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Architecture ‘in the round’. Water-towers in the New-Towns of the Pontine Plain.

Abstract
In the convergence between Fascist ideology and rural modernisation, the exploitation of water resources for landscape change empowered planning as a key to achieve a new settlement pattern and hierarchy. In the outskirts of Rome, the Pontine Marshes underwent major infrastructural and technical transformations which prompted large-scale experimentation. In this process, some “hybrid buildings” came to the fore. Hovering between engineering and architecture, they enshrined utilitarian and symbolic meanings in the new townscapes. This is precisely the case of water towers which, in the Pontine area, stood both as technical buildings and figurative landmarks.

Keywords
Technical landscape — Water towers — Pontine Plain

So, it is evident that all those subjects that we have excluded from architecture proper – bridges, obelisks, fountains, triumphal arches, clusters of trees, etc. – actually are all part of urban spaces. Facades in particular come all into play in the formation of urban spaces (Zevi 1948, p. 28) (Transl. by author).

Referring to Portugal, the historian Tiago Saraiva (2009) emphasises the convergence between internal colonisation schemes and the frontier. According to him, the policies aiming to modernise the rural landscapes and extend the cultivated lands accelerated the synergies between engineering, technology, planning and architectural experimentation within the nation-states.
Frontiers between untamed nature and the man-made environment were a common feature of several European countries in the early 20th century, yet these frontiers were imaginary constructions, especially in the political narratives of totalitarian regimes, where technological innovations supported the creation of new settlements, also underpinning the representation of an emerging society.
When we think about the frontier, the image of rarefied landscapes often comes to mind: roads covering great distances, orderly settlements alternating with isolated buildings.
The long-standing European colonial experience imparted into the general culture the need for seizing the frontier through the construction of new towns, qualifying them as embryos of a new social order (Nicolini 2006). Geometry, abstraction and grids indifferent to topography (Culotta et alii 2007) dictated urban and territorial settlement schemes as an attempt to match the newly established ideal society.
A possible common denominator between colonial ventures and 20th-cen-

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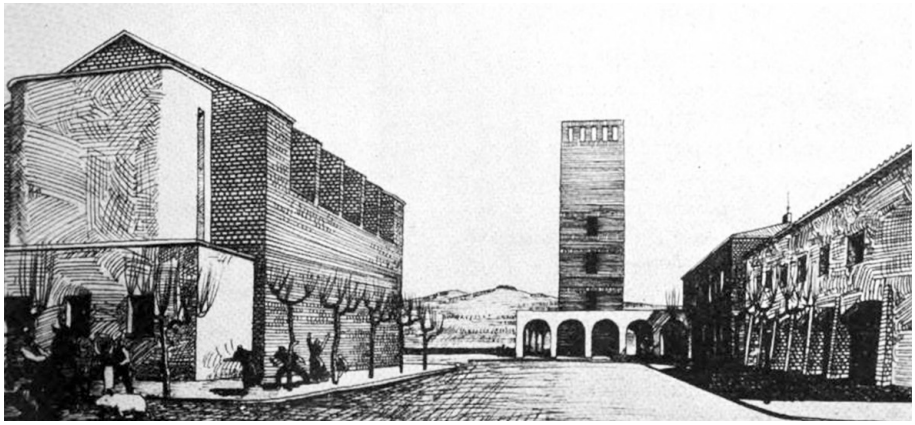

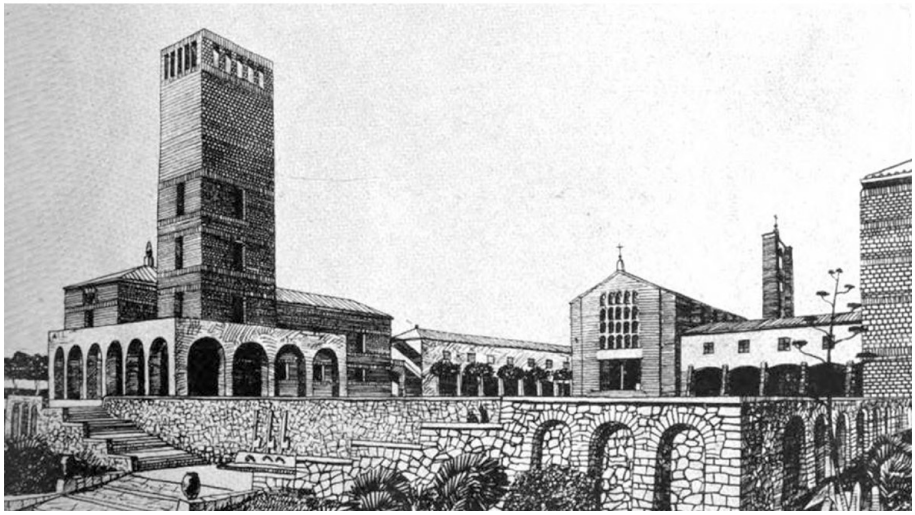

Fig. 1
Pomezia Master Plan by Petrucci Tufarolli, Paolini, Silenzi, (from L'Ingegnere 1938).

tury inner colonisation schemes lies in the presence of a military matrix aimed at controlling the territory, allied to a figurative abstraction of the urban layout. Farmhouses, farms, stables, warehouses and sheds thus became the object of constructive experimentation, setting the ground for repetition and typological inflections.

