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A Close-Up on Kyoto's Urban Fabric

van Thoor, Marie-Therese; Stroux, Sara

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HERITAGE, HISTORY AND DESIGN BETWEEN EAST AND WEST

A Close-Up on Kyoto's Urban Fabric

Marie-Thérèse van Thoor & Sara Stroux [eds]

Heritage, History and Design Between East and West

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Heritage, History and Design Between East and West

A Close-Up on Kyoto's Urban Fabric

Marie-Thérèse van Thoor & Sara Stroux [eds]

向井商店

Preservation and Adaptive Reuse as a Common Challenge

Exchange between Delft University of Technology and Kyoto Institute of Technology

This book comprises a collection of essays on traditional machiya in Kyoto from various viewpoints and at different scales, including the urban fabric, the construction, the layout of the space plan, and building materials and details. By discussing the topic further from the various perspectives of the Dutch and Japanese scholars, we aim not only to cultivate a better understanding of machiya, but also to clarify the difference between the Netherlands and Japan in terms of ideas and approaches to preservation and regeneration of historical buildings.

Concepts and approaches with respect to traditional architecture differ greatly between the Netherlands and Japan. The differences lie not only in the construction methods, respectively brick and timber construction, but also in the ways of living, as well as miscellaneous systems and regulations regarding architectural materials. Efforts to clarify such differences will promote a better understanding of each other's culture, history and context, as well as comparative studies and a re-evaluation of ideas and approaches to preservation, regeneration and adaptive reuse of historical buildings in both countries.

This book was conceived as a record of the outcomes of exchanges between students and scholars of architectural history, preservation and adaptive reuse at Delft University of Technology (TU Delft) and Kyoto Institute of Technology (KIT). The exchange started when Kazuto Kasahara from KIT joined TU Delft's RMIT (which later became the Heritage & Architecture section) as a visiting scholar from 2010 to 2011, and conducted surveys and research on preservation and adaptive reuse of historical buildings. Since then, both universities have been engaged in ongoing research and educational exchanges through KIT's invitations to scholars from TU Delft. In February 2012, KIT hosted the international symposium *The Present and Future of Preservation of Modern Architecture* and invited Marie-Thérèse van Thoor and Hielkje Zijlstra to lecture. On the occasion of other symposia on preservation and adaptive reuse of historical buildings, Wessel de Jonge (November 2016) and Paul Meurs (February 2018) were invited to speak. In March 2015, Paul Meurs and Hielkje Zijlstra visited Japan to investigate possibilities for further collaboration in research and education within the KYOTO Design Lab, an institution launched by KIT and dedicated to practice-based research and

innovation in, amongst others, the field of urban revitalization and architectural design. As a first joint project, KIT and TU Delft organized the design project *Heritage & Machiya*, involving a group of ten students from each university, from November 2015 to February 2016. Sara Stroux and Alexander de Ridder from the Netherlands and Kazuto Kasahara and Kazue Akamatsu from Japan participated in the project as instructors. The students' works were exhibited at TU Delft in November 2016.

Five TU Delft scholars spent a month in Kyoto conducting research into machiya: Hielkje Zijlstra (Nov.-Dec. 2015), Lidwine Spoormans (Jan.-Feb. 2016), Carola Hein (July-Aug. 2016), Marie-Thérèse van Thoor (Feb.-Mar. 2017), and Barbara Lubelli (July-Aug. 2017). Most of the contributions in this book present the outcomes of these study trips.

Thus, TU Delft and KIT have been cultivating research and educational exchanges especially in the field of preservation and adaptive reuse of historical buildings, which are the challenges of the immediate future in the Netherlands and in Japan. The exchanges between both universities will hopefully contribute to finding solutions.

Yoshiro Ono
Professor and Vice President, Kyoto Institute of Technology / CEO, KYOTO Design Lab

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Debates on History and Heritage between East and West

Sara Stroux & Marie-Thérèse van Thoor

The collaboration between KIT and TU Delft started out with the central theme of machiya, a traditional type of wooden townhouse, known in Kyoto as kyomachiya. Rather than Kyoto's pre-eminent monuments like shrines, temples or one of the 17 world heritage sites, the vernacular architecture of the kyomachia seemed to be the ideal study subject, addressing conservation issues and the need for adaptation to both contemporary demands and new uses. With over 40,000 machiya still in existence, this building type is very characteristic of the cultural landscape of Kyoto. Machiya, built on narrow parcels and recognizable by their closed street facades (*omoté*), originally combined a residential function with a commercial one.

However, traditional machiya are increasingly disappearing from the Kyoto streetscape. Complicated ownership and inheritance structures prevent young people from buying or inheriting traditional machiya. The fact that machiya do not provide any parking space and do not satisfy contemporary Japanese living standards, are just two of the reasons why wealthier people prefer to live in new apartment buildings. Occasionally they own a machiya as a second house. But a lot of machiya are still inhabited by older people, who have great difficulty maintaining these wooden structures with earth walls and floors. What is more, the number of craftsmen capable of restoring and renovating traditional machiya is steadily declining. Today, while a lot of new buildings imitate certain features of machiya architecture – mainly the design of the street facade and the building volume – they employ fundamentally different construction methods and materials. In recent years traditional machiya have been renovated, extended or transformed for other functions, such as popular hotels (B&Bs) and restaurants. Unfortunately, a lot of machiya are simply demolished and replaced by modern buildings.

In the following chapters, researchers from KIT and TU Delft present the findings and outcomes of their research, conducted for the most part during their field trips to Japan. Depending on their individual scholarly background and research focus, the authors studied various topics related to machiya architecture and the challenge of preserving this specific Japanese heritage for future generations: from the urban organization of machi, concepts and methods of conservation theory and practice, and design approaches to adaptation and reuse of machiya, to the significance of craftsmanship and detailing and the question of which essential features of machiya architecture can (and should) be preserved. A selection of design proposals by students of KIT and TU Delft complement Lidwine Spoormans study of design strategies for adaptive reuse.

Most of the results are based on close reading, site visits and interviews with craftsmen, architects, academics and other heritage professionals conducted during short visits to Japan. Aware that all observations made here are influenced by either an Eastern or a Western background, and given the limited research time and lack of English literature on the topic, this publication does not claim to be exhaustive. It aims—like the entire exchange programme between KIT and TU Delft—to stimulate the debate on history and built heritage between East and West.

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Machi

Neighbourhood and Small Town—The Foundation for Urban Transformation in Japan

Carola Hein

In 1854, American navy ships under Commodore Matthew Perry appeared off the shores of Japan and pressured the formerly secluded nation into accepting a treaty that included opening some ports to American ships and the beginning of trading (Reischauer and Craig 1989).

With this opening to outside influences, Japanese professionals began to study, among other subjects, modernizing European and American cities in search of models to implement at home (Hein and Ishida 1998). When they applied new principles, Japanese practitioners tweaked the original ideas to make them fit their own changing cultural backgrounds, local needs, experiences, and practice. One element in their particular reading of foreign form was and continues to be their understanding of urban space in terms of neighbourhoods and small towns, both of which are called *machi* in Japanese. The word itself captures themes in national and local identity and different perspectives on urban living, density, and transportation, and evokes—at least in some of its meanings—specific socioeconomic structures and urban development. As machi appears to be a foundation of Japanese urban thought, a closer look at the term and its multiple meanings may well be useful to foreign observers and scholars interested in Japanese planning, urban form, and thought.

In the early years of contact with Japan, foreigners repeatedly criticized modernizing Japanese cities and planners for the apparent discontinuity of urban space and lack of planning principles (Taut [1937] 1958). Western scholarly interest in the Japanese city and comparative studies grew in the 1960s with the translation into English of Japanese books. Of particular importance among these were the works of the sociologist Yazaki Takeo, who, while intent on comparison and classification, highlighted the need to keep in mind distinct patterns of change and continuity (Yazaki 1963 and 1968).

By the 1970s, Western scholarly discussion saw a number of publications that celebrated a unique Japanese urban form—particularly visible in the capital, Tokyo—based on continuities between the traditional and the modern city (Befu 1993; Berque 1984, 1994 and 1999). This shift during the past three decades, from criticizing the city to celebrating it, is visible in the changing metaphors that Japanese and foreigners have deployed in urban projects, architecture, and publications to describe and 're-script' Tokyo: as the British geographer Paul Waley puts it, in their views, Tokyo has gone 'from ugly duckling to cool cat.' (Waley 2006). The 'most persistent cluster of metaphors,' Waley says, is the theme of 'Tokyo (...) as a city of villages,' or 'Tokyo as something smaller than the sum of its parts.' (Waley 2006 and Smith 2006). Indeed, as the American historian of Japan, Henry Smith has pointed out, the village metaphor has long been a theme in foreign writings about the city (Smith 2006).

The notion of a metropolis as a cluster of villages is not new or limited to Japanese cities. During the past century, visitors and researchers have described many cities, including Berlin, London, Los Angeles, Toronto, and even New York as composed of unique units. In 1929, the American planner Clarence Arthur Perry stated that 'every great city is a conglomeration of small communities. For example, Manhattan—New York's oldest borough—contains sections like Chelsea, Kip's Bay and Yorkville.' (Perry [1929] 1974). It is thus not surprising that the distinctive patchwork character of small and imaginatively used units in Japanese cities has captured the imagination of foreign practitioners. During the past three decades, these practitioners have looked to Japanese approaches for ideas about designing increasingly chaotic, albeit comprehensively planned, European, American, and Australian cities; they are intrigued by local initiatives that allow parts of the city to change flexibly according to different rhythms and varying principles (Shelton 1999).

In particular, the concepts of the neighbourhood (machi) and community building (*machizukuri*) have evolved into a central concern for contemporary Japanese and foreign researchers and practitioners of urban and built form, as well as for those interested in social organisation (Fiévé and Waley 2003; Karan and Stapleton 1998; Sorensen 2002; Sorensen and Funck 2007). In Neighborhood Tokyo, the American anthropologist Theodore Bestor points out that 'Tokyo neighborhoods are geographically compact and spatially discrete, yet at times almost invisible to the casual observer. Socially they are well organized and cohesive, each containing a few hundred to a few thousand inhabitants.' (Bestor 1989). Inhabitants generally refer to the machi as a place of a particular lifestyle and a social community. The Japanese idea of neighbourhood offers identity to its citizen to a larger extent than does the overall design of the city—much in contrast to the European concept of urban identity. Longstanding social practices, such as festivals (*matsuri*), help bring the community together at regular intervals in preparation and celebration and temporarily transform the existing urban spaces (Ashkenazi 1987; Kumagai 1996; Moriarty1972; Sadler 1969, 1970 and 1975). In form and function, these urban neighbourhoods are heterogeneous, a reality that perhaps finds a source in land ownership patterns and urban laws. For example, there are neighbourhoods in which a large landowner leases part of the land to individuals, who build both homes and rental apartments. Neighbourhoods can thus host a diverse group of owners, leasers, and renters, all of whom have rights (for example) in the case of an urban renewal project.

If we abstract design and planning concepts, these traditional multifunctional Japanese neighbourhoods provide a life-environment, with inspiring features in regard to sustainability, liveability, and community planning (Sorensen and Funck 2007). Tokyo, for example, is an easy-to-live-in metropolitan area of about 12.5 million inhabitants (as of 2005) inside its administrative boundaries, totalling about 35 million in the continuously built-up area. It is composed of a multitude of high-density, multifunctional neighbourhoods that offer a mixture of different residential types, from private houses to small apartments, integrating different social groups. Following an investigation of historic and contemporary meanings of machi, and its particular spatial and socioeconomic forms, this text argues that the Japanese tradition of machi has influenced the ways in which modernizing Japan picked up foreign concepts through the nineteenth and particularly in the twentieth century. It is crucial for those looking at Japanese neighbourhood organisation, city life, and urban form today to understand machi as a key concept in their analysis of Japanese urban form and function.

Machi as neighbourhood

The term machi can be used to describe units inside a Japanese city, even various and often very diverse ones (Ishida 1996). Thus, the term *shita-machi* describes the low-lying and usually working-class areas of Tokyo and other cities as distinct from the *yamanote* areas, the wealthier highlands (Ishida 1996 and 2002; Hein and Ishida 1997; Pelletier 1994). The map of the city

of Edo (the name of Tokyo before the Meiji restoration), home to the shogun and namesake of the Edo period, also highlights the socio-spatial division of the city into various units, de facto small towns, which were under the control of the military class, temples and shrines, or the townsmen, each with their own regulatory and even police powers [FIG. 1].

Monofunctional districts for samurai and their retainers or for merchants, but also the geisha district (for example, *Kazue-machi*, *Kanazawa*) or a shopping district, can be called machi (with the Chinese character 町 sometimes pronounced chō). Craft communities originally settled into residential areas according to specialties, such as blacksmiths (*kajiya-machi*), dyers (*konya-machi*), or carpenters (*daikuchō*) (Yazaki 1968). Neighbourhoods have taken different forms over time, with streets as boundaries between them. However, some machi called *ryōgawa-chō* were centred on the street and included buildings on both sides. These were typical for Kyoto and visible in the street plan of Edo in the seventeenth century, as the Japanese architectural and urban historian Tamai Tetsuo has shown (Tamai 1986). Geographic features, such as slopes or valleys, can shape the spatial dimensions of machi and building lots, as the architectural historian Jinnai Hidenobu shows in an analysis of neighbourhoods and the residences of feudal lords (*daimyō*) in Tokyo (Jinnai 1995).

Thus, the form, size, and definition of urban machi have varied over the centuries. Different social classes—samurai (the military nobility), temple folks, and commoners—occupied distinct areas, but their governance structure was similar. In Edo, and similarly in other cities, each class was governed separately: by a city magistrate (*machi bugyō*) for the commoner areas (*machi-chi*), by a temple magistrate (*jisha-bugyō*) for the temple areas (*jisha-chi*), and directly by central authority (*Bakufu*) or local rulers (*daimyō*) for the samurai areas (*buke-chi*) (Sorensen 2002). As a result, a large urban area, such as Edo, was ruled in bits and pieces by various authorities with certain degrees of local authority, but there was no single metropolitan government

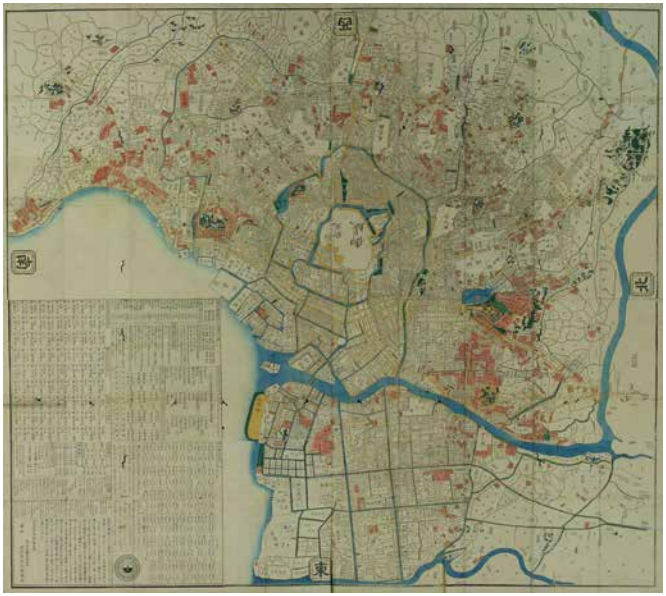


FIG. 1 The map shows Edo (Tokyo) in 1858 at the end of the Edo period. The shogunal (later Imperial) palace is at the center of a spiraling moat system. Large lots are used by the military aristocracy (marked by a stamp); small lots and street grid characterize the Ginza townsmen area

(McClain and Wakita 1999; Sorensen 2002). Today, machi continue to be important administrative and planning units (Iyori 1994). The term still has multiple meanings in the Japanese city: it can be used to indicate a district that tries to revive the feel of an earlier era, such as *Showa no machi*; an urban unit of the postal system; or a residential area centred on a shopping street.

Although the term and urban form of machi have a longstanding history and actuality, the Japanese city's postmodern and post-occidental order introduced a break with the past, as the French geographer Augustin Berque has argued. And as Bestor has also pointed out, there are no continuous links between contemporary urban neighbourhoods and preexisting villages and their lifestyles; today's machi are not simply administrative units or the expression of bygone social structures and lifestyles (Berque 1994; Bestor 1989).

Nonetheless, the concept of neighbourhood activity underlying the idea of machi has roots in earlier forms and continues to flourish today. The formal division of the city into units, for example, was partly derived from traditional China, where cities were divided into sections with strict social hierarchies and control structures (Yazaki 1968). Yazaki, writing about medieval Kyoto, calls these subdivisions 'towns' and notes the importance of Kyoto local organisations: 'All subdivisions of Kyoto thus developed as towns. One block surrounded by larger streets consisted of five or six *chō* (townships), and several of such *chō* units formed *oya machi*, or larger townships. The townspeople, *machishū*, were mainly merchants and their helpers, craftsmen and some deposed nobility. Money-lenders and sake brewers generally held dominant positions in the management of town affairs and security, which, in any case, the townspeople managed themselves. The townships were organized into larger autonomous bodies, *machigumi*, which, again were brought into even larger unions of the Kamikyō, Nakakyō, and Shimkyō (upper, middle, and lower sections of Kyoto)' (Yazaki 1968).

Special neighbourhood organisations, composed of local citizens (mostly landowners and merchants), continue to administer many neighbourhoods in Japan, which is to say that they are responsible for organising neighbourhood events and other activities, as well as establishing, for example, rules for waste disposal (Nawata 1994 and 1997). They have long been the primary partners of local government. Even today, the local government may ask local institutions, such as traditional self-governing neighbourhood organisations, the *chōnaikai*, for advice before deciding on controversial projects such as the construction of a new street or the implementation of urban renewal projects; it may request the *chōnaikai* to find out about the needs and ideas of the inhabitants so as to be able to organise emergency services or to preempt opposition movements. Traditional neighbourhood groups also head the organisation of festivals. Although recent years have seen a concerning decline in the numbers of participating members and their relevance to community life, the practice of civic activity is still alive, and the growth of new local groups gives hope for the continued vitality of the neighbourhood. These neighbourhood organisations and other local groups reappear in the analysis by the German anthropologist Christoph Brumann of the conflict over the 1996 proposal by the Kyoto mayor to build a copy of the Parisian Pont des Arts footbridge over the Kamogawa River (Brumann 2006).

While such associations are based in the neighbourhood and build on strong traditions of local self-governance and self-management, they are also part of strong vertical hierarchies, from neighbourhood to district, ward, and prefecture, as the Canadian geographer André Sorensen has demonstrated (Sorensen 2002 and 2007). Sorensen convincingly argues, their structure can funnel demands and protests from citizens as well as top-down directives and cooperation from above. The close relationship between chōnaikai and established institutions throughout Japan contributed to the rise of new and diverse social, political, and design processes based in small areas rather than the larger scales of the entire city or region, referred to since the 1960s as *machizukuri* (literally, 'making a neighbourhood' or 'making a community'). *Machizukuri* generally aims at improving liveability, management of 'shared spaces' as Sorensen calls them, and urban form (Sorensen 2007; Watanabe 1997, 1999, 2006, 2007; Evans 2002; Hein 2001; Hein and Pelletier 2006; Hohn 2000; Sorensen and Funck 2007; Vogt 2001). Such movements have made an appearance all over Japan during the past few decades, and local administrations have started integrating their activities into their frameworks., It is important to point out that these readings of *machizukuri* rely on the perception of urban units as small towns and as such build on traditional elements of urban form.

Machi as small town

The term *machi* thus refers to an urban unit inside a city but also to a small town. Japan traditionally has had a large network of small towns fulfilling different purposes (Kornhauser 1976; Sorensen 2002; Wheatley and See 1978; Yazaki 1968). Following

periods of multiple fiefdoms lasting into the middle of the first millennium, the establishment of a centralized system and new capitals modelled after Korean and Chinese examples (such as Nara, founded as Heijōkyō in 710 A.D., and Kyoto, founded as Heiankyō in 794 A.D.), a feudal system emerged after 1180. This system included urban settlements, labelled machi in conjunction with a special function and location, such as around temples (*tera-machi*), below fortresses (*jōka-machi)*, or next to ports (*minato-machi*). The policy of mandatory alternate attendance at court for regional rulers in the Edo period (1603-1868), called *sankinkōtai*, further increased the number of regional cities: people established post stations to offer accommodation to travellers along the old highway system and other businesses and houses settled next to them (*shukuba-machi*). Other examples are *hiroba-machi* (market towns) or *onzen-machi* (spa-towns). In contrast to European cities, where fortification surrounded the whole urban area, in Japan, walls surrounded only the actual castle, highlighting the town as an independent unit. Centraliation after the country's opening, in 1854, led to a sharp decrease in the number of municipalities from more than 71,000 by 1883 to slightly more than 14,000 in 1898. After a second municipal amalgamation in the 1950s and 1960s, their number was down to slightly more than 3,000 (Mabuchi 2001; Rausch 2006). Later amalgamations have further reduced the number of municipalities, with government aiming for the target number of approximately 1,000, again for easier administration and stronger local governance (Jacobs 2004). These sharp declines in the number of municipalities indicate a strong move toward centralisation that seems to contrast the declared desire of the Japanese government to promote decentralisation (Ishida 2006). Some scholars, such as the sociologist Andrew J. Jacobs, have argued that the Japanese situation is more complex than the term *centralized* usually connotes, as some municipalities (notably the big cities) retain more power than others (Jacobs 2003; Hein and Pelletier 2006; Steiner 1965). In their discussion of complexity and interdependence between central and local governments in terms of central control and local initiative, the American sociologists Richard Hill and Kuniko Fujita show that local power has grown despite a largely centralized national budget (Hill and Fujita 2000). It is clear that the mega-cities (*seirei shitei toshi* **政令指定都市** or *seirei shi* **政令市**, especially Tokyo, have almost as much power as the prefectures, while the wards of Tokyo (its administrative units) each have as much power as an average city (Nakabayashi 2006).

Machi and the import of foreign ideas

As Japanese practitioners carefully examined foreign examples after 1854, their cultural background influenced their selection of ideas (Hein 2003; Hein and Ishida 1998). Concepts that dominated planners' thinking in many European countries, notably those revolving around aesthetic concepts, failed to excite their interest, as the case of the rebuilding after a major fire in 1872 shows. The Tokyo governor decided that reconstruction in the Ginza area should set an example for fireproof residential construction. He retained the English engineer Thomas J. Waters, who designed the entire district along lines common in European cities at the time: with brick buildings, a unified streetscape, and the separation of traffic [FIG. 2].

FIG. 2 Ginza Avenue, shown in an 1873 photograph, features a European-style streetscape with continuous building lines, pedestrian walkways, and street lamps

The plan also called for widening streets and rearranging and replotting some blocks, mostly following the traditional urban layout. Nonetheless, Tokyoites perceived the buildings as expensive, damp, and not earthquake-proof. Many of the buildings remained empty for years, the project had no followers, and the 1923 Great Kanto Earthquake proved the critics right: it destroyed the brick district (Ishizuka and Ishida 1988). With many planners around the world, Japanese professionals and bureaucrats viewed attempts at deconcentrating the city, such as the garden city, with great interest. Here their understanding of cities as composed of specific urban units may have influenced their thinking (Howard [1898] 2003; Howard and Osborn [1902] 1965; Watanabe 1980). In 1918, Fukuda Shigeyoshi, a technical officer of the City of Tokyo, developed the visionary New Tokyo Plan for a deconcentration of Tokyo during the next fifty years.

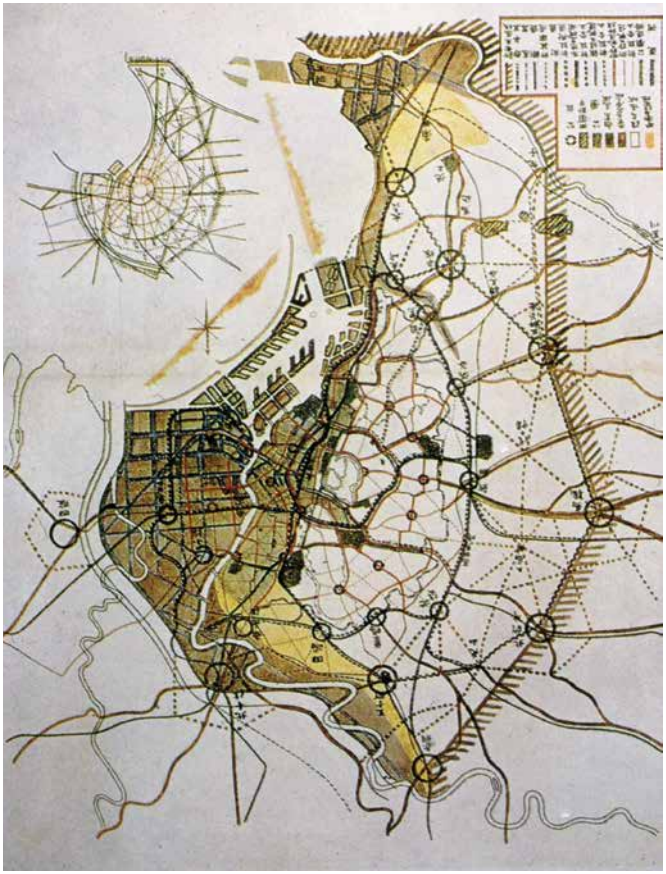


FIG. 3 Fukuda Shigeyoshi designed the New Tokyo Plan in 1918, proposing a deconcentration of Tokyo and the creation of new centers in the west connected to each other and the existing city

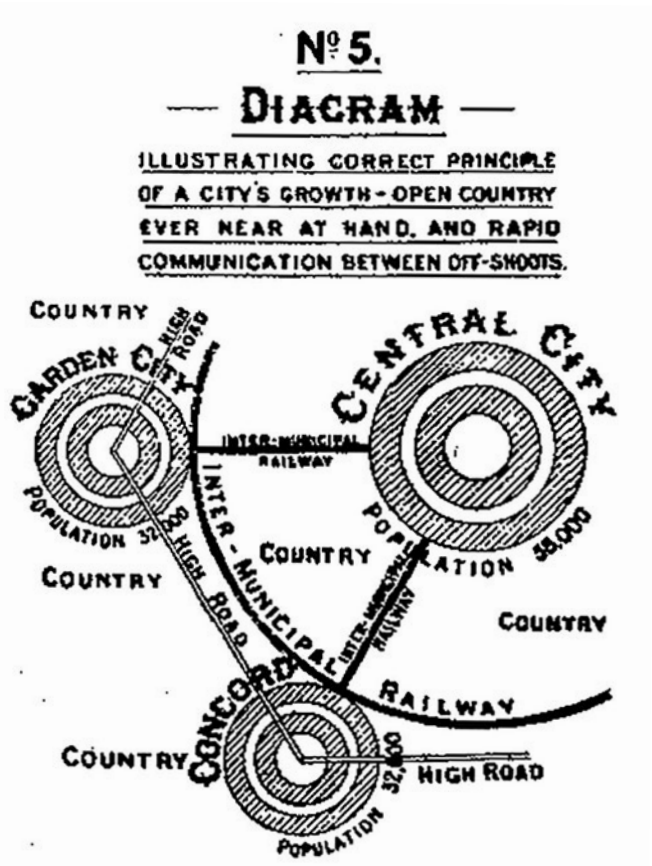


FIG. 4 Ebenezer Howard's Diagram number 5, 'illustrating Correct Principle of a City's Growth, 1902' may have served as a reference to Fukuda's New Tokyo Plan

In the plan, he limited the city's size to ten kilometres (a one-hour commute at the time) and proposed the development of sub-centres and satellite cities [FIG. 3]. Fukuda's proposal resembled Howard's diagram number 5 of city growth, with open country nearby and rapid communication lines, but Fukuda used the idea for a large metropolis instead of a town of 55,000 inhabitants and proposed decentralizing commercial functions—rather than residential—to the rim of the existing city [FIG. 4]. Fukuda's plan remained only on paper until 1923, when the Great Kantō Earthquake of 1923 destroyed large parts of Tokyo and Yokohama and led to a major drop in the population of the city of Tokyo as people fled to the suburbs and the countryside (Nakabayashi 2006). Gotō Shinpei, an important actor in Japanese urban planning who was mayor of Tokyo at the time, took up the deconcentration ideas of the New Tokyo Plan. But through the 1920s and 1930s, unrestrained growth spread around Tokyo. The Kanto National Land Plan attempted in 1936 to create green belts, removing industrial functions from central areas into satellite towns—a move that was also supported by the 1937 Air Defence Law and the 1939 Tokyo Green Space Plan (Ishida 1987; Nakabayashi 2006). During this time, Japanese planners continued to monitor Western discussions and to consult with practitioners in Europe and America. Fukuda, for example, discussed the rebuilding plan for Tokyo after the Kantō earthquake in 1923 with the German planner Fritz. Schumacher, and Ishikawa Hideaki (1893-1955), at that time an engineer in the Ministry of Home Affairs assigned to the town planning of Nagoya, consulted Raymond Unwin during his trip to Europe in 1923 to seek advice on his city's master plan (Shoji 1993). Ishikawa's writings and urban plans were a major conduit of planning ideas from the West to Japan. He reflected on Western planning ideas and influenced emerging practice through readings and interpretation of foreign planning examples including German principles from the 1920s and 1930s, notably the works of the geographer Walter Christaller and professor of planning Gottfried Feder (1883-1941) (Schenk and Bromley 2003). Japanese interest in British and American planning ideas was similar to that of other countries, but their interest in the two Germans, especially Feder, highlights a distinctively Japanese approach to the creation of small units that is comparable to the German attitude of solving the problem of big cities. The German idea of Stadtlandschaft (urban landscape), developed since the nineteenth century in conjunction with Anglo-American ideas, sought to transform existing cities by creating smaller neighbourhoods separated by green areas. It seems to have resonated with Japanese planners who appropriated German ideas according to their own lights, requirements, and culture—and constraints, also given the fact that they had few legal tools to implement large-scale plans and they faced widespread opposition to any attempts at comprehensive planning. For all of these reasons, their preference was for small-scale, machi-like patterns (Durth and Gutschow 1988; Osborn [1946] 1969).

