

RING-AND-CIRCLE, SYMBOLICAL AND PRACTICAL MEANING OF THE FORM IN TOWN PLANNING AND ARCHITECTURE

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Abstract

In the research analysis of historical urban and architectural developments was confronted with the newest concepts in town planning and architecture. The search was set against the background of political and social situation as well as changing technical possibilities. Applied methodology was focused on finding links between forms created by people and crucial events characterizing analyzed periods. The methods involved included studies of literature, historical registers in museums and research in situ.

Oval or circular urban systems and structures were shaped by several factors: safety, community demand, worship, expression of emotions and experience of decision makers and builders.

At times when the defence of people and their possessions was a frequent necessity it was a ring of walls or circular rampart or tower on a plan of a circle that were used. Logics of this solution can be easily proved by simple equations. When mathematics imbued with magic or religion, and became a tool of shaping architecture, use of a ring was symbolic, and often used in sacred urban layouts and architecture. Circle, as the most perfect of figures was appreciated by the people of power of all periods up to now. First theoretical urban plans developed either from circular focal building or implemented circle or ring in shaping the whole layout. In the era of rationalism theorists of that time saw the opportunity to organize functional zones in concentric way. Recent decades unveiled new phenomena: circular projects in urban and architectural scale.

The circle as a symbol and a practical geometric figure

Solar deities were worshipped in prehistoric and ancient times, across different parts of the world and in different ways - under a ubiquitous symbol - the circle. The circle is present in all cultures, religions and belief systems as a magical and symbolic sign. For example, the

Buddhist Mandala, where the circle symbolises the sky, transcendence and infinity, and the square represents the inner self, that which is associated with man and earth. The Chinese Jin-Yang from the Book of Changes symbolises the interplay of opposites of the same¹, the Indian swastika (circular, different from the one commonly known), is a symbol which refers to the cult of the sun; it means life, fertility and good fortune. The symmetric pagan Celtic cross (the sun cross) was combined with a circle².

Dancing was the oldest form of worship of the powers of nature and gods, practiced by societies of old. A ring of dancers would form naturally; prayer would be said in a circle. The places for such rituals would be circular, which, amongst others, determined the shape of the Greek theatre orchestra. The gathered formed into a ring to perform rites around a fire; thus the circle had both a symbolic as well as a practical dimension. Many temples and places of worship across different cultures were constructed on a circular footprint - the British Stonehenge, the Polish Seven Sisters (*Siedem Sióstr*), the Buddhist stupas. Burial sites plans of prominent society members and priests were often based on a circle.

People were living under the canopy of the sky night and day, and to depict it was a creative act from the boundaries of the realm of magic. The faces of the Sun and the Moon were constantly watched. The horizon was a circle. The cyclicity of day and night, the seasons of the year, the lives of plants and humans are also perceivable as continuous, which is reflected in beliefs. Maya, Inca and Aztec calendars are also circular³.

Apart from the magical and religious significance, since the dawn of society builders used the shape of a circle in construction as it was easy to mark out on site with simple tools: two stakes and some rope, string or even a strip of leather. Settlements and town outlines were circle like, most primitive shelters were on a circular footprint - regardless of the materials they were made out of or the climate zone.

The oldest urban plans

For defence reasons, the oldest Neolithic settlements were oval. Biskupin, a historical monument from the 8th century B.C. is an example of this, where, despite the use of log construction which imposes orthogonal plans for houses and the street layout, the defences are in an oval shape. Plains, without natural defensive land forms, predestined just such a shape for early settlement defences, defensive towers and fortified towns.

A similar circular shape was also assumed by the *kraal* and the *boma*, African enclosures, to protect livestock against predators at night.

The circle in medieval urban planning

In the Middle Ages, defensive attributes also determined the circle or oval as the shape of choice for defences and fortifications:

¹ *The Illustrated Encyclopedia of Confucianism*, Vol. 2. New York: Rosen Publ. Group, 2005, p. 869.