A technical landscape in the making

It is no surprise that the military metaphor recurred so often in the Fascist propaganda[1] (Mussolini 1932, p. 3) about the hydraulic reclamation of the Pontine Marshes. Taming the marshes – dubbed 'branch of hell' (Savinio 1936) – was like a warfare, entailing recruitment of workers from afar, great manoeuvres of machinery, and daily duties to advance through the swamp (Cencelli 1935, p. 162). The logistics of reclamation resulted in a network of roads, electrified lines, canals and water machines superimposed to the former marshes, featuring altogether what can be defined as technical landscape (Selvafolta 2001).

The importance of this frontier was such that, before reclamation (Armiero et alii 2021), the marshy and wooded areas of the Pontine Plain resulted as uncharted; when the newly built roads reconnected Rome to the plain, the Fascist party advertised it as a restitution of a piece of motherland which materialised into a new Cartesian network of roads and canals hinged onto the ancient Appian Way.

Roads, canals and windbreaks were all elements of this technical landscape that integrated natural elements and artificial networks, meant to make the plain productive and settle the local rural population erasing all traces of pastoralism. To curb massive migration towards the cities, the regime en-

acted rural policies that relied on technology; this, however, caused an increase in the industrial production of seeds, fertilisers and agricultural machinery (Caprotti 2007).
Along with the productive aspect, modernisation implied the distribution of electric light and running water for the residing population. The networks of modern cities (Graham 2001, p. 10) and the technical artefacts assumed an iconic role in the new countryside of the 1930s[2].
According to Kaika and Swyngedow (2000), the urban transformations of the 18th century marked a new approach to networks and related buildings which became *material shrines of progress* in the urban landscape. In many cases, these buildings, despite their limited accessibility had a figurative intent and were designed to be seen from the city, contributing to the *civic magnificence* of public spaces[3].
Seen from the countryside, the architecture of the water towers emphasised the grandeur of the hydraulic works that could be hardly embraced with the eye, as they originated elsewhere and stretched throughout the whole territory. On the other hand, their towering figures contrasted with the historic city, thereby heralding the modernity of a device that enabled new lifestyles. These technical artefacts may be considered architecture of public utility and help us disentangle the evolution of the notion of modernity, whereby technology and architecture complemented each other.

Towers

A water-tower is an elevated reservoir in compliance with the laws of gravity, as water from a higher point can be distributed with increased pressure to several lower points simultaneously. Piezometric towers work on the same principle and provide a more capillary distribution even within multi-storey buildings. Through a pumping station at the base of the tower, water is captured (from a well in the ground or from an aqueduct) and then piped to the upper reservoir. In addition, piezometric towers set a height-rule for the whole settlement, as towers must be taller than the buildings they serve; through a system of pressured secondary pipes, stored water reaches individual houses, even those with several floors.
Initially, water towers were built in the suburbs of industrial towns, near railway stations or along the tracks to provide supply steam locomotives; subsequently towers reached out residential areas.
Fascist propaganda used water as a metaphor for the redemption of the land: the regime had injected some orderly movement in the chaos of the swamp (Cavallo 2016), stagnant water was pumped, channelled into linear canals towards the sea; on a smaller scale, machines released underground water and tapped it in reservoirs at the very core of the new settlements.
The proximity between water towers and the urban fabric established a field of experimentation for both engineers and architects. Engineers sought to build lighter and bolder lifting structures (Fasoli 2012), redefining the shape of the reservoirs with respect to different lifting systems and local climatic conditions. While engineers struggled to refine the structure of the shaft and the shape of the reservoir, architects thought about a shape that would harmonise with the surrounding context; they even ventured to embed the tank and the tubes within historical buildings, as in the towers of Milan's Castle by Luca Beltrami (Di Biase 2016).
In the design of a piezometric tower, technical constraints dictated the structural solution, a precondition to envisage the overall form. If, as a general rule, gravity influences the functioning scheme of a water-tower, aspects

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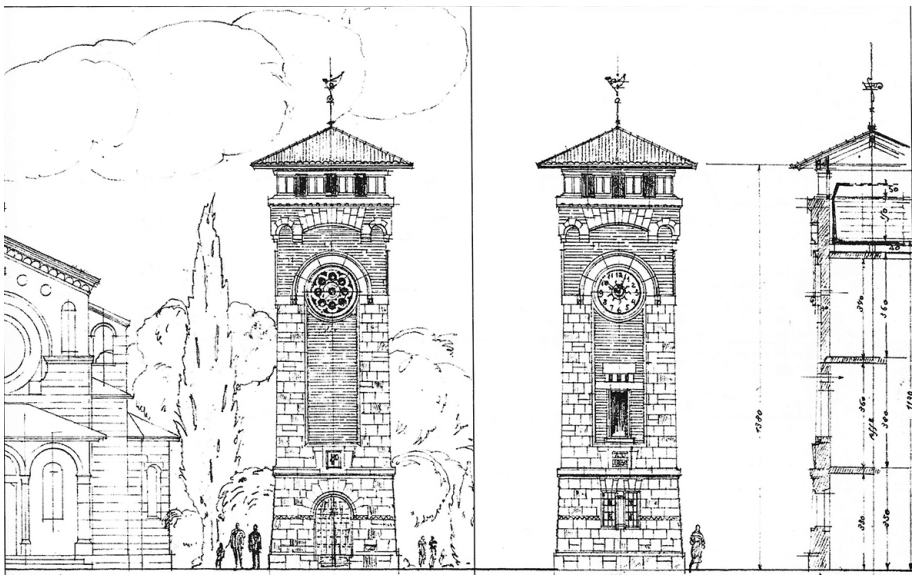

