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City Planning: Aztec City Planning

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The Aztecs were the most urbanized of the ancient civilizations of Mesoamerica. The last in a long line of urban societies, they selected principles of city planning from an ancient Mesoamerican heritage and adapted these to their needs. Most Aztec urban centers were modest settlements best called towns, but the central capital Tenochtitlan was a huge metropolis of a different order.

Most Aztec towns were founded between AD 1100 and 1350 when the Aztec peoples immigrated into the central Mexican highlands. They established new settlements and dynasties leading to a system of autonomous city-states. The construction of a royal palace marked the official founding of a new city or town, most of them city-state capitals. In 1430, three Aztec peoples – the Mexica, Acolhua, and Tepanecs – formed a tributary empire, known as the Triple Alliance or the Aztec Empire. Two of their capitals, Tenochtitlan (Mexica) and Texcoco (Acolhua), became the preeminent cities of the Valley of Mexico. By the time Spanish conquerors arrived in 1519 this empire had conquered much of Mesoamerica, and Tenochtitlan had grown into a city of 200,000.

One of the remarkable features of Aztec urban planning is the extent to which basic buildings and

City Planning: Aztec City Planning. Table 1 Historical sources of planning principles employed in Aztec cities

Principles of Urban Planning	Aztec Towns	Tenochtitlan
<i>Ancient Mesoamerican Planning Principles:</i>		
1. Inventory of public architecture	x	x
2. Urban epicenter	x	x
3. Central public plaza	x	
4. Astronomical orientations	x	x
5. Unplanned residential zones	x	
<i>Teotihuacan Innovations:</i>		
6. Huge size of the city		x
7. Massive scale of main temples		x
8. Orthogonal planning of entire city		x
9. Layout dominated by central avenue		
10. Lack of central public plaza		x
11. Standardized housing		x?
<i>Tula Innovations:</i>		
12. Formalization of the epicenter	x	x
13. The largest temple on the east side	x	x
14. Circular Quetzalcoatl temples	x	x
<i>Aztec Innovations:</i>		
15. Twin-temple pyramids	x	x
16. Multiple small altars	x	x
17. Walled ceremonial precinct		x

planning principles were standardized among cities throughout central Mexico. This standardization long preceded the formation and expansion of the Aztec empire, and its explanation probably lies in the common cultural origins of the Aztec peoples, coupled with processes of interaction that kept the rulers and nobility of the Aztec city-states in constant contact with one another. This uniformity in urban planning contrasts strongly with other Mesoamerican cultures, such as the Classic Maya, the Olmec, or the Zapotec, whose individual cities show far greater variation in architecture and urban layout.

Historical Development of Planning Principles

The Aztecs drew upon several ancient historical traditions to select principles of urban planning for their cities and towns. Not surprisingly, the two major Aztec urban types – city-state capitals and Tenochtitlan – had somewhat different historical legacies. In this section I outline 17 principles of urban planning employed in central Mexico, grouped into four historical categories based upon their historical origins: ancient Mesoamerican principles, Teotihuacan innovations, Tula innovations, and Aztec innovations. Table 1 lists these principles and their use in Aztec towns and in Tenochtitlan.

Ancient Mesoamerican Principles of Urban Planning

The Aztecs drew on ancient Mesoamerican principles of urban planning in the design of their cities. Five such principles can be identified for the pre-Aztec cities of

Mesoamerica, including those of the Classic Maya lowlands, Oaxaca, and other regions (for Mesoamerican architecture and cities, see Hardoy 1968).

1. *The Inventory of Public Architecture.* A basic set of public buildings was used in most ancient Mesoamerican urban centers: large temple-pyramids, smaller temples, royal palaces, ballcourts, and a suite of less-common special purpose buildings that included council halls, sweatbaths, schools, and other structures.
2. *The Urban Epicenter.* Public architecture in Mesoamerican cities tended to be concentrated spatially in a central zone, called the urban epicenter. The locations and orientations of individual buildings often suggest coordination and planning, although strict formal patterns, such as orthogonal layouts, were rare.
3. *The Central Public Plaza.* The basic unit of urban planning was the public plaza, an open rectangular space whose sides were taken up with public buildings. Large cities with multiple concentrations of public buildings often had multiple public plazas of different sizes.
4. *Astronomical Orientations of Buildings.* The ancient Mesoamerican peoples were accomplished astronomers, and key public buildings were often aligned with significant astronomical phenomena, such as the direction of sunrise on the solstice. There is a general tendency for urban epicenters to be aligned roughly to the cardinal directions (most

typically several degrees east of north), a pattern that may also have derived from astronomical considerations (Aveni 2001).