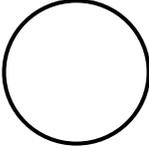
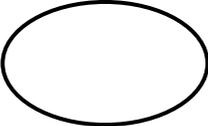
² Modzelewski K. et al, *Mitologia Słowian*, Wydawnictwa Uniwersytetu Warszawskiego, 2006, p. 87.

³ Rostworowska M., *Historia państwa Inków*, PIW 2007, p.47.

- the ratio of the area inscribed in a circle to the circumference of that circle is more favourable than for an ellipse, square or rectangle, which affects the number of potential defenders which are able to live in the town (Tab. 1)
- corners of a fortress were its weak points: rams were able to knock out cornerstones easily one after another, and on the walk on the top of the wall the defenders got in each other's way
- in a town shaped roughly like a circle the distances from houses to the town square were similar, which made for a more convenient communication and hierarchisation of given plots.

The logic behind such a solution is even more perspicuous when we consider that the chessboard like outline of a *castrum romanum*, a Roman military town served as the blueprint for the street system in Middle Ages towns enshrined to this day in the layouts of Medieval cities of Western Europe. Usually, town walls were erected a few dozen or so years after the town was granted urban charter and it was undoubtedly a significant financial and logistical undertaking for the residents⁴. The defences outline most closely reflected the defence needs, financial capacity and the topographical conditions of the area.^{5 6}

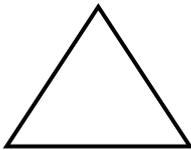
Table 1. Comparison of the proportions of geometric figure areas to their circumference as a guideline for shaping defensive plans

	<p>CIRCLE = 1 sq. km</p> <p>$P = \pi r^2$ $1 \text{ km}^2 = \pi r^2$ $\sqrt{1 / \pi} = r$ $r = 0,56 \text{ km}$</p> <p>$Ob. = 2 \pi r$ $Ob = 2 \pi 0,56$ $Ob = 3,54 \text{ km}$</p> <p style="text-align: right;">P / Ob = 1 / 3,54</p>
	<p>ELLIPSE = 1 sq. km</p> <p>$P = \pi ab = 1 \text{ km}^2$ $a = 2b$ $a = 0,8 \text{ km}$ (wzór) $b = 0,4 \text{ km}$</p> <p>$Ob = 3,9 \text{ km}$ (wzór)</p> <p style="text-align: right;">P / Ob = 1 / 3,90</p>
	<p>SQUARE = 1 sq. km</p> <p>$P = a^2$ $a^2 = 1 \text{ km}^2$ $a = \sqrt{1} = 1 \text{ km}$</p> <p>$Ob = 4a$ $Ob = 4 \times 1 \text{ km} = 4 \text{ km}$</p> <p style="text-align: right;">P / Ob = 1 / 4,00</p>
	<p>RECTANGLE = 1 sq. km</p> <p>$a / b = 1 / 2$ $P = 1 \text{ km}^2 = a \times 2a$ $a = \sqrt{1 / 2}$ $a = 0,71 \text{ km}$ $b = 1,42 \text{ km}$</p> <p>$Ob = 2 (a+b)$ $Ob = 2 (0,71 + 1,42)$ $Ob = 4,26 \text{ km}$</p> <p style="text-align: right;">P / Ob = 1 / 4,26</p>

⁴ Poznań: urban charter: 1253, city walls approx. 1280; Kraków : urban charter: 1257, city walls from 1285; Środa Wielkopolska: urban charter: 1208/1235, city walls 1324 (mentioned), Lublin urban charter 1317, city walls from 1341.

⁵ Ostrowski W., *Wprowadzenie do historii Budowy miast*, Warsaw: Oficyna Wydawnicza Politechniki Warszawskiej, 1996, p.322.

⁶ Ostrowski W., *ibidem*, p. 415.