Fig. 2
Pontine land Reclamation Authority, Capograssa village, the tower/reservoir project, elevation and section, 1929.

Fig. 3
Pontine Land Reclamation Authority, Casal dei Pini Village (later Borgo Grappa) under construction, water-tower in the foreground, 1930.

such as position, orientation and its overall height depend on topological conditions, such as the access to water or the availability of electricity to activate the pumping system; moreover, the size of the reservoir depends from the number of users and the estimated consumption per unit. While defining a benchmark, all these parameters leave some freedom as far as the body of the building is concerned, from the basement to the top.
Formal outcomes are manifold, lending themselves to different interpretations of the urban and landscape role of the building. When we consider water tower architecture the metaphor of the shell is not out of place.
Water-tower design opened up a field of spatial and expressive experimentation for architects, in the attempt to move beyond mere engineering and standard solutions established by railway needs[4]. What we refer to as the «sculpted shell» (Ippolito 2003, p. 41) is actually the enveloping façade of water towers designed with figurative references to mechanical components, the diversified use of cladding materials along with chromatic quality and other features that loaded the public spaces with a renewed sense of civic decorum (Theseider-Duprè 1929).

Between Utilitarianism and Representative Instances

In the late 1920s and throughout the 1930s, piezometric towers were a recurring

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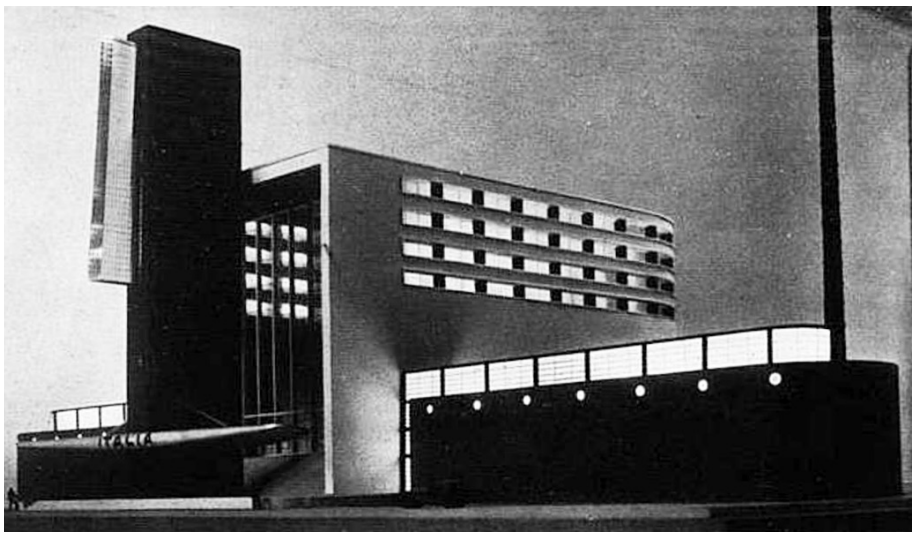

Fig. 4
Pontine Land Reclamation Authority, Borgo Montenero water-tower, 1930.

Fig. 5
Adalberto Libera and Mario De Renzi, Italian Pavilion at Chicago World's Fair, 1933. Photo of the model (from Architettura 5, 1933).

design theme for a number of young architects.
Angiolo Mazzoni'[5] designed many water towers, which he usually conceived as cylinder structures with coplanar shaft and reservoir; this rendered them *metaphysical solids* standing out from the historic urban fabric.
The «aspiration to modernity» (Godoli 2003, p. 21) can be detected by the choice to position the inspection staircase outside the tower. This allowed to shrink the diameter of the tower, providing a 360-degree view of the surrounding landscape. Dedda (2017, p. 110) noted that: «In this way a bond established between the building and the context is set [...] it admits a new sequence: building-man-landscape».
The isolated position of Mazzoni's water-towers offered a dynamic reference, perceivable from afar at a speed set by the modern means of transport. The *urbanisation* of water-towers meant that purely technical buildings[6] acted as vertical landmarks of new public spaces. The composition by contextual adaptation influenced the architecture of water-towers, shifting the focus from the building itself to its urban relationships at different distances[7].
The solutions adopted for the façades as sculpted shells and non-technical spaces within the water-towers triggered architects to move beyond handbook solutions.
The issue of the façade was approchead avoiding any meaningless decorative aspect (Group 7 1927, p. 468). On the other hand, the limited number of public buildings forming the core of the new-towns rendered technical artefacts part of the urban composition and decor. Designing new public spaces or re-designing existing ones meant harmonizing them with the surrounding context.
From a formal point of view, «setting-in» a building was a basic problem for any young architect trained under the supervision of Gustavo Giovannoni at the Regia Scuola Superiore di Architettura in Rome. This is where many of the planners of the new towns in Italy and the colonies came from: personalities like Luigi Piccinato[8], Angiolo Mazzoni and Concezio Petrucci, who embodied the figure of «integral architect» in line with Giovannoni's concern about the importance of controlling the impact of individual interventions, be it monuments or ordinary buildings. According to Paolo Portoghesi (2019, p. 9), the culture of «setting-in» marked an important advancement, as «architecture is not just about grandiose monuments, it is something very different. It has the city as its background, not only as a set of buildings but also as a landscape».