5. *Unplanned Residential Zones.* Most urban housing was located outside of the urban epicenter. Individual houses typically show little or no evidence that their locations, forms or orientations were coordinated or planned by central authorities.

Teotihuacan Innovations

With a population of around 150,000 inhabitants, the huge metropolis Teotihuacan was the largest city in Mesoamerica (and one of the largest anywhere in the world) during the Classic period (ca. AD 150–650). Teotihuacan dominated central Mexico politically, and its economic and cultural influence extended to all corners of Mesoamerica. In its form and size, Teotihuacan was utterly unique in Mesoamerica, and only the later Aztec imperial capital Tenochtitlan can be said to resemble Teotihuacan at all (Cowgill 1997; Millon 1992). Six innovations in urban planning can be identified at Teotihuacan.

6. *The Huge Size of the City.* With an extent of over 20 km² and its huge population, Teotihuacan was a city of a different scale from anything seen previously in Mesoamerica (Fig. 1).
7. *Massive Scale of the Main Temples.* Although not the tallest pyramids in ancient Mesoamerica, Teotihuacan's "Pyramid of the Sun" and "Pyramid of the Moon" are among the most massive in volume.
8. *Orthogonal Planning of the Entire City.* The principle of orthogonal city planning was quite rare in ancient Mesoamerica, found only at Teotihuacan, Tenochtitlan, and perhaps Tula. Teotihuacan is remarkable for the consistency of orientation of its buildings.

9. *Layout Dominated by a Central Avenue.* The so-called "Street of the Dead" is a central avenue several km in length that forms the central axis for the layout of Teotihuacan (Fig. 1). This use of a dominant central avenue is not found elsewhere in Mesoamerica.

10. *Lack of a Central Public Plaza.* There is a moderately sized open plaza at the north end of the Street of the Dead, but this plaza differs from typical Mesoamerican central public plazas in several key respects: it is small in relation to the size of the city; only a few of the central public buildings are adjacent to the plaza; and it is not centrally located within the city. Instead, the Street of the Dead at Teotihuacan can be considered a functional analogue of the Mesoamerican central public plaza in terms of urban layout and planning. The major public buildings were arranged along this feature, which gave form to the entire plan of the city.

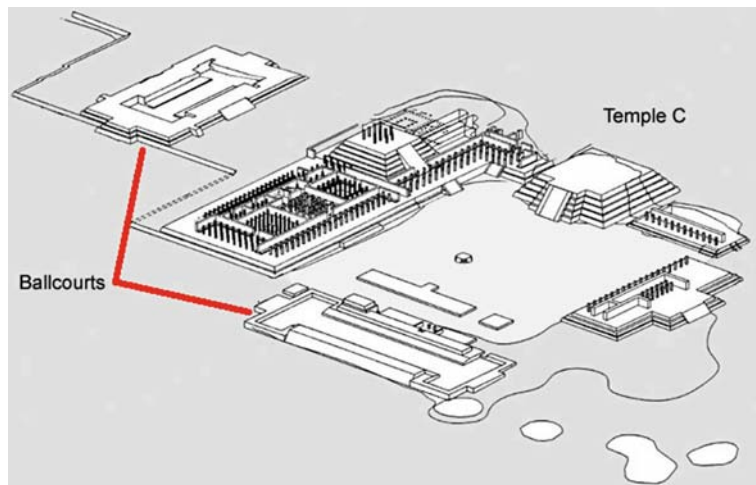
11. *Standardized Housing.* One of the most remarkable urban features of Teotihuacan was the highly standardized form of commoner housing, the apartment compound. There were more than 2,000 apartment compounds in the city, all aligned to its orthogonal grid.

Tula Innovations

Tula, the next large political capital in central Mexico after Teotihuacan, drew on the layout of Teotihuacan for inspiration in urban planning. Although the rulers of Tula returned to the older Mesoamerican pattern of urban layout around a large public plaza, they employed several of the Teotihuacan innovations (nos. 6, 7, and perhaps 8). Although not as large as Teotihuacan, Tula was much larger than its central Mexican contemporaries, and one of the largest cities in



City Planning: Aztec City Planning. Fig. 1 The "Street of the Dead" at Teotihuacan. Photograph by Michael E. Smith.



City Planning: Aztec City Planning. Fig. 2 Reconstruction of the epicenter of Tula. Modified after Mastache et al. (2002: 90).

Mesoamerica during the Epiclassic and Early Postclassic periods, ca. AD 800–1200 (Mastache et al. 2002). Three urban planning innovations can be identified for Tula.

