930s. In the meantime, the Great Depression also prompted the move of many Americans and Europeans to Shanghai. Shiploads of unemployed workers came and the foreign population increased nearly twofold in three years, from 36,500 in 1930 to 70,000 in 1933.²⁰ Despite their different political backgrounds, most newcomers resided in the Western District of the International Settlement and the recently extended French Concessions.²¹ The convergence of political refugees and economic immigrants, together with the growing number of Chinese businessmen and Western educated intellectuals, turned Shanghai into a melting pot and made it one of the most cosmopolitan cities of the era. However, the boundaries of the three cities became a grey area where criminals exploited the loophole between the three administrations, with private slaughterhouses often occupying these spaces.²²

Shanghai Municipal Abattoir

It was within this context that discussions began on a new Shanghai Municipal Abattoir in the SMC administered area, to replace an earlier construction. The proposal to build a new modern abattoir was put forward in 1921 when the original abattoir built by British in 1892 in the International Settlement was damaged by a fire.²³ Over the next twelve years until building completion in 1933, the related departments of the SMC – primarily the Public Health Department (PHD) and the Architecture Office of the Public Work Department

(PWD) – had long discussions, mainly revolving over the selection of a suitable site, the search for best practice, the development of design proposals and construction details.

Six potential sites were considered. Four of those were situated in Yangtzepoo (now Yangpu), which was the major industrial and most eastern area of the Settlement. The other two were in Hongkew (now Hongkou): one was the site of the fire-damaged abattoir and the other was adjacent to it, on Dixwell Road. By 1924 the choice was narrowed to two possibilities: either the Dixwell Road site, or a site in Yangtzepoo that was much cheaper to acquire. The Chief Inspector of PHD argued against making the selection purely on cost grounds and instead argued in favour of the Dixwell Road site, because of its close proximity to the rail station, which would reduce the distance for transporting living animals; because of its proximity to the Hongkew Market where the meat trade was conducted; and because of its relatively central location, close to the customers of the Western District of the Settlement, where the foreign population resided. The Inspector's argument proved compelling, and negotiations accordingly were concluded for the purchase of the Dixwell Rd site, opposite the existing cattle sheds and convenient to the wharves along Hongkew Creek [8].²⁴

With the issue of site finally resolved, from 1926 the focus switched to designs for the new slaughterhouse which were prepared by the Architecture Office of PWD, following the brief prepared by PHD. From the beginning the PWD proposed a two storey structure but, on the one hand, PHD argued for a single-storey approach on cost grounds and, on the other, rather paradoxically, the Municipal Economy Committee, demanded a new design with a larger slaughter capacity. This was an ongoing conflict for some months.²⁵ In due course, new plans of a four-storeyed structure were devised (Plan H and K). At the end of 1928, the commissioner of PWD informed the Acting Secretary of SMC of the latest revision of plan – Layout P. In the letter accompanying the plan the required sections and rooms included in the slaughterhouse and the design rationale for each room were explicated in great detail. These components parts seem to resemble the final plan, according to which the slaughterhouse was built, but it is difficult to infer whether the spatial configuration of Layout P is also similar to the final design.²⁶

The PWD commissioner stated that Layout P met the new requirements specified by the Economy Committee and the plan was 'based on the study and consideration of modern humane methods adapted to Chinese cattle and custom'. Having lairage halls (or holding pens) and cold storage rooms incorporated into the interior space, the new abattoir would be 'self-contained and complete, as regards disposal of manure and waste materials and, other than electric current, should require practically no outside working assistance'. In the meanwhile;

*'the design divides all live stock and foul areas from finished product and clean areas. Cattle drivers and coolies are parted and catered for separately from butchers, dealers and their workmen. At the same time simple access is provided for business communication'.*²⁷

The Architecture Office appeared to be rather proud of their successful attempt in integrating the cattle stalls with the slaughter hall and believed it was unprecedented at that time. It noted:

after consideration of the few abattoirs in existence in other countries, it appears that many are out of date and that each deals with different essentials and no abattoir quite meets the present case with the lairage divided but [in] close proximity to the slaughter halls... [and] also the fact that the animals and butchers and products are not actually the Council's staff or property, but belong to private ownership working under regulated supervision is a special feature.²⁸

From 1928 to 1930 it was a slow and laborious process of adding technical refinements to the operational system of slaughter and making alterations to the plan at the request of the client, PHD. On 31 March 1933, a meeting was held at the under construction Municipal Abattoir with the key personalities in charge from both PHD and PWD to discuss all alterations and deviations from the original plan. From PWD this included the chief architect of the Architecture Office, Charles Henry Stableford, and assistant architect, Arthur Carr Wheeler, understood to have been the principal designer of the new abattoir.²⁹ In October 1933, a letter from the Architect in charge, signed by Wheeler, was sent to the PHD Veterinary Surgeon, Dr. Pedersen, officially declaring the handing over of the new abattoir to PHD for occupation [9].³⁰

International references

As the quote above indicates there were concerted efforts made by PHD to seek examples of best practice from around the globe in 1930, when Layout P was almost finalized and before PWD invited local firms to tender for the building contract. In early March 1930, PHD made enquiry to the Department of Health of New York about public abattoirs in large cities throughout the United States, in particular, in terms of their 'general design and area of site; height and number of stories; and methods of offal disposal'.³¹ The Director in New York passed on the query to other cities and William Veit V.M.D (city Veterinarian) from the Department of Health City of Los Angeles replied to PHD with a long list of instructions for the planning and construction of a municipal abattoir.³² For example,

Floors of all rooms where killing, handling, preparing or storing is done must be impervious and must be constructed of concrete, asphalt, or other non-absorbent material. All such floors must be covered and carried up the face of the wall to a sufficient height to prevent seepage under the floor. Also all such floors must be made with a pitch or fall of not less than one-fourth inch to the foot, and be directly connected with gutters, of the same material, which discharge through properly constructed traps into drain pipes leading to the sewer.³³

Specific advice was also provided by the Toronto Municipal Abattoir Manager. In a letter to PHD dated on 5 June 1930, the manager wrote:

the Toronto Municipal Abattoir and Cold Storage has been operating as a Public Abattoir for the past sixteen years [...] my recommendation to you is that your killing take place on the top floor so that your offal will gravitate to the floor below [...] in the operation of killing the livestock on the top floor, it would be much better to have your beef conveyed over to a separate building which could be utilized as a public wholesale market and would also separate your by-product department from your fresh meat entirely. ³⁴

E.H. Waugh of the City Engineer's Department, Johannesburg also discussed the advantages of multi-storey construction in a letter of October 1930:

The abattoirs as originally built had slaughtering on the ground floor and the Hanging Hall opposite. Some nine years ago additions were made on the first floor of which the slaughtering of cattle easy done. The arrangement is not an uncommon one and the writer has personally visiting the abattoirs over in Sydney and Adelaide and also in Melbourne where slaughtering was done on the first floor and even on second floors. | The advantage of this is very considerable in as much as the animals can all walk up an inclined way, and gravitation can therefore be employed for delivering the various products of the dressing of the beast to lower levels for treatment. ³⁵

It is difficult to ascertain to what extent these inputs from abroad refined the original design of the abattoir in Shanghai. Based on the written archival materials, it seems probable that the original design devised in the late 1920s, i.e. Layout P, established the core design principles of the building. For example, in this design, there were two inclined ramps to bring oxen, calves and sheep to the lairage halls on the upper floors, with the animals then led by narrow passages or bridges to the slaughter box. While the location of the slaughter hall for oxen and sheep was unaccounted for, the pig slaughter hall was placed on the ground floor since they were unable to walk up on ramps and always arrived in crates or by wheel-barrow.³⁶

However, the various suggestions solicited and given may well have influenced the detailed design.