The works of Christaller (discredited partly later because of the use of his ideas by the Nazis) echoed the desire of the Japanese planners to make regional, metropolitan, and urban plans. Christaller, whose writings were first introduced in Japan in the 1930s, analysed urban services in regional context and pointed to a regularity in the distribution of specific functions that could be used in the location and planning of new cities [FIG. 5] (Christaller [1933] 1969; Christaller and Ezawa 1969).

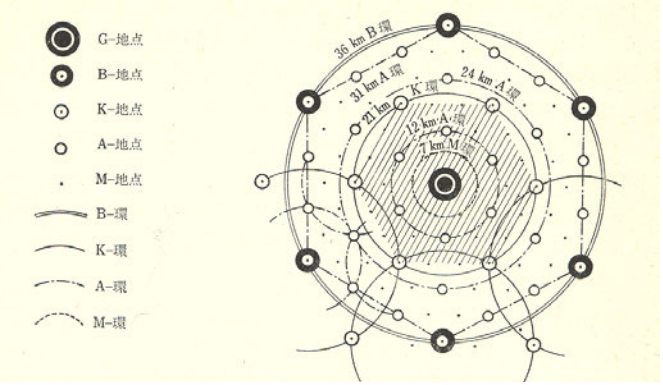


FIG. 5 Walter Christaller's theory of central places found great interest in Japan and was published in Japanese

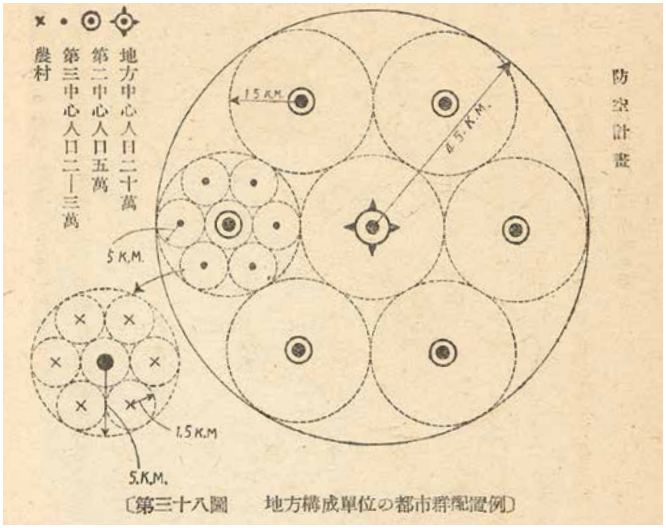


FIG. 6 Hideaki Ishikawa's sketch for regional planning, published in his 1942 book War and City, shows a hierarchy of urban places bearing resemblance to Christaller's ideas

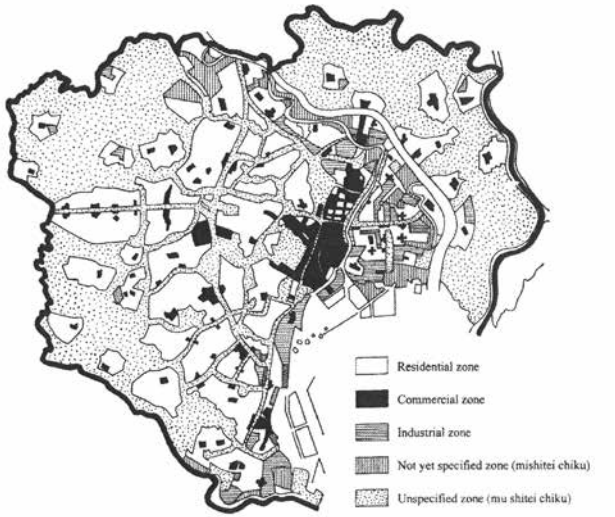


FIG. 7 Ishikawa proposed a land-use plan as part of his Reconstruction Plan for Tokyo (1946). His plan advocated deconcentration and lower population numbers than before the war

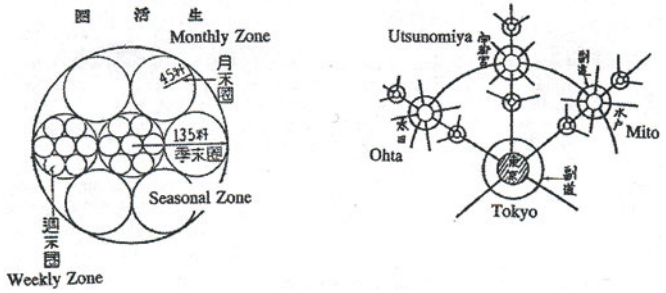


FIG. 8 Ishikawa included proposals for regional planning in the Kanto area as part of the Tokyo Reconstruction Plan

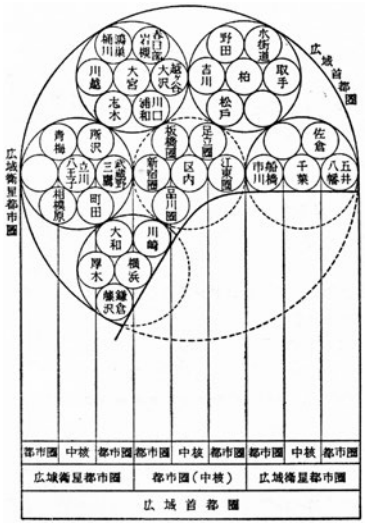


FIG. 9 Ishikawa's regional planning ideas included the larger capital city area and aimed at deconcentration on a regional scale

Building on this, as well as on Fukuda's and other earlier proposals for a deconcentration of functions in Tokyo, Ishikawa developed a visionary and all-encompassing plan for post-war Tokyo starting in October 1944. He took up British examples, notably the Greater London Plan of 1944, but also specifically recommended the creation of new specialized centres around the city, which would function as a regional network reminiscent of Christaller's work. With his first textbook on urban and regional planning, in 1941, Ishikawa had proposed his own regional planning ideas and had laid them out more extensively in a section on planning for defence in his 1942 book *War and City*. His scheme had divided the city into multiple small units according to daily, weekly, and monthly needs and strongly influenced his proposal for the post-war reconstruction of Tokyo [FIG. 6/7] (Ishikawa 1941 and 1942). A sketch from 1946 for the Kanto region highlights the specific connections he envisioned between Tokyo and satellite cities such as Ōta, Utsunomiya, or Mito; he also translated this concept into a schematic drawing based on his regional planning concepts in1963 [FIG. 8/9] (Nakabayashi 2006; Ishikawa [1946] 1993 and 1963). Both Ishikawa and Nishiyama also carefully examined the inner workings of a city, focusing on aspects of foreign planning that revolved around the idea of small cities and on urban units as the basis for metropolitan planning. They drew especially on works of the American planner Clarence Perry and Thomas Adams, as their proposals for the creation of largely independent units are close to the division of Japanese cities into independent units [FIG. 10] (Adams 1934; Perry [1929] 1974).

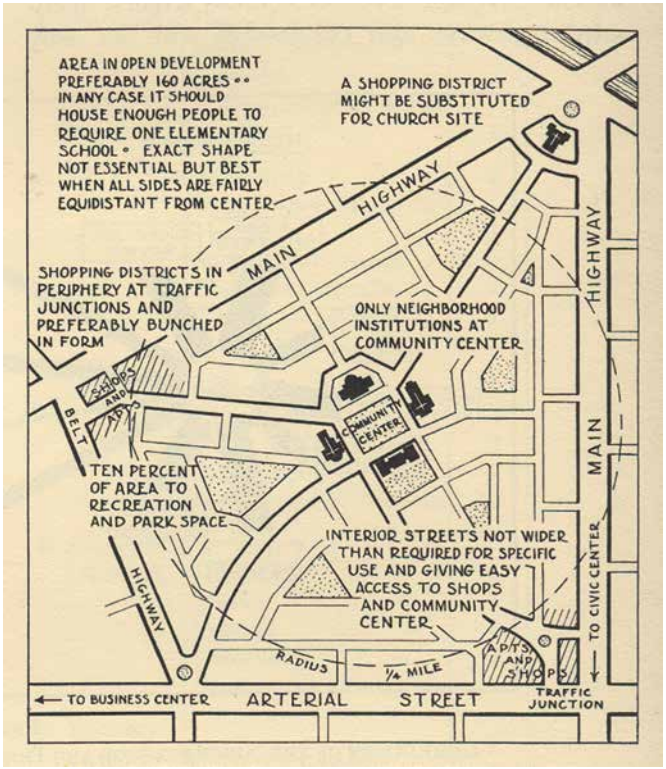


FIG. 10 The Neighborhood Unit Principles as proposed by Clarence Perry in 1929

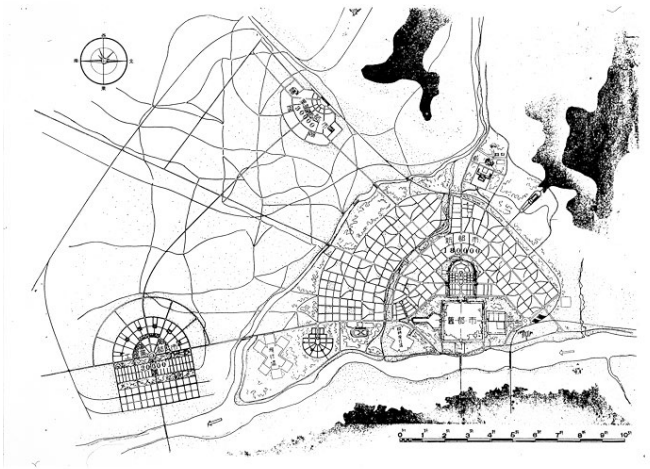


FIG. 11 Utida Yosikazu, Takayama Eika, Utida Yosifumi, a.o., proposed an urban plan for Datong in 1938, which included Western planning ideas

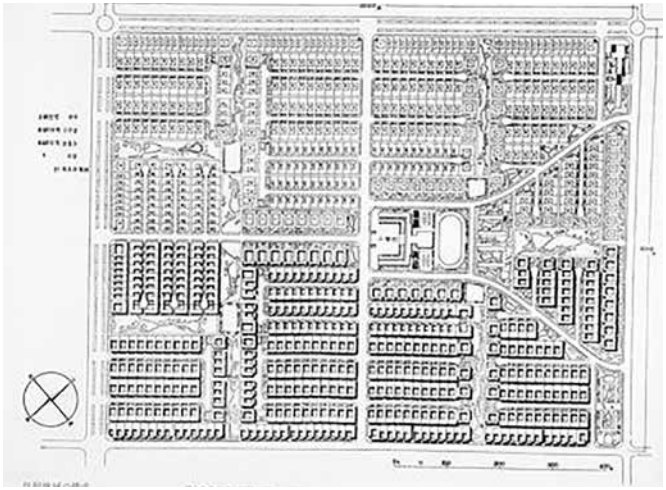


FIG. 12 The neighborhood proposed for Datong in 1938 by Utida Yosikazu, Takayama Eika, Utida Yosifumi, a.o., based on a Detroit neighborhood

The degree to which Western planning influenced Japanese thought is well illustrated in the works of the Japanese planner Takayama Eika, who in 1962 founded the first urban planning section in Japan at Tokyo University, for the Manchurian city Datong in 1939, where he modelled his neighbourhood plans on Detroit designed in 1931 [FIG. 11/12/13] (Hein 2003). The Japanese were thus aware of worldwide discussions, but they appreciated German planner Feder, whose work built on historic and contemporary examples including Anglo-Saxon concepts, featuring among others a preliminary plan for Greenbelt, Maryland (Feder 1939). It is possible that due to the political and military context of the1940s, German ideas received more Japanese interest than the proposals of other countries, but the post-war influence of Feder's ideas raises questions as to whether there was a specific reason for the sustained Japanese interest in this planner and the selective import of his work.

Since the 1940s, Japanese urban planning textbooks have given Feder's *The New Town* a prominent place in a lineage that includes Howard and Perry, and Japanese planners often refer to it in interviews (Toshikeikaku kyōiku kenkyū kai, Toshikeikaku kyōkasho 1987, 1995, 1996; Akiyama 1980, 1985, 1993; Higasa 1977, 1985, 1986, 1992, 1993, 1996; Ishikawa 1951; Katsura, Adachi and Zaino 1975, 1988; Takei 1960, 1958). Ishikawa's 1941 textbook on urban and regional planning illustrates his knowledge and interpretation of international planning examples, displaying—after Howard—images by the German planner Paul Wolf (mistakenly spelled Worf by Ishikawa) for the formation of a metropolis from 1919, the French architect Le Corbusier's city for three million inhabitants (1923), and Feder's The New Town proposal, a selection that Ishikawa maintained even in later editions (for example 1951, 1954, 1956, and 1963),some of which are considerably revised [FIG. 14]. In general, though, Japanese textbooks provide little detail about Feder's ideas. The planner Akiyama Masayuki, for example, refers to 'Gott Feder' and explains only the detail that he suggested multifunctional areas for daily living for about twenty thousand inhabitants, separated from each other and from industrial and other areas

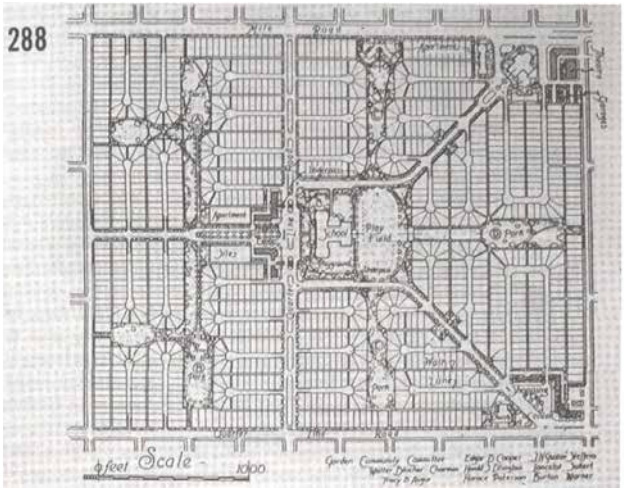


FIG. 13 A garden city neighborhood in Detroit designed in 1931 that served as inspiration for the neighborhood design in Datong by Utida Yosikazu, Takayama Eika, Utida Yosifumi

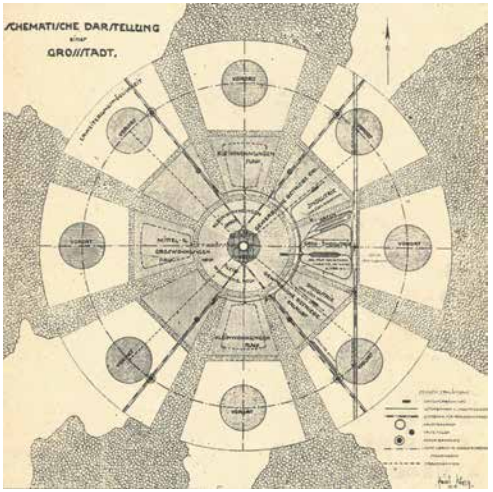


FIG. 14 Ishikawa republished the schematic representation of a metropolis by Paul Wolf (misspelled Worf), displaying his knowledge of Western planning concepts

by one hundred– to five hundred–meter wide green belts that incorporate small parks, footpaths, and sports facilities, as the basis for new town planning

(Akiyama 1993). It is clear that a certain ignorance of the book's contents existed; meanwhile, German- and English-language publications largely ignore the book (Schubert 1986; Hall 1996; Mumford 1961; Taylor 1974). In the political context of the 1940s, when Nishiyama wrote his article, such a genealogy might have been comprehensible, as the project was new and needed to be explained in detail. In regard to contemporary analysis of the history of town planning, this insistence on Feder may suggest that the book resonated with Japanese planners and planning principles as a technical introduction to urban planning rather than a politically motivated theory. Nishiyama, educated as an architect between 1930 and 1933, and one of the rare Japanese planners whose proposals are based on a comprehensive and long-term concept of society, was a major instrument in importing Feder's ideas (Nishiyama 1975, 1976, 1980). In 1942, he was examining the problem of the big city as a locale for a concentrated workforce, trying to find a new organisational form for the Japanese city. In this connection, he analysed the major urban planning discussions in the West. He chose material to present without regard to the political context that engendered it, whether capitalist America, socialist Russia, or fascist National-Socialist Germany. He compiled his findings and interpretations in an article titled 'The Structure of Life-units (or Spheres)' (*Seikatsu kichi no kōsō*) (Nishiyama 1968). In that text, first of all, he refuted urban concepts featuring skyscrapers and higher density of population in the cities, as had been advocated by Le Corbusier or Hilberseimer, calling the first a simple reorganisation of the city without seeking solutions to the density problems and the second a transposition of the capitalist American cities. He also rejected Beaux-Arts projects like the plan for Canberra as purely aesthetic concepts. Although it is not mentioned in this particular article, Nishiyama further objected to the monumental National-Socialist urban design proposals by Albert Speer and others (Kishida 1943).

Nishiyama was looking for a concept that could be applied both to new and to existing cities, and in this regard he very much appreciated Feder's ideas outlined in his book *Die neue Stadt* (The New Town), published in 1939 (Ishikawa 1943; Feder 1939). Feder proposed urban units for twenty thousand inhabitants divided in nine autonomous units and surrounded by agricultural areas. Based on a lengthy survey of existing cities, he listed all institutions necessary for a small town, creating a kind of guidebook to city building. *The New Town* was published in January 1939. Six months later, on June 1, 1939, it was already on the shelves of the administrative library of the city of Tokyo, demonstrating the interest given to the publication by the Japanese. It cannot be assumed that *The New Town* was read and understood by all planners, but it provoked enough interest to be partially translated by the Chamber of Industry and Commerce (*Shōkokaigisho*) by May 1942. At about the same time, several Japanese planners commented on the text in different articles. Itō Goro, officer at the building police section of the Metropolitan Police Board in Tokyo mentions it in his articles on Nazi Germany (Itō 1942 and 1943). Ishikawa refers to it in his article 1943 and Nishiyama discusses it in his study on the neighbourhood (Itō 1942 and 1943; Ishikawa 1943; Nishiyama 1942). Nishiyama's reference to Feder's book seems to have had a lasting influence on the Japanese interpretation and analysis of the Western history of town planning. Most Japanese textbooks explain Feder's concept as a hierarchy of daily/weekly/monthly centres. These are the words first used by Nishiyama and appear mainly in connection with a single illustration in *The New Town*. This suggests that Japanese planners picked up Nishiyama's translation or that few authors returned to the original document (Feder and Rechenberg 1942). The same is true for the choice of the illustration: in fact, apart from one book, the *Toshi keikaku kyōkasho*, which is also the only one to correctly describe the contents of the Feder text, the design printed is always the same. It is the one chosen by Nishiyama, which refers to daily/weekly/monthly centres and which was in the original and not included in the translation. As Nishiyama correctly mentions,

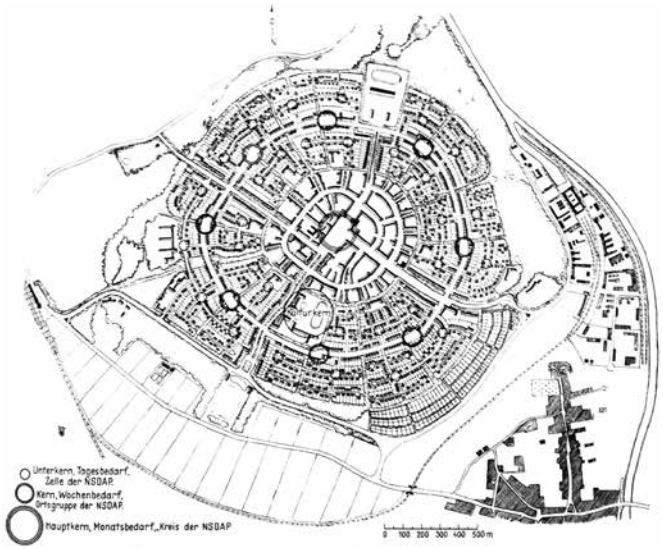


FIG. 15 Ishikawa republished this drawing by the student Heinz Killius, attributing it to Gottfried Feder

this particular drawing, referred to in many books as the 'Feder-plan,' was actually created by Heinz Killius, one of Feder's students [FIG. 15]. Feder had initiated a student project on the topic of a new town for twenty thousand inhabitants and included five student proposals in his book. While praising the Killius plan for its attempt to create an organic settlement, he also criticized it as too rigid. Among the other projects were proposals for satellite cities, one designed by Günther Hahn in Feder's seminar, the other created under the guidance of Professor A. Muesmann at the Technical University in Dresden [FIG. 16/17]. Both proposals highlighted the possibility of applying Feder's ideas to new as well as existing towns, a possibility that Feder stressed in his book.

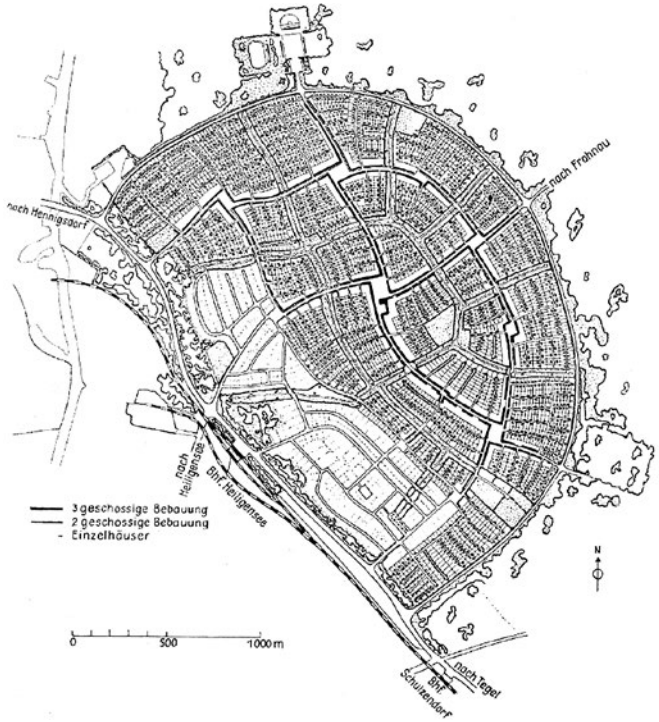


FIG. 16 Feder selected the proposal by Günther Hahn for a satellite city near Berlin (Berlin-Henningsdorf) to illustrate the concepts explained in *Die neue Stadt*

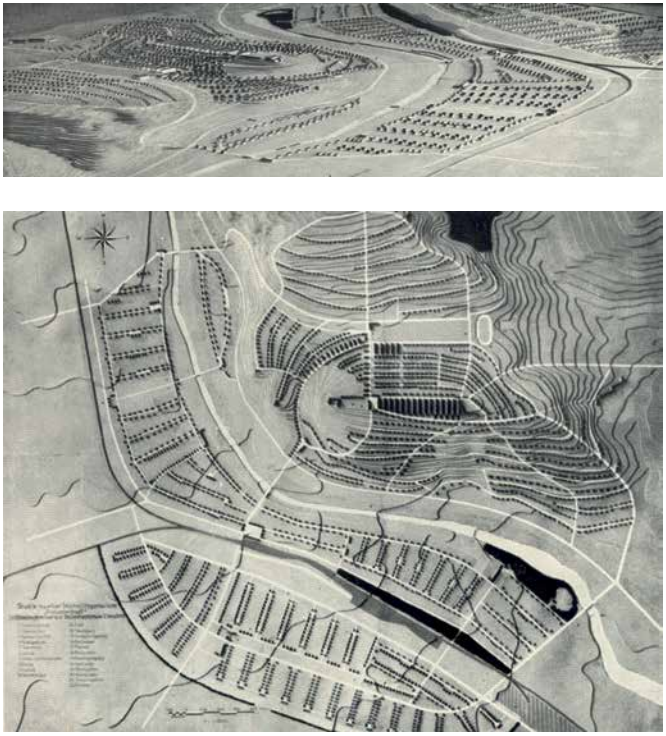


FIG. 17 Proposal for a satellite city designed in the urban planning seminar of Professor Adolf Muesmann at the Technical University Dresden, published in *Die neue Stadt* as an example of Feder's concept

Feder considered this technical project to be connected with the art of city planning, as shown in the subtitle of his book, *Essay on the Creation of a New Art of City Planning, Based on the Social Structure of Its Inhabitants*. However, the aesthetic part of this project and the reference to European medieval forms were not appropriate to Japan, and Japanese planners therefore largely ignored them. It appears that the notion of adjoining centres that catered to all daily needs while being linked into a larger network of central places appealed to the Japanese perception of machi-like urban units and the flows between them. Another connection may exist between the Japanese and the German interpretation of urban units as small towns: the German word *Siedlung* (settlement) can apply to a newly established village or town but has also been used notably since the 1920s for a residential district within the city. Ishikawa seems to have grasped this similarity, as he uses the term *Siedlung* when writing about Feder's new town project as well as when he refers to the apartment block complex Leipzig-Lößnig and others (Ishikawa 1941, 1951, 1963; Hein 2010b).