12. *Formalization of the Epicenter.* The public plaza at Tula established an orientation that was used for all of the buildings in the urban epicenter (Fig. 2). This shows a higher level of coordination and formalization than was typical of other Mesoamerican urban epicenters. The Aztecs later adopted this principle for their urban epicenters.
13. *The Largest Temple on the East Side of the Plaza.* At Tula, the largest pyramid, Temple C, is located on the east side of the central public plaza, a pattern also used by the Aztecs.
14. *Circular Quetzalcoatl Temples.* The cult of Quetzalcoatl, the feathered serpent, spread throughout Mesoamerica in the Epiclassic and Early Postclassic periods. In Postclassic times, circular temples were dedicated to Quetzalcoatl's avatar, the wind god Ehecatl (Pollock 1936). At Tula, a circular temple was built at the El Corral locality, a concentration of public architecture outside of the main urban epicenter.

Aztec Innovations

The rulers of Aztec city-states drew primarily upon general Mesoamerican planning principles and Toltec innovations when they laid out their towns. The rulers of Tenochtitlan, on the other hand, emphasized these principles to a lesser extent, preferring planning principles from Teotihuacan. Three innovations can be identified for Aztec cities.

15. *Twin-Temple Pyramids.* Several of the earliest Aztec cities (e.g., Tenayuca and Teopanzolco) used



City Planning: Aztec City Planning. Fig. 3 Aztec twin-temple pyramid at Teopanzolco. Photograph by Michael E. Smith.

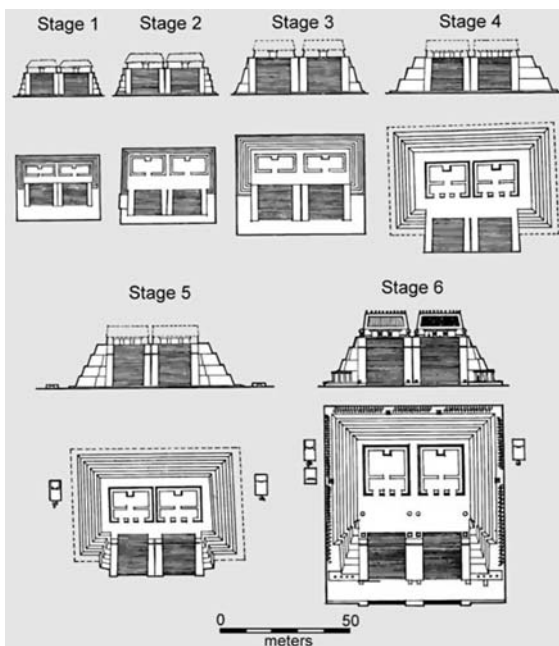
a new form of pyramid with two temples on top and two stairways (Fig. 3). By the Late Aztec period, this form had fallen out of fashion except at the central temples of Tenochtitlan and Tlatelolco.

16. *Multiple Small Altars.* One of the notable attributes of Aztec cities is the prevalence of small platforms or altars throughout the urban epicenter (Fig. 4). These were often located within the public plazas, and some altars were adjacent to large pyramids.
17. *Walled Ceremonial Precinct.* The central religious architecture at Tenochtitlan was concentrated within a walled compound called the "Sacred Precinct". Although some authors have suggested that this was a regular feature of Aztec cities, Tenochtitlan is in fact the only example with a well-documented walled precinct.

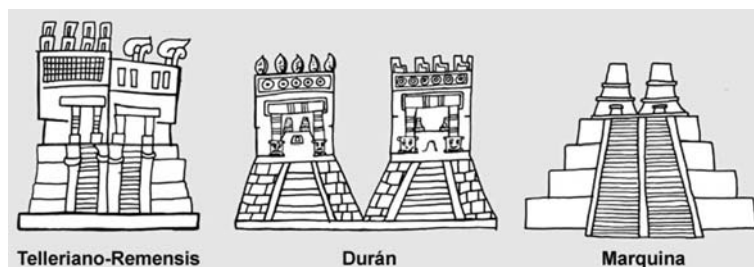
These seventeen principles are listed in Table 1.



City Planning: Aztec City Planning. Fig. 4 Row of small altars at Teopanzolco. Photograph by Michael E. Smith.



City Planning: Aztec City Planning. Fig. 5 Construction stages of the twin-temple pyramid at Tenayuca. From Smith (*The Aztecs* 2003: Fig. 2.8); based upon (Marquina 1951: 169).



City Planning: Aztec City Planning. Fig. 6 Native drawings of the Templo Mayor of Tenochtitlan. From Smith (“A Quarter-Century of Aztec Studies” 2003).