	<p>TRIANGLE = 1 sq. km</p> <p>$P = a \sqrt{3} / 4 = 1 \text{ km}^2$</p> <p>$a^2 = 4 / \sqrt{3}$</p> <p>$a = \sqrt{4 / \sqrt{3}} = 1,51 \text{ km}$</p> <p>Ob = 3a</p> <p>Ob = 3 x 1,51 km</p> <p>Ob = 4,55 km</p> <p style="text-align: right;">P / Ob = 1 / 4,55</p>
<p>Result:</p> <p>Circle of 1 sq.km area needs 3.54 km of defense wall</p> <p>Ellipse of 1 sq.km area needs 3.90 km of defense wall</p> <p>Square of 1 sq.km area needs 4,00 km of defense wall</p> <p>Rectangle of 1 sq.km area needs 4,26 km of defense wall</p> <p>Triangle of 1 sq.km area needs 4,55 km of defense wall</p>	

Aigues Mortes, a fortress city for the armies gathering for the crusades was inhabited by soldiers: an abundance of defenders and as such the external fortifications were in the shape of a rectangle with many gates. Medieval towns do not mirror such a system.

Keeps and defensive towers were similarly shaped. *Architektura militaris* of that period also used the circle and oval in smaller scale fortifications.⁷

Independent of defensive towns, villages also assumed shapes which facilitated defence and these were usually circles or ovals. Some survive in Poland to this day and are called *okolnica* (roundling) or *owalnica* (oval shaped village). In this case, the fences established a ring around the farmsteads, providing defence against enemies and protection against wild animals, as well as the central green inside the village (*majdan*) where cattle were herded at night for protection. Usually it was possible to draw water, water the cattle and wash in a pond or stream running across the green. Kamiennik (Opolskie Voivodship), former part of a knightly house, is an example of a village which survives to this day.⁸

In the Middle Ages, following lessons learned during the 13th century Mongol invasions and in the face of other dangers in Central Europe, defensive settlements and monasteries were built until the 16th century. A few hundred or so are worthy of particular attention, surviving in Romania and primarily in Transylvania. They constitute a very important element of rural defensive architecture, spontaneously erected by local communities around churches. The monasteries in this region were built in a similar fashion: with a ring of circumference walls with monastery cells and sometimes also premises for the villagers added.

The Härman village (Romania, Transylvania) is an excellent example of such a solution. A village brick church dating back to 1241, with a high-bell tower which also doubled up as an observation post, was surrounded by a tall wall. The wall is circular, with protruding granite towers, has overhung arrowslits, a gatehouse and is surrounded by a moat. Two storeys of living quarters have been built on the inside of the wall, one for each of the local families. The upper storey is reached via ladders. Living quarters of this type have also been built onto the body of the church itself. Cattle could be herded into the internal courtyard to wait out the danger in such fortress. The monastery in the nearby Prejmer as well as many others were built

⁷ Świebodzin plan from 1586, Poznań, with a visible bulging of the walls to the North-East to enclose the Dominican Monastery built earlier, and many others.

⁸ Other surviving examples: Mieszki (today a district of Łódź), Swołowo (near Słupsk). Surviving roundlings: Paproć Duża (Podlaskie), Księżę Pole (opolskie).

in a similar fashion. Everywhere, the final fortifications were on a circular footprint, rational from the defence point of view.⁹ Later, in the 16th and 17th centuries, monastery complexes in the neighbouring Moldavia, centred on the “painted churches” were on rectangular footprints, reflecting the style of the epoch and multicultural and multireligion background.¹⁰ Their defence capacity was only hypothetical, similar to the defensibility of *palazzo in fortezza*, a popular residence of this more peaceful period.

The circle in Renaissance urban planning

The great transformation in the art of war caused by the invention and widespread use of the cannon, a weapon which could easily knock down Medieval walls had little impact on the shape of towns. Theoretical town plans, created by numerous Renaissance architects, still reflect the circular or oval shape to which triangular bastions were added. A star shaped layout had the same advantages as Medieval walls but it protected the centre against bombardment from the outside. This pertains to both earth fortifications, typical for the Netherlands, as well as the Italian brick curtain walls and bastions. An observation point located in the centre of a complex made it possible to command the defenders, shift troop detachments where needed most and the distance to the command post from everywhere was the same.¹¹ As time went on, fortification outlines were becoming more and more complicated, with the basic shape remaining unchanged¹².