Form and Function of Building – the Path to Death

The principal abattoir building of the final design consisted of two structures; an outer rectangular building for holding stock and chilling carcasses and an inner cylinder building for killing animals. [10, 11, 12, 13, 14] The combination of these two structures consequently forms two voids within the building envelope: one is a ring-shaped court sandwiched by the two structures, with a series of bridges at different levels spanning across to connect the animal stalls to the slaughter halls; and the other is a round-shaped court defined by the

circular structure and a vertical circulation core at its central point, with another set of bridges radiating from the core and connecting to the slaughter halls.

This spatial arrangement shares a similar directional logic with Jeanneret's two unrealized abattoirs, where animal halls, slaughter halls and refrigeration were separated, yet interconnected by a series of passages and bridges. The separation of the three major functional rooms also follows the abattoir design principles established by Richardson and emphasized by Ayling for humanitarian reasons and hygienic zoning.³⁷ Above all, it bears a marked resemblance – in both geometrical shape and functional separation – with the floor plan of the 'Model Abattoir' proposed by Richardson, as if the three circular plans of Richardson were stacked up, and turned into a multi-storey structure, so to utilize the force of gravity [1]. The two structures are approximately the same height, although the rectangular building has four storeys and the cylinder only three; extra ceiling height was required to hang the carcasses. The ramp at the southeast corner was for cattle and the northeast ramp for sheep and calves. Cows were kept in the east and south wing on all the four floors. The north wing was mainly used to hold calves, sheep and pigs, but the eastern area on the ground floor was for ill cows [15]. After being kept in pens for 24 to 48 hours, cattle were herded towards the platform (waiting section) facing the inner court, to walk across the bridge narrow enough to prevent animals turning around and only allow them to walk towards the death chamber.³⁸

The Slaughtering Building

On the outer ring of the slaughtering building cages were placed on a platform. Animals would be walked to these after crossing the bridge. There was a substantial difference in height between the platform and the floor of the slaughtering building – a deliberate design to use gravity to assist the killing process. After walking into a box, the ox was already in the slaughter hall. Screened behind a wall, it was unable to see the slaughtering operations taking place on the floor. Workers stepped up and stunned the animal in the cage with a pistol, for large animals, or by applying an electric shock, for small ones. The cage was then lowered down by means of leverage. Workers opened the cage door, the animal slid down to the designated area on the floor, and the cage automatically went back to the original position, immediately ready for the next ox to be driven in. Workers drained the blood when the animal was on the floor, with the blood flowing into a purpose-made bucket. Internal organs were removed and a set of pulleys used to hoist the carcass upside down. The animals were moved toward the slaughtering table and stripped of skin [16]. Every table was equipped with two tubes nearby – one for conveying the hide and the other for the organs, which connected, on the one hand, to the hide processing room on the bottom level of the cylinder slaughtering building and, on the other, to the organ processing room on the mezzanine level.³⁹[17] Once hung, carcasses were kept on rails, never coming into contact with the floor. They were moved across a bridge (within the cylinder slaughtering building) to the central room in the west wedge of the building, for inspection. Inspectors weighed the carcasses and inspected

them for signs of disease; doubtful carcasses were moved to a special room for further inspection and, if infection was confirmed, they would be sent directly down to the digester or incinerator on the ground floor without passing through any lair or slaughter halls. After inspection, healthy carcasses were moved across the bridge again into the chilling rooms in the west wing of the rectangular building. Rows of carcasses were hung on rails and moved around slowly in the chilling room. By the time they reached the end of the rail, carcasses were chilled and ready for sale. Some of the carcasses were lifted up by crane and moved directly to the trucks parked to the west side of the slaughterhouse on Sawgin Road and transported to the markets within the concession, and others were moved across the bridge to the south of the chilling room and sent to the meat market (now demolished).⁴⁰

Cultural and Religious Sensibility

It is evident in the discussions both preceding construction and in its subsequent operation the PWD and the PHD were conscious of their location in a cosmopolitan enclave in a Chinese city, with both the production and consumption of meat affected by the range of Chinese and European cultural practices and traditions this entailed. For example, originally designed to fulfil the demand of British and American for beef and mutton, pigs were added to its production line later on in response to the demand of Chinese business elite in the concession. In addition, the abattoir was operated by Chinese butchers, a source of some tension:

*The whole of the equipment supplied is of standard type and in common use in similar premises in other countries, and should, within a few months, be successfully adopted by Chinese butchers. Many of the recent alterations have been made in an endeavor to meet the Chinese butchers' methods, which are, of course, not fully in accordance with modern practice...*⁴¹

Conversely, a significant part of the international diaspora in Shanghai was Jewish with consequent implications for slaughtering practice. In 1935, the Shanghai Jewish Communal Association requested the Council to install a Weinberg Pen and praying rooms for Jewish butchers with the Jewish community offering to pay half of the cost.⁴² Wheeler was sent to England to find the patentee and to place an order for a customized pen to be used at the abattoir. In his letter to Stableford dated on 28 June 1935, he wrote:

*After wandering about the streets of Leeds I eventually traced Mr. Weinberg to a small working tailor's shop. He is the patentee and an inventor whose patents and inventions have brought him nothing so far and he is still working as a mending tailor. He told me that he had the pens made as and when ordered by different firms to his patents and that during the last six months he has improved parts of them to meet the requirements of Sir Frederick Hobday of Royal Veterinary College, London [...]*⁴³

A series of alterations to the internal layout of the abattoir were carried out in the years following its completion mainly in response to various demands of the increasing Chinese and Jewish population within the International Settlement.

Aesthetics of the Building Envelope

Constructed for the express purpose of accommodating mass animal killing, the abattoir embraced functionalism and adopted machine aesthetics. But the resultant building was also an extraordinary structural object wrapped by an orientalised Art Deco exterior. The adoption of the Art Deco style was part of a wider trend in Shanghai from the early 1920s, when it first appeared on the shopfronts of retail stores in the French Concession. By the end of the decade the adoption of art deco had spread to British and American architects who were using it for buildings along the Bund. It has been asserted that there were 31 tall buildings (10-storey high and above) erected in Shanghai from 1929 to 1938, only two of which were not decorated with some organic motifs or symmetrical designs associated with the style.⁴⁴

The composition of the Shanghai Municipal Abattoir, especially its western façade to Sawgin Road, is striking: an orientalised art deco, standing on pilotis over a front arcade. As contemporary photographs make clear, the effect would have been all the more dramatic as the building was of a significantly larger scale than any other in the immediate environment, albeit public views would be distant as the site was contained behind a large boundary wall [9]. Equally, however, the façade did not disrupt but reinforced the functionalism of the building. The west wing of the rectangular building was used for chilling carcasses, apart from some small parts on the ground floor used for offices and pig slaughter halls. Using the same concrete construction as the rest of the building, the latticework of the Art-Deco façade provided decorative details to the building envelope but, more importantly, allowed natural ventilation to the chilling rooms. The Art Deco exterior seems an acknowledgement that this is a public face, requiring different treatment, but nothing more. It is notable that whilst the archive demonstrates there were long debates over the functional form of the abattoir, discussion of its external architectural expression is completely absent.