Urban Architecture

In addition to their use of ancient Mesoamerican traditions of urban planning, the Aztecs also made use of Mesoamerican patterns of monumental architecture. The basic religious structures were temple-pyramids, typically rebuilt and expanded by successive kings. When archaeologists excavate into a Mesoamerican pyramid, they typically find the buried remains of one or more earlier construction stages (Fig. 5). This continual rebuilding of temples in the same location was related to notions of sacred space and the importance of continuity with the past. In addition to temple-pyramids, the Aztecs also used the basic Mesoamerican architectural inventory of palaces, ballcourts, altars, and commoner houses.

Twin-Temple Pyramids

This innovative form of temple-pyramid is found at only five Aztec cities. Two of the major political capitals of the Early Aztec period – Tenayuca and Teopanzolco – employed large twin-temple pyramids for their central state temples (Fig. 3). Excavation of the Tenayuca pyramid revealed a series of enlargements and expansions (Fig. 5), all employing the double temple design. By the Late Aztec period, this style had fallen out of fashion at most Aztec cities, whose main pyramids had only a single temple. But the Mexica peoples at the twin cities of Tenochtitlan and Tlatelolco revived this form for their central pyramids. At the well-known Templo Mayor of Tenochtitlan, the temples were dedicated to Tlaloc (an ancient central Mexican fertility god) and Huitzilopochtli (patron god of the Mexica with associations of warfare and sacrifice). This structure is known both from excavations (Matos Moctezuma 1988) and from pictorial sources (Fig. 6).

Single-Temple Pyramids

The single-temple pyramid was the standard form of temple throughout most of Mesoamerican history. The extent of its use during the Early Aztec period is hard to judge, but by Late Aztec times this form dominated Aztec cities, serving as both their central temples and as subsidiary temples (Fig. 7).

Circular Pyramids

Many Aztec cities and towns had circular pyramids dedicated to the wind god, Ehecatl (Fig. 8). These temples were rarely if ever located in central positions in Aztec cities. In some cases (e.g., Tlatelolco and Tenochtitlan) these temples were located within the urban epicenter but somewhat apart from the central twin-temple pyramid (Guilliem Arroyo 1999). In other cases (e.g., Huexotla, Zultepec, and perhaps Calixtlahuaca) the circular temples were located far from the urban epicenter, as at the earlier city of Tula.

Ballcourts

Only a few Aztec ballcourts have been located, but given the prominence of ballcourts and the ballgame in Aztec codices (Nicholson and Quiñones Keber 1991) (Fig. 9), it is likely that these features were integral parts of most city layouts. The restored ballcourt at Coatetelco (Fig. 10) is probably typical of Aztec ballcourts; see also Matos Moctezuma (2001). The



City Planning: Aztec City Planning. Fig. 7 Small single-temple pyramid at Calixtlahuaca. Photograph by Michael E. Smith.



City Planning: Aztec City Planning. Fig. 8 Circular temple at Tlatelolco. Photograph by Michael E. Smith.

Aztecs played a version of the Mesoamerican ballgame, a public performance using a rubber ball that combined sport, ritual, and politics in poorly understood ways.

Palaces

Aztec palaces, unlike those of the Classic Maya, were highly standardized in layout. They contained a central courtyard with a single entrance. The courtyard was enclosed by raised platforms, on top of which were arranged a series of rooms, halls, altars, and other features (Figs. 11 and 12). This standard plan was followed for a whole range of palaces, from the sumptuous royal palaces of Tenochtitlan and Texcoco to the modest residences of provincial nobles (Smith *The Aztecs* 2003: 139–146; Evans 1991).

Special-Purpose Buildings

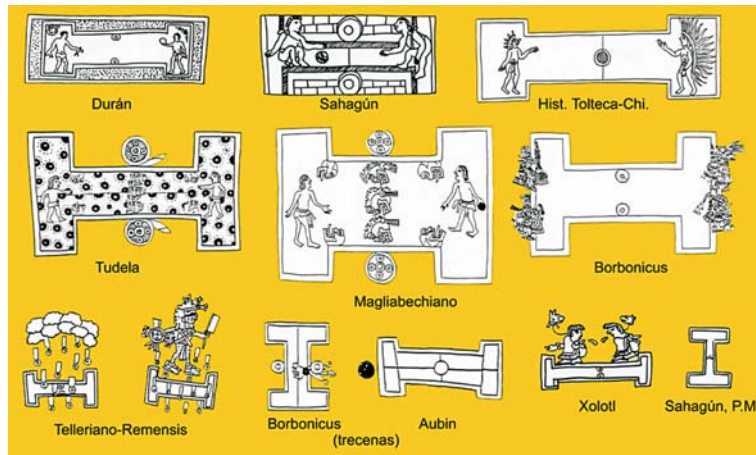
A variety of specialized buildings are known from archaeology and documentary sources. Written sources mention two types of schools, but none have been excavated. Special buildings for elite warriors have been excavated adjacent to the Templo Mayor of Tenochtitlan and in a rock-cut chamber at the hilltop ceremonial precinct of Malinalco (Fig. 13).