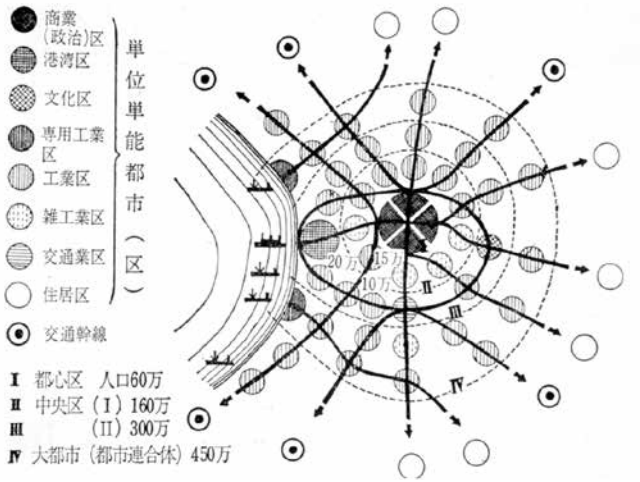


FIG. 18 Nishiyama's proposal for the zoning of a metropolis in 1946. The proposal includes centers of different function and size

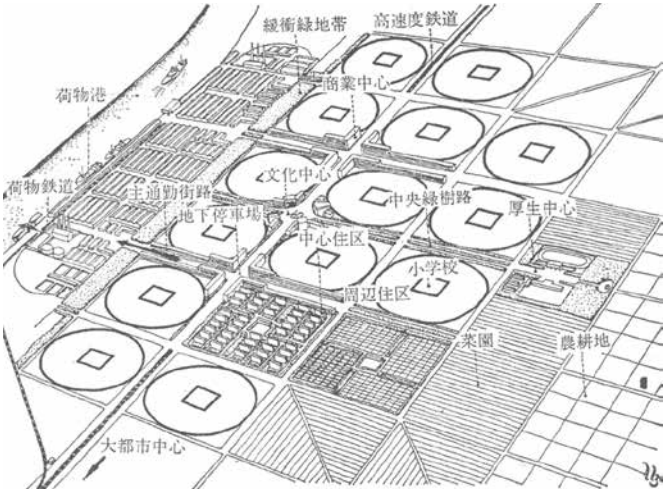


FIG. 19 Nishiyama's proposal for the interior structuring and urban units of different functions (neighborhoods are structured around elementary schools), 1946

Nishiyama also developed several projects concerning the organisation of the city in decentralized, self-governed neighbourhoods (in the tradition of machi), which he called 'life spheres' or 'life units.' Just like his Western counterparts, he opposed unnecessary traffic and suggested the creation of small urban units. However, he did not criticize the big city itself. On the contrary, and this is typical of Japanese planners, he tried to find a way to maintain the multifunctionality of big cities while making them more liveable. He stressed the need for equilibrated growth and the existence of an appropriate number of workplaces, welfare facilities, and the like to prevent sprawl [FIG. 18/19] (Nishiyama 1971). Japanese planners, such as Nishiyama and Ishikawa, thus appropriated Western ideas—and particularly selected German concepts—according to their own lights and used them to develop concepts for the transformation and modernisation of the Japanese cities. Their selection of foreign ideas appears to reconfirm their own understanding of the organisation of cities in small units, decentralisation, and deconcentration and made them highlight the development of cities as a conglomerate of neighbourhoods.

Machi as neighbourhood and lessons for the west

Newly introduced planning techniques added a new facet to Japanese urban form and planning concepts. They did not overtake and restructure Japanese cities but rather contributed to and continued the patchwork character of Japanese cities (Hein 2010a). City characteristics, reflecting particular geographic contexts; national and local traditions of politics, economic development, and social interaction; traditions of land ownership and planning tools; urban form; and architectural design continue to actively shape urban form and planning.

In turn, Japanese ideas about machi resonate with planning ideas from other countries. The concept of the neighbourhood unit is a central theme of twentieth-century planning, intimately tied to the name of Clarence Perry. Residential neighbourhood units, often organized around cul-de-sac streets, have been central planning features in many countries around the world, meant to allow child's play and community interaction. Many of these projects failed, however, and the result of modern neighbourhood planning in the United States and elsewhere

(as in the example of Levittown) have been residential subdivisions for single-income brackets that have rapidly degraded. Researchers widely analysed the decay of the social interaction of traditional neighbourhoods, and in the 1960s, a new group of planners emerged in response to the writings of Jane Jacobs, defending community interaction, or New Urbanism. The current promoters of these ideas have once again taken up the topic of small-scale neighbourhoods.

Thus, today it is the patchwork character of Japanese cities, the multitude of local identities, of different perspectives of urban living and the strength of social networks in traditional, non-planned, neighbourhoods—some of the same characteristics that earlier observers condemned—that attracts foreign researchers. They seek inspiration in the densely built, functionally and socially mixed residential areas with shopping streets, educational facilities, and public transportation within walking distance and feature narrow and irregular paths that require cars to drive carefully and allow room for neighbourly talk and children's play. There is a special quality to the neighbourhood, its social and functional diversity, and its meaning for the Japanese in terms of identity that is distinctive of the traditional machi, which have the feel of small towns and a certain feeling of local governance freedom. In fact, their interest tells us as much about Japanese cities as it does about the authors utilizing the metaphor, their home culture, and specific experience of urban space.

Please refer to the full version of the article for the complete list of references, published in: *Journal of Urban History* 35, no. 75 (2008); or to the online version: http://juh.sagepub.com/cgi/content/abstract/35/1/75.

Kyoto's Landscape

A close look at the Meirin District

Marie-Thérèse van Thoor

Sanjo Street, the old road to Tokyo, is a lively street in the middle of Meirin District in the heart of Kyoto. People live, work, shop and stroll there. The street, like all others in the district, is made up of houses and shops, restaurants, workshops and kinds of activity. The neighbourhood is well known for the many kimono fabrics, but there is even a bike shop – a familiar phenomenon for the Dutch [FIG. 1]. Building types vary. Where Sanjo Street connects up with the large avenues surrounding the urban block, there are large, tall buildings, with the occasional higher block of flats at the centre. However, low-build prevails. Meirin District is part of what is called the historical urban area, and contains buildings from various periods, from the 17th through to the 20th century, including many machiya.

FIG. 1 Bike shop in Sanjo Street

In his contribution to *Urban Coding and Planning* Yoshihiko Baba describes the history and the ordinances of districts in Kyoto, including Meirin District (Baba 2012). We can conclude that the current system and character of city planning are based on a long tradition. Interestingly, urban government supports local community initiatives on a neighbourhood level. In this text the spatial characteristics of Meirin District are seen through the lens of the Landscape Plan (2007), with input and know-how from city officials and architects, as well as from the point of view of the Meirin Neighbourhood Association (Kyoto City, 2007; interviews 2017).

The Landscape of Kyoto

'The landscape of Kyoto can be perceived not only by vision, but also by such sensations as light, wind, sound and smell which harmonized with each other since olden days. It is also perceived together with its history and the sensitivity and mentality of its people. For a long time, the landscape of Kyoto has been regarded as the asset that should be protected' (Kyoto City 2007, p. 2).

The landscape of Kyoto, in which geography, topography, climate, history, traditions, culture and inhabitants blend together, is an umbrella term which also covers architecture (historical and modern) and urban planning. In Kyoto's landscape the underlying components, elements and attributes mingle and coalesce; together they form the city's values and characteristics. The Urban Planning or Cityscape Department is responsible for that urban landscape, and in 2005 drew up the Landscape Plan, which was revised and adapted in 2007, based on the national Landscape Act (Kyoto City 2007).

Some of Kyoto's urban buildings have been designated as protected national monuments in accordance with the Law for the Protection of Cultural Properties. Japan has several types and qualifications of cultural properties. The most important monuments, such as shrines, castles and temples, count as national treasures. They have the highest protection, as well as the most restrictions. Other monuments are divided into national important cultural properties and national registered tangible cultural properties, generally referred to as national designated monuments and national registered monuments, respectively (Ishikawa 2017). Since 1897 the designation of monuments has been based on six criteria: historic sites, special historic sites, places of scenic beauty, special places of scenic beauty, natural monuments and special natural monuments. They are examined and recorded in various ways, and there are several forms of subsidization and advice. The government designates these monuments, the prefecture is responsible for their management and maintenance (Ishikawa 2017). Designated monuments are significant and may not be demolished indiscriminately. However, for the demolition of registered monuments one only needs to announce the intention. Registered monuments are the 'youngest' category. That classification was created following the devastating earthquake in Kobe in 1995. Many historical buildings were also vanishing at that time for other reasons, such as large-scale new-build. As a result, a move was made to inventory and register endangered and valuable heritage buildings that did not yet have protected status. Clearly, the restrictions for registered monuments are far less limiting, but at least such buildings are documented.

Yuichi Ishikawa is an architecture historian and works at the Heritage Department in Kyoto. His activities relate to the national designated and registered monuments and entail visual inspections, inventories, compilation of charts relating the values and distribution, and research and advice on restorations and subsidies. Ishikawa believes it is important when restoring designated monuments to respect the original concept of the building. When the occasion arises, it can mean that all elements must be restored or else replaced 'in the original way' (Ishikawa 2017). That applies for the façade, the roof, the building volume, the floor plan, as well as for the materials, colours or other details. In the next chapter, Kazuto Kasahara calls this original approach to restoration or renovation the 'traditional concept and method of renovation design', describing exactly what that amounts to (Kasahara pp. 45-47). Ishikawa however does see conversion of monuments, giving them a different use, or their modification (for instance, insulation), to be good options, provided such changes and modification are reversible (Ishikawa 2017).

The Heritage Department is also involved in making inventories of the national registered monuments. That process is well underway. In addition, a start has been made to list potential post-war monuments by the Ministry of Cultural Affairs. At the Heritage Department, apart from this policy-related research,

they also have scope for fundamental research into the historical city of Kyoto. It is a major exercise, initiated by the National Research Institute for Cultural Properties, entailing the study of smaller districts of Kyoto with a view to recording in depth the cultural landscape of all these neighbourhoods. The results are ultimately intended to be tied in with the Landscape Plan of Kyoto City (Ishikawa 2017).

Local heritage and the Landscape Plan

The Landscape Plan comprises all the urban ordinances relating to new-build, existing buildings and monuments. Kyoto not only has national designated and registered monuments, but also local designated and local registered monuments. Since 2005 those buildings have been designated by the city of Kyoto and do not fall under the Heritage Department's remit.

Initiatives for a Landscape Policy for developing, regulating and protecting Kyoto's landscape were already taken at the beginning of the 20th century. They speeded up in the 1960s, when the first plans for high-rise came about – such as for the Kyoto Tower in 1964. The Kyoto Hotel (1994) and Kyoto Station Building (1997) were to become the next controversial projects, once more on account of their height, which for Kyoto was exceptional (Kyoto City 2007). In 1991 the Council for Kyoto City Development on Measures for Land Use and Landscape was set up. It proposed dividing Kyoto into three areas, labelled as 'Conservation' (the north and the mountain areas), 'Revitalization' (downtown) and 'Creation' (the south). All manner of ordinances, guidelines and policies followed for the districts, including the Guideline for the Business-Residential Districts (1998), for the districts where traditional machiya, workshops and culture were under threat from tall apartment blocks. These guidelines contained measures to stimulate the revitalization of the districts, such as the conservation and renovation of machiya, opening up dead-end alleyways, and making them habitable, creating walking areas, and promoting small-scale industry. All this was based on cooperation and executed in conjunction with the city, businesses and residents (Kyoto City 2007). The local population's participation was an important and indispensable aspect, based on long tradition, as described earlier by Carola Hein (Baba 2012; Hein 2008).

However, the measures were not an immediate success, nor were they immediately understood and embraced by the residents. The situation only changed when the measures received legal and national support in the national Landscape Act, and the local population became more actively involved as well. Neighbourhood committees like the Neighbourhood Association of Meirin (School) District played a crucial role. Meanwhile, burgeoning urbanization and the fear that the city's heritage was being lost led to the founding of a body with the splendid name of Council on Landscape Formation of Kyoto Shining Forever (2005), which greatly influenced the content of the Landscape Plan. The Plan laid down uniform parameters, restrictions and design codes for the entire Kyoto landscape for which prior to 2005 there had been an incomprehensible and highly diverse set of rules.

Maps accompany the Landscape Plan indicating regions and districts in different colours designating the character, features and values of the areas. Different criteria and codes apply for each sector which are relevant to their character and values (Uehara 2017). For example, the pink blocks indicate the valuable parts of the historical urban area and have stricter rules than the surrounding yellow blocks. The green blocks mark the surroundings of the foremost monuments, or landmarks, like the Imperial Palace and Nijo Castle [FIG. 2]. Local designated and registered monuments are, like the national designated and registered monuments, integrated in the (cultural) landscape of each district. Furthermore, remaining machiya count as important landscape structures.

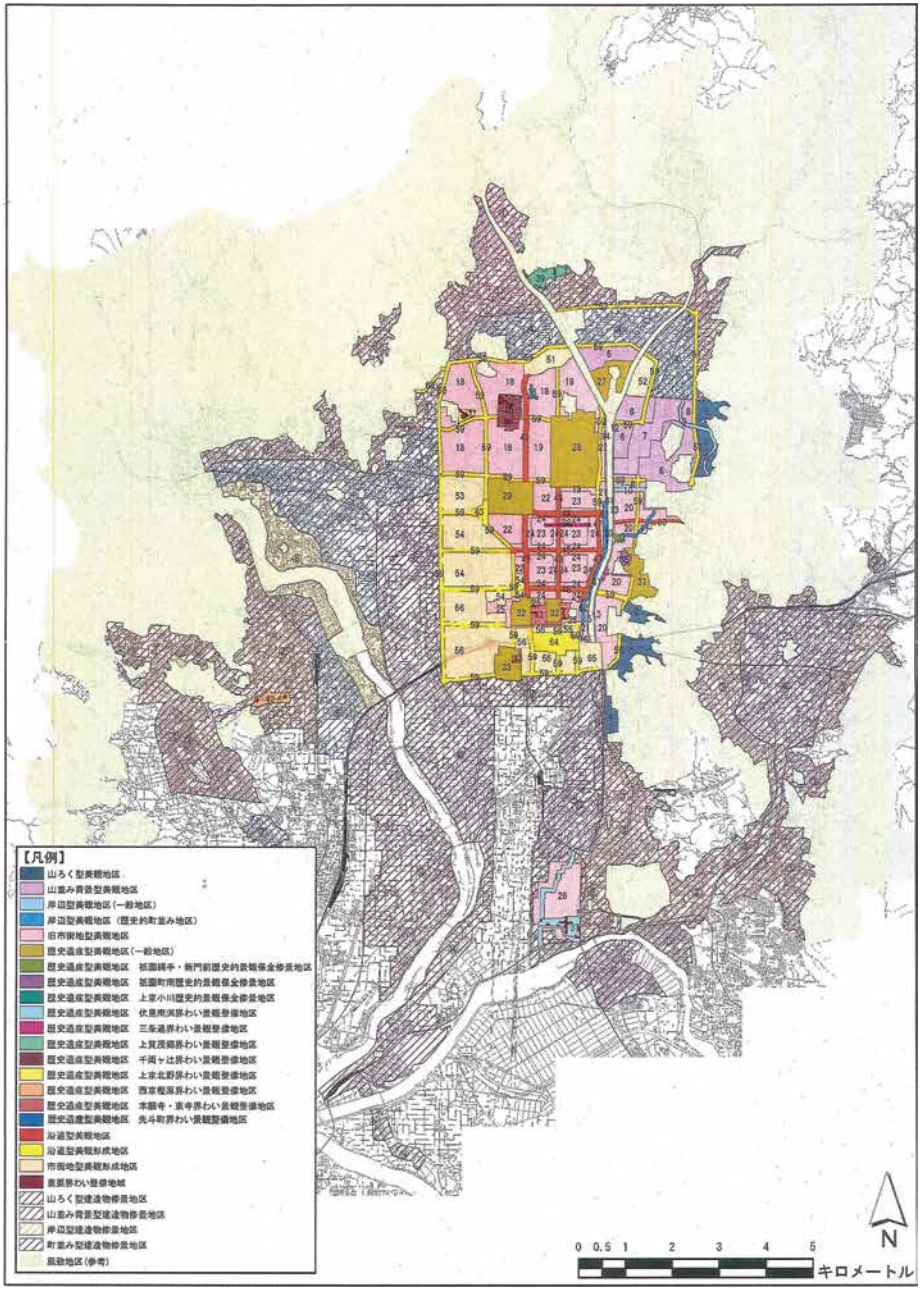


FIG. 2 Map in the Landscape Plan (2007). Different colours indicate character, features and values of the areas

The Heritage Department is responsible for the (national) monuments, as we have seen. It focuses on the buildings themselves and does not deal with urban development. The local designated and registered monuments should rather be considered as examples for the conservation, regulation and development of the overall picture of Kyoto's landscape. In their case, the qualification 'designated' or 'registered' only relates to the exterior, more specifically only to the façade and the outline. With the major monuments – local designated monuments – only the façade and height may not be altered. The less valuable monuments – local registered monuments – do fall under a design code, but it is easier to modify them, in height for instance.

For the implementation of the landscape development of the historical city of Kyoto five 'projects' are formulated in the Landscape Plan: 1. Regulation of building heights; 2. Formulation of design standards or design codes; 3. Protection of vistas and perspectives; 4. Advertising policy; 5. Conservation and revitalization of historical buildings, including machiya. The underlying idea of the Landscape Plan is to 'create' a landscape that not only harmonizes with the natural surroundings, but in which the new – future – appearance of Kyoto also harmonizes with the traditional urban landscape. Conservation, revitalization and creation are inseparably bound together here (Kyoto City 2007).

The Landscape Plan has three important features. Firstly, the plan is geared to development, and looks to the future of Kyoto in 50 to 100 years time. In the city, most property is privately owned, but the landscape of Kyoto is seen as public property. Lastly, it is the responsibility of everyone in the city to protect landscape structures for the future (Kyoto City 2017). This plan unites cultural history and spatial development. In that respect the Landscape Plan resembles the Dutch Belvedère Memorandum (1999), and one wonders if the Belvedère strategy 'conservation through development' might not also apply for the policy of Kyoto City.

Building height

Kyoto lies in a basin surrounded by hills. Regulations have been made regarding building heights, to prevent high-rise from detracting too greatly from that picture of a city between mountains. In the business districts (round the station) building heights may exceed those elsewhere in the city. In addition, there is already high-rise along a number of large avenues [FIG. 3]. The intention is for building height gradually to decrease between the commercial centres and the hills. Six height levels are applied, ranging from a maximum of 31 metres in the centre to maximum 10 metres on the urban periphery at the foot of the hills.

FIG. 3 Karasuma Street, which borders the Meirin District on the west side, shows higher building heights then the centre of the urban block

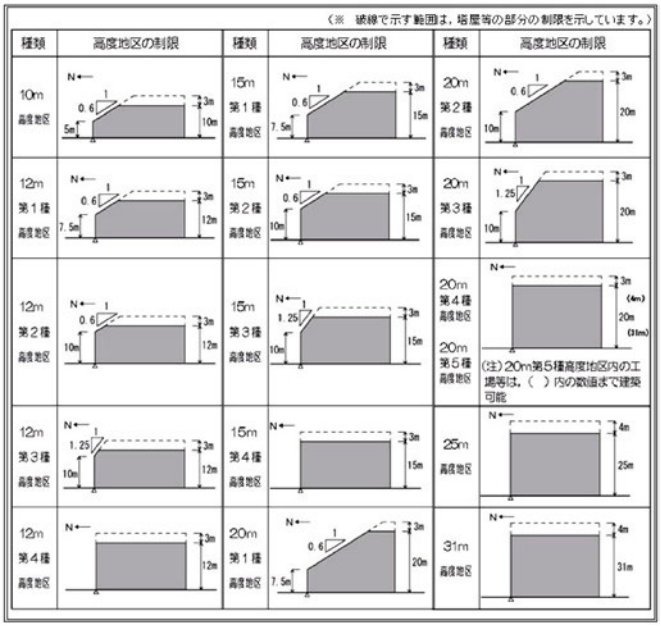


FIG. 4 Building regulations for height control

These heights are relative to the characteristic elements of the districts in Kyoto's landscape. For instance, in the historical urban area the maximum height of 15 metres is in line with machiya [FIG. 4].

In exceptional cases it is possible to exceed the maximum height, in order to promote an attractive urban landscape that harmonizes with the city's dynamic (Kyoto City 2007, p. 45). That exception may be applicable if a building's design is such that it will improve the quality of the setting (or even of the city) [FIG. 5]; if the building has a public function in keeping with the surrounding landscape; if greater building height is necessary in terms of safety or construction; and if the building is part of an attractive 'street landscape'. Street landscapes of that type are found in Meirin District, for example in Oike Street or Karasuma Street, and where building height is substantially more than in the smaller streets and alleys within the urban block [FIG. 6].

FIG. 5 The design quality of this building permits its greater height as compared to the surrounding setting

An exception can also be made for pitched roofs. They are considered to characterize Kyoto's appearance and so such roofs may exceed the maximum height actually prescribed in the area in question [FIG. 7].

FIG. 6 Karasuma Street, a roadscape landscape with heigher buildings

FIG. 7 Characteristic pitched roofs

(1) 壁は京壁又はこれに準じるものとする。 (2) 飾り窓，下地窓，下地腰間，ガラス格子引違戸又は腰高ガラス引違い戸並びに張り出し手摺よって構成する。	(1) 塀は京壁，しっくい壁又はこれに準じるものとする。 (2) 1階は格子前戸，腰高ガラス引違い戸，はきだし引違戸又は腰板張りによって構成する。 (3) 2階開口部は，腰高ガラス格子引違戸，面格子又は出格子窓によって構成する。	(1) 壁は京壁又はこれに準じるものとする。 (2) 1階は格子戸，はきだし引違戸又は腰下見板張りによって構成する。 (3) 2階開口部は，数寄屋風装飾窓，下地窓，腰高ガラス格子引違戸又は出格子窓によって構成する。	(1) 壁は京壁又はこれに準じるものとする。 (2) 2階開口部は，腰高ガラス引違戸又ははきだし引違戸及び長押によって構成する。
(1) 仕上げとなる柱，長押，建具等の見掛り部は木とする。 (2) 犬走りはモルタル塗装，洗い出し砂利仕上げその他これに類する仕上げとする。 (3) 駒寄や犬矢来を設ける。	(1) 仕上げとなる柱，長押，建具等の見掛り部は木とする。 (2) 犬走りはモルタル塗装，洗い出し砂利仕上げその他これに類する仕上げとする。	同左	同左
木部はべんがら塗り，古色塗装又は生地仕上げその他これに類する仕上げの色彩とする。	木部はべんがら塗り，古色塗装又は生地仕上げその他これに類する仕上げの色彩とする。	木部は古色塗装又は生地仕上げその他これに類する仕上げの色彩とする。	同左

FIG. 8 Examples of guidelines for building standards or design codes

FIG. 9 How to park a car in a machiya

FIG. 10 A car parked in a modern building

FIG. 11 Setback above the second floor

FIG. 12 Another solution for a setback

Design codes

Building standards or design codes are the measures which architects and residents encounter most in practice. Tomoko Uehara of the Cityscape Department emphasizes that they not only apply to new-build, but also to monuments, though additional values and rules also apply to the latter (Uehara 2017). Design codes also vary greatly, depending on the district to which they relate. At present the city works with twelve different standards. As a neighbourhood may belong to several such districts, several codes can apply. Meirin District combines a machiya landscape with roadscape landscapes at the peripheries. Moreover, it is situated to the south-east of Nijo Castle and accordingly the view corridors towards that monument must be unencumbered in a circle around it.

There are common standards applying to the basic designs of most of the city as a whole. In addition, each district has more specific local standards. The design codes are set down in detail, in writing and in pictures. According to Ms. Uehara, all architects should in fact know all the guidelines by heart, or at least always have them to hand [FIG. 8].
There are common standards for roof colours, for the material of the indoor walls, for balconies, for the colours of exterior walls and for property boundaries (fence, gateway, wall, hedge and the like). For example, design codes prescribe possible solutions for the parking of a car in or in front of a house [FIG. 9/10].

The design codes, combined with the regulations for maximum building heights, also identify the desired course of the rooflines (see fig. 4). A setback is required above a certain height, which is usually applied very literally [FIG. 11/12].

Vistas and advertising

As we have seen, important buildings, monuments and sceneries may be regarded as landmarks for future development. It can require an unimpeded view of such landmarks from various directions. In the Landscape Plan these Perspective Landscape Conservation Zones are identified, alongside the concomitant regulations for building height, form, design, colours of structures and elements, or colours of outside walls and roofs. Depending on the value and significance of the landmarks, the zones are referred to as perspective zone, short distance view zone or distant view zone. The setbacks of the buildings in these zones are also planned to correspond to the view of the landmarks.

It is impossible to envisage a dynamic, modern city of the future without advertising. Consequently, the Landscape Plan also has a project that regulates policy regarding outdoor advertising. There are rules relating to the place, height, colours and size of displays and billboards in the landscape (and on buildings). The advertising, photos or paintings must be appropriate to the buildings and the environment. The rules are not only intended to discourage certain advertisements, but also to stimulate good quality. In exceptional cases it is again possible to depart from the rules, as is the case with historical advertising, or advertising of 'extremely good design'. In such cases subsidies are even available. The qualification 'good' or even 'excellent' applies to advertising that is discreet and blends into the surroundings [FIG. 13].

FIG. 13 Example of excellent advertising: it perfectly blends with the machiya

Revitalization of machiya

The Landscape Plan defines machiya as important structural elements and vehicles of the image of the future. That is why they are specially spotlighted in the plan. A few decades ago, the inhabitants, architects or committees were the ones who campaigned to save and preserve machiya. For instance, researchers from Kyoto University and a few architects embarked on the research and restoration of machiya some 25 years ago. A group of architects, including Ryoichi Kinoshita, set up Kyomachiya Architects. In recent years they have dealt with around 250 machiya. On the one hand, their work relates to restoring the houses. On the other hand, Kyomachiya Architects trains craftspeople, like carpenters, supervises them, and in this way ensures that know-how is passed on to the younger generation. In the *Kyoto Machiya Revitalization Project* it is possible to see the results of the Kyomachiya Architects' endeavours (Kyomachiya Council 2011 and 2016).