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Giovannoni's influence on the planners of the new towns cannot be demonstrated through documents; yet, his design proposals suggesting the partial demolition of historical city centres shows some resemblance with the new-towns. Considering the layout of these centres and the resulting townscape, we might venture to identify principles of the grand urban-architectural composition, where no demolition was needed to improve the overall townscape perception.
Squares resulted from staggered layout of the streets, orienting the viewer's perception towards the tallest buildings (bell tower, civic tower, Littorio's tower) and filtering the view of the surrounding landscape with porticoes and monumental portals[9]. The combination of multiple street directions and the «accidental effect» of the built ensamble was enhanced by the interplay of volumes with different heights and façades, where towers acted as landmarks, either defining a corner volume or the final point of a central perspective[10].
In the new-towns designed by Concezio Petrucci towers acted as backdrops of distant views, recalling the territorial impact of Mazzoni's water-towers[11]. This hypothesis seems to be supported by the fact that the main public and service buildings, such as the Casa del Fascio, the Town Hall or the headquarters of the ONC (Ex-Servicemen organisation), were characterised by an architectural language blending monumental elements with others taken from minor architecture, not necessarily local, reinvented to recreate a «remote and domestic otherness» (Culotta et alii 2007, p. 37).
In the case of Pomezia, the last new-town built in the Agro Pontino, the convergence between technical and representative aspects culminated in the central water tower. This building in fact is at one and the same time a *torre littoria* (the tower of the Fascist party) and a civic tower facing onto the main square. The tower was conceived as an autonomous volume, slightly offset from the Town Hall, at the corner between the main square and the large avenue linking Latina to Pratica di Mare. At the ground level the tower is connected to the neighbouring buildings with a portico surmounted by a terrace. The tripartite composition of the elevation reflects the building programme: the portico at the ground level leads to the circular staircase connecting all levels; the three-storey shaft is punctuated by single-lancet windows and stringcourses, the top element is a panoramic terrace. The prevailing impression is that of a sculpted element with building volumes carved out from a solid block.

Fig. 6
Water-tower-granary silo in Latina (demolished). (From Architettura 2, 1933)

Water-towers of the Pontine Plain Agro Pontino: a repertoire of images
The technical office of the ONC – a laboratory (Cucciolla 2006, p. 213) where architects designed both towns and farmland – managed to produce original designs for technical artefacts, epitomising the hybridisation between engineering and architecture.
Being the Pontine Plain a highly artificial landscape where technology underpinned the re-creation of a *second nature*, hydraulic works such as canals, pumping machines and even water-towers were key artefacts allowing for the permanent residence of farmers. In fact, water towers were part of a widespread network bringing a modern commodity from the cities to the countryside.
Just like for Pomezia[12], where the water tower was the tallest building in the main square, in the workers' villages built by the Land Reclamation Authority the provision of services was based on criteria of rationality and economy. The village of Capograssa[13], built on the extension of Migliara 43[14] served

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Fig. 7
Littoria water-tower-granary silo. Postcard, post-1945.

as a logistical centre for workers involved in the excavation of the canal Collettore delle Acque Medie, the widening of the Sisto River and construction of roads. The building site appeared as a battleground: hastily built shacks, makeshift public buildings with basic functions[15], and a dense network of narrow-gauge railways that could be easily dismantled and rebuilt on other sites. Situated at the crossroads of drainage roads, the village core was dominated by vertical buildings. The water tower – with an electric cabin underneath – acted as a temporary bell tower of the adjacent chapel, while a 30-m antenna with a balloon served as a landmark for tracing the road in the season when the vegetation was particularly dense.
Construction of the church in 1931 started the metamorphosis of the workers' village into a rural centre. Completed in 1933, Borgo San Michele and its water-tower epitomize the formal and functional hybridization of utilitarian buildings. The water-tower with a clock facing the square is entirely disguised under a 13.80 m tuff cladding whose decorative elements echoed the church façade.
Given the overall extent of the reclamation project and the pervasive network of roads, water-towers were «set-in» against a wider context. It may suffice to consider the tower still overlooking the intersection of the coastal road with Migliara 45. This was the water-tower of Casal dei Pini, a logistic centre for reclamation workers. When the place was converted into a rural village and renamed Borgo Grappa, battlements, buttresses and corner ashlars were added to the tower outer shell making it a copy of the Torre Olevola, an ancient watchtower part of the coastal defence system of Latium.
Borgo Montenero's water-tower near San Felice Circeo was built after 1933. In this case, the «cubic form of architecture for energy» celebrated by Marinetti (1935, 136) was replaced by a fascio littorio (fascist beam) of 21.2 m. The 15 m-high shaft contains a staircase reaching the top reservoir cantilevering onto the square. The intersection of the two volumes is a blatant symbol of the Fascist party, recalling temporary propaganda structures or exhibition pavilions, such as that designed by Libera and De Renzi for the 1933 Chicago Fair.
In Borgo Montenero the water-tower is a tall, isolated building hinged onto the urban layout. The village was described as a squared plan, divided into three rectangular sectors with the smaller side facing the main road. The cen-