Altars and Small Platforms

Among the more intriguing and poorly understood features of Aztec cities are small altars and platforms that typically occur in multiple groups (Fig. 4). There were evidently numerous categories of such altars, dedicated to diverse deities and with a variety of uses in ritual and performance. Two specific functional types have been identified so far: platforms that supported skull racks (for the display of the skulls of sacrificial victims), and altars dedicated to the curing principles of the *tzitzimime* deities (Fig. 14) (Klein 2000). The Aztecs even journeyed to Tula to build a small altar in front of Temple C, perhaps symbolically to convert the ancient structure into an Aztec temple.

Commoner Housing

Two patterns of commoner housing have been identified at Aztec cities. At Tenochtitlan and other cities in the Valley of Mexico, house compounds enclosed by low walls was the norm (Evans 1988; Calnek 1974). These compounds contained a number of structures and rooms arranged around an open work area (Fig. 15). In the provinces, in contrast, commoners lived in individual adobe houses (Smith et al. 1999). Although often arranged into groups around a central patio, these house groups were never enclosed with walls (Fig. 16). Commoner housing exhibited considerably more variation within and between cities than was found in the palaces of the nobility.



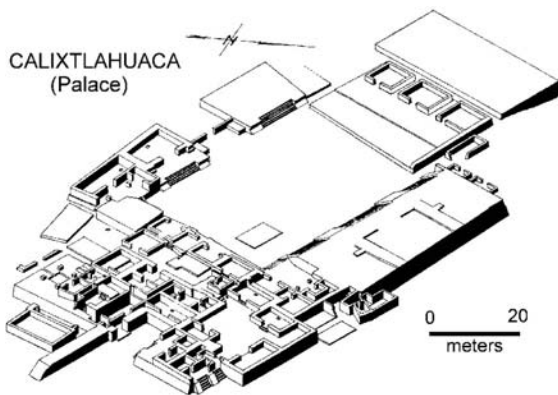
City Planning: Aztec City Planning. Fig. 9 Depictions of ballcourts in the Aztec codices. Modified after Nicholson and Quiñones Keber (1991).



City Planning: Aztec City Planning. Fig. 10 Ballcourt at Coatetelco. Photograph by Michael E. Smith.



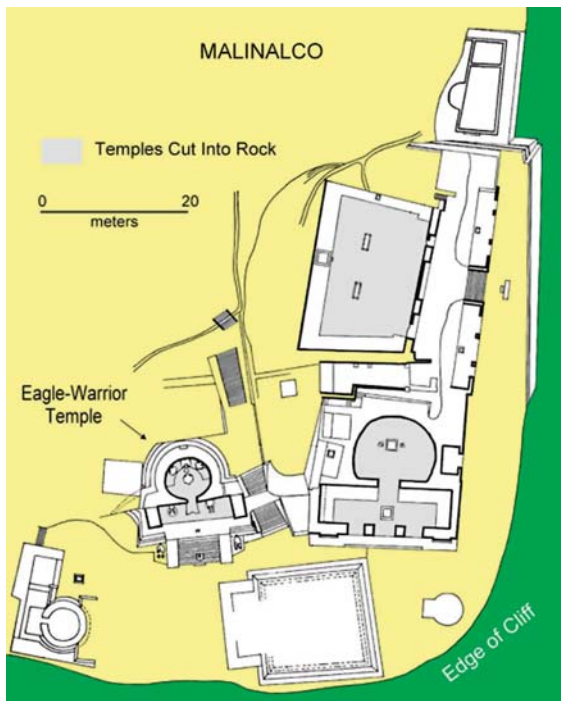
City Planning: Aztec City Planning. Fig. 12 Rooms in the royal palace of Yautepec. Photograph by Michael E. Smith.



City Planning: Aztec City Planning. Fig. 11 Reconstruction of the palace at Calixtlahuaca. Modified after (Smith *The Aztecs* 2003: Fig. 8.7); based originally upon (García Payón 1981: Fig. 8).