Kyomachiya Architects works with the Kyoto Centre for Community Collaboration (KCCC), which was founded some twenty years ago. According to its website, the KCCC helps to achieve the goal 'How to keep Kyoto *Kyoto*'. In the 1990s the Centre conducted surveys which charted the number of machiya remaining in the city and any still existing relevant information. The surveys formed the foundation for the lists of local designated and registered monuments. The restoration and conversion of machiya, and the uniqueness of materials and details will be addressed in subsequent chapters.

As we have seen, one of the aims of the Landscape Plan is to involve residents actively in protecting collective property of the Kyoto landscape. The KCCC is important for information, communication and mediation, between the city, organizations, architects, craftspeople and inhabitants. In the neighbourhoods themselves, the neighbourhood committees may have great influence on the specific character and appearance of their neighbourhoods. Kyoto City has recognized such committees in what are meanwhile nine neighbourhoods as serious partners of the city in implementing the Landscape Plan (Uehara 2017). Principals and architects in those nine neighbourhoods cannot just ignore the committees or associations. In neighbourhoods other than the nine it is not compulsory (as yet) for people planning new-build, alteration or conversion to first pay a visit to the local association, but the city does urge them to do so.

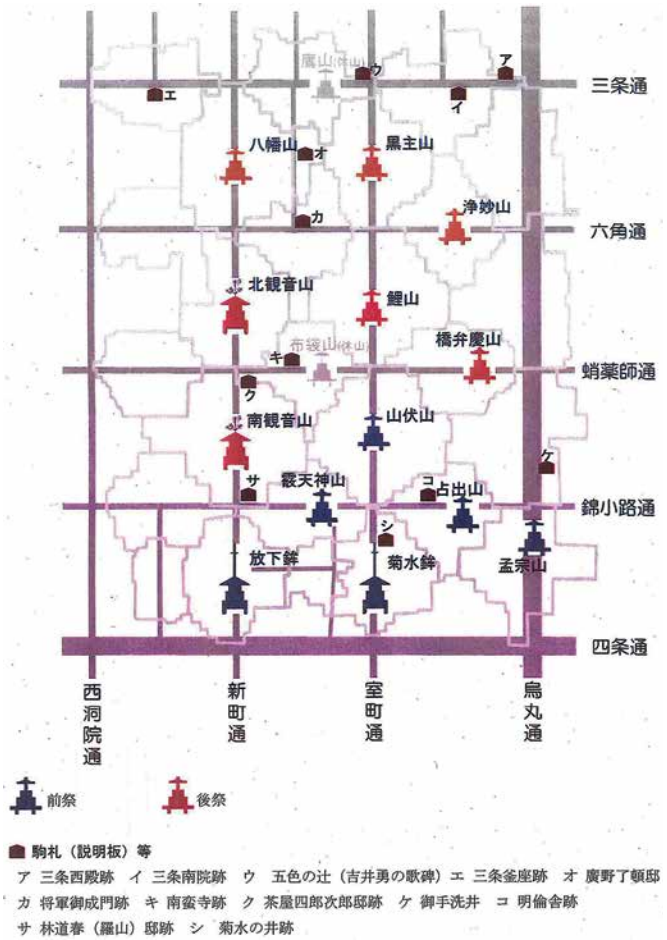


FIG. 14 Plan of Meirin (School) District, comprising 27 smaller neighbourhoods

FIG. 15 Mr. Akira Hasegawa, president of the Meirin District neighbourhood association, March 15th 2017

FIG. 16 Window shop in Sanjo Street, the leading street for traditional kimono industry

Meirin District Neighbourhood Association

Akira Hasegawa is the president of the neighbourhood association of Meirin (School) District, one comprising 27 communities [FIG. 14/15]. The association was set up in 2000 and has meanwhile attracted growing interest and influence, as Mr. Hasegawa proudly told me (Hasegawa 2017). The construction of a large apartment building in the middle of the block occasioned the founding of this neighbourhood committee. At that time many small artisanal businesses, which are so characteristic of the neighbourhood, were closing down. Hasegawa lives in Sanjo Street which is the leading street in Kyoto – and perhaps in the whole of Japan – for traditional kimono fabrics [FIG. 16].

The building of the twelve-storey block of flats amounted to an enormous jump in scale for the neighbourhood. Flats of that type block a great deal of sunlight for the surrounding, lower buildings. But the neighbourhood does attract many new residents, particularly from outside, the majority of whom want to settle in new-build apartments. On the perimeter of the block, at Horikawa Street, there is a secondary school that prepares intelligent students for university – the prestigious Horikawa High School. Parents wishing to enrol their children in that school must be able to prove they live in the neighbourhood. So many families are looking for homes there. According to Hasegawa 80% of the local residents now live in apartments.

As high-rise buildings went up, a noticeable rift came about between the 'indigenous' residents (living mostly in the older, low-rise homes) and the new inhabitants. The association, which was originally founded as a pressure group against big construction firms which were buying up small business premises and having them demolished to make way for high-rise, also saw an opening for other activities. hey were concerned about a decline and loss of the district's traditional culture, and sought means to protect it and bring it to people's attention. Also, they could seek to make contact with the new neighbours and inform them on the history, temples, tea ceremonies, music and other traditions of the communities. The chief medium in that respect is the *Meirin News*, a free publication of the neighbourhood association and delivered door-to-door three times a year (*Meirin News 2005-*). In the course of the first nine years, the *Meirin News* introduced the 27 neighbourhoods, one at a time. Today it is an important medium of communication for and about people, businesses, festivities, meetings and topical developments in the district [FIG. 17].

FIG. 17 The *Meirin News* (2015)

FIG. 18 A machiya pulled down and deported (2015)

FIG. 19 Apartment blocks replace traditional buildings

The big construction firms or financiers, often from Tokyo or Osaka, had little time for the activities originating from the neighbourhood, nor were they interested in information relating to cultural history reported in Meirin News (Hasegawa 2017). In order to meet the ever-increasing demand for new housing, the builders kept on buying up existing properties and proceeded to pull them down and replace them with large apartment blocks [FIG. 18/19].

Apartments change hands quite often, meaning that their occupants do not form ties with the neighbourhood. Accordingly, low-rise buildings rapidly disappeared and the numbers of machiya dropped drastically. Figure 20 presents a map of Meirin District showing the machiya still encountered by the KCCC during a survey between 2008 and 2010. Some have been pulled down in the meantime [FIG. 20] (Nishii 2017). Since this district is important on account of the fabrics (as used for kimono) stocked in machiya, it has meant that not only the district's traditional architecture, but also its cultural identity is under threat.

However, there is another side to the demolition followed by new-build: after 2010 many food shops and eating and drinking establishments came to the district, followed by hotels. In 2009 *yamahoko*, the floats deployed in the Gion festival (*Gion Matsuri*) were registered on the Unesco world heritage list as expressions of intangible global heritage. The *yamahoko* are drawn in a procession through the district's streets during the annual Gion festival in July. They are also known as moving museums, because they are hung with tapestries and other objects depicting the district's cultural crafts and traditions. For Kyoto, and certainly for these neighbourhoods, the Gion festival is the most important festivity of the year and of the city. And it appeals to tourists. Today Kyoto counts as one of the most attractive tourist cities in the world.

In that context, we saw that the neighbourhoods are important and serious partners for the city of Kyoto. The Meirin District association is one of the city's nine partners, though it is still relatively new. Before Kyoto City changed the policy for the landscape in 2005, each district had its own regulations and

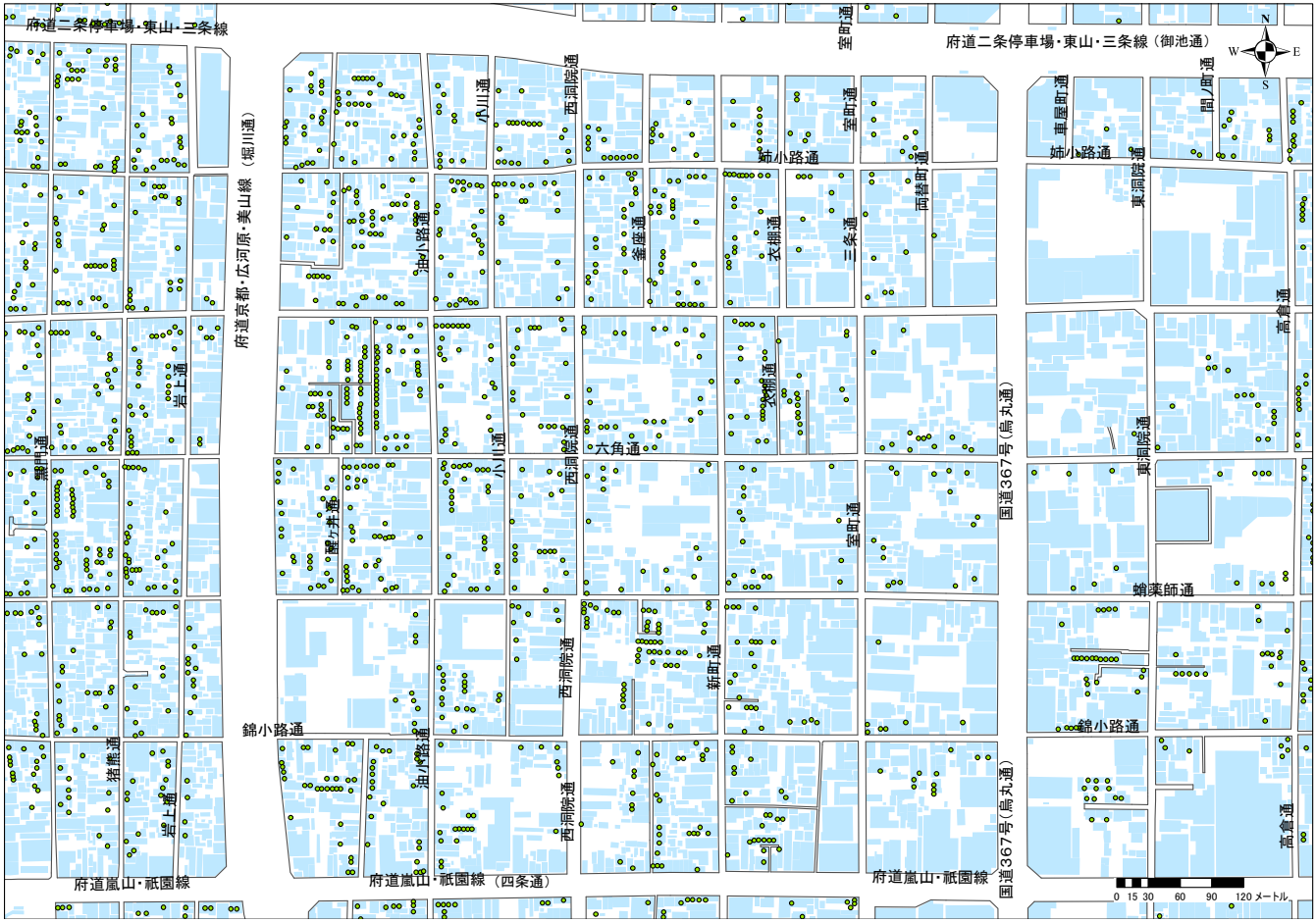


FIG. 20 Map of Meirin District indicating still existing machiya, encountered by a KCCC survey between 2008 and 2010

restrictions. However they did not work, according to Akira Hasegawa, because it made no difference whether they were observed or not (Hasegawa 2017). And initially the new city policy did not make much of an impression on builders and architects either. That is why the city decided to involve the association as an intermediary between the city on the one hand, and the owner, the construction firm or architect on the other. The neighbourhood acquired an official role in the building process, as a convincing mediator, though admittedly without real power. If an owner wishes to apply for building permission, the architect or contractor must first call on the neighbourhood association. There he receives extensive information on the history and traditions of the district, and the association explains its own wishes regarding the application or the neighbourhood. Since it is a mixed-use district, with residential and commercial functions, and everything in between, the regulations are not

FIG. 21 Air-conditioning unit attached to the street façade of a machiya

FIG. 22 Air-conditioning units covered behind specially designed wooden screens

as strict as in Gion District, for example – the famous *geiko* (the local term for geisha) district. There, it is possible for the city to apply stricter regulations for building, even including specific colours and materials. In Meirin District the key factor is the persuasiveness of the association. And it is sometimes hard to persuade owners and architects, because officially the association is only there to be heard.
A report of the discussion with the association must be added, as proof that the visit has taken place. Ultimately, it will only be clear once the building is finished whether the association has had any influence.

Meirin District Design Codes

Consequently, the neighbourhood association decided to draw up its own design codes, alongside the city building standards, partly on account of its positive experience with designs which it had been able to influence. The Design Codes of the Meirin Neighbourhood Association were in preparation in March 2017, publication was expected in the April (Hasegawa 2017, *Meirin News* 6/2017). Interestingly, the association gives authenticity as the first rule regarding design. The Landscape Plan does not mention that term, but for the neighbourhood association, authenticity is vital. What it amounts to is that the essence of the machiya (in particular) be maintained and the context not adversely affected. In our conversation with the architect Ryoichi Kinoshita of Kyomachiya Architects, authenticity was also discussed. For him, the essence of the machiya relates perhaps more to what is 'natural' rather than to the specific materials, techniques or layout. He believes that the 'machiya idea' is sensed mainly inside the machiya. You 'feel' the cold and the warmth, and the machiya can be either wet or dry. According to Kinoshita, the way light enters the rooms and the way you hear and feel the wind through the walls, are important. Although such sensory authenticity is not formulated as such, it corresponds quite well with the 'sensations that harmonized with each other since the olden days' in the Landscape Plan (Kyoto City 2017, p. 2).

The Meirin codes also prescribe a 'soffisticated' façade, amounting to the requirement that its colours and materials be in harmony with the context and the neighbourhood. In practice, it also means that the occupant may not attach anything extraneous on or to his house. Today many houses in Kyoto have air-conditioning and the ugly units can be found throughout the streetscape. The neighbourhood association is trying to get rid of them, encouraging the use of specially designed wooden

FIG. 23 Remaining dead-end alleyway, or *rogi*

FIG. 24 Potted plants in front of the façade look attractive, but deviate from the essence and traditional plan of machiya

screens behind which the units can be concealed [FIG. 21/22]. That rule also relates to advertising, in order to guarantee continuity and consistency of the landscape. In keeping with the afore-mentioned attention to original or traditional building practices, the Design Code also calls special attention to maintaining the essence of the machiya, with its specific façade, the *omoté*, and the dead-end alleyways, the *rogi* [FIG. 23].

Apart from design codes, the association also publishes more general rules for the district in the *Meirin News*. They relate to the observance of silence at evening- and night-time, to safety in the street and disaster protection (for example for earthquakes). The association is also responsible for organizing activities for the Gion festival. It decides on the route for the procession, which houses will display their own 'treasures' and who will play which role in this important festivity. Lastly, the association seeks to discourage one of the activities which the city of Kyoto actually stimulates.

It relates to the small trees, shrubs or potted plants that increasingly are being crammed onto the small plots in front of the houses. Kyoto City wants to encourage greenery in the city, to make the streetscape more attractive; also, tourists react positively to the green still-lifes [FIG. 24]. But the associations prefer greenery in the patio gardens, in keeping with the machiya's essence.

Development through conservation

The Landscape Plan is based on the idea that the city, or landscape of Kyoto, will once more be largely characteristic and original several decades hence. It is a picture of a city in which high-rise is concentrated in specific business districts, and in which, elsewhere, a maximum height of 15 metres applies, in line with the design codes. Earlier in this text, the Belvedère Memorandum was quoted in which cultural history combines with development. Conversely, Kyoto's strategy might be described as 'development through conservation'. It is an understandable strategy, because it builds upon essences and traditions they are seeking to foster. But one wonders if the desired picture of the future will still be one of ambience. Building codes, height regulations, vistas etcetera relate to street scapes, in which remaining machiya count as important landscape structures. But only their facades and general outline are regarded, without consideration of traditional concepts and methods of construction or restoration. Nowadays many machiya are unoccupied, and there are often complicated legal ownership structures regarding the property. And accordingly, machiya restoration, conversion and adaption take longer than their demolition.

Machiya Today

Concepts and Methods of Renovation Design

Kazuto Kasahara

Machiya is a type of wooden townhouse built according to a traditional construction method. In Kyoto, the basic type of small machiya is a long, narrow house, 3.6 metres wide and 20 metres deep. This form was established in the Edo period (17th to 19th centuries), but many of the buildings have since been reconstructed owing to the devastation caused by several wars and disastrous fires; most surviving machiya were constructed after the end of 19th century. There were approximately 40,000 machiya in May 2017 (City Office of Kyoto). The number of demolished or abandoned machiya is increasing year by year.

Although the city of Kyoto has laid down specific rules for conservation and set up organizations to handle conservation and adaptive reuse, the construction of new machiya houses using the traditional method is rare because of the constraints imposed by the Building Standards Law. Most people tend to prefer modern houses, while the number of craftsmen capable of restoring and renovating traditional machiya is steadily declining. There is a further obstacle related to inheritance law. These factors lead to a reduction of machiya. On the other hand, in recent years there have been many cases of people wanting to change the original dwelling function of machiya and convert them into a hotel, café, restaurant or bookshop.

The concepts and methods of renovation applied to Japanese machiya are very different from those used in the renovation of Western houses, which are built in stone or brick. While there is a similar desire to keep as much of the original design as possible, Japanese machiya are susceptible to mould, collapse and fire. This makes it difficult to reconstruct machiya using the concepts and methods customary in the West.

The Japanese approach to renovation may seem strange from a Western point of view: it entails continual replacement of damaged materials, and there is tendency to replicate the original design, with the result that alterations cannot be distinguished from the original design.
This aspect could be said to be in contravention of Article 12 of the Venice Charter established by ICOMOS in 1964: 'Replacements of missing parts must integrate harmoniously with the whole, but at the same time must be distinguishable from the original so that restoration does not falsify the artistic or historic evidence' (The Venice Charter 1964).

In Japan, however, both restoration and any additional construction use the same design as the traditional one, thus precluding any distinction between new parts and the historical building. Why is this? What is the intention behind the use of the same design? To date, even in Japan, there has been no definitive analysis of the reasons for using the same design. This contribution aims to do just that: identifying and describing the concepts and the methods used in the renovation of machiya through interviews with architects and contractors involved in the restoration and renovation of machiya, and in so doing providing insight into the practice of machiya renovation today.

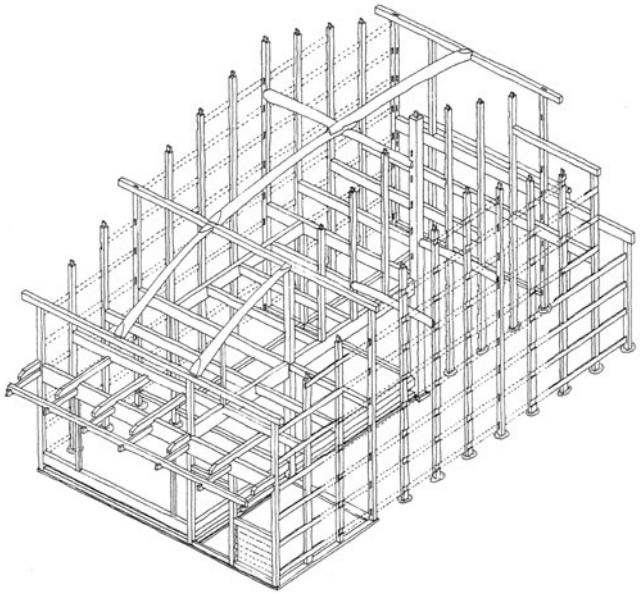


FIG. 1 Traditional construction method, Kyomachiya Architects

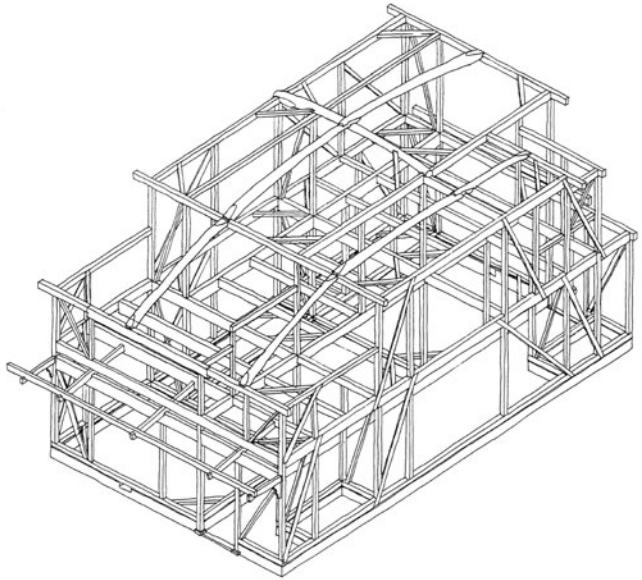


FIG. 2 Conventional construction method, Kyomachiya Architects

Conventional and traditional construction methods

Before turning to the renovation design of machiya, we need to address the construction method used for these buildings, as this forms an important background when thinking about the problem of the renovation design.

Even today, most Japanese houses are made of wood. According to data gathered in 2013 (Statistics Bureau), there are 30,110,000 wooden houses, which represents 57.8 per cent of all Japanese houses. The number of non-wooden houses with, for example, a reinforced concrete or steel frame is 21,990,000, or 42.2 per cent. In other words, almost 60 per cent of houses in Japan today are made of wood. These wooden houses are classified by two types of building methods: one is called the traditional method [FIG. 1] and is based on a traditional construction method, and the other is called the conventional method [FIG. 2], which is based on a modernized construction method. The Kyoto machiya referred to in this article, are built according to the traditional method of a flexible wooden structure. But this method is not used for new wooden houses. Modern-day Japanese wooden houses are constructed using the conventional method of construction.

The traditional method of construction does not depend on metal components and uses wood and traditional Japanese construction principles such as all-timber joinery. The building is set on a base of stones arranged on the ground. The house itself is accordingly separated from the ground and there are no diagonal bracings between posts and beams.

As a result, the whole building is quite flexible. In the event of an earthquake, the house moves independently of the ground, deforming and absorbing the tremor and thus avoiding collapse.

At first sight, the conventional method of construction resembles the traditional method of construction, because it, too, uses also undressed wooden posts and beams. This new method of construction, which effectively superseded the traditional method, was developed to conform to the Building Standards Law of 1950. The concrete base and wooden structure of beams are fixed with bolts. The joints between posts and beams are fixed by a metal connection plate. This method, which consists of joining the wooden members in such a way as to make them stronger, is aimed at preventing structural deformation. The conventional method of construction results in a rigid wooden structure.

Renovation of machiya and the traditional method

The reason why the traditional construction method of machiya is not used today, is that it was difficult to verify its ability to resist earthquakes in scientific terms at the time when the Building Standards Law was being drawn up in 1950. Thus, the conventional method of construction was developed to conform to the new standards. Today, thanks to more research, there is renewed appreciation for the tectonic quality of the traditional method. However, this is still not recognized officially by the Building Standards Law and so it is almost impossible to construct a new house using the traditional method. This is also one of the reasons why the number of machiya is decreasing. But the Building Standards Law does make it possible to continue to use a machiya built in the traditional method by renovating it. The number of machiya renovations has grown in recent years.

However, such renovations face a lot of constraints. First and foremost, there is the problem of protecting the building against earthquakes and fires. Then there are a lot of limitations regarding any modification of the building's structural function. Other limitations derive from laws relating to the post-renovation function and type of commercial activities, such as the Food Sanitation Law and Hotel Business Law. Moreover, the concepts and the methods of renovation for machiya are also influenced by the owners' taste and by the ideas of architects and craftsmen. A machiya renovation project may be impacted by all these factors.

In addition, there is no commonly agreed way of renovating and restoring machiya, nor is there any reliable documentation of the process. If the machiya in question has been designated a 'cultural property' under the Law for the Protection of Cultural Properties, renovation must be supervised by a nationally certified expert who ensures that the restoration and renovation is carried out in such a way as to protect the historical value. Only three of Kyoto's 40,000 machiya have a national heritage designation. This means that the vast majority of machiya, which are not regarded as cultural heritage, can be freely renovated by architects and craftsmen. That is why many renovated machiya have lost their original historical value. Fortunately, there are also architects and craftsmen in Kyoto who try to understand the structure and the nature of machiya and to respect the traditional renovation method as much as possible. The following sections focus on the concepts and methods of renovation employed by the architects and craftsmen who renovate machiya without regard to the Building Standards Law and other constraints, such as the owners' taste.

FIG. 3 Machiya before renovation

FIG. 4 Machiya under renovation

FIG. 5 Machiya after renovation

Making a machiya durable

One of the main objectives of a renovation is to make the machiya durable. This might seem obvious from the Western point of view where a stone or brick building can remain standing for several hundred years. However, machiya are made of wood and earth, materials that degrade relatively rapid and are very vulnerable to destruction by fire. In fact, most machiya in Kyoto, having been burned down several times, were constructed after the Meiji period, which began in 1868. Only few machiya constructed before this period have survived.

'Making a machiya durable' is the most important objective for the Kyoto-based construction company Araki (Araki 2017). Masanobu Araki is the chairman and his son, Isamu Araki, is the CEO. Established in 1925, this company has carried out a lot of machiya renovations using traditional construction methods. They believe that the construction methods laid down in the current Building Standards Law, which tries to deal with earthquakes by constructing sturdy buildings, is unsuitable for the renovation of a machiya structure.

Although many machiya they renovate have already been modified since the Second World War using modern construction methods (e.g. interior walls covered with plywood), the company tries to return machiya to their original state. The purpose is not to replicate the design or the appearance of the original, but to restore the original tectonic functionality in order to make it durable. As a result, the design could regain its original form [FIG. 3/4/5].

As previously mentioned, machiya are prone to damage and material degradation, which means that regular maintenance is very important. Interior posts and beams covered with boarding can pose a problem for maintenance, because the boarding may hide damage by insects such as white ants. In the conventional method of construction developed after the Second World War, covered plywood and diagonal bracings are common. While it is true that the load-bearing capacity of covered parts may be greater because the space between posts and beams is fixed, this operation alters the tensile strength of the structure as a whole, with the result that such a building may paradoxically be more vulnerable to an earthquake. Araki renovates a machiya as a dwelling that is fit for contemporary uses by removing boarding and diagonal bracings and replacing damaged wooden parts or roof tiles, as well as by renewing the bathroom. In terms of the design, even when they add some additional construction to a machiya, they use the original design, so that new or modified parts are not necessarily visible.

FIG. 6 Kamanzacho-Choie, exterior

FIG. 7 Kamanzacho-Choie, backyard

FIG. 8 Additional building of Kamanzacho-Choie

By adding new parts in the same condition and with the same tectonic functionality as the original parts, it is finally possible to make the whole structure durable. The reason why the company chooses the traditional method of wood construction in combination with the original design is that it is rational and suited to the Japanese climate and environment.
According to Masanobu Araki, steel does not last 100 years but wood does. This may sound paradoxical, but it makes sense if you add the words 'with continual maintenance'. A wooden house may be comparatively fragile, but at the same time it is easy to partially remove and renew the materials. That is why it is possible to make wood endure longer than metal, which eventually rusts because it is difficult to dismantle and renew individual parts. This approach clearly demonstrates the philosophy of Araki construction company.

Maintaining the environmental setting and traditional skills

There are also architects who attach great importance not only to the machiya itself but also to durability of its environmental setting and structure. Kyoto-based architect Ryoichi Kinoshita has had a lot of experience in machiya renovation as well as in new-build reinforced-concrete houses. Having studied repair and renovation of historical buildings at the Ecole Saint-Luc in Bruxelles (Belgium) in the 1970s, he is an expert in repair and renovation of European historical buildings (Kinoshita 2017). Kinoshita also regards repair as a precondition for buildings like machiya and in his opinion they can be made to endure for a long time by means of numerous, continual repairs. Like Araki, he does not believe that the construction method laid down by the Building Standards Law aimed at dealing with earthquakes by strengthening buildings, is suitable for the structure and the renovation of machiya.
Kamanzacho-Choie is an example of Kinoshita's approach to machiya renovation. For this project, the architect used a modern construction method to renovate an already modified machiya by trying to reconstitute its original form. He added a toilet in the backyard, the design of the new toilet is identical to that of the original machiya, with the result that few people would recognize it as a new construction [FIG. 6/7/8].

Additional parts were designed in the traditional way and were harmonized with the original building. According to Kinoshita, the idea of distinguishing between original and additional elements is based on the European evolutionary concept. In Japanese traditional renovation, there is no value judgement regarding the various chronological layers, so there is no reason to distinguish between the new design and the original one.

FIG. 9 Nagae Family's Residence

FIG. 10 Additional building of Nagae Family's Residence

Reuse of original materials is a frequent feature in machiya renovation. If additional elements were made in new materials, there would be a progressive discrepancy in material properties and this could result in divergent movements within the building structure and lead to serious damage during an earthquake. That is why it is necessary to maintain the building's tectonic harmony and to construct it using the same materials, system and design.

What aspects of the 'machiya' type should be preserved and passed down through the generations? Kinoshita recognizes not only its physical quality, but also its environmental setting and related technical aspects: the penetration of natural light by way of windows, spatial composition and garden, the use of local materials such as roofing tiles and tatami, and of Kitayama cryptomeria for wooden elements. These aspects indicate the importance of maintaining machiya.

That is why Kinoshiya does not necessarily return to the original form of a machiya in a renovation project. The choice of materials is not limited; he is quite prepared to use aluminium products, for example, as he regards aluminium as a natural material. In his view, as long as the original concept and structure of machiya are respected, the use of contemporary materials is acceptable. The choice of materials depends on the circumstances and can be flexible. In fact, Kinoshita has often adopted contemporary design in his new machiya designs. It's like saying that this flexibility corresponds to the social situation and so that is how a machiya should be.

There are also architects who are keen to keep the architecture of machiya alive and who try to use traditional techniques in their renovation projects. Kyoto-based architect Yoshitomo Koga has a lot of experience in machiya renovation as well as in new-build reinforced-concrete houses. In a renovation he aims to remove modified parts added after the Second World War as much as possible and to return the machiya to its original state. Koga adopts the same approach when adding to the original structure; seamless design in the overall composition and reconstitution of traditional design [FIG. 9/10] (Koga 2017). Learning and passing on the technical skills associated with

traditional building methods is, according to Koga, one of the most important reasons for his approach to renovation. It is very difficult to revive a traditional skill once it has fallen into disuse. The reason why Koga often adopts the method and design of the original building in a renovation project is to enable craftsmen to learn the techniques of traditional construction methods and so keep those skills alive, now and into the future.
While Koga wants to make the environmental setting of machiya durable and to preserve the techniques that make it possible, he is not necessarily committed to preserving the building per se. The aesthetic appearance cannot be a principal intention. It is more important to preserve the specific features of machiya, such as the structure and the spatial layout.

FIG. 11 Machiya of Kamigyo, exterior

FIG. 12 Machiya of Kamigyo, interior

Preservation of spatial composition

In renovating a machiya, some architects aim to perpetuate the techniques used to fashion elements that could otherwise not be realized today, as well as the spatial composition of machiya. In the 1960s and '70s, Kyoto-based architect Tokuichi Yoshimura spent ten years working in the office of Junzo Sakakura, a disciple of Le Corbusier. Later, after setting up his own practice, Yoshimura worked mainly on new constructions, but he also carried out several machiya renovation projects (Yoshimura 2017). His style is regarded as modern Japanese design. 'Kamigyou no Machiya' [FIG. 11/12], a renovation project designed by Yoshimura and completed in 1994, entailed the insertion of curved aluminium walls into an old machiya. This radical renovation, in which there is a sharp contrast between new and old parts of the machiya, was well received by critics. Yoshimura regards himself as a contemporary architect and so he naturally applies the contemporary design method. According to him, there is no problem about changing the functionality and design to suit a contemporary lifestyle. It is also all right to remove the street garden if it serves no functional role.

On the other hand, when renovating a machiya, he tries to retain as much as possible of streetfacade, a study alcove called *shoin*, which cannot be built using current techniques, and the entire spatial composition. He retains the spatial composition because, apart from its historical value, it is also the logical layout for a house on a long, narrow site.

Yoshimura is the kind of architect who prefers to show the difference between the present and the past, an attitude that may be informed by European examples. Under the influence of his mentor Junzo Sakakura, who was the leading Japanese post-war modernist, Yoshimura might have developed a tendency to plan an architectural project based on abstract aesthetics.

Norihito Takeda, who co-founded the Expo architectural design office in Kyoto in 1999, is another architect committed to retaining the spatial composition and main structure, as opposed to the materials of a machiya. While he has designed many new buildings, he is one of the architects who are also working on the renovation of machiya and old private houses (Takeda 2017).

FIG. 13 Kyohatago Mugen, exterior

FIG. 14 Kyohatago Mugen, interior

Takeda took charge of the renovation and design of the Kyohatago Mugen machiya [FIG. 13/14], which was converted into a Japanese-style hotel (2016). Given the considerable change of function entailed in the conversion from house to hotel, there are a lot of newly designed parts, but according to the architect, the structural framework and spatial composition have not been changed significantly. Materials, on the other hand, were modernized: for a mud wall, new materials that comply with the Building Standards Law were used, and there was a renovated toilet in the garden. However, the design is very similar to the original one. Despite taking a flexible approach to new designs, Takeda nevertheless tries to retain as much as possible of the original design.

This is not an imitation

The architects and craftsmen mentioned in this text have the same ideas about the fragile nature of machiya, and the difficulty of maintaining authentic materials. That is why continual repair and renovation and the preservation of the environmental setting and techniques, are key to preserving the most important values of the machiya: the architectural structure and the spatial composition. In other words, visual appearance is not the most important value of a machiya. In the case of additional construction, if its purpose is to preserve the environmental setting and building techniques, the most rational approach would be to use the same design in terms of construction method, materialization and architectural language. As the result, new renovated parts should be executed in accordance with the original design.

Some would say that from a European point of view, there is a lot of imitation in Japanese architecture. For example, every 20 years, Ise Jingu is dismantled and a new building using the same design and techniques is constructed on an adjacent site. The aim of this exercise in repetitive construction, is to pass traditional techniques from generation to generation for as long as possible. Ancient wooden shrines and temples are 'overhauled' in a 100 to 300-year cycle. Overhaul in this instance means a process of reconstruction that consists of taking wooden elements apart and replacing and reinforcing rotten parts. It is an essential working method for making an inherently fragile wooden building durable that is also aimed at passing on traditional skills. Why stick to the original, traditional design when planning additions, even in the case of a contemporary machiya renovation? The motivation is the same as with the reconstruction of Japanese shrines and temples: to maintain historical wooden structures and to sustain building traditions and craftsmanship. Unlike the many stone and brick buildings

FIG. 15 Fortune Garden Kyoto

FIG. 16 Fortune Garden Kyoto, rooftop extension

in European countries, wooden Japanese houses are inherently fragile. Thus, maintaining a building's original condition over the long term is an important issue/challenge.

Imitation of a traditional cultural practice

However, this approach of sticking to the original design and materialization should be restricted to the restoration of historical wooden architecture and the cultural context of Japan. In Japan, many renovations of modern architecture made of reinforced concrete are also executed in the same design as the original.

For example, Fortune Garden Kyoto [FIG. 15], converted into a wedding reception venue and restaurant in 2012, was originally the head office of Shimadzu Corporation, designed by the celebrated modernist architect Goichi Takeda and completed in 1927. During the renovation, a rooftop extension was added to the top floor. The original building is made of reinforced concrete, but the extension has a steel frame in a design similar to the original [FIG. 16]. Perhaps the architect in charge of this renovation thought that it would be more harmonious to adopt the same design for the extension. However, this extension is a mere formal imitation and that makes it problematic, because it could be mistaken for an authentic design by Takeda.

A similar problem occurred recently in the Netherlands. In 2009, the Sonsbeek Pavilion, one of Rietveld's masterpieces, was demolished and subsequently rebuilt (in 2010) using new materials but adhering to Rietveld's design. Commenting on this reconstruction, the director of the Kröller-Müller Museum stated that 'the project emulated the traditional Japanese way of building' (Kiewit de Jonge 2010). It seems that he was thinking of the above-mentioned Ise Jingu, which is reconstructed every 20 years. However, it seems unreasonable to refer to a Japanese wooden building with its own cultural context and building tradition as justification for a reconstruction of a work of modernist architecture using reinforced concrete and a steel frame. This comparison reveals a lack of understanding of the differences in culture, context and architectural values between Japanese traditional architecture and modern European architecture. This is mere imitation of a traditional cultural practice.

Today, we should avoid referring to Japanese traditional culture out of context and using it to justify or explain non-Japanese architectural interventions. Fortunately, the traditional culture of machiya is still being passed on through renovation projects, which should ensure that renovation and extension projects are based on genuine traditional ideas and methods.

Clay-Based Building Materials in Traditional Kyomachiya

Barbara Lubelli

FIG. 1 Example of a machiya in Kyoto

The architectural landscape of Kyoto is dominated by the presence of traditional residential and religious buildings: castles, temples, teahouses and machiya. These traditional buildings often have a wooden frame structure with an infill made of earth walls [FIG. 1] and a roof covered with heavy grey fired-clay tiles. Clay is therefore an important material in Japanese traditional architecture. The centuries-long experience with the use of clay-based materials and the oral transmission of the acquired knowledge have enabled Japanese craftsmen to attain a high level of skill. Unfortunately, this is little known outside Japan, as English publications on this subject are rare. During my stay at KIT I interviewed architects, craftsmen, researchers and academics, with the aim of collecting some of their knowledge on the use of clay-based materials in Japanese traditional architecture and in particular in machiya. I visited some machiya and temples and reviewed the scarce English literature on the subject. In particular, Emily Reynolds recent book *Japan's Clay Walls* (2009), which describes in detail the materials and techniques used in earth walls, has been very useful to me. This contribution does not aim to be exhaustive, instead focusing on those aspects which, because of my own background and knowledge, were particularly interesting to me. Similarly, any evaluation is unavoidably biased by my Western background and education.

Traditional Japanese architecture

Tradition is paramount in the Japanese architecture of machiya and other buildings such as teahouses, temples and shrines. Rather than the product of the creative genius of a single person, these buildings are the 'collective' result of knowledge of techniques and materials acquired during centuries of experience and transmitted via generations of craftsmen, without the architect seeing this as a constraint on the creative process (Kawai 2017). This approach might be related to the fact that, until the 20th century, the figure of 'the architect', as understood in the West, did not exist in Japan; the carpenter was the designer and the maker. Similarly, the design on paper phase was minimal: the architecture was defined on site,

in agreement with the client and based on known building typologies, and it could still be modified during construction to adapt it to the specific situation.

In Japan the authenticity value of built cultural heritage has a different, possibly broader meaning than it usually has in Western culture. Protection of the authenticity of built cultural heritage does not focus on the conservation of the original materials, but more on the preservation of the use of the traditional construction techniques and building typologies: these are considered of utmost value in Japanese traditional architecture. Thus, whereas the authenticity of the original materials in listed buildings like some of the temples is preserved as much as possible, in other traditional architecture, including most machiya, the authenticity value is preserved by the perpetuation of the use of traditional construction techniques and building typologies. Therefore, the original material can be replaced with a similar material, without significantly affecting the heritage value of the building.

Japanese architecture is built in such a way that it can be easily modified, renovated and in some cases even dismantled and possibly rebuilt somewhere else. Also, the re-use of materials is not infrequent: for example, craftsmen report as common practice the scraping away of the damaged layers of earth walls and the re-use of the valuable clay. The possible differences between parts of the same structure (e.g. colour differences in an earth wall) resulting from partial replacements and additions, which to our Western eyes may look aesthetically unpleasing, are not regarded as disturbing; on the contrary, in the aesthetic of teahouses, the absence of homogeneity is appreciated, as it testifies to the fact that the building is cared for. In terms of the contemporary pursuit of sustainable architecture, traditional Japanese architecture can be seen as an example of good practice. Japanese traditional architecture has a strong sustainable character, as it makes use of locally available natural resources such as wood and clay, it encourages the re-use of materials and building elements (such as wooden posts and clay walls), it appreciates the imperfections of repairs, and the flexibility of the wooden post-and-beam structures favours the re-use of buildings for new, modern functions.

FIG. 2 Example of shinkabe earth wall in a machiya

Specialized and skilled craftsmanship is of crucial importance for the perpetuation of traditional Japanese architecture. Carpenters and *sakan* (i.e. craftsmen working with earth as material and a trowel as tool), in particular those working on important temples and teahouses, consequently enjoy considerable recognition in Japan, especially in Kyoto. Their social position improved greatly about 400 years ago, in the period in which the tea ceremony and thus the teahouses dedicated to it, acquired importance (Reynolds 2009). One would therefore expect such valuable knowledge of materials and building techniques to be transmitted to younger generations through modern education and dissemination methods, such as in schools and universities, through publications, et cetera. However, apart from a few schools (e.g. Kyoto Sakan Guild's training academy), no structured education system for learning these techniques exists in Japan. Knowledge about materials and techniques is transmitted from master to pupil. The education of craftsmen is based on a 'learning on the job' approach, similar to that of the *bottega* of the Italian Renaissance period. Craftsmen I spoke to said that it takes

FIG. 3 Example of okabe earth wall

FIG. 4 Wooden frame with bamboo lattice bound by rice ropes on which the first, inner layer, of the earth wall has been applied (left). Wooden frame with reed lattice, before the application of the earth plaster (right)

five years of apprenticeship to master the preparation of materials and the application of earth wall techniques. Recently, there have been some attempts to reduce the length of the apprenticeship by supporting beginners with an e-learning programme (Akihiko et al. 2014).

Clay-based materials in machiya

In a traditional machiya, clay, together with wood, is the most important building material. Clay is used in the earth walls, the corridor floors and the fired-clay tiles of the gable roofs.

Earth wall

In Japanese traditional architecture two types of earth walls exist:

- *Shinkabe*, consisting of an earth wall filling the space between the wooden posts [FIG. 2]. This is the most common type of earth wall in Japanese architecture and is used in machiya and teahouses.
- *Okabe*, in which the earth wall includes the wooden frame [FIG. 3]. This second type is used, for example, in castles and *kura* (a storehouse for kimonos and valuable goods) and has the advantage of protecting the wooden posts from fire.

Shinkabe used in machiya are composed of multiple layers: the number of layers and their composition may vary depending on the function of the building, the region of Japan and the school of the *sakan*. Generally, the following main layers are present:

- The inner layer or daub core (*ara-tsuchi*) is composed by clay and rice straw fibres. The length of the fibres in this layer is generally 5-10 cm. The mix is fermented for some time before application in order to increase its workability (the fermentation of the straw makes the mix stickier). The thickness of this layer is generally 5-10 cm, but it can vary depending on the total thickness of the wall. This daub core is applied to a bamboo or reed lattice structure, bound by ropes made of rice, palm or hemp fibres. Some horizontal wooden slats are used as well [FIG. 4].
- The middle layer is composed by clay, rice straw fibres (shorter than those used in the inner layer, 2-3 cm) and sand; the grain size of the sand varies depending on the thickness of the layer.
- The outer layer is less than 2 mm thick and it is made of clay, fine straw fibres and fine sand. In some cases, lime can be used instead of clay (see the paragraph on *shikkui*).

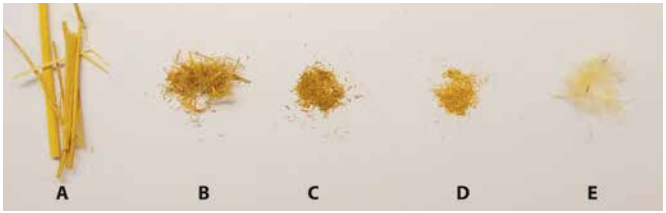


FIG. 5 Rice straw (A-D) and hemp (E) fibres of varying lengths used for the different layers of the earth wall

FIG. 6 Grinding (left) and sieving (right) of the clay

FIG. 7 Different coloured clay finishes

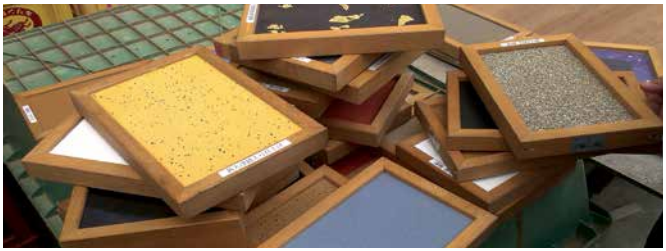


FIG. 8 Different types of decoration of the outer clay layer (with gold leaf, mother-of-pearl, etc.)

The length of the rice fibres and the grain size of the sand used in the earth mixes decrease from the inner to the outer layer [FIG. 5], similar to traditional lime plasters used in Western countries.

Different types of clay are used in the different layers; generally, clay types with a higher plasticity are used in the outer layer; clay types containing calcareous impurities, like those from the eastern areas of Japan, are more often used in the inner and middle layers. Mr Hagino, *sakan* in Kyoto, uses Fushimi, Fukakusa or Higashiyama (eastern mountains) clay for the inner and middle layers, and Juraku, Akatsuchi, Osatsuchi, Shirotushi or Kurotsuchi clay for the finishing layer (Hagino 2017). Juraku clay, dug in the Kyoto area, is considered the best type of clay: it makes the mix more workable and has limited shrinkage during drying. The finishing layer made of Juraku clay is very durable and has good water-resistant qualities. As Juraku clay is scarce and very valuable, it is sometimes re-used: the clay is scraped from the wall surface, ground [FIG. 6, left], sieved [FIG. 6, right], washed to remove any biological growth and made ready for re-use.

The outer layer can be made solely with clay, sand and water (*mizugone*) or with the addition of a glue (in this case the layer is called *norigone*). The addition of the glue improves the workability of the mix, but it decreases the durability of the hardened layer. Because of this, *norigone* can only be used in interiors, whereas *mizugone* is generally used in exteriors. The glue used in the clay mix is traditionally prepared by boiling seaweed and then filtering the compound to extract the glue. However, nowadays, to save both time and costs, a ready-made powder that can be directly added to the mix is often used.

The colour of the clay-based outer layer can be varied by the use of different coloured clays or by the addition of pigments [FIG. 7]. In important buildings, a very artistic finishing can be applied, for example with gold leaf, hand-made Japanese paper (*washi*), mother-of-pearl, et cetera [FIG. 8].

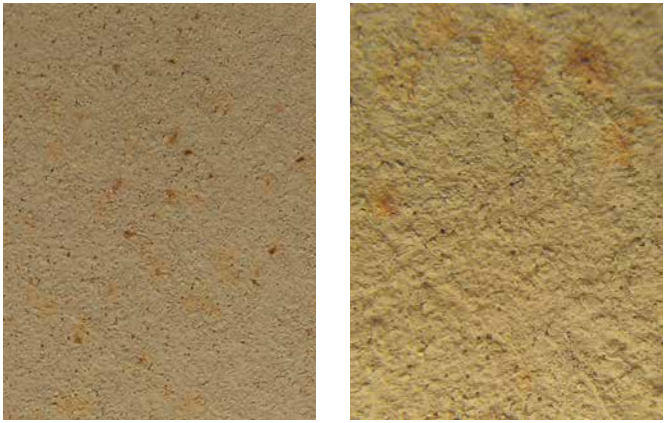


FIG. 9 Firefly finish obtained by mixing iron flakes into the clay; the oxidation of iron gives the red stains (on the right a detail of the picture on the left)

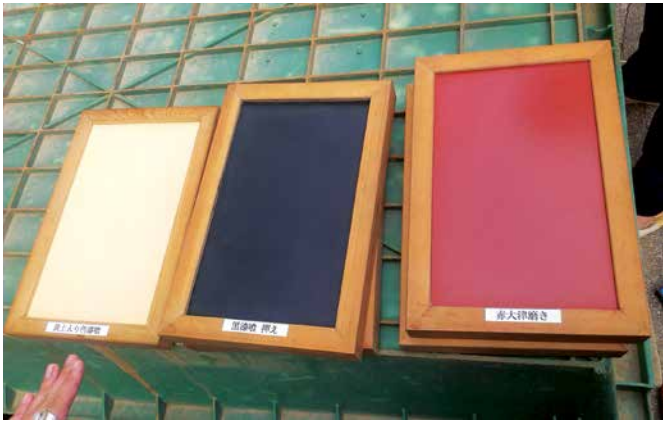


FIG. 10 Coloured shikkui

Sometimes flakes of iron are mixed into the clay in such a way that, with time, red stains appear on the surface due to oxidation (firefly finish) [FIG. 9]. In addition, the presence of manganese in clay has been shown to modify the colour of the finishing layer, making it irregularly darker over time as manganese ions are transported to the surface (Kuroda et al. 2014). The resulting differences in colour are particularly appreciated in teahouses.

Shikkui

The finishing layer of the earth wall can also be made of hydrated lime, hemp fibres and seaweed glue: this finishing layer is called *shikkui*. In some cases, reconstituted fibres of Japanese paper (*washi*) are used instead of hemp, to make the *shikkui* looking whiter. Hydrated lime used in *shikkui* in Kyoto is calcium carbonate ($CaCO_3$) obtained by burning limestone from the Shikoku region. In other regions of Japan lime from dolomitic stone is used as well. In some cases, 20-30% shell lime is mixed with hydrated lime obtained from limestone. Hydraulic binders, either natural or obtained by the addition of pozzolanic material, were unknown in Japan before the introduction of cement. The reason, according to Dr Hiroyuki Sato, might lie in the fact that the technology for making lime was imported from Korea, and Japan maintained this tradition without wondering whether it could be modified or improved (Sato 2017). As with clay mixtures, no exact recipes exist for *shikkui*; some basic recipes are adapted, based on experience, depending on the situation and on the weather conditions (e.g. in the winter less glue is used in the mix than in the summer).

Shikkui is applied in multiple layers, with each layer being pressed down with the tool: this application procedure makes the *shikkui* very dense and resistant to weathering. *Shikkui* is thus more resistant to water than the clay-based top layer; for this reason, in the south-western regions of Japan, (e.g. Shikoku, Okinawa), where typhoons are more common and harsher, this type of finishing is more common (Kenzai 2017).

In Kyoto, *shikkui* is used in very important buildings like temples or *kura* [FIG. 3]. This is also related to the high cost of *skikkui* production in the past. In fact, before the introduction of seaweed glue about 600 years ago, the glue needed for *shikkui* was produced from rice; this made this finishing layer very expensive and, consequently, a sign of wealth (Kenzai 2017). Like the clay finishing layer, *shikkui*, too, can be made in different colours with the use of pigments [FIG. 10].

FIG. 11 White and black shikkui and its application on the exterior of a kura building (sakan from Mr Hagino's company)

For example, black *shikkui* can be made by adding ink [FIG. 11]. The surface of *shikkui* can be highly polished. Mr Yuzo Asahara, *sakan* in Kyoto, reports using two types of shiny *shikkui*: *shikkui migaki* (*migaki* means polish), with the regular *shikkui* composition but applied in a larger number of layers, and *ootsu migaki*, made using lime, Japanese paper (washi) and colour pigment (Asahara 2017). Both types of *shikkui* are used mainly in machiya corridors, as they have a high mechanical strength and are thus resistant to wear and tear (e.g. scratches from kimonos). *Shikkui migaki* is stronger than *ootsu migaki*. Generally, no oil is added to *shikkui*, as this layer is sufficiently water-resistant by itself; exceptions are sometimes made for *shikkui* applied to the exterior of *kura* buildings.

Application and tools

The daub core of the *kura* earth wall is created by throwing balls of fermented clay-straw mix onto the bamboo (or reed) lattice. In contrast, the middle and outer layers are applied with a trowel in multiple layers. The surface is made straight and flat by use of the trowel only and with the help of a reference line, traced in ink on the wooden frame. For thinner earth walls for machiya or temples, for example, the daub core is trowelled on, as is each successive layer. Each layer needs to dry completely before the next layer can be applied. This application procedure limits the appearance of cracks in the clay and gives a layered structure to the wall. What is more, it makes it possible for each clay layer to be easily removed when damaged: by hammering the surface each layer will effortlessly detach from the layer underneath, without further damage (Reynolds 2009).

It is known that clay can shrink considerably during drying. In order to avoid shrinkage cracks and the eventual detachment of the earth wall from the wooden structure due to shrinkage, different techniques are used by the *sakan*. In some cases, a different clay mix, rich in sand and therefore less prone to drying shrinkage, is used on the sides where the earth wall is in contact with the wooden frame. On top of this sand-rich clay layer, the clay layer is applied. Another technique consists of fixing a bamboo strip attached to a hemp gauze to the wooden post; the gauze [FIG. 12, left] is then embedded in a sandy clay layer. Alternatively, nails attached to hemp fibres can be used: the nails are fixed to the wooden frame and the hemp fibres are embedded in the clay layer [FIG. 12, right] (Reynolds 2009).

A large range of metal trowels are used for making and shaping earth walls. Every plasterer acquires a large number of tools [FIG. 13], often self-made or self-adapted, during his working life and sometimes bequeaths some of these valuable heritage items to his pupils. The shape, the metal and the way the trowel is made (either by hand or by machine) is reported to affect the properties of the clay layer (Sato 2017). Iron trowels are used for coarser earthen plasters; recently introduced stainless steel trowels are more flexible and commonly used for the finishing layers. Apart from trowels, brushes of different shapes and fibres are other tools commonly used by the *sakan* for cleaning the working area and removing remnants of clay from the timber frame.

Durability

The resistance to weathering of the earth wall seems in general to be very high. The addition of glue is generally avoided in the exterior clay layer, as this has a negative effect on durability.