The only complete execution of such a “perfect” plan is found in the Palmanova fortress town, designed by Vincenzo Scamozzi on a plain to the north east of Venice. Through this, the Republic was looking to establish an outpost to defend the capital against the expected Turkish attack. Three fortress towns were built in The Republic of Poland in the 16th and 17th centuries.¹³ However, none of those had such a regular shape as Palmanova, each made use of the local terrain (marshes, slopes) and took into account the owner's residence located asymmetrically within the fortifications.¹⁴

The circle in Baroque urban planning

Regardless of the practical significance for defensive systems, the circle was also used to emphasise the rank of a site. The Baroque palace in Karlsruhe is an excellent example of its use as a symbol to mark out the centre; the location of the prince's palace. Interestingly, the circular form of the circumference alley and radial alleys criss crossing the woodland park was not noticeable to those on the ground. It was only visible on plans of the entire complex. The baroque impetus stemming from the ambition and capabilities of the rulers of that time, led to

⁹ Brykowski, R., Chrzanowski T., Kornecki M., *Sztuka Rumunii*, Zakład Narodowy im. Ossolińskich - Wydawnictwo, 1979, p.78.

¹⁰ Kocój E., *Świątynie, postacie, ikony. Malowane cerkwie i monastiry*, Wydawnictwo UJ, Kraków 2006.

¹¹ Kostof S., *The City Shaped*, Bulfinch Press, New York, Boston, London, 2007, p.189-190.

¹² Poznan three lines of fortifications are a good example of military logics: oval Medieval wall, polygonal fortress of the 18/19th century around it and extended ring of forts from the 20th century.

¹³ These are Zamość, construction started in 1579 by Bernardo Morando, an Italian and Chancellor Jan Zamojski; Hetman Stanisław Żółkiewski's fortress of Żółkiew erected from 1597, designed by Paweł Szczęśliwy; and Stanisławów designed by Stanisław Kostka Potocki and an Italian military engineer after 1650.

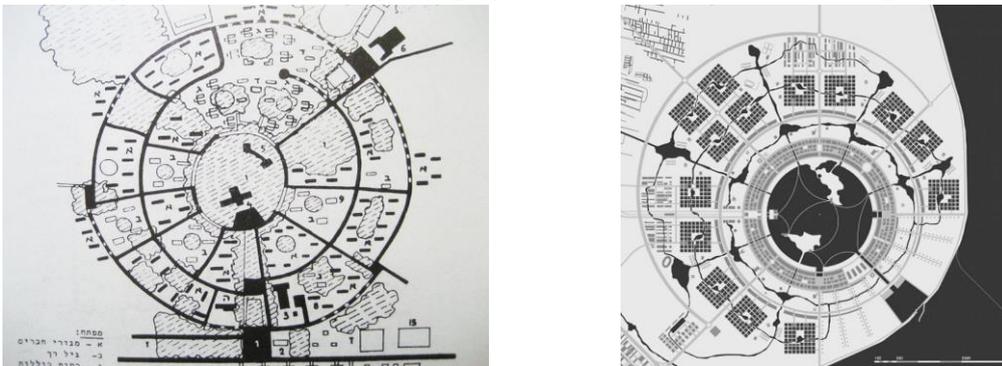
¹⁴ Bogdanowski J., *Architektura obronna w krajobrazie Polski*, PWN, Warszawa-Kraków 1996, p. 36.

inscribing urban and garden plans into the scale of the universe. Here, “never-ending” garden perspectives and far reaching symbolism of the plans themselves constituted the tools¹⁵. The Baroque architects, in creating urban and garden spaces, also often used the circle. Cylindrically concave frontages created by facades of palaces created impression of grandiose and monumentalism. In gardens circular piazzettas within bosquets emphasised the role of incorporated sculptures or pavilions.¹⁶