Categories of City City-State Capitals

As noted above, the designers of Aztec cities and towns drew upon the principle of the formalized urban epicenter as articulated at the ancient city of Tula (Fig. 17). The city of Coatetelco in Morelos (Arana Alvarez 1984) illustrates this pattern (Fig. 18). The central pyramid lies on the east side of the plaza (as at Tula), with the ballcourt opposite. Five small altars or platforms, attached to the exterior wall of the ballcourt, extend into the plaza. The buildings on the north and south sides of the plaza were only partially excavated and their functions are not known. The formal, planned central plazas of Aztec towns are clear even in the overgrown mounds at unexcavated urban sites such as Coatlan Viejo (Fig. 19). Although it is possible that the planned layout of the epicenters and their consistent orientations just east of north related to cosmological principles, there is no concrete evidence to support this interpretation.



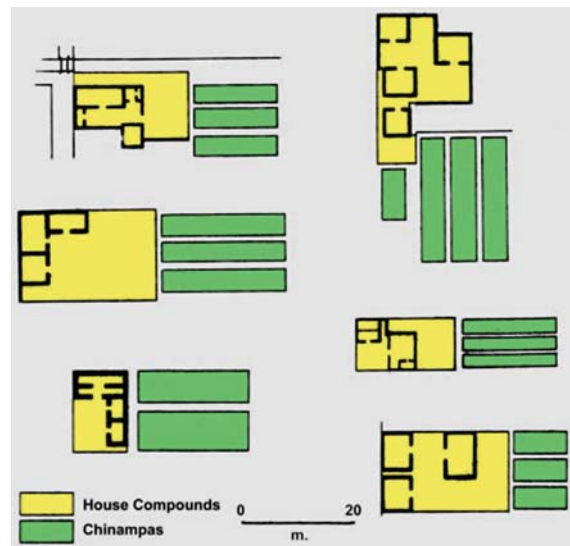
City Planning: Aztec City Planning. Fig. 13 Map of the hilltop ceremonial zone of Malinalco. From Smith (*The Aztecs* 2003: Fig. 7.5); based originally upon Marquina (1951).



City Planning: Aztec City Planning. Fig. 14 Altar decorated with carvings of human skulls at Tenayuca used to worship the *tzitzimime* deities. Photograph by Michael E. Smith.

Outside of the epicenter, the residential zones of Aztec towns exhibited little evidence for planning or coordination. Although only one Aztec town – Cuexcomate – has been mapped in its entirety (Fig. 17, top), residential excavations in other cities and towns are consistent with this interpretation of unplanned residential areas (Smith et al. 1999).

A related type of settlement was the hilltop ceremonial zone, found in a number of Aztec city-states. The rituals carried out at these locations were typically political ceremonies linked to both agricultural fertility and the religious legitimation of kings and dynasties. The best known examples are Cerro Tlaloc in the



City Planning: Aztec City Planning. Fig. 15 Commoner houses with *chinampa* (agricultural) fields. Modified after Calnek (1972: 112).



City Planning: Aztec City Planning. Fig. 16 Commoner houses excavated by the author at Yautepec. Photograph by Michael E. Smith.

Valley of Mexico, Malinalco in the State of Mexico (Fig. 13), and Tepozteco in Morelos.

Tenochtitlan

When the Mexica peoples constructed Tenochtitlan on an island in Lake Texcoco in the early fourteenth century (the official date for the founding of the city is AD 1325), they drew more inspiration from Teotihuacan and Tula than from the standard Aztec urban plan already established at many towns in central Mexico (Table 1). The use of orthogonal planning is one of the remarkable features of the imperial capital (Fig. 20). Although few explicit articulations of urban planning concepts have survived, three factors were most likely responsible for creating the form of Tenochtitlan: the

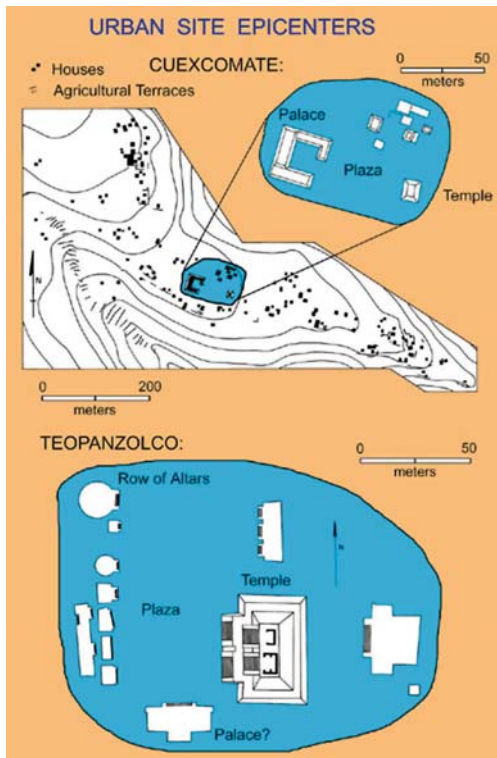
city's island location, imperial ideology, and cosmological principles. Most of Tenochtitlan's 13.5 km² were reclaimed from Lake Texcoco. Spanish observers were struck by the great number of canals in the city, which they likened to Venice. The canals were used as transportation arteries and for agricultural purposes. Raised fields or *chinampas*, an extremely productive