Discussion

Modern, public abattoirs emerged as a building type in the nineteenth century. They emerged as a response to the growing involvement of the state in the regulation of food production on both health and humanitarian grounds. But the typology was also increasingly influenced by the scale of demand and production, with industrial populations increasingly requiring industrialised methods of production to keep them fed. It is in this context that we see the emergence of the disassembly line – a prototype for subsequent industrial assembly lines. In the nineteenth century the architect's role was primarily to provide a dignified empty container for these activities, but increasingly the spatial configuration and detailed

specification of the abattoir came to be driven by functional needs. This was recognized by the speculative templates provided by, on the one hand Richardson or, more dramatically, the young Le Corbusier on the other. As the twentieth century progressed, however, the trend was for abattoirs to become anonymous sheds, externally indistinguishable from other industrial uses, with the very specific mechanized machinated technologies of slaughter concealed within.⁴⁵

The Shanghai Municipal Abattoir would seem to be a culmination of thought and practice of a very specific building type; of a functionally expressed modern abattoir, a ‘machine for killing’, that is certainly no anonymous warehouse. It is an extraordinary series of multi-storey concrete structures, functionally dictated by the bloody business of slaughtering animals and processing their carcasses. It is given some dignity by an art deco façade, which, with its open latticework screen, links in turn to the functional activity behind of chilling carcasses. Whilst we have assembled substantial information on the production of the building it is difficult to be definitive about how the particular dramatic form was generated. However, it was certainly strongly functionally driven, with much recorded debate about the practice of killing and very little about the practice of architecture as such with, for example, no recorded discussion about the architectural expression of the front façade. This case also illustrates the rich international networking that PWD was able to undertake, soliciting information on abattoir design from across the English-speaking world; advice that seems to have been freely and generously given, yet the core design principles seem to have been set before this advice was sought. The directional logics and functional separations employed in Shanghai have some correspondence with those employed by Jeanneret in his competition entries of the decade before, but there is no evidence of PWD being aware of these precedents and indeed it seems unlikely that they had influence on the Shanghai design. It is more probable that the same functional logics led to similar conclusions. The architectural expression of the Shanghai building bears superficial comparison to pioneers in the architectural use of concrete, such as Auguste Perret, for example in his *Musée des Travaux Publics*, although again there is no evidence that anyone in PWD was aware of Perret (and indeed this particular masterwork of Perret dates from later in the 1930s).⁴⁶

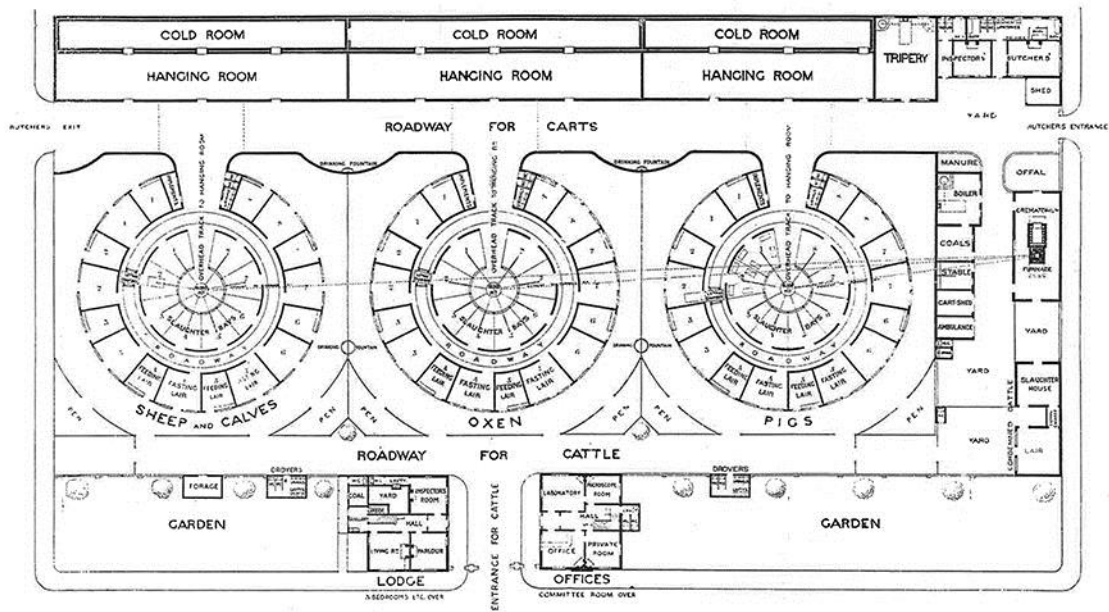
If there is a prototype for the Shanghai Municipal Abattoir it seems to be the model scheme presented by Benjamin Ward Richardson. As discussed, it is as though the three circular plans of Richardson were stacked up, and turned into a multi-storey structure so as to economize on land and utilize the force of gravity. Whilst we have no evidence that the architects working in PWD knew of Richardson’s work, in contrast to the case of unpublished Le Corbusier and Perret, it seems inconceivable they were not aware of a major book on abattoir design relatively recently published in English. Influenced by international ideas and best practice, aimed at efficiency, hygiene and humane slaughter the Shanghai slaughter house was also responsive to local specificities. We see the colonial desire to bring European notions of order and practice to the Chinese city. This is evident from the outset

and the selection of a more expensive site, but a site that works better in terms of the space of flows of meat in the burgeoning city in terms of the arrival of live animals and then the distribution of meat to wholesalers and consumers. We also see a response to the rapidly growing population of Shanghai in the global turmoil of the 1920s and 1930s that causes a drastic upscaling of the abattoir's capacities. And we see the influence of cosmopolitanism and the 'melting pot' of a Chinese indigenous population and a substantial and heterogeneous European diaspora. The authorities of the cosmopolitan International Settlement responded to, on the one hand, the fact that the butchers in this new facility would be Chinese and, on the other, to the demand from a substantial Jewish minority for kosher meat. The Shanghai Municipal Abattoir is a culmination of machinic and expressionist functionalism allied to architectural ambition and local conditions as it is quite definitely a specific building type created for a specific purpose in every respect.