Contemporary characteristics

Subsequent centuries brought with them city planning problems associated with the industrial era. This primarily boiled down to ensuring respectable living conditions for their residents. A number of concepts based on concentric, circular layouts were coined during that time. Amongst others, those include Ebenezer Howard’s correct town development principle published in 1898 and revised in subsequent decades. The essence of this concept was to provide the residents with access to open green areas, to reduce smoke pollution in cities and improve living and working conditions. The central city and satellite cities; separated by open, green areas - that was to be the new face of urbanisation. The factor which dictated the concentric rings of functional zones in satellite cities was access to the basic town functions and correct proper access isochrones¹⁷. The twentieth and twenty first centuries did not bring about solutions to town planning. The phenomenon of increasing fragmentation of its structure in modern local plans and urban sprawl generated, amongst others, by individual car communication, turned the architects’ attention to the role of the society in shaping town space and the fact that it is there for the people.¹⁸

**Figure 1. Kibbutz for 250 families 1940, arch. Samuel Bickels,
Figure 2. Lingang New City (Shanghai), gmp Architekten von Gerkan, Marg and Partner**



Source: Fig.1: Kibbutz. Architecture with no precedens. La Biennale di Venezia, 2010, p.96, Fig.2: authors archives

¹⁵ Ostrowski W., *Wprowadzenie do historii Budowy miast*, Warsaw: Oficyna Wydawnicza Politechniki Warszawskiej, 1996, p. 417-418.

¹⁶ Ostrowski W., *ibidem*, p. 415.

¹⁷ Czyżewski A., Trzewia Lewiatana. *Miasta-ogrody i narodziny przedmieścia kulturalnego*, Państwowe Muzeum Etnograficzne w Warszawie, 2009, p.54.

¹⁸ Bonenberg A., *Beauty of the City. Urban Empathy. Case Study – Catania in Sicily*, Wydział Architektury, Politechnika Poznańska, 2010, p.46-58.

Figure 3. Brondby, suburb of Copenhagen, settlement of garden plots with summer houses, built in the sixties; the idea of social integration at summer and weekends



Source: <http://static1.squarespace.com/static/52b3aae6e4b00492bb71aa3d/t/5536a023e4b0799bf6161467/1429024503161/>

The concept of a society as the main medium for urban values, on an emotional and ideological level was fulfilled by concentric layouts of a number of kibbutzim, which the Jewish architects, to a large extent students of Bauhaus, erected in the forties and later, for the settlers in then Palestine, and subsequently the Jews running away from the Holocaust.¹⁹

Similar idea was expressed in Lingang New City, an extension to Shanghai. As the city grows towards the East Chinese Sea, a new centre is going to take over inhabitants working in the area of the new port and industrial zones.

For palm-cities in Dubai, that is of paramount importance when it comes to promoting the given location. The urban layout not identified from the pavement and road levels, creates its brand.

The circle in architecture

Mesa Verde in Colorado (USA), is an Ancestral Puebloans Indian settlement dating back to the 12th century, built on an inaccessible rock shelf, under a rock overhang. Similar to Pueblo Boniti of the same tribe, built using brick and stone, it comprises irregular, rectangular like and rounded buildings and round, ritual buildings. These interiors, the *kivas*, were used for male ritual dances. Just like other cultures, Indians were seeking to mirror the cosmos which surrounded them using the circular plan²⁰. A circular, regular footprint reflected the function (dancing in a circle) and also the technical capabilities (marking out a ring and chiselling out a cylindrical "wall")²¹.

As Marta Tobolczyk points out in her book "The Birth of Architecture", rounded building forms, as well as corners, came about not as much as a result of primitive technology, but were primarily a reflection of organic forms which the builders encountered and which they considered to be more beautiful, and probably, friendlier.

The second, more primitive form of a home, used to this day is the tent. Excavations and partially surviving dwellings aside, it is the Siberian yurt which has the longest tradition and history as well as most modifications associated with the way people lived under its roof. The steppes, where nomadic peoples created and improved this portable home for large families, are the playground for strong winds. The dome-like, squat and symmetric shape of the yurt

¹⁹ Kibbutz. *Architecture with no precedents*, Red. Galia Bar Or, La Biennale di Venezia, 2010, p.37.