method of farming, were built to cultivate reclaimed swampy land in the outer neighborhoods of the city (Calnek 1972). Families living on their individual small plots worked these fields (Fig. 15). As the city expanded, many of these rectilinear *chinampas* were converted into dry land, contributing to the orthogonal plan of the city.

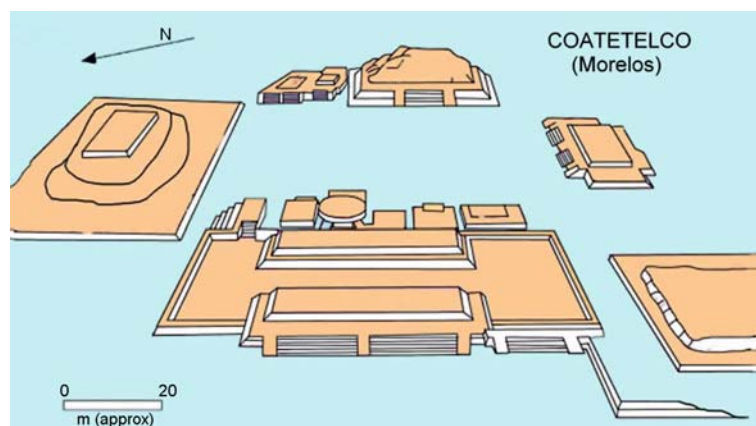
Tenochtitlan's orthogonal layout is seen in the major avenues radiating out from a central ceremonial precinct in the cardinal directions (Fig. 20). The avenues divided Tenochtitlan into four quarters, each with its own smaller ceremonial precinct. Outside of the *chinampa* areas, houses were packed tightly together. The city of Tlatelolco, with its own impressive epicenter (Fig. 8), was originally a separate town but was later incorporated into Tenochtitlan (González Rul 1998). By drawing on the orthogonal layout of Teotihuacan (Fig. 1), the Mexican rulers proclaimed Tenochtitlan's continuity with the past and its legitimacy as the imperial capital of central Mexico (Umberger 1987).

Cosmological principles also contributed to the form and layout of the capital. The largest structure, the Templo Mayor (Fig. 6), was viewed as the symbolic center of the Aztec empire (Carrasco 1999; López Luján 1994), and it was the setting for elaborate state ceremonies including human sacrifices. The Templo Mayor was built in alignment with sunrise on a key holy day (Aveni 2001), and the entire layout of Tenochtitlan can be viewed as an extension of the sacred orientation of the central temple.

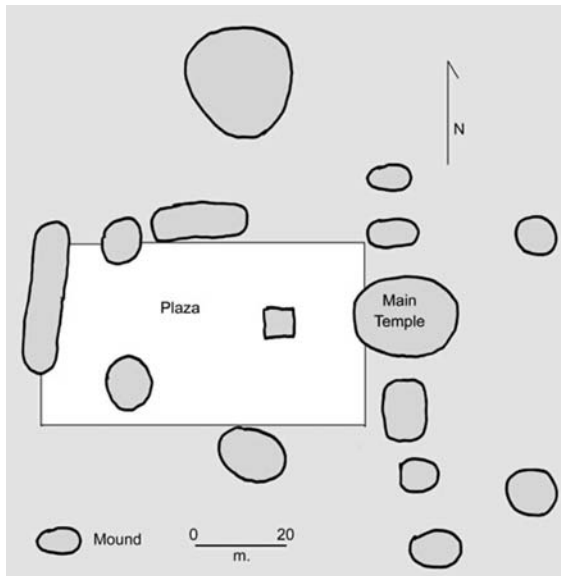
In sum, the planners who laid out Tenochtitlan made radical breaks with past Aztec (and Mesoamerican) norms in two ways. First, they filled the central plaza with buildings. In place of an open plaza is the sacred precinct, a large walled compound packed with temple-pyramids, altars, priests' residences, and other sacred buildings (Fig. 21). The palaces of the Mexica kings



City Planning: Aztec City Planning. Fig. 17 Definitions of urban epicenters of Cuexcomate and Teopanzolco. Modified after Smith (2004: Fig. 2).