tral portion - the narrower – is bounded by two N-S roads and a W-E green axis linking the main road to the piazza with a garden at the opposite side.
The backdrop of the green-axis is the axe-shaped tower with a reservoir at the top, a unique case among rural villages (Pennacchi 2008, p. 233). Its highly expressionist outer shell makes it the protagonist of Borgo Montenero's public space and a visual element along the road towards the sea.
The axe over a bundle of wooden rods – the fasces – was the symbol par excellence of the Fascist party and the ultimate example of the so-called «politics of the visible»(Culotta et alii, 2007)[16]: society and politics were to be re-shaped through the re-shaping of formal features of the built environment; for this, public buildings were characterized by elements recalling the fasces either literary or in more abstract forms.
In many cases, the towers themselves were assimilated with the figure of the fascio to the point that the vertical shaft and the plasticity enhanced by the shadow cast on the areas in front of them was used to enhance visibility from great distances, including the vision from the airplane. Visible from afar from several points, and when driving a car, the water towers were ever-present in the everyday life of rural settlers conveying a sense of modernity as a conquest and domestication of the frontier.
The sculpted outer shell is a distinctive feature of technical artefacts tying together the territorial and the urban dimension. Referring to aqueducts, Vittorio Gregotti wrote: «the design of the building and its form enshrined the interdependence between nature and settlement 'through the cleverness of building'» (1994, p. 5).
In the first three new-towns, Latina (1932), Sabaudia (1933) and Pontinia (1934), water-towers were placed at the edge of the settlement, near agricultural areas and the main access roads. As for the workers' villages turned into agricultural centres, in the new-towns these buildings provided opportunities for functional hybridization and architectural experimentation. In all three cases, the functional tripartition of the water machine was variously interpreted in the envelope, providing gathering areas or elevated observation points. The design of the three water-towers was entrusted to Oriolo Frezzotti (1888-1965), acting either as main architect or as consultant for the urban plans of Latina and Pontinia and for the designs of public buildings.
In the case of Latina, the water-tower originally appeared as an abstraction of *fasces*. Base and shaft were overlapped cylinders of different heights; a third parallelepiped volume with the staircase connected the ground floor to the top. The cylinder at the base, a flattened monolith with ten circular columns, engulfed a series of walled storage rooms facing a semicircle on a porticoed area. The roof terrace above overlooked the countryside and the stadium, allowing a 360 degrees view of the city and the reclaimed plain.
The tower's middle portion, a 12 m high shaft, was made of reinforced concrete pillars set on the perimeter and partially embedded in the outer façade, so as to create the illusion of the bundle on the fasces. Inside it contained a grain silo that could be accessed and filled at various heights; above was the water reservoir.
Located in between the Stadium and the fields crops, Latina's tower may well depict the dual character of technical artefacts, acting as landmarks for people driving along the coastal road and those moving along any urban thoroughfare.
Sabaudia's tower is another example of functional hybridization featuring an iconic reshaping of its shell. Like the water-tower of Latina, the cyl-

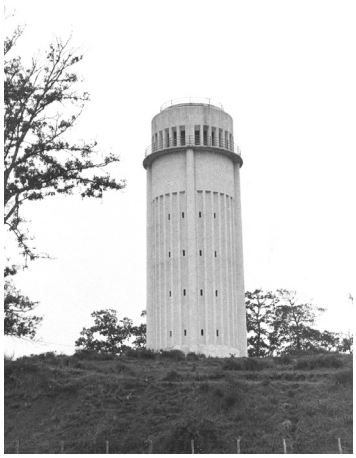

Fig. 8
Oriolo Frezzotti, Sabaudia's water-tower. (Archivio fotografico storico, Istituto Superiore di Sanità (c).

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Fig. 9
Sabaudia's water-tower and Viale Biancamano. (From Sabaudia Amarcord, Facebook page; downloaded 23 July 2022).

inder shaft included a three-floor silo and a water tank with a capacity of 360 cubic metres; a dedicated pumping machine was located at the ground floor. In this case, the enveloping structure was a double shell enclosing the functional core. This created a ring-shaped cavity of approximately 70 cm for the staircase which connected all the levels of the silo providing a stiffening structure. In the gap between the functional core and the perimeter wall, there was a ring staircase reaching the circular terrace at +20.40 m above sea level (used for tank maintenance). From the machine room to the tank impost, the envelope was carved with flat-edged grooves 15 m high to mark the shaft. The contrast between the solid parts and the chiaroscuro effect of the grooves made the tripartition legible and alluded to the rods of the fasces. The functional nature of the water-tower is once again reinterpreted in a monumental key: a large rectangular water basin (21 m x 13.50 m) with a blue mosaic at the bottom alludes to the fountains and lavatories of the rural world.

Despite its monumental design, the tower was not part of Sabaudia's core. Its offset position on a hilly area made it visible for those driving along Migliara 53. The water-tower marked a threshold between the territorial stretch of Migliara 53 and its urban continuation ending into the municipal tower on the main square. The overall urban design can be described as the final crossing of Migliara 53 with an orthogonal system of squares opened towards the sorrounding landscape.

For what concerns the architecture of water towers as part of a wider urban scheme, Pontinia's tower well exemplifies what *in the round* actually means. This concepts delves into art and it is a nod to the *in the round* sculptures freely designed structures conceived in such a way allowing viewers to appreciate it from different positions.

Pontinia's water-tower is a parallelepiped (14m x 8, 50m) 28.50m high located on the banks of the Sisto River. From the technical report it emerges that this solution depended on the shape of the tank and the structure required to bear its load[17].

The structure is a framework of 12 reinforced concrete pillars connected by 8 orders of beams cladded by stone-brick mixed façades. From outside, the frame structure is not visible and it is further hidden by the alternating horizontal travertine bands which convey the image of a continuous load-bear-

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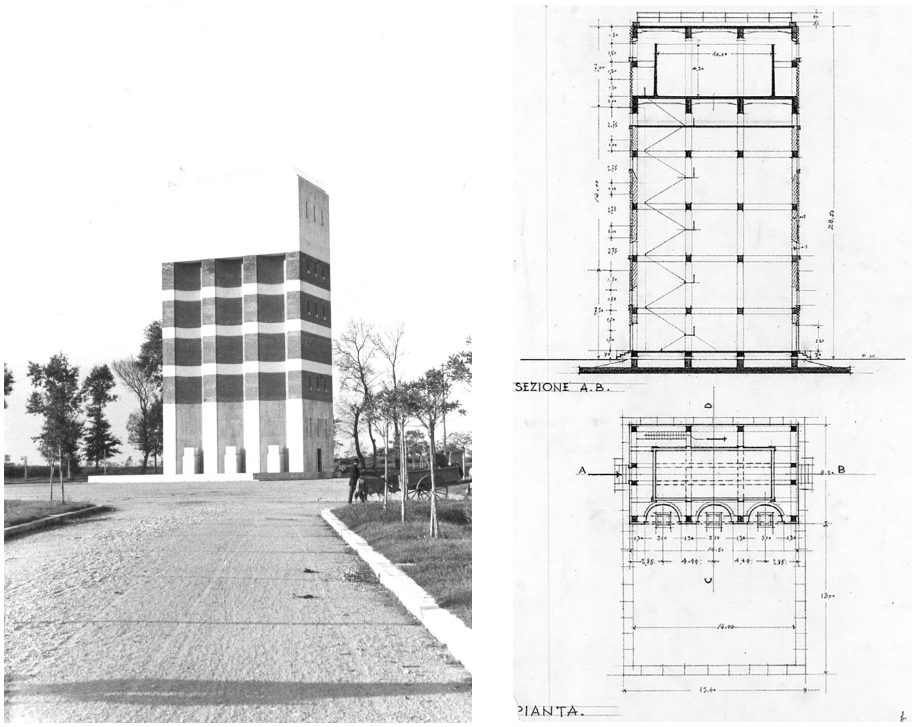

Fig. 10
Oriolo Frezzotti, Pontinia Aqueduct Reservoir Tower, Istituto Superiore di Sanità. Historical photo, plan and section a-b, 1934. MAP, Pontinia.

ing wall, almost as if it were a fragment of a larger fortified structure.
The façade facing the central square to the north-west is conceived as an excavated a built mass: three niches define the shaft of the reservoir above like the giant fragment of an ancient monument; each niche accommodates a spout at the base feeding the basin in front. Seen from a foreshortened angle, the interaction between the jet of the gush and the verticality of the niche recalls the shape of an inverted fasces.
Pontinia's water-tower contradicts the peremptory layout of the central square: its offset position and slight rotation qualifies it as an outstanding building within the axial layout of the new-town. The tower marks edge of a trapezoidal composition that combines the geometry in plan – mainly the central axis of the square and the course of Sisto River - and the perspective features emphasized by the elaborated façade.
The final effect of this rotation – unprecedented in the other new-towns of the Pontine Plain – provides a simultaneous corner-view of two façades, one the city and the other facing the countrysid. The unfinished project of the picturesque promenade along the Sisto River would have enriched the spatial sequence between the river and the city by making the tower-tank visible from all sides, a solution that reinforces the hypothesis that the «setting-in» of technical buildings in rural new-town was a key symbolic construction as part of the frontier narrative.
Still today, when reaching the terrace above the travertine top volume, the experience of the frontier persists in the dialectic between the territorial scale of the reclamation project, visible in the linearity of roads and canals across the plain, and geographical counterpoints such as Cape Circeo and the coastline to the west, the Appian Way and the Ausoni-Lepini Mountains to the east.

Concluding remarks

Despite Giuseppe Pagano's critical stance[18] about Pontinia as a missed opportunity, one cannot ignore the architectural and urban quality of the water-towers in the new countryside. These towers are examples of an un-

precedented formal and functional hybridization.
The result – at times modest or magniloquent – is the statement of a principle: architectural design should not shy away from expressing figurative choices even when size, location and use are purely utilitarian.
By broadening the spectrum of analysis on the modernisation of rural landscapes and new-towns we inevitably might confront the idea that «agriculture is an industry that does not know it is yet an industry» (Studiati 1930, p. 783) meaning that the role of technology and structures built to sustain either agricultural production or the artificial landscape is fundamental.
The examples from the Pontine plain help expand the field of histographic boundaries and venture into future challenges. In fact we might see a lasting challenge concerning the coherence between architectural design and technological aspects which are often eluded by the entrenchment within disciplinary boundaries. Today, buildings which house or sustain specific technologies, logistics or energy production are dramatically over-simplified by repetition, while standardisation of construction systems almost completely avoids functional hybridisations as a field to develop formal and spatial complexity.
In spite of the obsolescence (Abramson 2016) of the technological networks and supply system and the replacement of the water distribution in the cities of The Pontine Plain, the inoperative water-towers still provide a visual element that helps restore the interplay of perspectives and views dating back to foundation.
We might ask ourselves if the present-day utilitarian buildings – so dramatically exposed to faster technological innovations, shorter obsolescence phases and with ever more limited frontiers to be placed – will soon become architectures of waste, alien to contexts and precarious in terms of identity.
Assuming that one of the future tasks for architects will be to design productive or utilitarian buildings, one wonders how architectural design can still express its ability to orchestrate the spatial organism without being merely a container.
The study of Italian rural modernism and the «setting-in» effort of the water towers shows how public buildings, minor architectures and even structures supporting technological innovations contribute equally to the overall quality of the built environment.

Notes

[1] Corrado Alvaro (1934, p.47) also applied the war metaphor when describing reclamation. He wrote: «It must never have happened to see in such a short time, and from day to day, such a vast and complete transformation of the earth [...] perhaps in the event of war, when a meadow in a brief hour changes physiognomy, and the two or three thousand men who occupied it, each for himself and for all, transform it into an encampment with tents, drains for water, a kitchen, clearings, offices; or rather, on the battlefield, when the elements of destruction were combined with the work of man, the land would change its appearance down to its very heights and a gigantic city of cave dwellers would emerge with the rapidity of the work of the termite mound» (Transl. by author).
[2] The cultural geography Maoz Azaryahu (2019) analyses the role of piezometric towers in Zionist rural settlements, observing their evolution from iconinic buildings of progress to actual memorials of the Israeli War of Independence.

[3] Italian examples include the Cisternone (1829-1842) in Livorno designed by Pasquale Poccianti at the head of the aqueduct derived from Monte Colognole springs. The façade is characterised by a Tuscanic colonnade surmounted by a hollow hemispheric shell. A series of smaller pavilions served to regulate the flow of water. Another example is the aqueduct of Lucca designed by Lorenzo Nottolini, ending with two monopterial temples surmounted by a drum and dome: one at the Guamo springs and the other just outside the city walls. According to Matteoni (2001, p. 83), this form which made explicit the public destination of the building, can be referred to the projects of Boullèe and Ledoux. In some cases, such as the London sewage works (1864-1874), filtration stations also took on a monumental character; these were two iron and brick buildings designed to lift sewage to facilitate its outflow. The waterworks at Crossness recalled elements of Romanesque architecture while Abbey Mills was inspired by Neo-Byzantine architecture.

[4] Biagini and Nuti (2003) identify a transitional phase for the development of railway architecture in the shift from the use of coal-fired locomotives to the electrification of the national network, which made many buildings obsolete, while new ones were buildt such as central apparatus cabins, electric traction depots and workshops.

[5] Angiolo Mazzoni del Grande (1894-1979) worked in the Technical Department of the State Railways where he designed many stations, as well as numerous postal buildings. After the fall of Fascism Mazzoni moved to Colombia (1947-1963) and then returned to Italy for good. In the Pontinian Plain he designed Latina Scalo station (1932) and the post offices of Latina (1932) and Sabaudia (1932-1934).

[6] See Maltoni (2013) and Ciccarelli (2014). The piezometric tower in Forlimpopoli is an emblematic example of a hybrid typology. The basement was conceived as a chapel and then as a war memorial. In the case of Osimo, the reservoir tower designed in 1933 to replace the pre-existing one initiated the reconfiguration of the square in front of it. In contiguity with the Romanesque church of San Leopardo, the tower was likened to a bell tower. Many piezometric towers built during the Fascist period have been imagined as littoral towers.

[7] In describing the Aprilia plan, Concezio Petrucci (1902-1946) emphasised its scenic effect: «The plan extends on a pleasant hillock, from which one can observe the exceptional panorama of the Colli Albani to the north, the chain of the Monti Lepini to the north-east and to the south-east the characteristic outline of the Promontorio del Circeo, which is drawn sharply on the horizon, like a gigantic bulwark that seems to protect the marvellous reclamation that only Mussolini's men were able to carry out» (Petrucci 1937, p. 19). The square in Pomezia, on the other hand, is described as «closed on three sides, it opens up the fourth like a wide terrace, facing the clear horizon of the surrounding countryside with the cerulean shadow of the Albani mountains as a backdrop» (Patti 1938, p. 96).

[8] Although he was not a pupil of Giovannoni, Luigi Piccinato made some of the most innovative concepts his own; in particular the idea of the city as an organism in which the relationship with the 'new building' was played out (Pane 2015).

[9] In the new-towns, portals and arcades connected individual public buildings, delimiting the space of the square. In the sanitation project for Bari Vecchia (1932), Concezio Petrucci «continues to pin architectural elements typical of replacement buildings that are, to a large extent, necessary to suture the wounds caused by demolitions during the sanitation project» (Cucciolla 2006, p. 127)

[10] In a way entirely similar to the examples of historic Italian cities and in particular in the interpretation that Giovannoni and his students made of them in their sanitation projects which included demolition and rebuilding. Petrucci's project for Bari Vecchia, in this sense, is the most «accomplished and organic example of the application of the theory of building destruction for sanitary reasons» (Cucciolla 2006, p. 135) since it identified Norman bell towers as the visual catalyst of the intervention, i.e. points of monumental concentration with respect to a minor building fabric (Moschini 2019).
In the thinning plan (piano di diradamento) for old-Bari, the demolition of buildings or parts of them to free up the crossing axes also has an artistic purpose: it is the cathedral bell tower that is the goal and visual backdrop of all the planned streets.

[11] Cucciolla (2006, p. 245) writes: «The civic tower plays, together with the bell tower, the oft-referenced role of compositional pivot of the entire project and primary visual emergence; the tower is resolved as a compact volume, devoid of openings and made up of a Marino tufa wall, elegantly subdivided into modules by a thin incision [...]».

And more: «Petrucci uses the cathedral bell tower, which constitutes the highest architectural emergence in Bari, as the main visual goal for the user and as the pivot of the urban reconfiguration, according to scenic criteria that may even make one think of Baroque suggestions or Haussmann-esque citations» (ibid., 126). (Transl. by author)

[12] Designed by architects Concezio Petrucci, Mosè (Mario) Tufaroli Luciano and engineers Filiberto Paolini and Riccardo Silenzi. The group built three new towns on behalf of the ONC: Aprilia (1936), Pomezia (1937), Fertilia (1937-1943); Petrucci designed Segezia (1939-1941) while Paolini and Tufaroli designed Borgo Appio and Borgo Domitio in Campania in 1939.

[13] The fifth to be built by the Piscinara Reclamation Consortium after Sessano, Passo Genovese, Casal dei Pini and Doganella (Paradiso and Vittori, 2002).

[14] Migliara 43 was laid out at the end of the 18th century in the context of Pius VI's land reclamation.

[15] Collective facilities included a school with accommodation for teachers; a health centre with doctor's quarters; a cinema and after-work club; a building for the head of the Azienda Agraria temporarily used as a technical office; a church, a police station, three blocks of flats for the workers that could be converted into farmhouses, a food pantry, a collective bakery, three fountains with drinking troughs and a lavatory.

[16] The symbol of the fascio littorio did not only represent the Fascist party. It represented the new values advocated by Fascist Italy. From 1927, the fascio became the State coat of arms. From 1929, two fasces flanked the coat of arms of the Savoy family. The fascio littorio also became the symbol used on 1 and 5 lire stamps (Falasca-Zamponi, 1997, p. 99).

[17] The technical report states: «Assuming a stable population of 5,000 people and a per capita use of 100 litres of water, the expected average daily consumption is 500,000 litres, to be met, during the period of maximum consumption, by filling the reservoir three times a day. The reservoir, with an almost square cross-section, measuring 4.5 m by 4 m and a length of 10 m has a capacity of 180 cubic metres».

[18] Pagano (1935, p. 6) wrote : «Pontinia does not lack even some vague fluttering in its frame, some picturesque and seductive elements. It is enough to look out over the riverbed where the river, laid out by Ascanio Fenizi by order of Sixtus V and arranged [...], flows to foresee the urbanistic use that can be made of that watercourse. The Sisto Rivers, in its regular banks, also has the width and serious quietness of the canals of Padania. A tree-lined road will run, in the direction of the river, and it will be Pontinia's Lungosisto. On warm nights, groups will go for a walk along the embankment, just like the villages in the Po valley». (Transl. by author)

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