²⁰ Kelm T., *Architektura prerii i kanionów*, Oficyna Wydawnicza Politechniki Warszawskiej, 2007, p. 22.

²¹ Tobolczyk M., *The Birth of Architecture*, The Urban Intern. Press, Gateshead UK 2008, p.56-58.

stands up to them tremendously. Small trees growing in the tundra and widely available animal skins are used to construct it. Cylindrical homes with pointed roofs dominate in Sahel, these are spacious huts made out of branches and covered with hay.

The North American Plains Indians created two types of home-tents: the wigwam for permanent dwelling and the portable tipi - both of a circular footprint. Their structures constitute frames made out of thin trunks, radically different in each case: dome like for the wigwam and conical for the tipi. Both forms stemmed from experience and stood up to the elements in their own particular ways: the wigwam in a similar fashion to the yurt, whereas the slender tipi "sliced" the wind. As in the Plains there was a shortage substantial wood construction materials, a structure using tree saplings led to two solutions: a cone, tied at the top and covered by animal skins, and a similar structure, where the uppermost parts of the saplings are bend creating a dome.

The winter dwelling of Eskimo families, the igloo, has also a circular plan. Built out of blocks of hard snow, it was covered by a dome, with additional snow piled on top, protected the inhabitants against hurricane winds from the North²².

The practical side of the above solutions, despite the use of various kinds of materials remains similar: it is relatively easy to erect a structure on a circular plan both out of wooden elements and a dome out of snow blocks. A regular, symmetrical layout provide uniform resistance against variable wind loads. The circular interior allows various functional arrangements: both hierarchical and equal. A similar structural concept is in use in stone homes, which one may come across in various parts of Europe. Erected on a circular footprint, they are shaped like slender domes; can be found in Turkey (Izmir region), in Italy (Apulia), in France and in Croatia. The availability of slate and shortage of timber resulted in the use of the local building materials in the simplest manner possible.

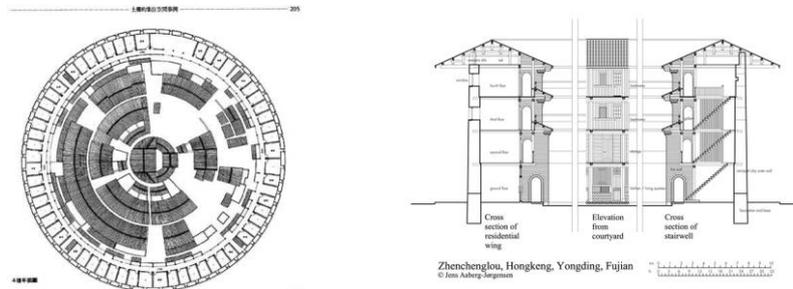
Middle ages - use of circular plans in architecture

In the Middle Ages, in the present day China homes were built on a circular layout for the same reasons as in Europe. The Chinese called them *tulou*, which means "earthen structure", despite some of them being erected out of stone. Tulou is a dwelling for an entire family, typical for the mountainous areas in the south and west of the Fujian province. Often a temple stood at the centre of a complex, a family sanctuary, sometimes accompanied by other buildings. The circumference wall had three to four storeys of living quarters on the inside. Due to climate, storage space was often located on the top storeys. These structures were erected from the 12th century all the way through to the start of the 20th century. They were expanded by adding external rings of walls with further dwellings resulting in a very characteristic, concentric layout. Access to the interior of a *tulou* was through a single guarded gate. The Hakka people, one of the ethnic groups which erected these structures, used the properties of a circular plan to establish a non-hierarchical society. All families had same size rooms, and one family owned vertically stacked premises from the ground floor all the way to the roof. Large families had a few such sections. This was connected with the necessity to defend the structures by shooting

²² Rapoport A., *House, Form and Culture*, Prentice-Hall, Inc, Englewood Cliffs, N.J., 1969, p.98-100.

gun posts near the top.²³ A circular or oval layout made it possible to establish a hierarchy or a community on equal terms.²⁴