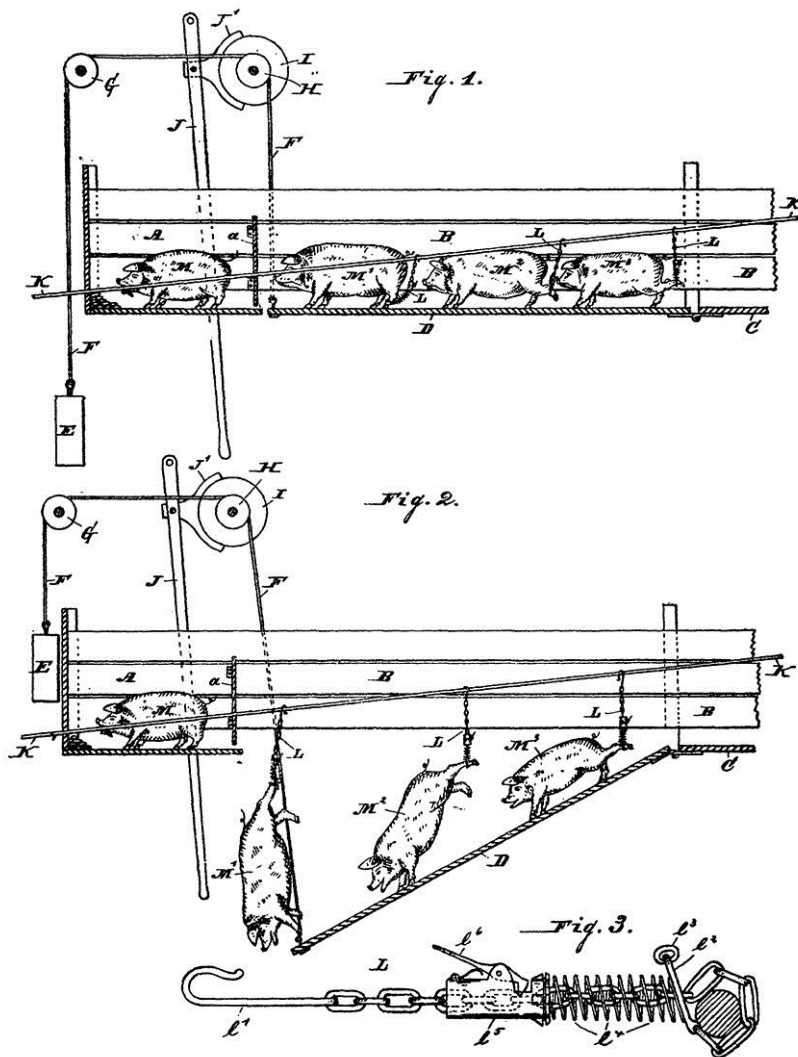
Coda

Wandering through the spaces of the former abattoir today raises interesting questions about the nature of building and architecture and, indeed, sculpture. It is a visually thrilling experience exploring these aestheticized spaces and their connections, designed with the express purpose of killing. Indeed it is telling that the building remains for the visitor to explore in a city in as constant state of change as Shanghai. The SMC abattoir was accorded heritage status in 2005 and has subsequently been conserved (and interpreted), being branded the 1933 Old Millfun in the process. One might have thought a building created with such specificity would lack adaptability and its unsavoury past deter investment. In practice the conversion has attracted a variety of high-end cultural business, bringing an edge of surrealism and a profound sense of dissonance to a visit.

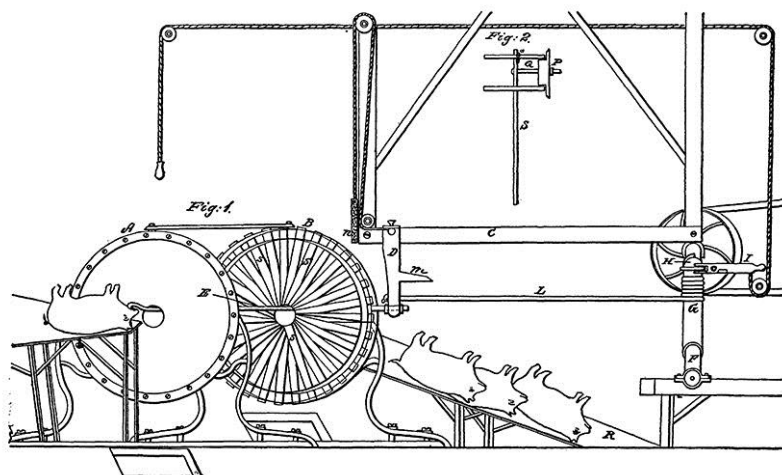
Illustrations



1 Plan of Model Abattoir designed by Benjamin Ward Richardson, from Ayling, *Public Abattoirs*, 1908.



2 Hog catching and suspending apparatus (1882), US Patent 252112, from Giedion, *Mechanization Takes Command: A Contribution to Anonymous History*, 1948.



3 Hog-cleaning machine (1864), US Patent 44021, from Giedion, 1948.

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- 4 Jeanneret's abattoir design for a site in Challuy (1917), archived drawing 22360 of Fondation Le Corbusier © F.L.C. / ADAGP, Paris, 2016. (Available at: <http://www.fondationlecorbusier.fr/corbuweb/morpheus.aspx?sysId=13&IrisObjectId=5574&sysLanguage=en-en&itemPos=1&itemCount=215&sysParentName=&sysParentId=65>)

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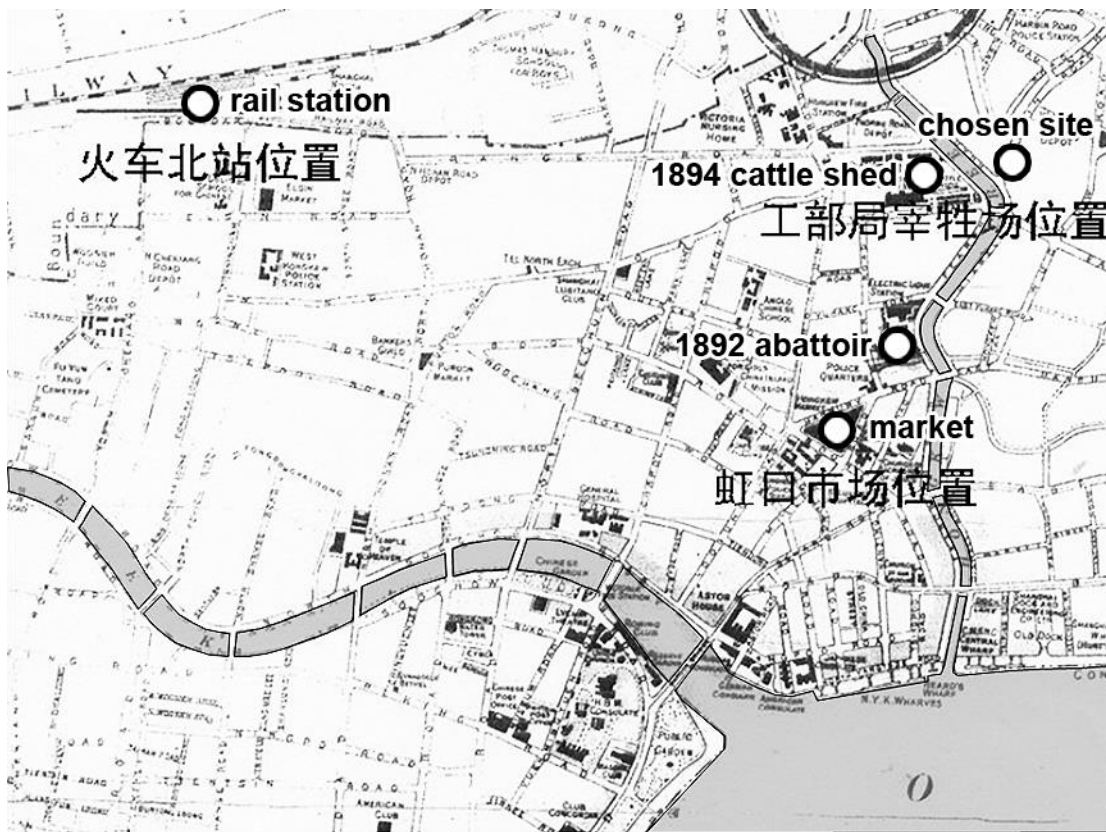
- 5 Abattoir at Challuy (1917), archived drawing 22352 © F.L.C. / ADAGP, Paris, 2016.