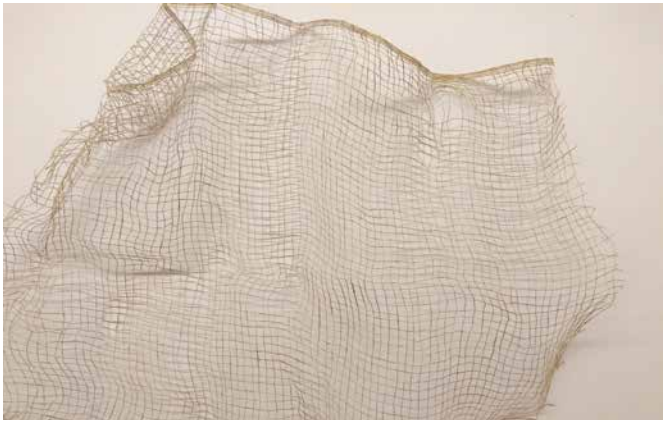


FIG. 12 Hemp gauze (left) and nails with attached hemp fibres (right): both are used to limit shrinkage cracks in the earth wall

FIG. 13 The tools of a sakan

FIG. 14 Peeling of shikkui probably due to moisture infiltration from the bottom of the wall of a temple in Kyoto

To improve the water resistance of the clay and lime-based finishing layer, oil (sesame, rapeseed, sunflower) is sometimes added to the mix or, nowadays, sprayed on the surface. Weathering processes most likely to affect the earth wall are frost and biological growth. Frost damage occurs mainly when cracks (e.g. shrinkage cracks between the earth wall and the wooden frame) allow water to penetrate the inner core of the wall. Water penetration is also frequent in those cases where the earth wall is in direct contact with the ground, as in a temple's garden walls [FIG. 14]. The materials get very wet and when the temperature drops below zero, the moisture freezes leading to frost damage in the clay wall. Biological growth can be an issue because of Japan's humid climate; this kind of damage occurs more often in clay finishing layers in which oil has been mixed in to confer water resistant properties to the clay.

Japan is regularly subjected to earthquakes, so the seismic resistance of buildings is of utmost importance. The combination of wooden frame and earth wall infill is particularly good at resisting seismic movements: the wooden frame ensures sufficient strength and the earth wall increases the stiffness of the construction: together they provide a very good seismic resistance (Muramoto et al. 2017; Muramoto and Tanabe 2017).

The earth walls have a layered structure, composed of a bamboo or reed lattice and multiple layers of clay-based mixtures. The bamboo lattice not only provides cohesion, but also guarantees that the earth wall and the wooden frame work together from a structural point of view; in order to ensure the connection between the earth wall and the wooden frame, the ends of the bamboo or reed elements are inserted into the wooden posts. The connections are made in such a way that some movement is allowed: this improves the flexibility of the structure and its resistance to earthquakes.

Lime-clay floor

The floor of the machiya corridor (*tataki*) is made with a mixture of lime, clay, sand and magnesium chloride ($MgCl_2$). The craftsmen I interviewed could not explain the reason for adding $MgCl_2$ to the mix; they said only that it is done to improve the durability to the *tataki*, as this is subjected to intensive use. It seems likely that this increased strength (and thus durability) is due to the presence of Mg^{2+} ions, which may favour the formation of magnesium-rich carbonate phases which are stronger than pure carbonate phases (De Silva et al. 2009).

The *tataki* can have different surface finishes: it can be smooth, or it can be deliberately roughened by removing the binder from the outer layer with a sponge [FIG. 15]. In teahouses the first option is generally preferred, so that variations in wear become visible over time. These differences, like the gradual change in colour in the clay of the wall, are aesthetically appreciated.

Roof tiles

When looking at Kyoto from the top of the mountains, the imposing grey gable roofs characterize the landscape of the city. Fired-clay roof tiles (*kawara*) are used not only in most machiya, but also in teahouses and temples; shrines, on the other hand, are covered with pieces of wood arranged in away to follow the curved shape of the roof.

Roof tiles were first introduced to Japan from China, via the Buddhist temple architecture of the sixth century. Soon afterwards, roof tiles started to be produced in Japan using locally sourced clay (Locher 2010). Japanese roof tiles are large and thick to withstand the typhoons common in these regions. In the Kyoto region, tiles are generally grey (smoked roof tiles, *ibushi kawara*). The tiles at the end of roof ridges of more important buildings like temples have decorative reliefs, which can have different forms [FIG. 16].

Mr Takemura, who owns a company in the Kyoto region that produces roof tiles, generally for restoration purposes, provided me with the information about the production process of the tiles described here (unless of otherwise specified).
Roof tiles are traditionally hand-moulded using wooden moulds (Locher 2010). The grey colour, typical of the smoked roof tiles in Kyoto, is conferred by the firing process. The tiles are fired in a kiln at about 1180 °C; then the oven is turned off and, when the temperature reaches 900 °C, butane gas is piped into the oven. It is this that gives the tiles their grey colour. The tiles are generally not glazed. In the past, in the western part of Japan, tiles were fired using a special procedure that gave them a shiny, whitish layer with improved waterproof qualities; however, the production process used has been found to be toxic and it is not used anymore.

Japanese roof tiles commonly have an S-shape [FIG. 17, left], although other shapes exist. Originally, Japanese tiles were made up of two parts: a round part and a curved part that would be interconnected when positioned on the roof. Tiles from old temples, conserved in a storeroom at Mr Takemura's house,

FIG. 15 Example of tataki with rough (left) and smooth (right) finish

FIG. 16 Roof tiles on a wall of a temple garden

FIG. 17 Modern Japanese (left) and Dutch (right) S-shaped interlocking roof tiles

FIG. 18 The interlocking system used in ancient Japanese tiles

show this type of interlocking system [FIG. 18]. Starting from the second half of the 17th century (the earliest documentation dates back to 1675) the two parts of the tile were produced in one piece, in a S-shape. The shape of the Japanese tiles is very similar to that of the Dutch *S-pan* [FIG. 17, right]; Mr Takemura noted that, according to legend, the Japanese imported the S-shaped tiles from the Dutch during the period when Japan had trading relations with the Netherlands (the Dutch used tiles as ballast in ship's holds and the Japanese may have seen these tiles and copied the technique).

To join different sides of the roof, layers of tiles are used; the height of these ridges is representative of the importance of the building and of its owner. Traditionally, roof tiles were laid on a clay layer while the ridge tiles were laid on a bed of *shikkui*, as this is more water resistant than clay-based mortars. Nowadays, that traditional technique is only used for temples; in machiya roof tiles are usually fixed in place with nails, except below the ridge tiles where a mixture of lime, sand and straw fibres is used [FIG. 19].

The type of clay and the firing process affect the durability of the roof tiles. For example, Mr Takemura reports that tiles made with clay from the Awaji region are not suitable for use in northern Japan, where winters are very cold, as they may suffer from frost damage. Apart from frost damage, roof tiles may also suffer from biological growth in shady and humid environments. However, no preventive measures are taken as biological growth is rarely damaging and is not considered unsightly from the aesthetic point of view. On the contrary, the growth of mosses and algae on the roof of teahouses is actually appreciated.

FIG. 19 The ridge of a roof in a recently restored machiya: roof tiles are laid on a bed of clay, lime and straw

Concluding remarks

Along with wood, clay is the most important material in Japanese traditional architecture, and thus also in machiya: it is present in earth walls, floors and imposing gable roofs. Knowledge of the properties of these materials and the skills attained by Japanese craftsmen in the preparation and application of clay-based materials are of inestimable value. Unfortunately, as this knowledge is mainly transmitted orally and by learning-on-the-job, and the demand for this specialized (and thus expensive) craftsmanship in Japan is decreasing, this fund of knowledge is at risk. Documentation (such as recipes for the different clay- and lime-based plasters, including criteria for adapting these mixtures to specific situations, and tricks of the trade on application techniques) would help to preserve this valuable heritage. Translation of existing documentation into English would make this knowledge available to a larger public outside Japan. This text aims to deliver a very limited contribution to this objective.

Culture is in the Details

Hielkje Zijlstra

FIG. 1 Seen through Western eyes: a house, plants and contained character, but through Eastern eyes, the noren - the welcoming curtain at the entrance - indicates this is a shop or restaurant

During earlier stays in Japan, in 2012 and 2014, I was struck by the great attention to detail, in the scale of the buildings, the streetscape, as well as in the clothing and the presentation of food. Life seems to be an accumulation of independent details that sometimes contrast considerably with one another. A city is made up of buildings, and they in turn are made up of details that have come about as a result of a combination of materials and their interrelations. Tradition, craftsmanship and the choice of materials play an important part in all this.

When I visited Kyoto in December 2015 for the KYOTO Design Lab, I recorded details and their contexts in photos [FIG. 1]. I sought to explain those details in the context of the culture of Japan. To what extent can culture be determined by details? Accordingly, it is important for me to tie Japanese culture in with the appreciation of detail. When we analyse an object we usually begin with the context and arrive at the detail. When we mentor students, attention to detail is not necessarily the focal point, certainly not at the start of the design process. Generally speaking, details are only addressed at a later stage. However, if we pursue the reverse course—from detail to building and its surroundings—we can consider concepts like tradition, craftsmanship and materiality differently, and relate them to culture. Moreover, if we base our thinking on a cyclically organized society and thus better understand the small elements and materials, we can get a better grip and grasp—and thus achieve a more aware and sustainable society, both in the East and in the West (Pendergast 2011). It is interesting to see how Japan presents itself in this respect. When dealing with existing heritage buildings and modern technological developments, can we revert to culturally-embedded traditions? It is important to consider craftsmanship based on experience, passed down from father to son; objects possessing a soul, such as the trees, of which only a few have been felled to be used as posts and beams in a temple (Brown 2012).

The following text is an 'exploration' based on observations, references, conversations and working visits. Theory and practice have been applied to find ties with architecture, built heritage, craftsmanship and tradition, with five building elements at the centre. They form the basic components of a building: floor, post, roof, closed wall and shelter.

Details as regards use of materials

How do we know how buildings are put together, in detail? We can consult the relevant literature, study drawings and photos, or we can observe buildings and their details. But to better understand how something is really put together, it is worth adding an explanation to those methods. For example, with Japanese wood jointing, the actual construction is often not immediately apparent on the exterior (Seike 1977). The German journal *Detail* has set the standard (since 1961). It always depicts and describes buildings by way of materials and details. In 2006, in my PhD thesis, I concluded that in the 20th century more and more had been written about architecture, but ever less by the architect him/herself, and far less about architecture how is made (Zijlstra 2006). Things are changing, slowly but surely. These days, *Detail* has an English version (*A+T*) and anyone interested can now access various reference works via the *Detail* website or YouTube.

When I was researching my thesis I made use of Kenneth Frampton's descriptions of the use of materials in work by several distinguished architects in terms of tectonic (Frampton 2001) and Edward Ford's documenting of a number of architectural masterpieces in his series *The Details of Modern Architecture* (Ford 1997). Ford deploys three-dimensional drawings of details and Frampton seeks to explain in text the essence of a building based on the tectonic. One of the first Dutch textbooks focusing on details is Ed Melet's *Het architectonische detail* (2002). He calls details 'architectural details' and makes sure they are always 'traced in the same way in all his publications, thus explaining how a building is made up, and what it means for architectural expression. Melet describes which materials go to make up the building and how they converge in a detail (Melet 2002).

The way Atelier Bow-Wow presents its architecture projects in its own publications is popular with architecture students (Tsukamoto 2011 and 2014). The title of the *Graphic Anatomy* publications (1 and 2) indicates that they address the explanation (anatomy) of architecture. Everything is recorded meticulously. In sectional diagrams in particular, texts are provided with all the elements, so nothing is left to chance or personal interpretation. Accordingly, here the sectional drawing is an accumulation of details. That method is not new. It is part of the Japanese culture to supply architectural drawings with a publication about a building. That is confirmed in *The Japan Architect*, for instance, and in monographs as written on Toyo Ito's Mediatheque in Sendai (Sakamoto 2003). Atelier Bow-Wow's anatomy lessons contain only the drawings. In the Sendai library publication a wealth of photos complements the drawings. They were taken during construction of the building and after completion. This provides a more complete picture, especially for those who want to know how the building and the detail are actually put together. In *Materials and Meaning in Contemporary Japanese Architecture*, Buntrock goes a step further and presents all this documentation theme-wise (Buntrock 2002). However, the most educative is a combination of all available methods, including one's own observation.

East and West

In talks I had with Paddy Thomesen about his experience working as an architect in Japan, I have discovered that it is very difficult for a Dutch person to be deployed in a Japanese architectural firm on an equal footing with a Japanese architect. There is great resistance to the inclusion of Westerners who actually contribute to products of Japanese culture. Experience is the best teacher and responsibilities are only granted after one has proved one's proficiency. That makes the fact that

FIG. 2 Sagawa Art Museum with, in the background, the tea pavilion designed by Raku Kichizaemon

since 2000 Frank la Rivière, an architect hailing from the Netherlands, has had his own practice and clientele in Tokyo all the more remarkable. He is also a lecturer at the Tokyo Institute of Technology, thus himself training students to become architects in Japan. He successfully passed the exams to become a 'first-class architect' in Japan (La Rivière 2017). When we were in Japan he and his colleagues told us that initially Japanese architects have a poor opinion of colleagues who work a great deal in the West, like Kengo Kuma, Toyo Ito, and later Tadao Ando and Sanaa. In their view they have become too Westernized, are money-driven and are therefore losing their focus on material and detail. They believe that such architects no longer meet Japanese standards and the buildings are not representative of Japanese architecture and culture. In her book, Buntrock also varies in her assessment of Kengo Kuma's work from positive to negative (Buntrock 2010). According to the Japanese architects with whom I spoke, Taniguchi Yosio of the Gallery of Horyuji Treasures in Tokyo and Raku Kichizaemon (in fact a ceramicist) of the Tea Pavilion at Sagawa Art Museum are better representatives of modern Japanese architecture [FIG. 2].

FIG. 3 The Gae machiya, a dwelling in Kyoto renovated by Toshi Kawai as a second home with a tea ceremony room

FIG. 4 Yoshiaki Nakamura from Sotoji and the stock of ancient timber

The Westerner's perception of Japanese architecture differs substantially from that of the Japanese themselves. Mention has already been made in that context of the comments on Japanese architecture by Frank Lloyd Wright at the start of the 20th century and, a little later, Bruno Taut (Nute 1993 and Taut 1936). At the TU Delft, in the framework of our research for the KYOTO Design Lab, we too look at Japan through Western eyes. Our opinions on Japanese architecture, details and culture are based on our own cultural background.

During my working visits I was able to confirm that architecture in Japan traditionally begins with the love of and attention to the material, and that they converge in the details. Also, when I talked to Moriko Kira, who works in the Netherlands and Japan, it emerged that the use of materials is part and parcel of architectural design: 'When the concept is clear, the materials are naturally extracted from it' (Kira 2013). She personally believes that her work in Japan is without a doubt of better quality than what she does in the Netherlands. However, she also notes a change taking place in Japan. It is affected by globalization, with major brands (like Prada) boastfully deploying Western architects in Tokyo. Think of the impressive architectural structures by Herzog de Meuron and OMA / Rem Koolhaas found in all the world's metropolises. She considers it unfortunate that this is setting a new standard, also in Japan, and thus detracting from the traditional qualities of landscape-specific architecture and culture (Brinkmeier 2013).

The influence of the West on Eastern, Japanese architecture is not a new phenomenon. It has been apparent since the end of the 19th century, as Carola Hein has described (Hein 2008). In December 2015, the Takanaka Carpentry Museum in Kobe mounted an exhibition *Modern Japanese Architecture* featuring photos, drawings and models of architecture built in Tokyo primarily in steel and brick, along Western lines. Since the Second World War there has been a shift in the use of materials in architecture in Japan. With American examples, and fires and earthquakes in mind, attempts were made to find alternatives for wood. According to the architect and professor Toshi Kawai, new regulations and a great shortage of wood were the

reason (Kawai 2015). Architecture faculties focused on brick, concrete and steel as the new building materials. By then, for traditional restoration, timber was being imported from neighbouring countries.

Rediscovery of wood

Building tradition in Japan is again shifting. Legislation has changed, and wood is once more permitted. Partly because trees have grown further and are now suitable for use as building material. Wood is, and continues to be, highly prized. In my student accommodation in Kyoto everything was covered with a layer of wallpaper or PVC film with wood-print. I felt surrounded, from floor to ceiling, with wood, but in fact it was a wafer-thin illusion, with the exception of the cover fillet. The Sagawa Art Museum is built entirely in concrete with an 'imprinted' wood-relief, a left-over from the formwork [FIG. 2]. In sustainability terms, the Japanese economy can also consider reintroducing home-grown timber as a building material. However, there is still too much focus on contemporary Western examples using timber from Finland and Switzerland, although Japan itself has a huge tradition of building with wood. It is found in particular in the temples, tea houses and old dwellings like machiya. The latter are disappearing more and more from Kyoto's streetscape, for a variety of reasons, one of which being the problems building with wood has entailed (Kawai 2015). New legislation could change that and have a positive effect on future restorations or makeovers of machiya. The conversion of an old machiya into a modern dwelling, with a space in the attic for tea ceremonies, Toshiaki Kawai's Gae machiya, illustrates this well (*ja+u* 2014) [FIG. 3].

Moriko Kira put me in touch with the architect Fumihiko Sano. He started out as a carpenter and that has determined his working method completely. He personally selects every piece of timber. Before showing me his own work, he first took me to his mentor, Yoshiaki Nakamura, from Sotoji. It was to be one of the most impressive experiences of my stay in Kyoto. Nakamura showed me various types of timber, the timber joints, the workshop, the storage area and several finished projects. The pride, the love for the material and the craftsmanship were all-pervasive. To his mind, the fact that wooden floors are made from harder timber these days—because people keep their shoes on when walking on them—greatly detracts from the quality. The wood that was originally used for flooring is much softer and finer to the touch. He showed me his stocks of wood, including part of an ancient tree that his father had once procured, 10 metres long and 105 cm wide. However, he is dubious about begrudging a Chinese client its use in his home [FIG. 4]. Each piece of timber in his store is marked and, when necessary, protected with a blanket. All the precise carpentry is carried out in his own workshop and only assembled on-site. The carpenters work their way through the wood with a hammer and chisel, in that way making the joints that are not visible on the outside (see fig. 11). In fact, Nakamura believes that wood is only suitable for use when it is 200 years old: storage facilities filled with splendid panels, beams and sawn logs await an appropriate use. A thin, parallel grain is important for posts. Large-sized, thin panels are used for ceilings and must be of high quality since they are very much in evidence. Substantially-sized beams and panels, and a regular grain course in the wood are considered to enhance the building. Nakamura works mainly on restoring buildings for tea ceremonies, pavilions at temples (as at the Ise Shrine), new, luxurious residences and guest accommodation in traditional style. That does not include the restoration of the relatively simple machiya, nor is that necessary in his view. The restoration of temples and the use of wood entail a very specific culture and tradition. The life cycle of a tree is consistent with that of a temple. A thousand-year old tree is suitable for use as a component in a temple, with the timber being used 200 to 300 years after the tree was felled. The position of the trees in the forest corresponds with the position of the posts in the temple. It is a considerable logistical undertaking and requires great precision. It involves a specialism and culture that are unique to Japan (Brown 1989; 2013).

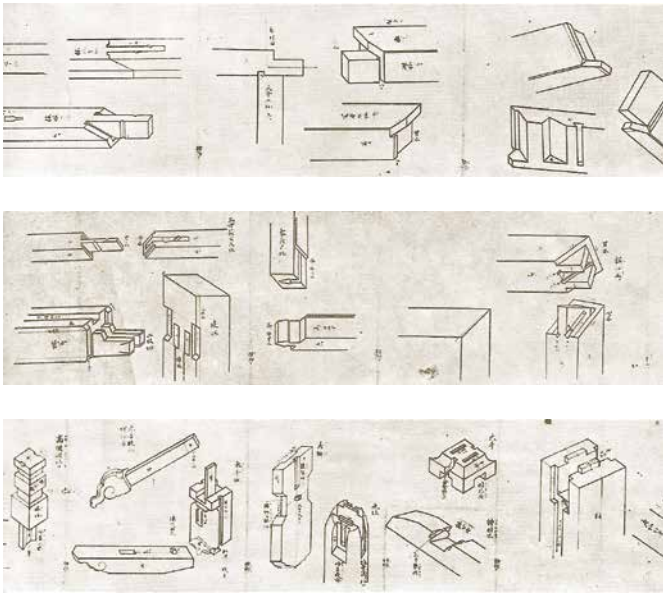


FIG. 5 Drawings of details on a traditional carpenter's scroll (date unknown) from which a dwelling was built

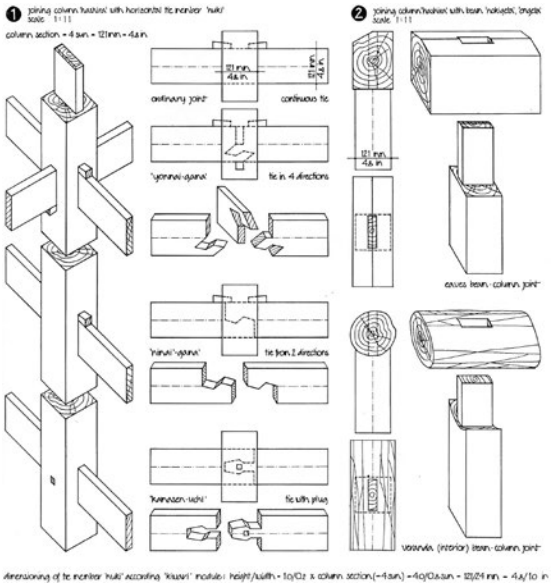


FIG. 6 Drawings of details as represented by Engel, sourced directly from the details on the carpenter's scroll

However, as yet there is no such tradition for the restoration and maintenance of machiya in the centre of Kyoto. The fact that their conservation also has an impact on the culture and perception of the city, and that, in addition, these buildings can be attractive for tourists, is only gradually sinking in (Bruma 2013). Sano also bears that out in his own work: for instance, the MTRL Kyoto machiya, which has been converted into a hip, flexible office space while retaining the old construction features and interior elements, as well as introducing new features like climate control and a wooden staircase.

Details as part of tradition and craftsmanship

Initially the research at the KYOTO Design Lab focused mainly on machiya in Kyoto. However, the visits to traditional artisans revealed that they deploy their materials more for the restoration of temples and teahouses. Nevertheless, the discussion of the five previously-mentioned building elements and the concomitant details relates, if possible, to the machiya. Those elements—floor, post, roof, closed wall and shelter—are tied in with the day-to-day work of the *tatami*-maker, the carpenter, the roof tiler, the plasterer and the producer of roller blinds and screens. These crafts have been handed down from father to son and daughter, who in turn will pass them on to future generations. In all cases, that family connection accompanied a love for the trade and craftsmanship. This too is an ingrained cultural phenomenon that is mentioned with pride, but is also felt to be a matter of course. Sudare blinds, for instance, entail craftsmanship than can only be learnt in practice, whereas the son-in-law of the *tatami*-maker learnt his trade by way of a university degree. With his degree he represents the seventh generation of practitioners in this company. In the Netherlands, that is an exception, in Japan it is a rule based on tradition.

FIG. 7 Tatami-maker Hajima Shinoda

FIG. 8 Hajima Shinoda at work

FIG. 9 Tatami floor in the Shin-Ryu-kyo machiya in Kyoto

The following section describes in more detail the five construction elements. It focuses on the outer form and the production process, with a view ultimately to unveiling the underlying culture in the details seen from the perspective of tradition and craftsmanship. For each element there is a photo of a location in Kyoto alongside some photos I took during my visits also presenting the work atmosphere and conditions. For drawings of details see Engel 1985, and Nishi et al. 1983. These are standard details that are generic for the applications [FIG. 5/6].

Wooden floor covered with a tatami

Sukiya is headed by Setsuo Takamura, he represents the sixth generation of the family business. Hajima Shinoda, the son-in-law, is the seventh in the line of succession. The trade is one you learn in practice, but Shinoda did so at university. According to Takamura he himself is learning something new each day. The traditional *tatami* is made from straw, compressed from 50 to 45 mm, and then covered with rush. The type of rush determines the quality and price. It comes from Okinawa or Hiroshima (the best quality). Only the middle part of the stalk is strong enough. The best *tatami* have a seam in the middle made from the stalks of rushes [FIG. 7], though these days that is not often the case. Modern *tatami*, which are suitable for export, have a synthetic foam core and an underside of synthetic foil. The edges are hemmed [FIG. 8] and finished off with a strip of cotton or hemp. *Tatami* have standard measurements (varying from region to region), but are tailor-made to fit precisely the size of the room [FIG. 9]. The smell and colour of the rushes are indicative of the *tatami*'s age. In Shin-Ryu-kyo we sat on *tatami* during lectures.

FIG. 10 Detail of post and beam

FIG. 11 The carpenter at work

FIG. 12 The Tsuruyayoshinobu (sweet shop), by Yoshiaki Nakamura of Sotoji

FIG. 13 Mr and Mrs Takamura explain about new and old tiles

FIG. 14 The personal archive of roof tiles of the family Takamura

FIG. 15 Old and new roof tile

The supporting structure of wooden post and beam

I visited Yoshiaki Nakamura's Sotiji company and Yamamoto Kogyo's workshop. According to a former employee, Fumihiko Sano, Nakamura is a unique craftsman. He gave a detailed explanation of the types of wood, the ideal course of the grain and the complex joints in the wood that are not visible. In the workshop and warehouses Nakamura showed how the artisans work, his stocks of costly timber and the sizes, and which timber is used for what [FIG. 4/10/11]. Both he and Yamamoto deal primarily with exclusive buildings, such as the restoration and new-build of structural elements of temple complexes, rooms for tea ceremonies, traditionally-inspired hotels, shops and dwellings [FIG. 12]. As yet there is no focus on the repair and maintenance of machiya. That is the preserve of architects like Fumihiko Sano and Toshi Kawai, as found in the conversion of the Gae machiya mentioned earlier.

The roof, made from wood with ceramic-tiled cladding

The Kawai Shokai company is another family business. Mrs. Takamura studied the history of architecture and runs the company with her husband. It was founded in 1951 by Takamura's father [FIG. 13/14]. They related the history of roof tiles in Japan using the computer, also showing a number of restorations of temple complexes, such as the Daitoku-Ji [FIG. 19]. Old tiles are generally cleaned and re-used as far as possible. If there is no alternative, new tiles can be installed. There is a great difference between old (originally from Korea and later China) and new tiles (from Japan) [FIG. 15/16/17]. The Japanese tile derives from the Dutch with an overlap and drip edge. The tiler marks his tiles, which makes it possible to date stages of construction. Temple restorations are documented in books with drawings and notes on pre- and post-intervention stages. Old tiles were held in place on the roof decking with wooden pins and later with iron or copper (steel can break). Tile weight plays an important part in earthquakes. The garage houses the archives with old components that have been collected during restorations [FIG. 16].

FIG. 16 Takamura's storage in the garage

FIG. 17 Tile production in the past, with two pieces folded round a mould

FIG. 18 Roof tiles in a display case at the Museum of Ethnology in Leiden. A tile from the Nagasaki region (1825-1829). It consists of two parts. Patterns in the end tile were applied in the clay with a wooden stamp

FIG. 19 Daitoku-Ji temple restored by Takamura with old and new tiles

FIG. 20 Hiroyuki Sato explains the seven layers of plaster work

FIG. 21 Different trowels for different surfaces of plaster. The smaller the trowel, the smoother the surface becomes

FIG. 22 Perfection in plasterwork in the buildings surrounding Katsura Imperial Villa

FIG. 23 Roller blinds being made by Kubato Birendo

FIG. 24 Kubato Birendo shows thin strips of bamboo

The closed plaster wall

Hiroyuki Sato is the fourth-generation owner of Izutsuya Sato, which was founded in1850. He is a plasterer and a professor at the Kyoto Institute of Technology, at the Future Applied Conventional Technology Centre. He wrote a book about his father and obtained his doctorate with research into damage to plasterwork caused by bacterial growth in the admixtures. In theory, plasterwork, he explained, comprises seven layers, including reinforcement [FIG. 20] (Lubelli pp. 57-62). A different trowel is used for each layer, the finer the surface the smaller the trowel. Plastering is not done with one hand but with the entire body, in a smooth movement. The layers of plaster are thin and dry quickly, so they must be applied swiftly and precisely. This method is used primarily for tearooms [FIG. 21/22]. The top layer contains seaweed since it is smooth and sticky. For machiya the top layer does not have so fine a structure, as was the case in other buildings until the 16th century. After that the procedure became more refined when used in rooms for the tea ceremony. Manganese rather than iron in the clay produces surface discolorations due to oxidation, something that can be prevented by using seaweed.

A bamboo blind partitioning off wall openings

Kubota Birendo of Sudare Blinds produces (roller) blinds. Kubota belongs to the sixth generation in the family business. His son and daughter-in-law also work with him. In addition to blinds, the company makes screens from thin plaited slats for use as ceilings in tea ceremony pavilions. The roller screens are made from reeds, bamboo or thin sticks (the weft threads), the warp threads are from cotton. A loom is used, fitted with weights [FIG. 23]. It is becoming increasingly difficult and expensive to source the right reeds, and the twigs or sticks are also costly. Bamboo is cut into very thin strips. The growth buds form irregularities, which, if arranged properly, form a pattern. Imperfection is deployed to achieve a decorative function [FIG. 24]. Finer material makes for greater transparency, but less protection from the sun. The screens keep out insects, light and sun, enhance privacy while permitting ventilation. That is important in summer. Outdoor sound can penetrate the interior; contact with the natural surroundings is essential, as in the courtyard of a machiya [FIG. 25]. Blinds need quite frequent renovation: bamboo lasts 50 years, reeds 10. The warp threads and the upper rail wear out sooner.

FIG. 25 Roller blinds at Ninigi machiya in Kyoto

Details as part of culture

The foregoing examples demonstrate that details are key characteristics in defining Japanese culture. Toshi Kawai told me that there is no word in Japanese for 'beautiful', but that in Japan you can just make things 'beautiful' and consider them to be so, without further explanation. Beautiful sells well, it relates to emotion and to the spirit. Beautiful is part of Japanese culture. Functional serves a practical purpose (and is very Western), beautiful is a higher goal. But there are differences within one country. According to Kawai, the dimensional tolerances are 3 mm, in Tokyo 30 mm and in Hokaido 300 mm. That remark is also of cultural significance.

FIG. 26 Model of a bamboo screen that looks simple and regular on the front

FIG. 27 The back reveals the cuts and adjustments necessary to give the front its regular appearance. In the office of Yoshiaki Namakura of Sotoji construction

Before we visited Kyoto, we read *In Praise of Shadows* (Tanizaki 1977) with our students. The elements it addresses, such as shadows, the accessibility of the toilet space via the outdoor veranda, the feel of the wind and the sound of the rain, the use of paper instead of glass, all made an indelible impression. They were also very identifiable in machiya we visited. The penchant and longing for tradition is greater in Japan than in the Netherlands. The presence of a traditional *tatami* space in almost every contemporary home confirms that. The way apparent contradictions can exist side by side in Japan is of great cultural significance [FIG. 26/27].

Adapting Traditional Machiya to a Contemporary Lifestyle

Lidwine Spoormans

When the German architect Bruno Taut visited Japan, he expressed his appreciation of the traditional house in his book *Houses and People of Japan*.

'The most interesting feature of the house is not its material appearance but its life. The Japanese house ... is like a stage in an open-air theatre, the background of which, visible through the open wall, is nature.' (Taut 1958)

But the vitality of traditional Japanese houses was already at stake in Taut's time. At the end of the book, he described the disappearance of traditional wooden architecture and the rise of new structures constructed of tin plate, which Taut characterized as 'trash' (Taut, 1958). He could not understand why Japanese people preferred modern houses.

This text focuses on the machiya, a traditional wooden townhouse. Its origins date back to the 12th century, when merchants all over Japan started to build temporary structures in town centres from which to sell their goods. Over the course of 800 years it evolved into a traditional vernacular house combining workplace and dwelling. Machiya in Kyoto (kyomachiya) came to typify the historical capital of Japan and, since Kyoto was spared earthquakes and Second World War bombing, they continue to play an important role in the cityscape. However, most of the machiya that still exist in Kyoto today were built in the 19th and 20th centuries, owing to a devastating fire that swept Kyoto in 1864, destroying many of its machiya (Löfgren 2003). The most important features that distinguish machiya from other traditional Japanese houses are the combination of business and residential space, deep and narrow parcelling with a closed street front, internal gardens (patios) and a long internal corridor connecting front and back. Unlike in Western domestic culture, rooms in a Japanese house do not have a single function, such as bedroom or dining room. The use of a traditional Japanese space plan works differently. Firstly, rooms can be separated from, or joined to adjacent rooms by way of sliding partitions, thereby creating small, secluded or large, continuous spaces. Furthermore, the use of a space changes depending on the time of day, the season or the occasion. Furniture 'on legs', like tables, chairs and dressers are not used in traditional Japanese homes. Instead of fixed pieces of furniture, the Japanese use moveable pieces that are used and then stored in built-in closets. The spatial layout of the Japanese traditional house is, as Bruno Taut described it, an open-air theatre in which different scenes alternate.

Although machiya are considered cultural heritage, their number is decreasing year by year. A survey of machiya by the Kyoto Centre for Community Collaboration (KCCC) in 2003 showed that 13% of machiya in Kyoto were demolished between 1996 and 2003 and replaced by modern, in many cases high-rise, housing estates. In the same period, 80% of the traditional houses were modernized, with the loss of various features of the traditional structure (KCCC, 2009). And this trend continues. The owner's decision to preserve or replace a machiya depends on

many factors: earthquake resistance, fire prevention, the cost of maintenance and renovation, high-rise surroundings, and inheritance tax are some of the drawbacks of living in a machiya (KCCC 2009).

The history of machiya has been extensively studied. Important literature for this study is Löfgren's wide-ranging research into the machiya and its development (Löfgren 2003) and Ueda's *The Inner Harmony of the Japanese House* (Ueda 1998), describing the development and qualities of the traditional Japanese house, including machiya. Despite the literature on the history of machiya, there is little Western research on its contemporary use. A 2007 research project by Atelier Bow-Wow documented all the machiya in the city of Kanazawa. By measuring the extent of their differences to the archetypal Edo machiya, the present machiya stock was categorized and represented by names like 'glass machiya', 'false-mustache machiya' or 'retired machiya'. Their method of analysis—reduction to a principle, categorizing and naming the alterations to machiya—has been an inspirational example for this study.

Although in recent years many machiya have been renovated and adapted to different uses, there has been no architectural evaluation of the spatial layout of these examples found so far. To what extent have machiya characteristics been preserved in these examples? Which machiya elements have been removed, transformed or adapted and what is their new purpose? Do current renovation projects contain new interpretations of machiya elements that might prove inspirational for the reuse of other machiya? The spatial layout and the possibilities for adapting it to new demands is crucial for the reuse of all types of buildings. For houses like machiya, which are still numerous and play an important role in the townscape, finding new uses and users is crucial to keeping the houses and the neighbourhoods 'alive'. Most attention, heritage regulations and design codes relate to the facade, its materials and details (Van Thoor pp. 33-37).Even Atelier Bow-Wow's research focuses on the presentation of the street facade and disregards the interior use of the house.

This study attempts to fill this knowledge gap by developing models for future reuse of machiya that combine contemporary lifestyles and traditional characteristics, in order to present possibilities for the preservation of machiya. The models for reuse are based on an evaluation of the spatial layout of renovated machiya in general and an analysis of the modifications of typical machiya elements in particular. This text documents ten case studies, based on location visits, photographs, drawings, interviews and literature study (for drawings of the floor plans of all case study buildings see pp. 96-99). Since there are 48,000 machiya in Kyoto, this study is illustrative rather than representative.

An important selection criterion for the case studies was the ability to visit the building. Since it is uncommon in Japanese culture to welcome strangers into your private domain, visiting a house entails building a network. Architects turned out to be the best contact for arranging a visit, and that influenced the selection. As to the approach taken in renovating a machiya, three main categories can be distinguished. The first is the restorative approach, which aims to reveal and preserve authentic qualities. The owners in these cases are machiya 'believers' and their mission is to promote machiya. A second category is a transformation designed by an architect, who deliberately combines old characteristics and new additions to make machiya fit for contemporary use. But the majority of machiya fall into the third category and are maintained and adapted without any guiding vision or architectural design and specific machiya qualities are not taken into account. Although all categories are represented in the documented case studies, the last category is under-represented in comparison with the machiya stock in Kyoto.

	MACHIYA	Width x length (m)	Current program	User
1	Mumeisha	10,0 x 33,0	Model-machiya Dwelling	Family
2	Kamanza Cho-ie	4,6 x 18,6	Model-machiya Office	Kyomachiya association
3	Anewal	6,0 x 19,2	Gallery Office Guesthouse	Architect-entrepreneur
4	Mugen	9,6 x 20,6	Hotel Apartment	Tourists/ entrepreneurs
5	Gae	4,3 x 14,6	Single-family house	Family
6	Noda	4,1 x 19,3	Single-family house	Family
7	Senryogatsuji	5,7 x 36,0	Shared housing	Young professionals
8	Iremoya	5,3 x 15,2	Shop	Box sellers
9	Higashiyama	4,6 x 10,5	Guesthouse Shop Coffee bar	Artist-entrepreneur
10	Inokuma	4,6 x 10,5	Office Garage	Architect

TABLE 1 Basic data of the ten documented case study machiya

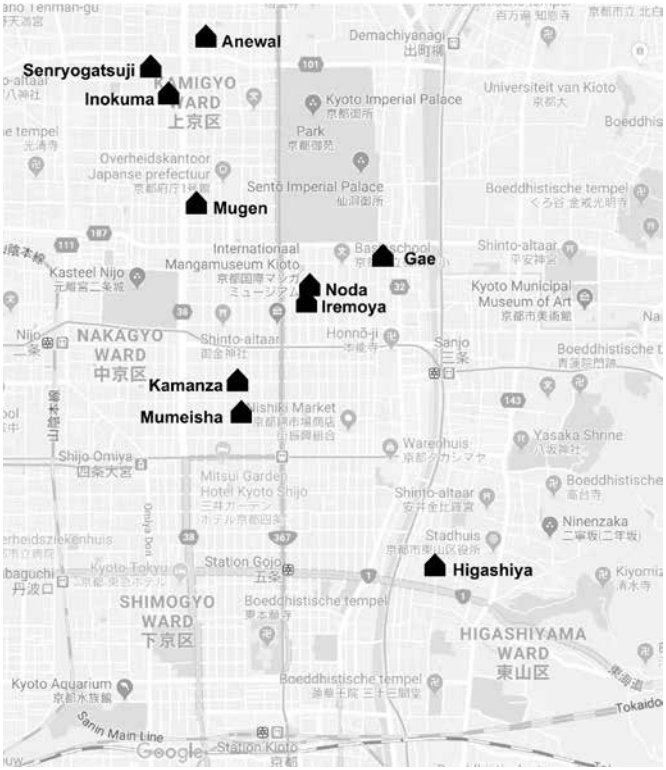


FIG. 1 Map of Kyoto, with the ten case study machiya marked

Comparison of ten cases

Size

The size of the ten machiya buildings varies greatly, as can be seen in Table 1. Kyoto districts are associated with a particular industry or business, so the district in which a machiya is located is a good indicator of the family's wealth and their machiya's size. Many machiya in Kyoto have their origins in the textile business, for example, the trade in kimonos, silk or thread in the Nishijin area [FIG. 1], but other businesses and crafts are also to be found.

In some cases, location, business and the family history explain a machiya's size, layout, luxury, et cetera. For example, the Yoshida family living in the very large and luxurious Mumeisha machiya ran a successful kimono business for generations. In other cases, however, like Higashiyama machiya, the exact age, function and history are unknown. Sometimes, machiya that are situated very close to one other have very different characteristics, like the small Inokuma and very large Senryogatsuji.

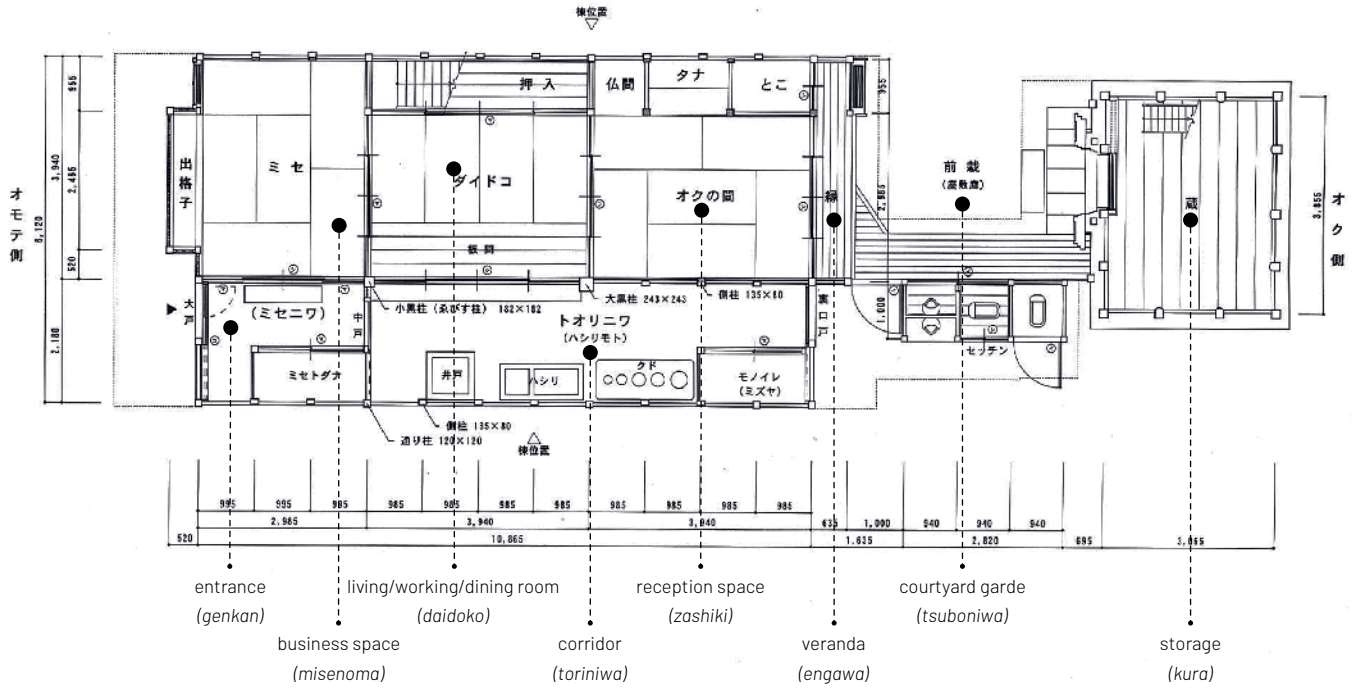


FIG. 2 Typical machiya layout

Although the precise dimensions may differ, machiya plots are always narrow and deep. A longer plot normally means more patios, as in the very deep Senryogatsuji and Mumeisha plots which have two patios and a backyard. The layout of different parts divided by patios, provides daylight and beautiful views. Many machiya have one patio, either surrounded by rooms (Anewal, Kamanza, Mugen) or at the back of the plot (Noda, Gae, Higashiyama, Iremoya); some have no patio at all (Inokuma). Some wider than normal machiya, like Mugen and Mumeisha, have a double row of rooms, whereas the others have one row of rooms lining the corridor. In the case of a double row, the middle rooms are narrower, do not receive daylight, and in most cases fulfil a transition function to an adjacent main room.

Programme, users and owners

Historically, machiya combine business spaces at the front of the house with residential spaces at the back. As Löfgren has pointed out, the house needs to be lived in to save some of the historical character of the machiya and its community life. However, the once inseparable working and living function is often lost, as in several of the machiya in this study. Mumeisha and Mugen combine dwelling and working, albeit in a non-traditional way, with the house occupying the former storehouse (*kura*). Only the smaller machiya, like Noda and Gae, have been transformed to single-family houses. Although once inhabited by one family and their servants, the larger machiya—if still residential—now contain collective housing (shared house or hotel). Mixed programmes occur in all sizes thanks to the

corridor (*toriniwa*), which makes all rooms directly accessible. Only one of my cases was a shop (Iremoya), but in Kyoto many machiya house small restaurants or cafés, as well as shops specializing in traditional crafts (Clancy 2012).

Six out of ten of my machiya have tourism-related programmes. Three of these offer accommodation, and two are Model Machiya that can be visited. According to a project manager from Hachise, a real estate company that buys, renovates and sells machiya, most of the people who sell machiya inherited it. Typical buyers are foreigners (30%) or Japanese people from Tokyo or other cities. It would appear that Kyotoites do not appreciate their own heritage as much as outsiders do. For many Japanese, the image of the machiya is of something impoverished, out-of-date and uncomfortable (Brown 2009). Architects and designers seem to make up another group of machiya fans, as they are the users in three of my cases. As mentioned before, however, my network determined the selection of cases, which may mean that architects are over-represented.

Renovation approach

Most architects I interviewed stated that it is important to preserve machiya. However, they think that designers need to be flexible and not overly orthodox in order to develop viable renovations. In my interviews, I asked them to define the 'essence of the machiya'. Their answers were very diverse. 'The relation to the public space is the essence. Every machiya renovation starts with the question of how to give the *misenoma* (business space) a good new use.' '*Toriniwa* (corridor) is the backbone of a machiya, since it connects exterior and interior and gives access to every part of the house. We reused *toriniwa* in all three machiya renovations we did.' 'The fact that the dweller is able to maintain and restore the house himself because of the materials and techniques used, is essential. Machiya is DIY.' Studying the designs, it becomes clear that in their approach to renovation architects prioritize different machiya elements, depending on how they interpret the essence of machiya.

Elements of the spatial layout

Although flexibility is a key characteristic of machiya, some aspects of the spatial design are strict. For example, dimensions are based on the size of a tatami mat, approximately 180 x 90 cm (Hein 2016), and consequently the dimensions of all spaces and building elements are multiples of 90 centimetres. Another dominant principle is the distinction between a low earthen floor (*doma*) and the raised tatami-covered floors (*yuka*). The machiya layout is characterized by a clear division between served spaces (raised floor) and servant spaces (low floor). All original machiya have an open entrance (*genkan*), a wide corridor (*toriniwa*), a business space (*misenoma*), a main residential and reception space (*zashiki*), a courtyard garden (*tsuboniwa*) and, in many cases, a fire-proof storehouse (*kura*) [FIG. 2]. Although the use of most served spaces is flexible, servant spaces, like the kitchen in the corridor, have fixed functions.

Some fixed machiya elements are a constraint on contemporary use. Two spaces with a fixed function that is no longer relevant (the *kura* and *misenoma*), provide an opportunity for a new use more in line with contemporary life. The *kura* walls are made of thick layers of clay to protect family valuables like kimonos from the climate and from fire, which was very important in a city where wooden buildings predominate (Brown 2012). This well-insulated, freestanding structure now provides an ideal location for a living space (Mugen, Mumeisha), a public function like a gallery (Kamanza Cho-ie), or a music and film room (Senryogatsuji). The *misenoma* at the front of the house was traditionally a merchant's shop. In former days, the front of the *misenoma* was open, as can be seen in picture scrolls depicting scenes from the Edo period. Later on, latticework decorated the facade and provided privacy, which is convenient for the many machiya that have lost their commercial function. Adaptive reuse provides an opportunity to restore the open relation between the house and public space, which some of the users and architects interviewed nominated as the essence of the machiya.

FIG. 3 Traditional toriniwa in Anewal (view from the entrance)

FIG. 4 A second toriniwa in Senryogatsuji shared housing (view towards the entrance)

Contemporary architects like Atelier Bow-Wow, try to resist the tendency towards enclosed, introverted spaces and argue for more communication, the introduction of public functions, and openness to the neighbours, including for new houses (Nuijsink 2012). This is achieved by the transparent front of the coffee bar in Higashiyama and by the public function and lowered level of the *misenoma* in Kamanza Cho-ie.

Two spatial elements appear to have a big influence on the spatial possibilities of the new machiya layout. These are the *toriniwa* and the stairs, which organize the horizontal and vertical logistics of the house. The renovation cases studied reveal different design solutions to the task of adapting these elements to contemporary lifestyles.

Toriniwa

The *toriniwa* is a corridor on one side of the house. It runs from front to rear of the plot and allows access to a succession of rooms. It is a zone of practical purpose and contains the entrance, kitchen, cupboards, toilet and bath cell, and ends in a backyard. The key characteristic is the low earthen or concrete floor, in contrast to the raised tatami-covered floors of the rooms. The difference in floor level has a functional, a spatial, and a social basis. According to Ueda (Ueda 1998), servants and employees were restricted to the domain of the earthen floor and in ancient Japanese society, with its rigid social class system, they were not permitted to rise above it. How does that relate to the society of today? One of the architects stated: 'The outside is folded into the house and that is a true quality.' But a machiya resident said: 'The *toriniwa* doesn't fit a modern lifestyle because it requires an organizational effort.

FIG. 5 Vanished toriniwa in Inokuma, now a garage (view from the entrance)

Bringing the food from the kitchen to the reception room, removing shoes and putting them on again after dinner. People prefer the dining room and kitchen to be easy to use and not separated from one another.' The main advantages of the corridor are the accessibility of all the rooms, from front to back of the plot and consequently the opportunity to compartmentalize. The main disadvantages are the strict separation from other rooms by floor level and the low level of comfort of this hybrid outside-inside space. The case study houses demonstrate new interpretations of the spatial, functional and social qualities of the corridor.

Traditional toriniwa

The Anewal machiya in the former textile area of Nishijin is 130 years old and originally housed a business trading in thread. The current occupant has lived there for some time, but a few years ago he introduced a new use. The ground floor now provides gallery space, used for exhibitions, meetings and projects; the front room on the upper floor is a shared office space; the back part of the upper floor is a guest room for rent. The *toriniwa* is traditional in its form and uses [FIG. 3]. It contains old stoves and big wooden cupboards, a dividing *noren* (curtain) and a citrus tree. It is used as entrance, kitchen, place to meet, bike storage, laundry space and other storage. The value of this space in the current programme is that it unites the different functions and users of the machiya.

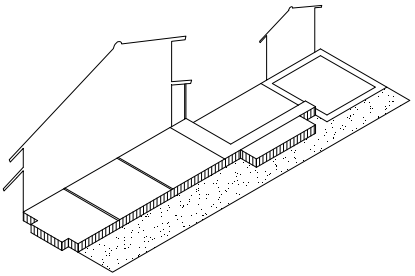
A second toriniwa

The Senryogatsuji machiya, which is very large, was built in the Ninshijin textile district during the Meiji period. Three years ago, a real estate company transformed the machiya into a shared housing complex and now they rent out rooms to young professionals. The building contains eight individual rooms, a dining-kitchen, several toilets and bathrooms, a patio garden, a tatami room, a terrace, a music and film room and a vegetable garden. The *toriniwa* is now a paved corridor that ends in the backyard. It is partly overbuilt by the hall on the first floor, which provides a good view into the *toriniwa*. The smart solution in this design is the duplication of the *toriniwa* [FIG. 4]. Alongside the original corridor, a new corridor was introduced that links all the rooms and functions of the house. Unlike the traditional corridor, the new one is on the higher 'tatami level', so there is no need to remove shoes before entering the rooms, and the corridor becomes a convenient connecting element and an integral part of the house.

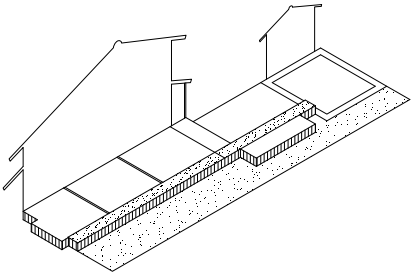
Vanished toriniwa

The machiya in Inokuma dori is one of a row of five. Nothing is known about the machiya's origins, but its former function was as a factory making paper boxes. Since 1999, it has housed a garage and storage space on the ground floor and office space on the upper floor. The most important reason for renting this property is the fact that it is cheap. There is no *toriniwa* but a study of the roof construction indicates where it must have been. Today the entire ground floor is at the lower *toriniwa* level and paved in concrete [FIG. 5].

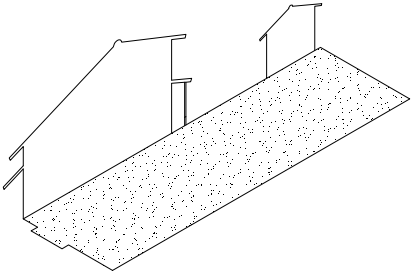
FIG. 6 Extended toriniwa opens up to a patio in Kamanza Cho-ie (view from the entrance)



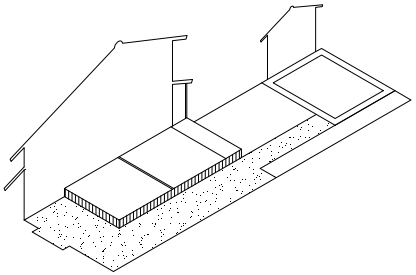
Traditional toriniwa



Second toriniwa



Vanished toriniwa



Extended Toriniwa

FIG. 7 Model of four design strategies for adapting the toriniwa (corridor) to a new use

One small raised section serves as a stair landing and the place to remove shoes. This transformation was not designed by an architect and the sacrifice of the *toriniwa* was not a part of any design vision. It is just the practical adaptation of a structure by people running a business.

Extended toriniwa

Kamanza Cho-ie has a special history. It was built by the family Onoya, who operated a blacksmith's workshop turning out kitchenware. In 1887 the childless Onoyas donated the house to the neighbourhood association and Kamanza Cho-ie became a neighbourhood house. In 2010 Kamanzo Cho-ie was renovated and today it is the office of the Kyomachiya association. An important aim in the renovation was to preserve the public function and improve the gradual transition from the street to the interior of the machiya. To create a welcoming entrance for visitors, the low floor level of *toriniwa* was extended by the front room (*misenoma*) that was lowered and thus became more public [FIG. 6]. Another clever 'extension' was the relocation of the toilets in the patio from the garden to the side wall, opening up a clear view and direct access from the *toriniwa* to the patio garden.

To summarize, abandoning the strict zoning of the traditional machiya, and adapting the floor level of the *toriniwa* is a useful strategy for accommodating new programmes [FIG. 7]. In the case of public functions, the low earthen floor (*doma*) can be extended, and in private programmes with one user, more raised tatami-covered floors (*yuka*) can be created. Shops and restaurants benefit from the first strategy; single-family houses choose the latter. Collective or mixed programmes adopt hybrid solutions and, in some instances, the traditional *toriniwa* layout acquires a new social function of bringing users together.

Stairs

Stairs in a machiya are hidden. In the typical layout, the position of the stairs is in a 'closet' located on the wall opposite the *toriniwa*, accessible from the *misenoma* or *zashiki* room. However, stairs can sometimes be found in unexpected positions, either original or added later, and a fixed placement does not seem to exist. Bigger machiya can have more stairs, accessible from different rooms, always in an enclosed alcove. Stairs are normally steep, have small landings, are made of wood and closed off by doors both downstairs and upstairs. Compared with Western staircases, they are less spacious. Historically, upstairs rooms in a machiya were not used for normal everyday living, but for storage and as a sleeping area for servants (Ueda 1998), which might explain the disregard for the amenity and the position of stairs. In adaptive reuse, the eccentric placement of the stair is problematic, because it forces people to pass through one room to get to the next. This limits privacy and the possibility of creating and accessing smaller rooms. According to one of the architects, privacy, including among family members, has become more important in recent decades. For collective housing or mixed programmes, direct accessibility of spaces is even more important. In these cases, stairs are introduced in different positions to improve the usability of the first floor.

Multiple hidden stairs

The Mumeisha machiya was built in 1909 by the family of Mr Yoshida, the present occupant, who were silk traders. During its lifetime, alterations have been made to the house, such as raising the room height of the upper storey. In the 1960s, Mumeisha was adapted according to the trends of that time: air conditioning, glass roofs covering the *niwa*, a concrete parapet and two parking places in the *genkan*. According to Mr Yoshida, people lost the sense of the machiya and got caught up by capitalism. Returning to Kyoto in the 1970s, he restored the house to its original state. This large and luxurious machiya has three 'closet-stairs' (plus two in the *kura*). The stair in the *genkan* is in an exceptional position and seems to have been added later. Although not every room is directly accessible, the availability of several ways to access the first floor offers more possibilities for reuse. The introduction of multiple (hidden) stairs, is a potential model for machiya renovations [FIG. 8].

FIG. 8 Hidden stair in Mumeisha

Dutch model

The machiya in Higashiyama is owned by HAPS, an organization that provides accommodation for artists. The artist renting the house renovated this machiya himself to create a guest rooms on first floor and a shop and coffee bar on ground floor. The coffee bar, visible through a new open window frame, is a reinterpretation of the traditional function of the *misenoma*, that of displaying and selling goods. The facilities in the corridor and the reopened patio are collectively used. The history of the machiya is unknown, but the previous 'modernization' with veneer panelling and toilets with plastic roofs in the patio has been reversed. Now there is a wide and comfortable stair in the middle of *toriniwa*. The central position of this stair and the first-floor landing, reminiscent of a typical Dutch house, provides direct access twitho the guest rooms upstairs [FIG. 9].

FIG. 9 Dutch model in corridor of Higashiyama

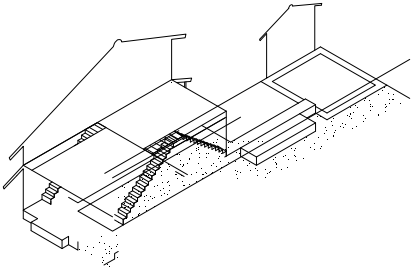
Central staircase

A similar strategy has been used in the Mugen machiya. Like Mumeisha, this is a large machiya with a relatively wide front and a double row of rooms. Originally it was a showroom for kimonos and textiles, but in later years it housed a medical practice. An entrepreneurial couple bought the Mugen machiya with the aim of turning it into a *ryokan* (traditional Japanese hotel) with five guest rooms. The *kura* at the back was transformed into the hotel bar and the owners' private apartment. The *toriniwa* has retained its traditional function as corridor and kitchen and gives access to a platform with a wooden floor in the middle row of rooms. Adjacent to that platform, is a new, open staircase leading to the landing on the first floor, which is surrounded by the guest rooms [FIG. 10]. The central position of the stair is an efficient way of providing access to the smaller private units. The spacious sizes and open access to the common spaces and stairs results in a clear and generous routing.

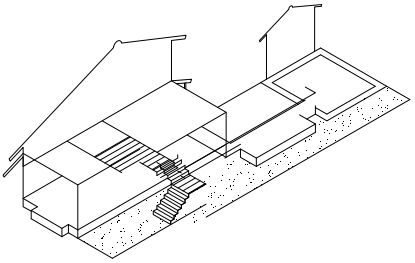
Loop

The Gae machiya is located in a neighbourhood south of the Imperial Palace and close to the court. According to the renovation architect, its first inhabitants may have been palace bureaucrats. After finding this plot for sale, the present owners encountered a building almost unrecognizable as a machiya. The *toriniwa* had been moved to the other side, a garage inserted and the roof altered. The intention of the new owners, who wanted to make a single-family home, was therefore not to restore, but to create a new design showing the historical layers of traditional elements, alterations, new interpretations of tradition and totally new elements. The layout is atypical for a machiya: the kitchen and tea ceremony room are on the first floor and the ground floor is open-space, with a bathroom, toilet and kitchenette as a central core. The *doma* (low floor) is minimized towards the entrance and the rest of the ground floor has a raised floor. The stair is in same zone as the entrance door but rises in the opposite direction. This creates a looping route from the entrance, around the core to the narrow stair, through the kitchen and so to the other rooms on the first floor [FIG. 11]. A similar routing is used in the Noda machiya, although there the entire ground floor is paved and at *doma* level. The box shop in Iremoya machiya is another example of a loop, but for a public function. This loop routing negates the typical machiya layout, but is a good way of creating a continuous space for a single-family house or some other single-function use.

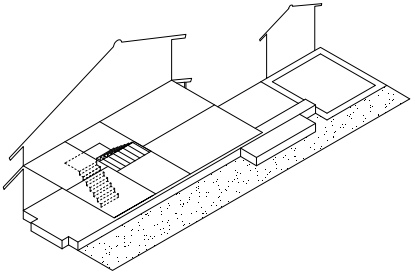
FIG. 10 Central staircase in Mugen (top)
FIG. 11 Loop routing in Gae (bottom)



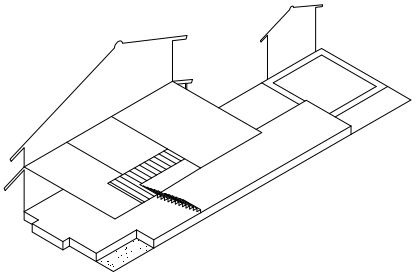
Multiple hidden stairs



Dutch model



Central stairs



Loop

FIG. 12 Model of four design strategies for improved stair access

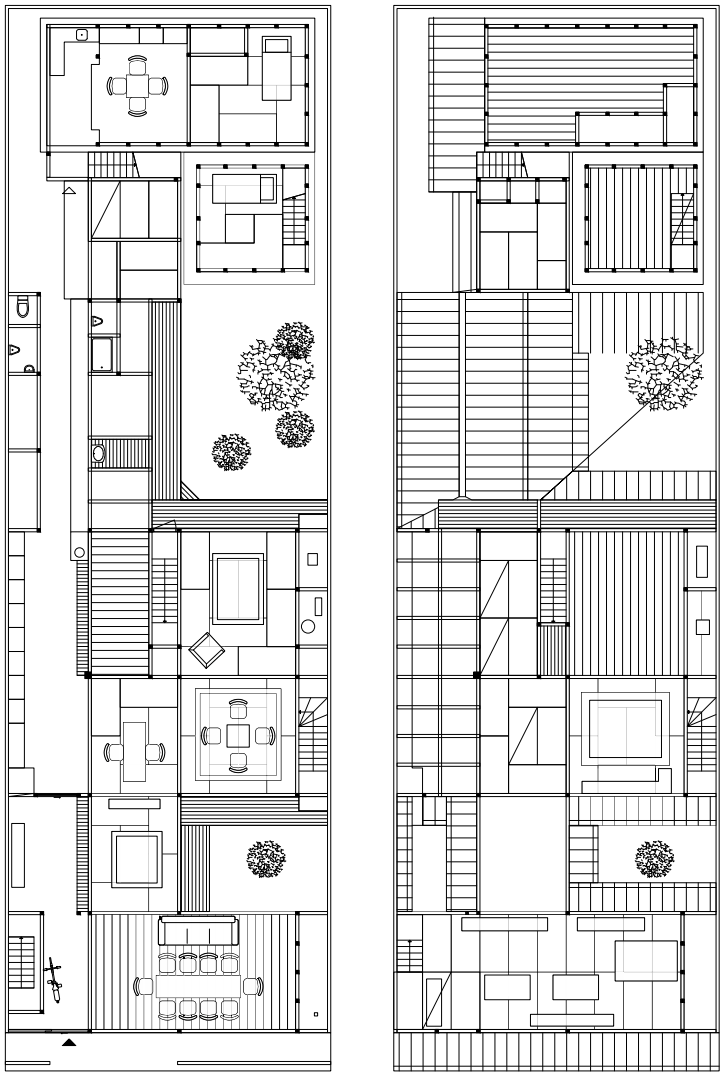
To summarize [FIG. 12]: although a single hidden stair in its traditional position can be sufficient for certain public or single uses, most new programmes require some modification of the vertical circulation. A loop route stringing the rooms together may be suitable for single functions in small machiya, such as private houses or shops. In the case of collective or mixed programmes, a new stair in a central position and open to the *toriniwa* is crucial for independent access to the various parts.

Something original

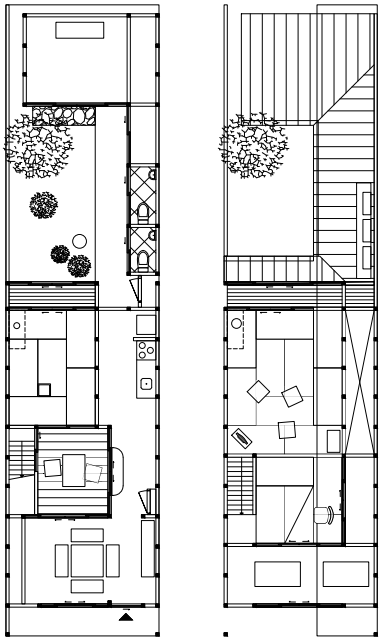
Drawing on ten renovation cases, this study has presented examples of the reuse of machiya through the modification of spatially characteristic, but (in terms of current demands) limiting machiya elements. New interpretations of these elements have been translated into models. Although the number of examples was limited, and the case study buildings differed in size, programmes, users and designs, some general conclusions can be drawn. The functional requirements of new programmes appear to be an important factor for design choices. In particular, the distinction between a single function with one user, and a mixed programme with multiple users, appears to be decisive for the reuse design, and especially for the circulation system. Strategies for adapting floor levels (see *toriniwa*) and connections to the first floor (see stairs), are completely different for mono-functional programmes and mixed programmes. In mono-functional programmes, open plans and passing through other rooms are possible, whereas in mixed programmes compartmentalization is crucial.

Not every programme is suitable for every machiya. The machiya determines the feasibility of a new programme. Small machiya are normally appropriate for mono-functional programmes, such as a single-family house, shop or restaurant, etc. Large machiya tend to be used for mixed programmes. Financial reasons and risks may play a role, but the arrangement of rooms, size and spatial organization of large machiya also make them very suitable for subdivision. Many renovated machiya, small and large, house functions related to tourism. Preferring a machiya—its location, its programme, its appearance—to other building types and design choices are influenced by commercial motives and by a desire to promote Kyoto's cultural history. Furthermore, architects exert their personal preferences, by prioritizing different machiya elements in their approach to renovation. In every adapted machiya, some elements are lost, some are modified and some are retained. Although many renovation projects do not preserve the complete authentic construction, Kyoto's machiya stock as a whole represents all the key characteristic elements.

Only when the spatial layout can be adapted to modern lifestyles and feasible functional programmes, do machiya have a future. As Brumann stated: 'For the vast majority of the houses, "freezing" will not do. Instead, something original has to be done with them to make their continued existence viable and meaningful, and this may involve their physical structure, uses, or both.' (2009). The examples presented here demonstrate ways of combining traditional characteristics and contemporary requirements; they do something 'original'. Inhabitants, users and architects developed solutions, based on their own wishes and preferences. The contribution of this study is the analysis and categorization of these proven solutions. By presenting them as spatial models, this study aims to provide current and future machiya owners with insight and inspirational but practicable models and thereby contribute to the preservation and enjoyment of machiya.

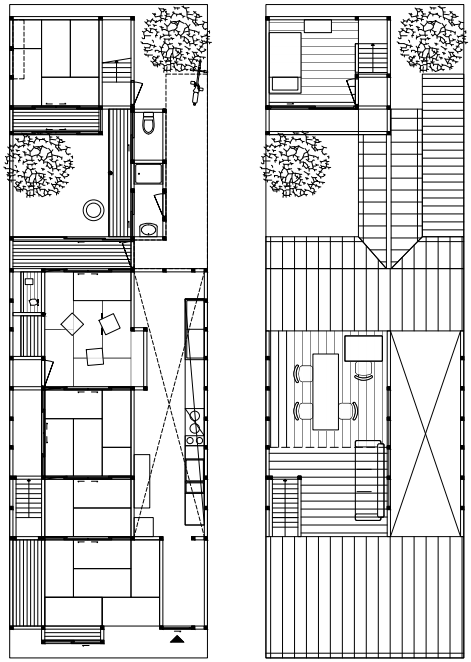


1 / Mumeisha

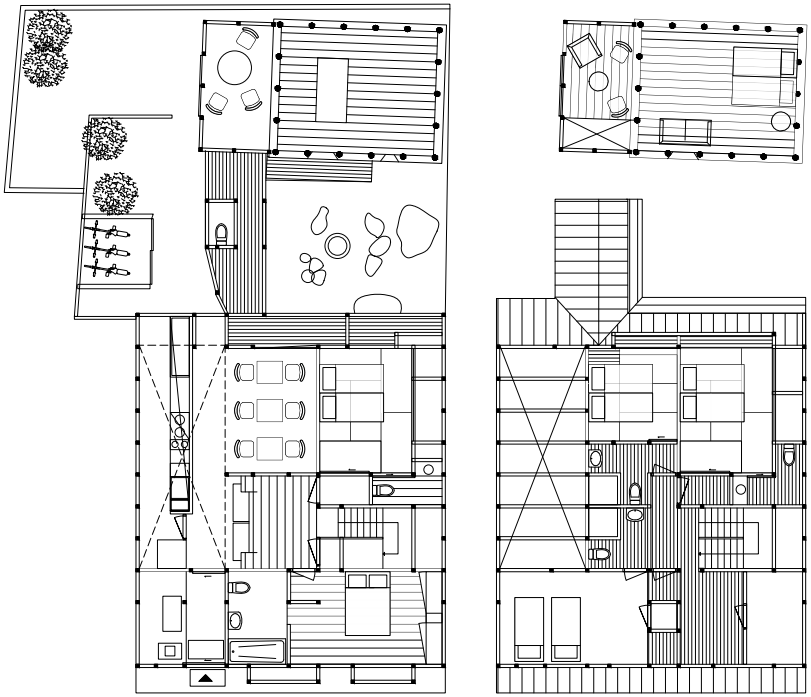


2 / Kamanza Cho-ie

FIG. 13 Floor plans of the ten documented case study machiya



3 / Anewal



4 / Mugen

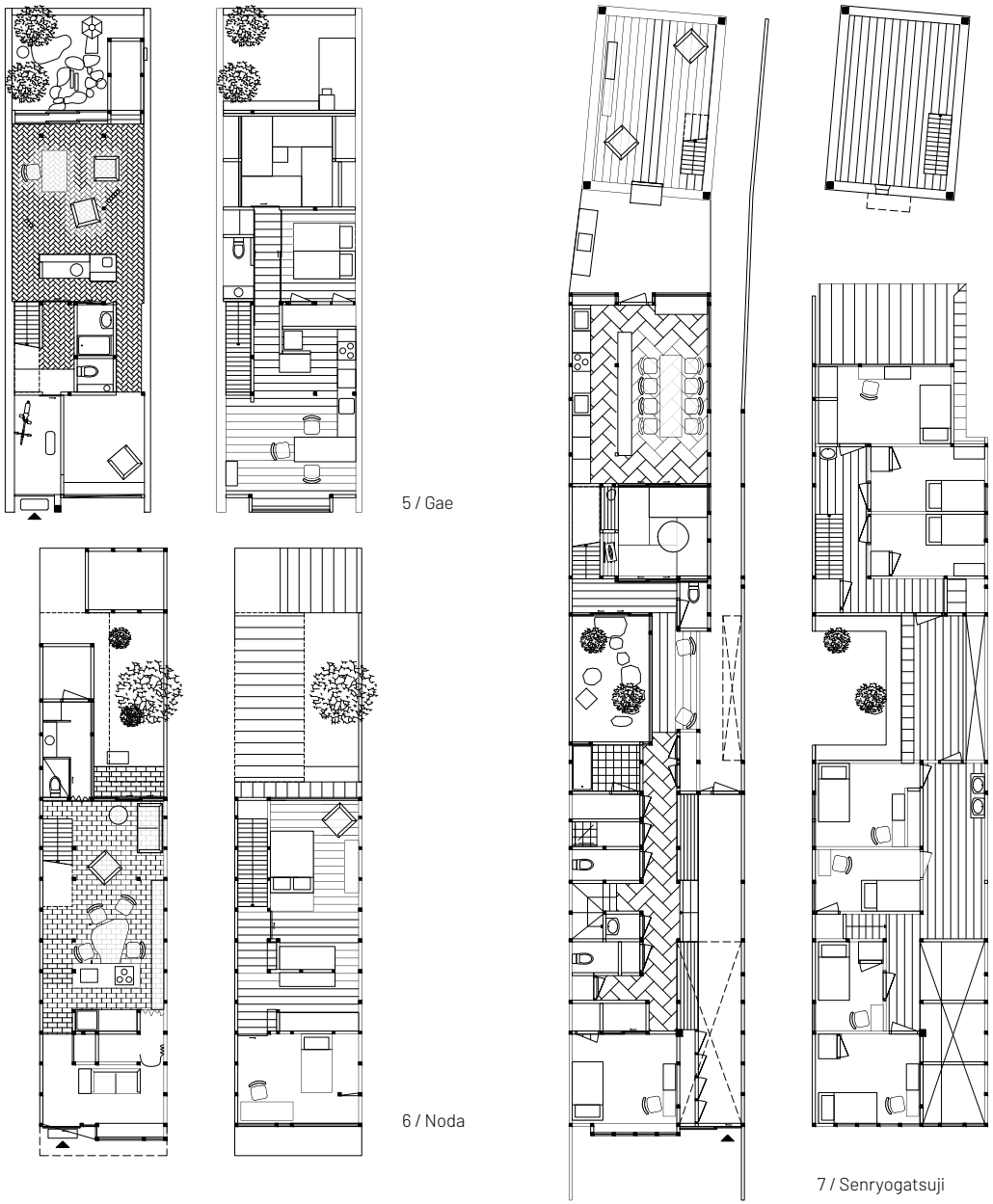
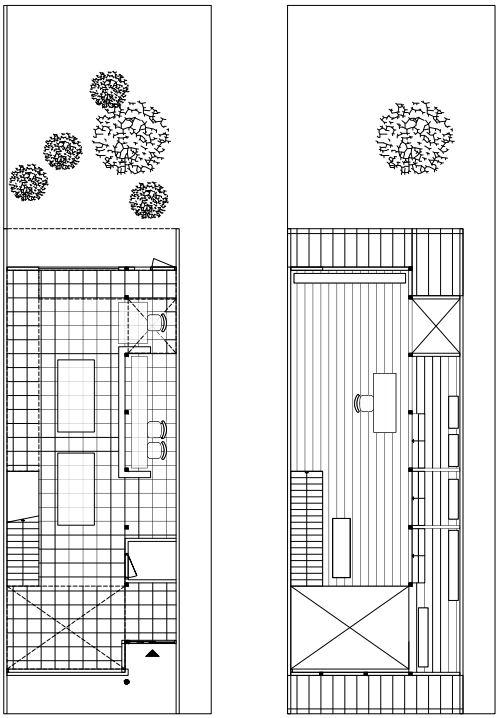
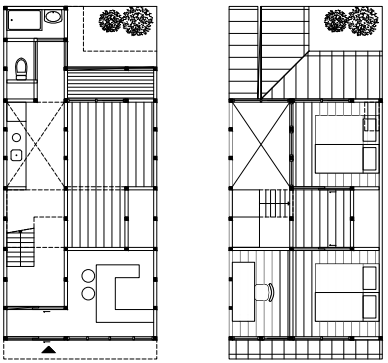


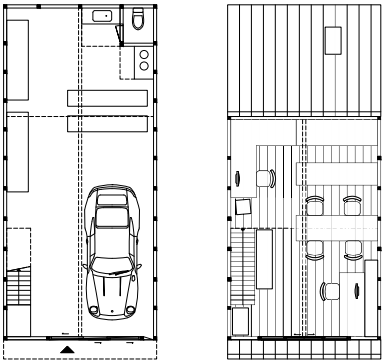
FIG. 14 Floor plans of the ten documented case study machiya



8 / Iremoya



9 / Higashiyama



10 / Inokuma

Re-Programming a Machiya

Student Projects as Test Ground

The following pages show a selection of design proposals from the joint student project *Heritage & Machiya* of KIT and TU Delft. The Ninigi Machiya at Sanjo Dori in Kyoto was chosen as case study for this project. It represents the typical characteristics of a traditional kyomachiya. Given the fact that the original use of a machiya—a home and workplace for a merchant or craftsman, his family and employees—cannot be continued in the future, students were asked to develop design ideas for new, suitable functions taking the essential qualities, the history and the context into consideration. To accommodate new functions the students applied similar strategies as described by Lidwine Spoormans in the previous contribution: the vertical and horizontal circulation had to be adapted and the (former) *tori-niwa* played an important role in the adaption of the space plan. At the same time key elements of machiya architecture were preserved, such as the overall layout of the front and back house with its typical roofscape, the wooden structure and the garden with the adjacent veranda.

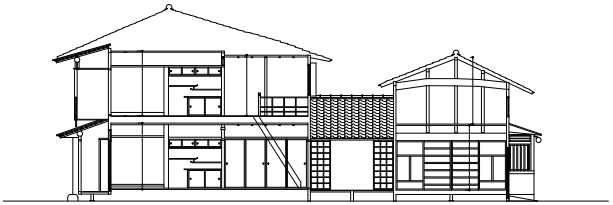


FIG. 1 Ninigi Machyia, longitudinal section of existing situation

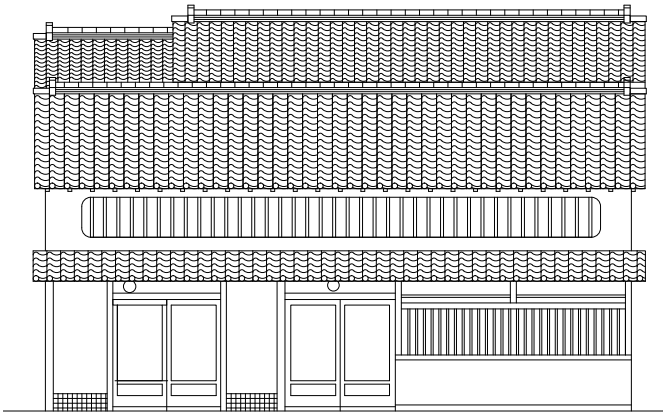


FIG. 2 Ninigi Machyia, street elevation of existing situation

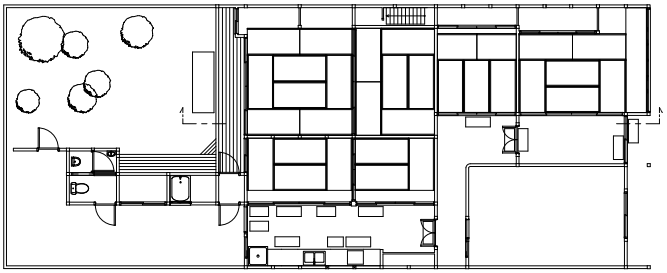


FIG. 3 Ninigi Machyia, first floor of existing situation

FIG. 4 Ninigi student accommodation, Eline Stubert

FIG. 5 Ninigi convention store, Nozomi Shimizu & Yuko Susaki

FIG. 6 Cultural information center, Jelmer van Zalingen

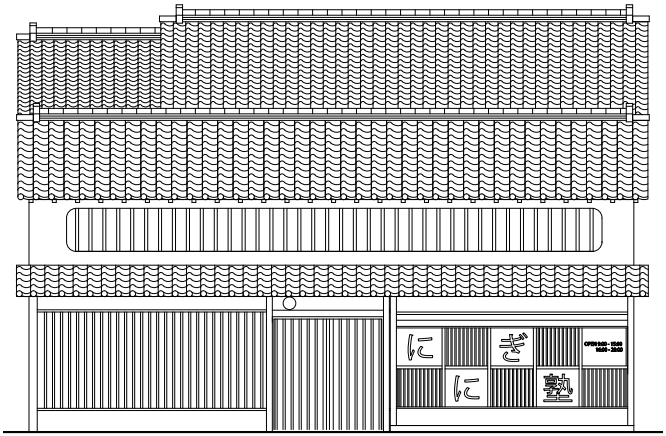


FIG. 7 Ninigi juku (school for classes on Japanese traditions), Thomas Sakuma & Yoshiki Hayashi

FIG. 8 KIT PhD accommodation, Anna Golubovska

FIG. 9 Ninigi student accommodation, Eline Stubert

FIG. 10 Ninigi convention store, Nozomi Shimizu & Yuko Susaki

FIG. 11 Ninigi juku (school for classes on Japanese traditions), Thomas Sakuma & Yoshiki Hayashi

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Text
Carola Hein, TU Delft
Kazuto Kasahara, KIT
Barbara Lubelli, TU Delft
Yoshiro Ono, KIT
Lidwine Spoormans, TU Delft
Sara Stroux, TU Delft
Marie-Thérèse van Thoor, TU Delft
Hielkje Zijlstra, TU Delft

Editors
Marie-Thérèse van Thoor
Sara Stroux

Image editor
Iris Burgers

Translation and English editing
Robyn de Jong-Dalziel
Wendy van Os-Thompson

Design
Sirene Ontwerpers, Rotterdam

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