Figure 3, 4. Tulou Chengqilou, plan of the third storey and cross section through dwellings, internal elevation and staircase cross section²⁵

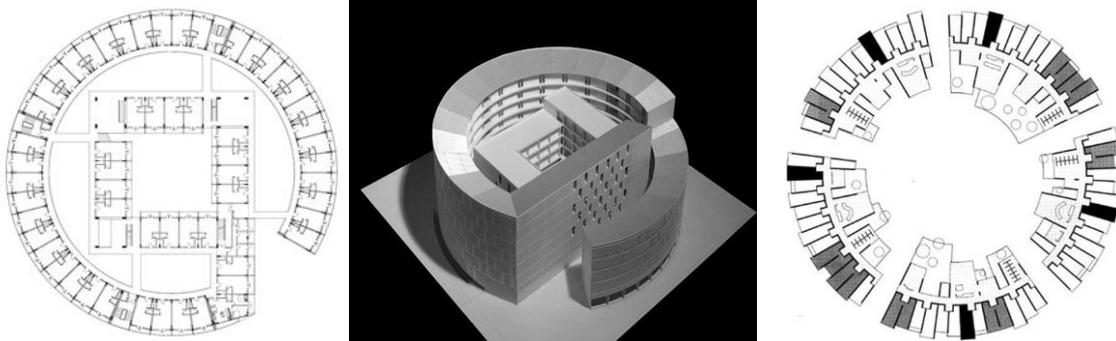


Source: Survey drawings by Jens Aaberg-Jorgensen. Fig. 3, www.chinadwelling.dk/images/jpg/chengqilou-3rd-floor-w.jpg, Fig.4, socks-studio.com/img/blog/hakka-tulou-05.jpg

Contemporary architecture

Modern concepts are constantly exploring urban planning ideas of the days gone by. They enforce the establishment of communities in today's cramped cities. One of these is the concept of a residential estate with a circular layout of houses, reminiscent of the tulou. Such a complex was built in 2008 in China. The Tulou Collective Housing, is a complex of affordable housing coined by URBANUS Architecture & Design Inc. as well as architects Xiaodu Liu and Yan Meng, located in Guangzhou, Guangdong province. In 2010 this project won the Aga Khan Award²⁶.

**Figure 5, 6. Tulou Collective Housing, Guangzhou, 2008, plan of the 4th storey, URBANUS Architecture & Design Inc., arch. Xiaodu Liu and Yan Meng
Fig 7. Copenhagen, Tietgenkollegiet, halls of residence, Lundgaard & Tranberg Architects, 2006**



Source: Fig. 5 archnet.org/system/publications/contents/2028/medium/FLS2402.png?1384756545, Fig.6 https://encrypted-tbn1.gstatic.com/images?q=tbn:ANd9GcS4PFkKR-Eo8gcgD5hbpp2Wa-sV7MRomldwopOVy_Z11l4vPXIW, Fig 7 www.arcspace.com/CropUp/-/media/736040/Tietgen-Dormitory-Lundgaard-Tranberg-plan.jpg

²³ Knapp R. G., *China's Old Dwellings*, University Hawaii Press 2000, p. 259-296.

²⁴ Knapp R. G., *ibidem*, p. 261.

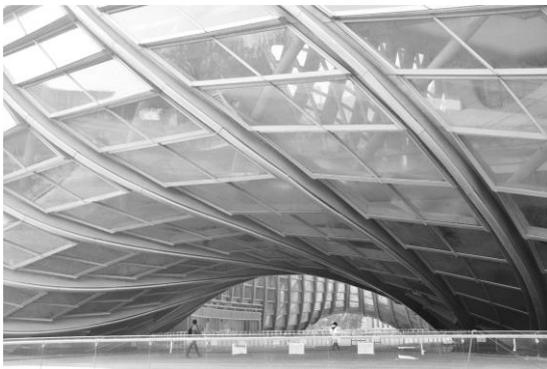
²⁵ Survey drawings by Jens Aaberg-Jorgensen.

²⁶ <http://www.akdn.org/architecture/project.asp?id=3860>

The outer ring of the contemporary *tulou* is made out of a seven storey circular block, with a four storey apartment block in its centre. Both structures are linked by footbridges at different levels with the roof of the lowest building a terrace for all residents. The ground and first floors contain commercial units accessible from passageways and ground floor courtyards. Amongst others, establishing a residential community means the apartments are available only for those who do not have a car and as a rule will spend more of their time in the vicinity of their homes. This experimental estate originally invokes *tulou* housing tradition in its most interesting form.

Slightly earlier, in 2001, a university halls of residence was created in Copenhagen, with a shape similar to the Chinese *tulou*. This concept unambiguously points to an integration of the student body as a *leitmotiv* of the established architecture.

Figure 7, 8. Phoenix International Media Center, Beijing, design: BIAD, 2014



Source: author

Figure 9, 10. Aldar headquarters, Abu Dhabi , United Arab Emirates, MZ Architects, 2010



Source: Karolina Sobczyńska

Over the last decades, it wasn't only the pro-social factors which affected the use of central solutions. New aesthetic experiences, which today millions of people are part of and which entail air travel and use of a Google Map type applications. In such a situation, an urban planning layout, with a defined, recognisable shape is not only a source of information about the location of a building, but also a source of aesthetic experiences.

For Mario Botta a cylindrical form became an element of, or a whole volume from the eighties of the 20th century²⁷. Also many large volume structures recently built in world capital cities rely on circular forms, which today are considered to be particularly attractive and outstanding. Here one may mention Phoenix TV HQ (the form shaped as Mobius Strip) and The National Centre for Performing Arts in Beijing, the Aldar Tower in Abu Dhabi (The Arab Emirates), Apple's Campus 2 designed by Norman Foster in Cupertino, California, now under construction...

Figure 11, 12. The National Centre for the Performing Arts, arch. Paul Andreu, 2007



Source: author

Final remarks

As is evident from the examples of the discussed urban complexes and multifunctional structures, the ring and circle were and are a form present in urban planning and architecture. They were and are being used for a plethora of reasons:

- functional, such as defence, communication, hygiene, insolation
- structural: ease of marking out a circle and providing even layout of structure and distribution of loads
- social
- aesthetic and prestige
- emotional

The table below shows a shift in the motives for using round forms from practical inspirations towards the spiritual side: emotions and aesthetic needs. In times when technical problems were solved with adequate financing or effort, circular forms became a status symbol of the owner - different in subsequent historical periods.

²⁷ Bonenberg W., *Architektura ostatnich dziesięcioleci XX wieku*, Stowarzyszenie Psychologia i Architektura, Poznań, 2001, p.81-83.

Table 2. The reasons for using round form in architecture and urban planning in selected urban and architectural solutions

	URBAN AND ARCHITECTURAL STRUCTURES	WORSHIP	EMOTIONS	AESTHETICS	FUNCTION	STRUCTURE
URBAN PLANNING	Early "temples" of the forces of nature	■	■		■	
	Medieval city in Europe				■	■
	Mediaeval fortified villages (Romania)				■	■
	Medieval villages, roundlings (Poland)				■	■
	Renaissance town, theoretical plans			■	■	■
	Representative building complexes		■	■	■	
	Modern city development models		■	■	■	
ARCHITECTURE	Burial sites, tombs of early cultures	■	■	■		■
	Pre-Christian temples	■	■		■	
	Martyria, commemorative buildings	■	■	■	■	
	Christian / Buddhist / Taoist temples	■	■	■	■	
	Palaces of Baroque and later periods		■	■	■	
	Chinese Tulou				■	■
	Contemporary municipal and HQ buildings		■	■		

Source: author

Looking at the time axis, a change from safe, technically simple solutions provided by circular forms towards aesthetically pleasing and socially beneficial is visible. In the past these forms were the result of objectively present threats and objective needs. Today they are first and foremost the manifestations of technical capabilities and further the prestige of owners and users.

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