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- 6 Jeanneret's abattoir design for Garchisy (1918), archived drawing 19309 © F.L.C. / ADAGP, Paris, 2016. (Available at: <http://www.fondationlecorbusier.fr/corbuweb/morpheus.aspx?sysId=13&IrisObjectId=5577&sysLanguage=en-en&itemPos=2&itemCount=215&sysParentName=&sysParentId=65>)

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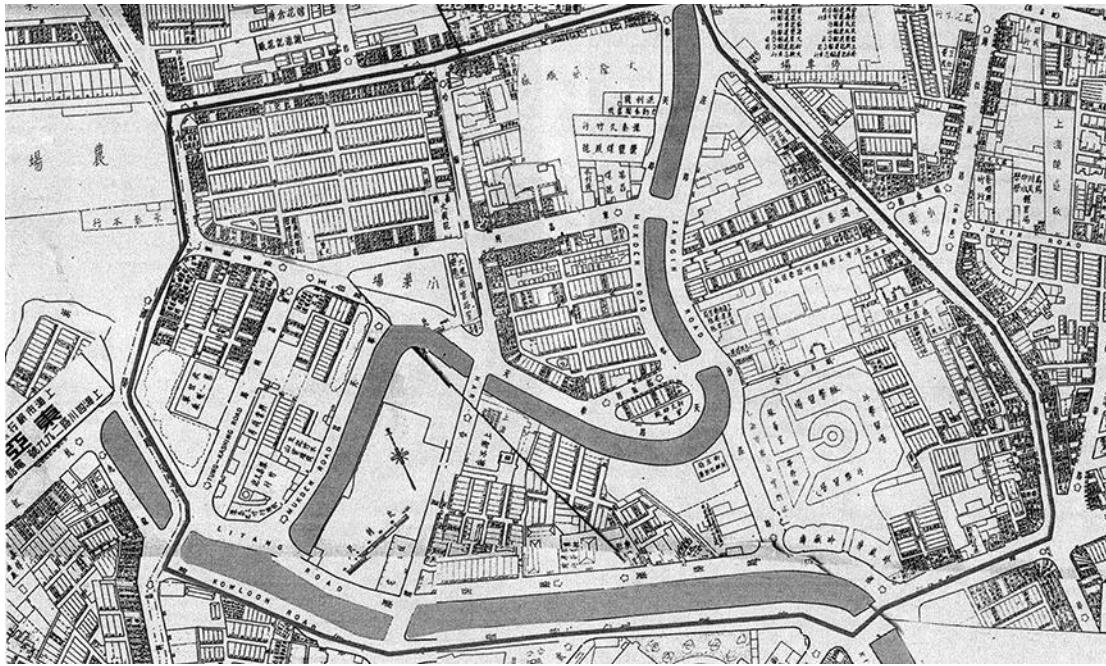
- 7 Abattoir at Garchisy (1918), archived drawing 19311 © F.L.C. / ADAGP, Paris, 2016.



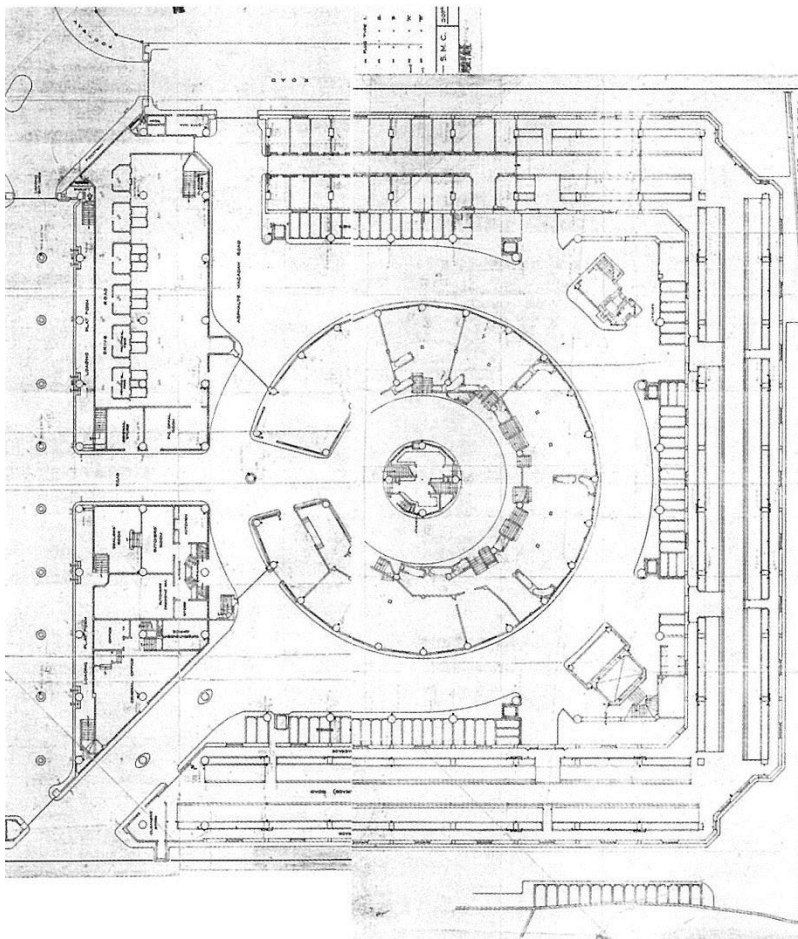
8 The location of the chosen site in relation to the rail station, Hongkew market, original abattoir (1892), cattle sheds (1894), and the waterway.



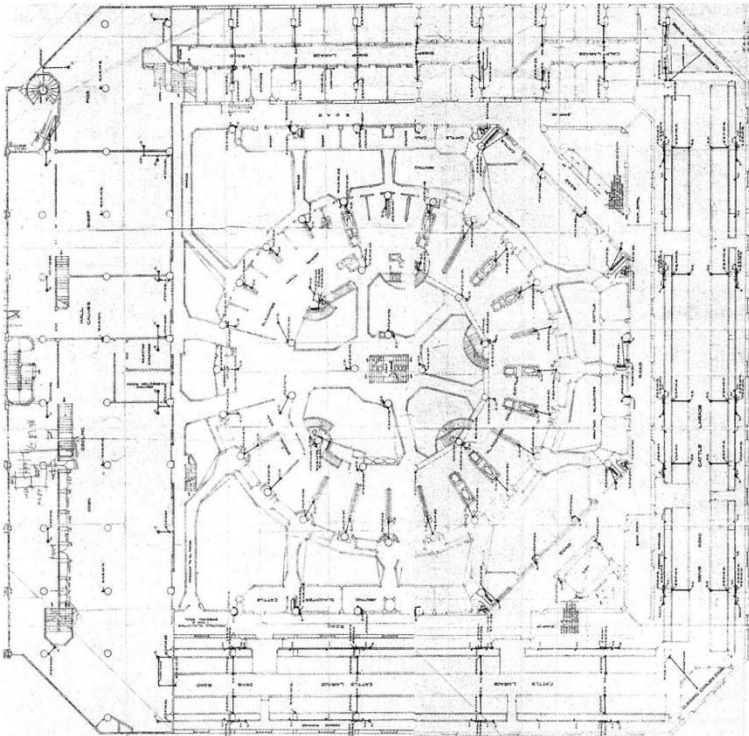
9 Shanghai Municipal Abattoir. Photo taken in 1937, showing the north-western corner and west elevation of the building.



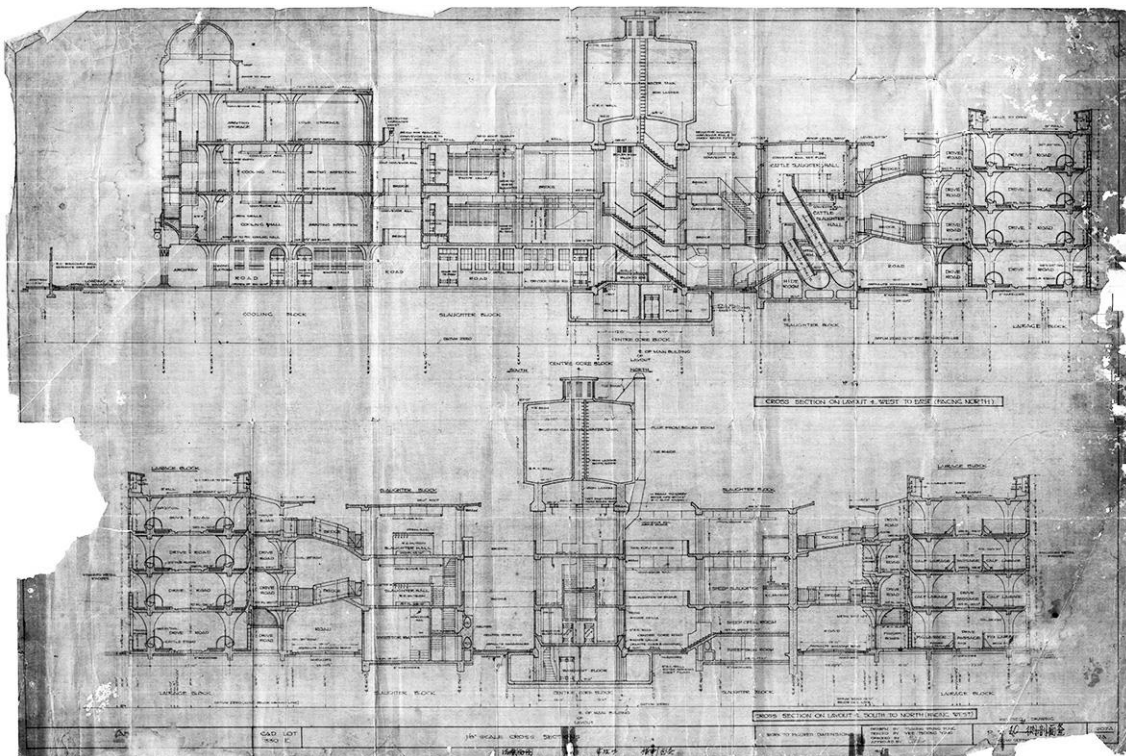
10 A 1930s survey map showing the abattoir, located on the east side of Hongkou Creek with a crescent-shape chilling room and meat market to the south.



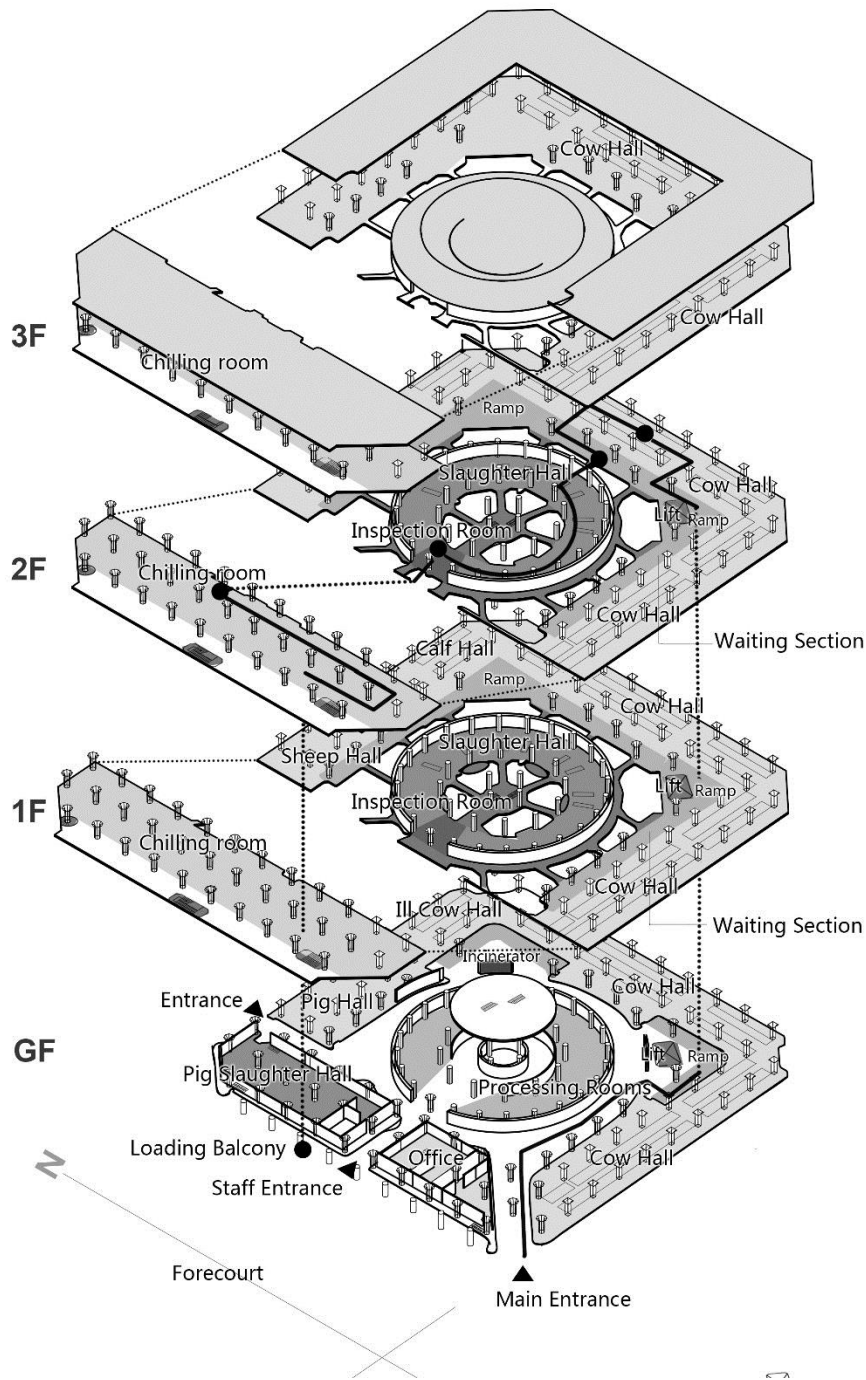
11 Ground floor plan of the abattoir building.



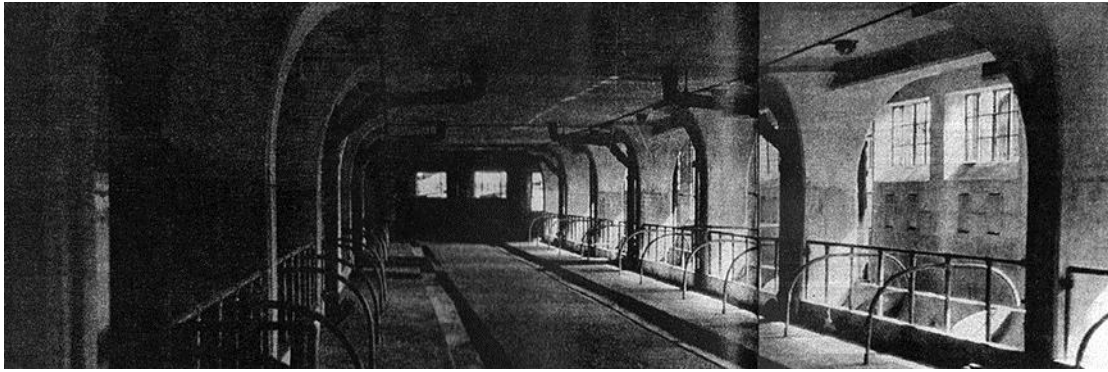
12 Second floor plan.



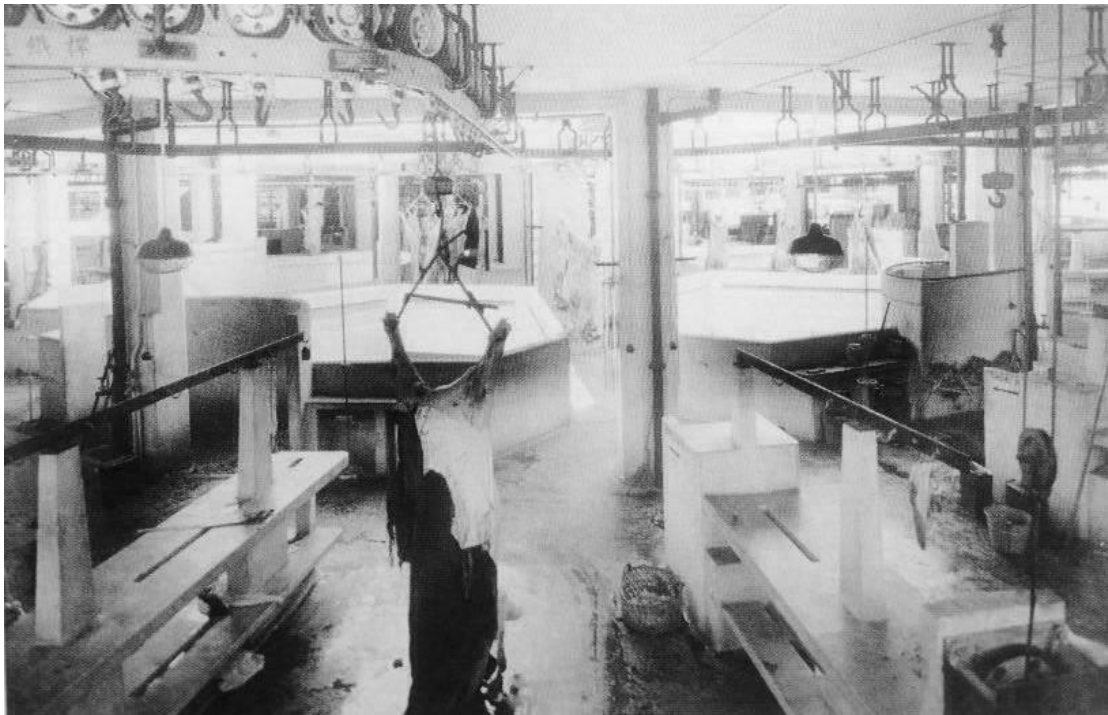
13 The west-to-east cross-section facing north, and the south-to-north facing west.



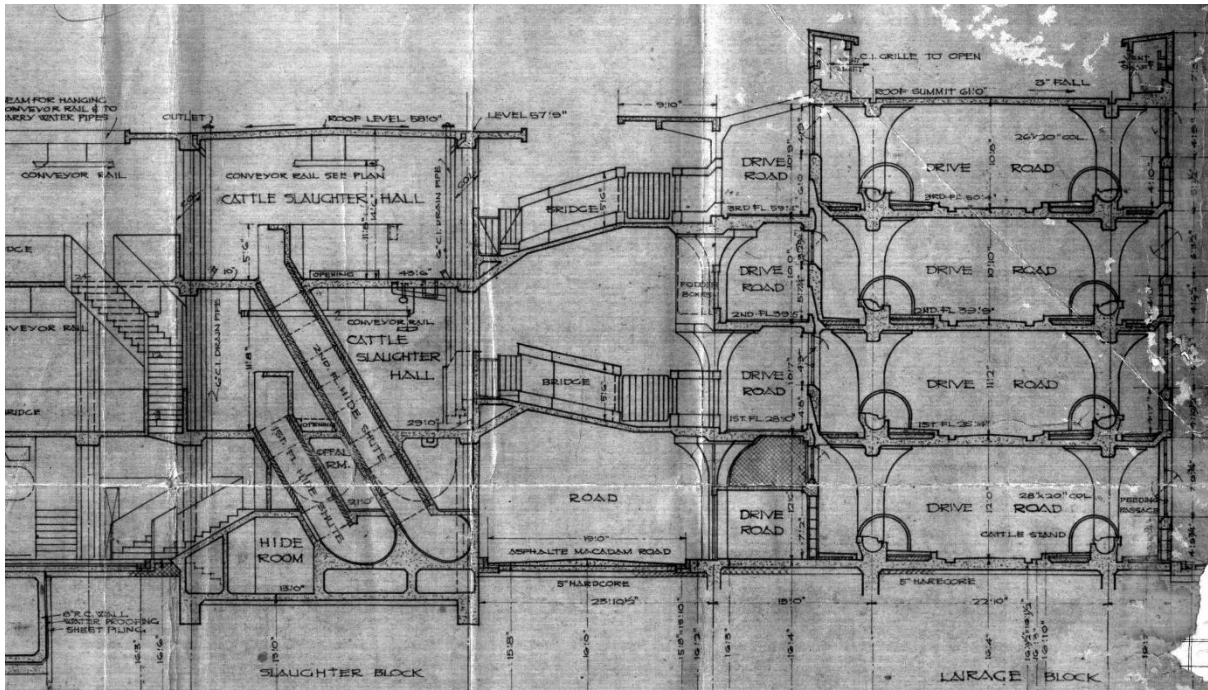
14 The exposed view of the abattoir.



15 View of a cattle hall.



16 The slaughter bays in the slaughter hall.



17 Section, from left to right, the slaughter hall, the outer ring court and the cattle hall.

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Shanghai Municipal Archives, 8.

Shanghai Creative Industry Investment Co. Ltd, 9-13, 15-17.

Xi'an Jiaotong-Liverpool University, 14.

Notes

¹ Paula Young Lee, *Meat, Modernity, and the Rise of the Slaughterhouse*, (Lebanon NH: University of New Hampshire Press, 2008).

² Sigfried Giedion, *Mechanization Takes Command: A Contribution to Anonymous History*, (New York: Oxford University Press, 1948); William W. Braham, Jonathan A. Hale, and John Stanislav Sadar, *Rethinking Technology: A Reader in Architectural Theory*, (London: Routledge, 2007).

³ Paula Young Lee, 'Siting the Slaughterhouse: From Shed to Factory', in *Meat, Modernity, and the Rise of the Slaughterhouse*, ed. by Paula Young Lee (Lebanon NH: University of New Hampshire Press, 2008), pp. 46-70.

⁴ Giedion.

⁵ *Ibid.* p. 210.

⁶ Benjamin Ward Richardson, 'Public Slaughter-Houses: A Suggestion for Farmers', in *The New review*, 49 (1893), p 634.

⁷ R. Stephen Ayling, *Public Abattoirs: Their Planning, Design, and Equipment*, (London: E&FN Spon, 1908).

⁸ Giedion.

⁹ Christopher Otter, 'Civilizing Slaughter: The Development of the British Public Abattoir, 1850-1970', in *Meat, Modernity, and the Rise of the Slaughterhouse*, ed. by Paula Young Lee (Lebanon NH: University of New Hampshire Press, 2008), pp. 89-106 (p. 96).

¹⁰ Giedion.

¹¹ Lee.

¹² Giedion, p. 229.

¹³ Lee, p. 68.

¹⁴ Ibid. p. 67.

¹⁵ Otter, p. 96.

¹⁶ Quoted in H. Allen Brooks, *Le Corbusier's Formative Years: Charles-Edouard Jeanneret at La Chaux-De-Fonds*, (Chicago: University of Chicago Press, 1999), p. 486.

¹⁷ Richardson; Ayling; Otter.

¹⁸ Edward Denison and Guang Yu Ren, *Building Shanghai: The Story of China's Gateway*, (Chichester: Wiley Academy 2006); Anne Warr, *Shanghai Architecture*, (Sydney: Watermark Press, 2007).

¹⁹ Warr, p. 12.

²⁰ Ibid.

²¹ Denison and Ren.

²² Warr; Jianrong Xing, *Documentary Records and Little-Known Facts of Old Shanghai*, (Shanghai: Shanghai Lexicographical Publishing House, 2007); Changlin Ma, Xia Li, and Lei Shi, *Research on the Urban Management of the Shanghai International Settlement*, (Shanghai: Zhongxi Publisher, 2011).

²³ Wei He and Xiaoming Zhu, 'A Research on the Architectural Archives of the Shanghai Municipal Council Abattoir', in *Time+Architecture*, 3 (2012); Wei He, 'Research on Architecture Archives of the Slaughter House of Shanghai Municipal Council' (Master Dissertation, Tongji University, 2011).

²⁴ Shanghai Municipal Archives, 'U1-16-1594: The Site, Drawings and Equipment Specifications of the Municipal Abattoir (1920-1930)', (Shanghai: Shanghai Municipal Council).

²⁵ Ibid. ; Shanghai Municipal Archives, 'U1-14-2392: Public Work Department Documents Regarding Building and Ordering Equipment for the Abattoir (1924-1938)', (Shanghai: Shanghai Municipal Council).

²⁶ This assumption is based on the written descriptions of archival records in the absence of relevant architectural drawings.

²⁷ Shanghai Municipal Archives. U1-14-2392:0057

²⁸ Ibid. U1-14-2392:0057

²⁹ The identity of the architect who designed the abattoir has been previously claimed under the name Balfours, who was believed to be a British Architect; this name appears in online articles of bloggers, academic papers and the statement of significance released by the local heritage authority. Xing; Haiwen Chen and Shiling Zheng, *Inheritance: The Fourth Installment of Outstanding Historical Buildings in Shanghai*, (Shanghai: Shanghai Cultural Publishing House, 2006). However, we can trace no historical evidence for this. Having conducted research on SMC archives, He and Zhu credited the abattoir design to A. C. Wheeler. Indeed, all the communication letters between PWD and PHD on the abattoir design were signed by either Stableford or Wheeler. According to a list of employees in 1930, the Architecture Office of PWD had 11 expatriates and 28 Chinese employees, and it was chaired by chief architect C.H. Stableford. The Office was divided into two groups: one for design and erection of new buildings and additions and alterations to existing buildings, headed by assistant architect, A.C. Wheeler and D.C. Mirams; and the other for maintenance of all existing Municipal buildings and leased properties, led by J.D. Watt. Shanghai Municipal Archives, 'U1-14-0569: Lists of Organizational Structures, Responsibilities, and Employees of Public Work Department (1930-1944)', (Shanghai: Shanghai Municipal Council). The Kalendar of the RIBA records that Stableford was elected as an associate of RIBA in 1921 and began to work as Assistant Architect at PWD in 1923. He was elected as a fellow of RIBA in 1932 and registered in 1935 with the Architects' Registration Council of the United Kingdom (ARCUK). When the Second Sino-Japanese War broke out in 1937, he was promoted as Deputy Commissioner of PWD and continued working in Shanghai until 1945, then returning to England. On the other hand, the earliest evidence from SMC archives showing Wheeler working at PWD is an internal document dated in 1926. He was then recorded as responsible for the Abattoir and developing sketch schemes for the abattoir with the assistance of three draughtsman and three tracers. He was registered as architect on the 1933 record of ARCUK and listed as working at PWD, SMC, until 1939 when he moved to Canada. Other evidence confirming Wheeler's role as the architect comes from a series of short accounts published by the local press between 1934 and 1936. Royal Institute of British Architects, 'The Kalendar of the RIBA', (London: RIBA, 1921,1923-24, 1923-24, 1927-28, 1933-34, 1937-38 1946-47 and 1949-50.); Architects' Registration Council of the United Kingdom, 'ARCUK Register 1933', (London: ARCUK, 1933); Shanghai Municipal Archives, 'U1-14-0731: Public Work Department Policies for Recruiting Assistant (1912-1931)', (Shanghai: Shanghai Municipal Council); Shanghai Municipal Archives, 'U1-16-1590: Records of College Students Visit the Municipal Abattoir', (Shanghai: Shanghai Municipal Council).

³⁰ Shanghai Municipal Archives, 'U1-16-1602: Public Health Department Records on the Establishment of the New Abattoir and Issues of Its Sanitation and Equipment', (Shanghai: Shanghai Municipal Council).

³¹ Shanghai Municipal Archives, 'U1-16-1593: Public Health Department Reports on the Establishment of Other Abattoirs (1920-1930)', (Shanghai: Shanghai Municipal Council). U1-16-1593:1372

³² He and Zhu; Shanghai Municipal Archives. U1-16-1593

³³ Shanghai Municipal Archives. U1-16-1593:1412

³⁴ Ibid. U1-16-1593:1436

³⁵ Shanghai Municipal Archives. U1-14-2392:0099

³⁶ Ibid. U1-14-2392

³⁷ Richardson; Ayling.

³⁸ Shanghai Municipal Archives. U1-14-2392

³⁹ A vivid sense of the slaughtering process was given in the local press, *Evening Post*, on 28 April 1936. What follows is an extract: 'Take an Ox. [...] He is a full-grown beast with big horns and big eyes and a small hump behind his head. He is brought in from the country and is put into a cement stall in the lairage section where the remains at least 24 hours. The lairage is well-ventilated and clean; the animals are not crowded. They have food and water. The inspectors look the ox over and after a day or so he is ready. The ox is then led to slaughter. | He is led into a narrow, cement runway and quartered temporarily in a waiting pen. He is surrounded by white cement, galvanized steel and mechanical efficiency. He cannot see what is happening to those that want ahead of him because the building is constructed to prevent that. | When they are ready for him, he is led on over a bridge into the slaughtering block. He walks into a "box" somewhat like a piano box without a top. He still can't see anything ahead. His nose is tied down to steady him if he is restless. | We stood and looked at this ox. He breathed a little hard but he didn't tug or kick or roll his eyes. He stood quietly. A man stepped up to him with a pistol in his hand and put the muzzle to the middle of this beast's forehead and fired. The ox instantly fell down in a heap in the box, quite dead. | *Done on Floor*. The box tipped mechanically and the body rolled out onto a cement floor, slanted for drainage. The butchers were here. The work was done, by local custom, on the third floor, a knife go into the throat, out comes the blood into a bucket, the efficient butchers took off the hide, cut off the feet, head, tail, tongue, out comes the organs, stomach and intestines went down a chute to a disposal plant. Organs and other meat parts were laid out on a table for the inspectors. A hook come down, caught in a leg tendon up went the carcass in the air, hired legs speared on hook attached to an overhead trolley. Out come special glands for inspection. The meat was stamped. The carcass rolled off to the cooling halls to join rows of similar carcasses. After that the meat is either stored for refrigeration or located to the grand floor for discharge'. Shanghai Municipal Archives. U1-16-1590 :1042

⁴⁰ Shanghai Municipal Archives. U1-14-2392

⁴¹ Shanghai Municipal Archives. U1-16-1602:2453

⁴² Shanghai Municipal Archives, 'U1-14-2380: Public Work Department Documents Regarding Building and Ordering Equipment for the Abattoir (1934-1935)', (Shanghai: Shanghai Municipal Council).

⁴³ Ibid. U1-14-2380

⁴⁴ Warr; Ming Xua, 'The Influence of the Art Deco Style on Shanghai Modern Architecture', *Urban Studies*, 2 (2008), 63-67; Zonghao Qian, 'Art Deco of the Early Twentieth Century' (PhD Thesis, Tongji University, 2005).

⁴⁵ Lee.

⁴⁶ Kenneth Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, (Cambridge, Massachusetts: MIT Press, 1995); Karla Britton, *Auguste Perret*, (London: Phaidon, 2001).