City Planning: Aztec City Planning. Fig. 18 Reconstruction of the plaza at Coatetelco. Modified after Smith (*The Aztecs* 2003: Fig. 8.2); based originally upon Konieczna Z. (1992).



City Planning: Aztec City Planning. Fig. 19 Map of the epicenter of Coatlan Viejo, an unexcavated city-state capital in Morelos. Modified after Mason (1980: 53).

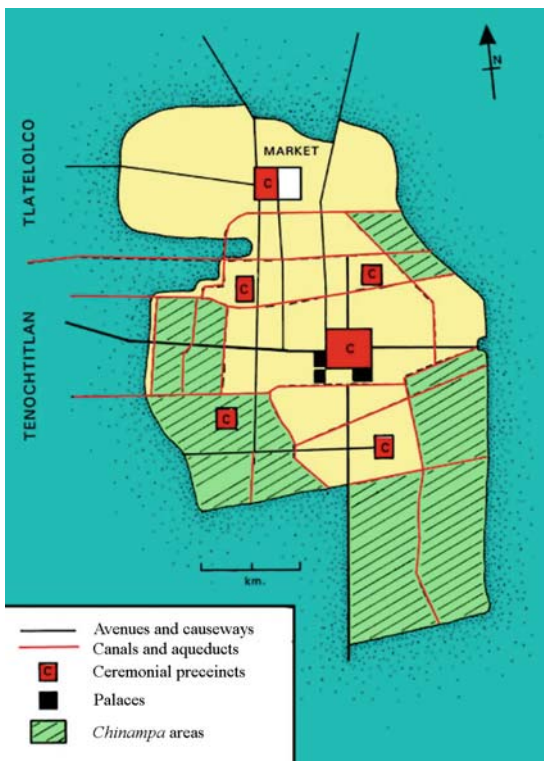


City Planning: Aztec City Planning. Fig. 21 The walled "Sacred Precinct" at Tenochtitlan. After Marquina (1951: lámina 55).

were arranged around the outer walls of the precinct. The sacred precinct occupies the place of the public plaza in other Aztec (and Mesoamerican) cities. Second, the imposition of a common grid over the entire city was a radical practice that expressed the power of the rulers to shape their city and differentiate it from other Aztec cities. The orthogonal layout also exemplified continuity with Teotihuacan and resonated with ancient Mesoamerican cosmological principles of the importance of the cardinal directions.

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City Planning: Aztec City Planning. Fig. 20 Map of Tenochtitlan. From (Smith *The Aztecs* 2003: Fig. 8.8); based originally upon (Calnek 1972: 108).

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City Planning: Inca City Planning

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Although the Incas were not great city builders, they redesigned their capital, Cuzco, on a grand scale, and founded numerous new settlements. Ollantaytambo is one such new town. Because it has what “may be the oldest continuously occupied dwellings in South America” (Kubler 1975), and because many parts of the town are well preserved, it would seem the perfect object for the study of the town planning principles of the Incas.

Ollantaytambo is located about 90 km to the northwest of Cuzco at the confluence of the Urubamba and the Patakancha rivers. It is built on a narrow, gently sloping bench of artificially leveled ground squeezed in between Cerro Pinkuylluna to the east and the Patakancha river to the west. It is carefully sited so as not to occupy prime agricultural land, yet to provide easy access to the terraced fields to the north and the south. The glacier-fed Patakancha provides an ample water supply for both agricultural and domestic uses. Tucked in between the high mountains at the mouth of the Patakancha valley, the town is well protected from the fierce afternoon winds which often sweep through the broader Urubamba valley.

The town was laid out on a regular grid, trapezoidal in shape, of four longitudinal and seven transversal streets. The transverse streets, oriented at 110.5° east of magnetic north, are perfectly parallel to each other, suggesting that the Inca were knowledgeable about geometry, and that they had a method of surveying to lay out the streets.

In the time of the Incas, there was a large plaza in the middle of the town. On its north and south sides it was bordered by great halls, long buildings with many openings toward the plaza. If what Garcilaso de la Vega tells us about Cuzco holds for Ollantaytambo, then the plaza was the theater for ceremonies and festivities, and the great halls were the place where the revelers withdrew to pursue their activities on rainy days (Garcilaso de la Vega lib. VII, cap. X; 1976: II,108).

The fifth transverse street manifestly divided Ollantaytambo into two parts with distinct architectural features: the street facing walls in the southern half of town were built of cut and fitted stones, whereas in the northern half they were built of unworked field stones. The blocks in the southern half show a rigorously repetitive block design of two walled-in habitation compounds, called *kancha*, arranged back to back, that is not reflected in the northern half. Cobo stated: