Windmills on the Southern Marmara Islands

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District of Erdek, Poyrazlı Neighbourhood, Poyrazlı Windmill GPS: **40°29'42.5"N 27°37'50.1"E**	**Not registered**
District of Marmara, Saraylar Neighbourhood, Saraylar Northern Windmill GPS: **40°39'17.8"N 27°39'56.8"E**	**Bursa KTVKBK - 18.08.1990 - 1293**
District of Marmara, Saraylar Neighbourhood, Saraylar Southern Windmill GPS: **40°39'14.0"N 27°39'54.3"E**	
District of Marmara, Ekinlik Neighbourhood, Ekinlik Windmill 1 GPS: **40°32'40.6"N 27°28'55.7"E**	**Çanakkale KTVKBK - 13.10.2005 - 1421**
District of Marmara, Ekinlik Neighbourhood, Ekinlik Windmill 2 GPS: **40°32'51.5"N 27°28'53.0"E**	
District of Marmara, Ekinlik Neighbourhood, Ekinlik Windmill 3 GPS: **40°32'47.9"N 27°29'35.1"E**	**Bursa KTVKBK - 15.06.1995 - 4400**
Construction period/date: **19th century**	Ownership status: **State Treasury**
Current status: **Abandoned**	

Fig. 7: Ekinlik Windmill 2, general view

History

The six mills identified in the Saraylar Neighbourhood on Marmara Island, on Ekinlik Island, and in the Poyrazlı Neighbourhood of Paşalimanı Island are the windmill type with cylindrical body and horizontal axle that are frequently seen in the Mediterranean and Aegean regions. When the criteria such as location, exterior appearance, operating principle, rotation type of the blades and blade types are evaluated, the windmills on the Southern Marmara Islands are thought to be in the Mediterranean windmill category and may be attributed to the 19th century (Takaoğlu 2016, 21-42). The dating latter is confirmed by the inscription "1877" on the marble panel over the entrance of the Windmill no. 2 on Ekinlik Island (Fig. 8). This inscription bears the letters I X N K respectively in the four areas formed by the arms of a cross, which are the abbreviations of Greek phrase ΙΗΣΟΥΣ ΧΡΙΣΤΟΣ ΝΙΚΑ, meaning 'Jesus Christ defeats.'

Architecture

Poyrazlı Windmill

Poyrazlı Windmill is the most prominent example that has survived with its unique features. It is located on the edge of Poyrazlı Neighbourhood on Paşalimanı Island, to the north of the road leading to the village (Fig. 1). The circular building has an inner diameter of approximately 4.35 m. While its northern façade faces the sea, its gate is on the east. It has a stone-coursed and cylindrical body. Local stones are used as the building material of the cylindrical body wall. The mortar between these stones is the combination of earth, organic additives, and cement-based binder with large amounts of marble and seashells. The cement-based mortar attested on the outer surface of the building must be the result of a later repair. Tension bars are used in the body walls as structural elements. This must be to protect the windmill from natural conditions, especially from strong winds coming from the north.

There are two window openings on the upper level of the windmill, one in the east and the other in the west. One of these is above the entrance, while the other is right across it. These openings are probably placed just below the timber, conical roof covered with

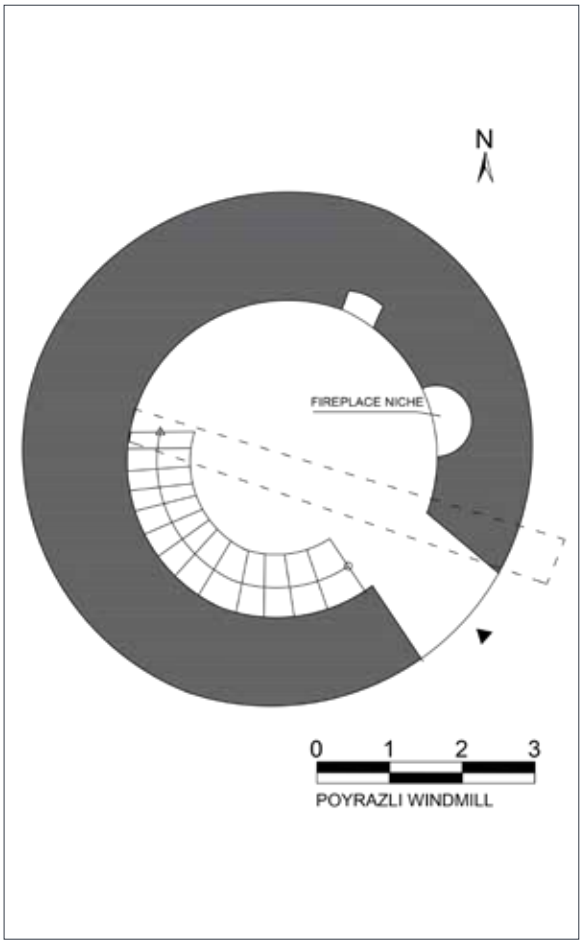


Fig. 1: Poyrazlı Windmill, general view

Fig. 2: Poyrazlı Windmill, millstone

thatch or straw. Since the grinding process was also carried out on cold days, small windows were typological features of the windmills (Bir *et al.* 2012, 74).

The flat lintel over the entrance is formed by a series of timber bands and supported by cut-stone jambs on both sides. The fine-cut block of stone over the entrance, which once had the construction or repair date inscription, was embedded in a round arch. However, the inscription cannot be read since it has been damaged.

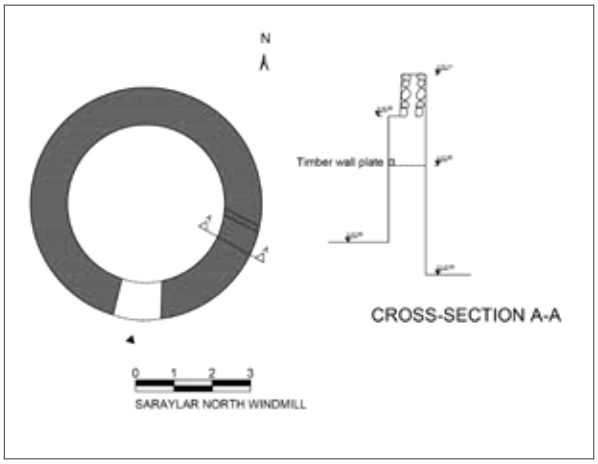
The details of the interior could only be partially examined due to extensive vegetation. On the interior, the stone courses are supported by two rows of timber bands and earth-based mortar with straws at places. On-site observations revealed that the interior has not been repaired recently, therefore its original features are better preserved than on the exterior. One of the well-preserved details of the windmill is the staircase across the entrance (western wall), which is thought to have been composed of cantilevered stone steps. The staircase was built by placing similar-sized flat stones on top of each other, supported by earth-based mortar. There is a round-arched niche within the staircase and a small niche with a timber lintel underneath the staircase. Since the windmill functioned year-round, a fireplace with a round arch was built to the north of the door to provide heat during the colder months. Next to the fireplace is another niche, supported by a timber lintel and is divided into two by a timber shelf.

The millstone retains its authenticity; however, due to the collapse of the timber beams and flooring carrying the second floor, where it was located, it is currently located downstairs (Fig. 2). The main timber horizontal axle (spindle), which is the main element of the windmill's movement mechanism, has largely been preserved.

Saraylar Windmills

The lot, approximately 116 decares, is on the hill to the east of Saraylar Neighbourhood and covers almost the entire slope. The northern windmill dominates over the area and it is about 150 m away from the sea (Fig. 3). The southern windmill is situated atop the slope, about 120 m from the northern one (Fig. 4).

The architectural elements of the northern windmill's original function have not survived, apart from the circular body wall. The circular building, which has an approximate inner diameter of 4.25 m, has an entrance to the west. The beam holes in the main walls suggest that the building was two-storey, similar to that in Poyrazlı. The grinding process was probably carried out on the upper floor, whereas storage and packaging were held on the ground floor; therefore, most of the installations (millstone, flour basin, wheel elements, etc.) that no longer exist must have been upstairs. Unlike the Poyrazlı Windmill, there are not any traces of a staircase connecting the floors on the main walls. There are two rectangular openings, one above the entrance door and the other close to the roof level on the east, for the illumination of the spaces. The fireplace used by the miller is on the upper levels of the main wall. The lintel of the fireplace is monolithic limestone. In the main walls, there are two niches with lintels, one near the fireplace at the upper level, and the other at the ground floor level (Fig. 5).



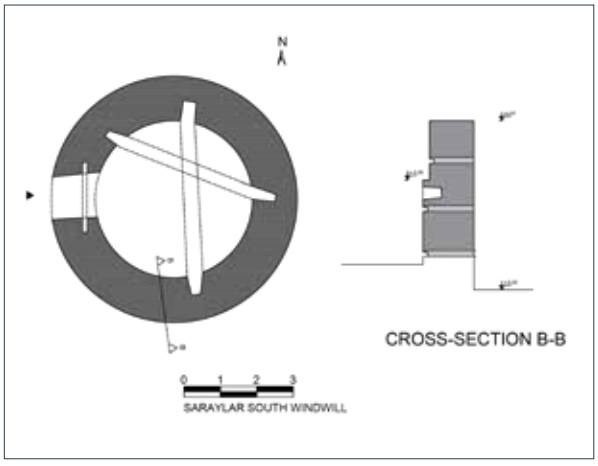


Fig. 3: Saraylar Northern Windmill, general view

Fig. 4: Saraylar Southern Windmill, general view

Fig. 5: Saraylar Northern Windmill, interior view

The main walls of the building, which sits on bedrock, are constructed in rubble masonry with timber bands and have a thickness of 120 cm. The walls currently reach up to a height of 4.60 m (the ground level on the southern façade is taken as reference). The timber bands, which are used as two rows within the wall, have cross-sections of 10x10 cm and they are connected to each other by elements with smaller cross-sections, placed transversely throughout the wall thickness. The distance between these rows are approximately 120 cm. The main walls make indentation at the level of the timber flooring. The doorway has five lintels (about 12x20 cm each), which continue into the wall for about 30-35 cm.

The southern windmill is more damaged than the northern one. Apart from its circular main wall, there are not any architectural elements associated with the original function of the structure. The building, which has an approximate inner diameter of 4.0 m, has its entrance in the south. The traces of beam holes on the main wall suggest that it had two floors. The walls, which are about 90 cm thick, are constructed in rubble masonry with timber bands. Lime-based mortar is used to point the façades, while earth-based mortar is used in the core of the wall. Two rows of timber bands (10x10 cm) are used in the walls. These bands are nailed to elements with smaller cross-sections (6x6cm) that are placed transversely throughout the wall thickness for bracing. The walls reach up to a height of 5.20 cm in the east. The walls on the exterior of the ground level protrude approximately 6-7 cm, forming a wall base.

Ekinlik Windmills

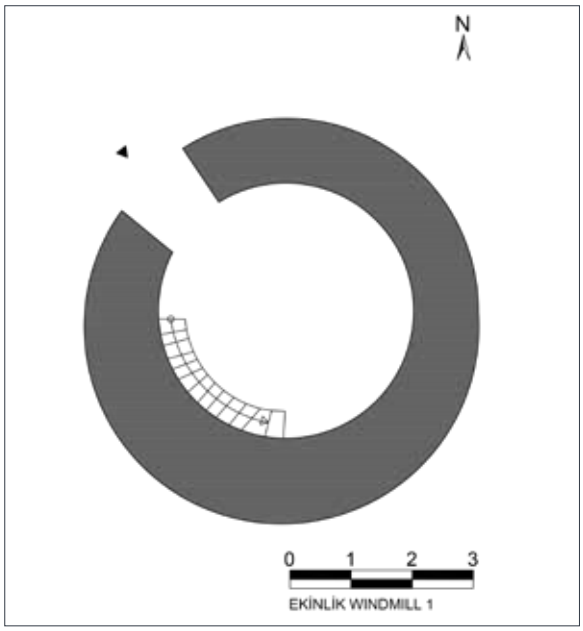
There are three windmills on Ekinlik Island. Two have been preserved relatively well (Windmills 2 and 3), while the other (Windmill 1) has been transformed into the garden annex of a private house.

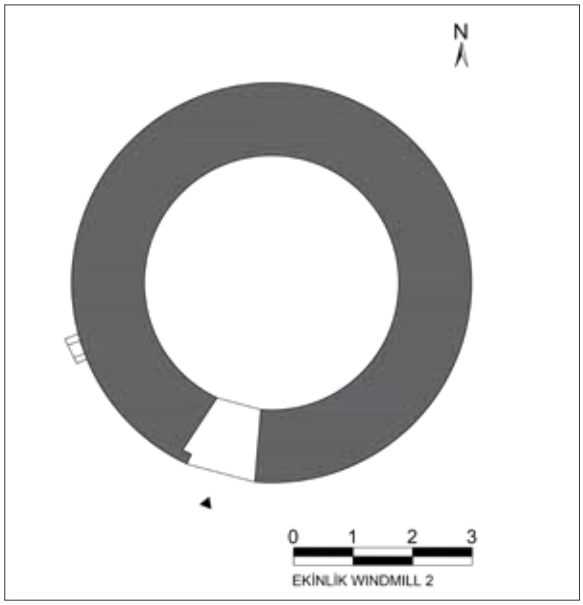
Windmill 1 is to the west of the harbour of Ekinlik Island (Pl. IX.39). It is on a 113.92 m² lot that is in the garden of a recently-constructed, residential building (Fig. 6). It is approximately 500 m from the harbour as the crow flies. The remaining sections of the structure are the circular main walls –with an approximate height of 1.85 m– and nine steps

of the staircase. The circular structure, which has an inner diameter of 4.10 m (excluding the wall thickness), has its entrance in the northwest. On the interior, there is a niche with a dimension of 48x45 cm in the south. The building no longer has a superstructure and its floor is covered with cement-based material. Its main walls are constructed with marble rubble. The perimeter of the building is 20.45 m; therefore, its outer diameter is about 6.50 m and it has a wall thickness of about 180 cm. The wall thickness varies between 106-110 cm where the stairs are located. The width of the stairs range between 18-25 cm.

Windmill 2 is used as a straw depot and located on a lot of 561.34 m² to the northwest of the harbour of Ekinlik Island. It is approximately 475 m from the harbour as the crow flies (Fig. 7). The main walls, as well as the window and door openings are intact. The circular structure has a perimeter of about 20 m (exterior diameter is approximately 6.50 m) and its entrance is in the south. The inscription "1877" over the entrance supports that the islands' windmills date from the 19th century (Fig. 8). Since the middle part of the stone lintel above the door has a curvilinear form, the opening seems to have the form of a depressed arch. According to the *Marmarina Nea* newspaper, the building belonged to a person called Ntompros before the population exchange (May 1952, 1). There is a rectangular window opening with a width of 45 cm to the west of the entrance, at the level of the inscription. The window jambs protrude by about 18 cm. The structure is currently covered with aluminium sheets. The main walls of the building are rubble masonry. The wall thickness is about 118~120 cm. Lime-based mortar and plaster are noted on the wall surfaces. On the upper levels of the body walls, there are holes for timber beams that carried the flooring. The mechanical parts of the mill sat on this flooring. Due to the bales of straw on the interior, the original features of Windmill 2, such as the extant staircase, could not be investigated in detail.

Windmill 3, like the other two examples on the island, has survived with its original elements. The building is on a lot of 329.37 m², and it is currently abandoned and dilapidated.





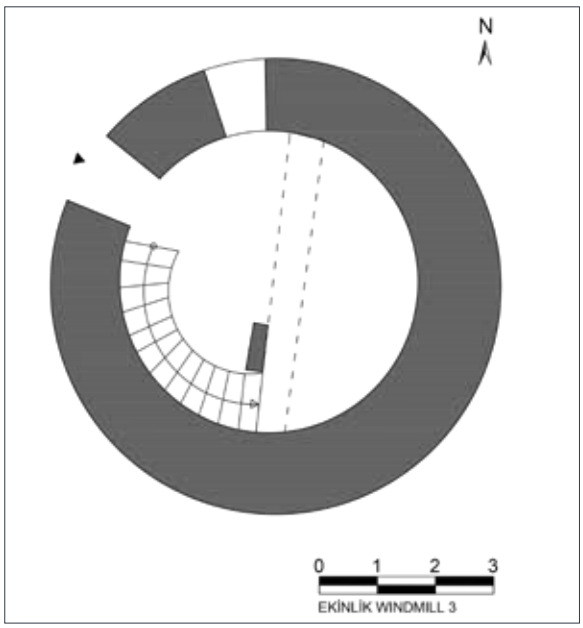


Fig. 6: Ekinlik Windmill 1, general view

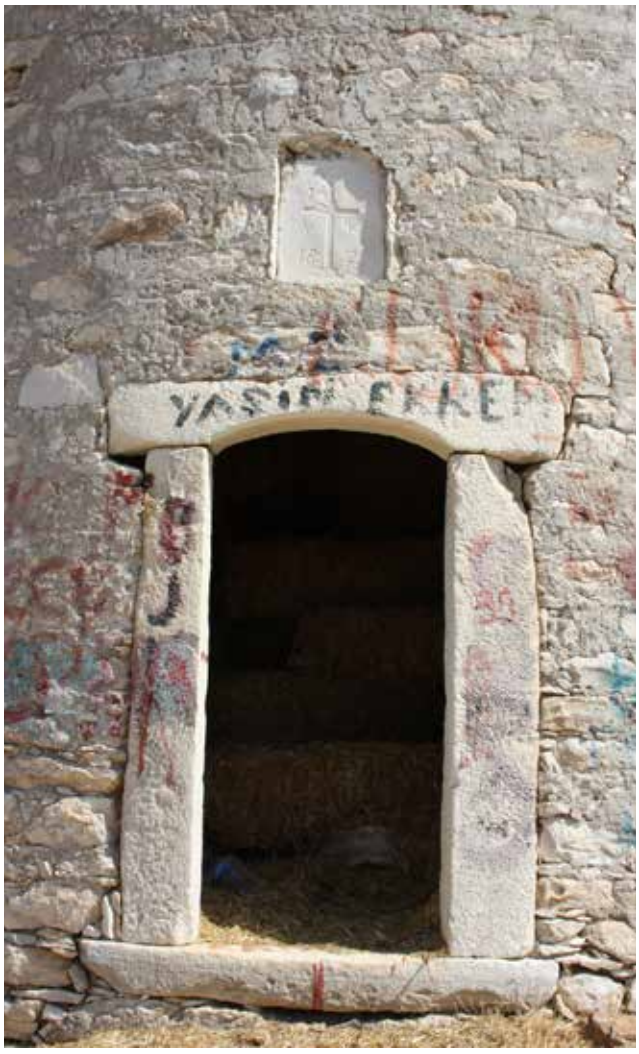


Fig. 8: Ekinlik Windmill 2, entrance door, inscription panel, and vandalism

Fig. 9: Ekinlik Windmill 3, western façade and general view

Fig. 10: Ekinlik Windmill 3, interior view and the staircase

It is approximately 200 m from the harbour of Ekinlik Island and 30 m from Marmara Sea. There are recently built residences to the east and west. The circular main wall, the stairs inside the building, and the architectural elements of the original installations of the windmill have survived in good condition. The entrance of the circular structure, with an inner diameter of 4.71 m, is in the west (Fig. 9). The staircase inside indicates that the building originally had two floors, similar to the other windmills. The ground floor was used as a storage area to collect the processed products and store flour sacks, while the upper floor was used as the production area. The non-extant elements related to the building's function such as the flooring of the upper level, millstone, flour basin, wheel elements etc. must have been upstairs. Traces of timber beams and posts in the production section, as well as those of the floor beams can still be observed on the main walls. The original stone staircase, which provides the transition between the floors, is located to the south of the entrance (Fig. 10). There is an arched opening above the doorway and small square openings scattered in the walls to illuminate the interior.

The main walls of the building, which sits on bedrock, are constructed in rubble masonry with timber bands and are about 115 cm thick. The perimeter of the walls is 22.86 m (outer diameter is about 7.30 cm). Timber bands are in two rows in the wall section and repeat at vertical intervals of approximately 120 cm. These bands have cross-sections of 10.5x10.5 cm and they are connected to each other by elements with smaller cross-sections (7.5x8 cm), placed transversely throughout the wall thickness. The entranceway has five timber lintels. The width of the entrance is 126 cm from the outside and 120 cm from the inside.

Current Condition

Poyrazlı Windmill

Poyrazlı Windmill is currently neglected and unprotected because its use ended. The structure is generally preserved in good condition. Some of its significant elements specific to windmills such as the staircase, fireplace, niches, axle, and millstone have survived. Timber bands in the main walls, which are thought to be original, have survived despite some biological growth; however, they have lost their strength. The loss of the superstructure makes the building susceptible to external factors, accelerates deterioration, and threatens the building's ability to survive for future generations. A large fig tree covers the building's interior to a large extent. Its leaves reach to the upper levels and exterior due to the loss of the superstructure. There are later interventions involving cement-based mortar, lime-based mortar, and iron reinforcement, which are not compatible with the original materials of the building and may mislead the interpretation of its construction techniques. There is cracking and detachment, as well as loss of materials in the main walls of the building. Biological degradation is seen on the stone surfaces of the exterior.

Saraylar Windmills

Only the main, masonry walls of these windmills have survived. There are losses of sections and growth of rooted plants on these walls. Unlike the Poyrazlı Windmill and the Ekinlik Windmills 2 and 3, all of the timber structural elements such as the lintels, the timber bands in the walls, and the flooring have been lost. The section of the northern windmill that is defined by the entrance and the window above it is structurally in critical condition. Due to the loss of the doorway's timber lintels, there are losses of the rubble stones in the wall above. Both buildings have debris inside; therefore, the original flooring could not be identified. Similarly, the original roof levels could not be determined. The installations related to the buildings' function have been lost, although the original millstones may be concealed underneath the debris layer on the ground.

Ekinlik Windmills

Of Windmill 1, only the main, masonry walls up to a certain height and the staircase are extant. Plant growth is seen in the interior as well as at connections of the floor and main walls. Cement-based mortar is used as binding material.

The main walls as well as the window and door openings of Windmills 2 and 3 have survived. The marble inscription panel in Windmill 2 is noteworthy. Since the interior is

used for hay storage, a detailed examination of the deteriorations could not be made. The area around the door lintel is spray-painted.

For Windmill 3, apart from the main walls, the staircase and some of the elements carrying the installations of the windmill on the first floor are still *in situ*. There is plant growth (especially a fig tree) in and around the building, similar to the Poyrazlı Mill. There are not any traces about the production mechanism such as the gear wheel, millstone, or axle. The original millstone is probably concealed underneath the debris layer on the ground, like the examples in Marmara Island's Saraylar Neighbourhood. Most of the timber structural elements –such as lintels, bands within the walls, flooring, and roof– of Windmill 3 are still in place. Therefore, it has better architectural quality than the other examples on Ekinlik. There are structural cracks between the level of the lintel and level of the roof on the northern and southern façades of the windmill.

Risk Assessment and Recommendations

Realizing the power of the wind in ancient times, human beings constructed windmills to grind produce, pump water, and operate sawmills (Gökaltun 2018, 30). Today, windmills more often produce electrical energy (Özdemir 2019, 343). They are considered industrial heritage as witnesses of the recent past, including the social, cultural, and social records of economic life based on urban or rural agriculture of their time. In addition to being immovable cultural assets, they are the documents of the economic, social, and cultural values of the region's life with their local materials and the experience of the mill masters (Uysal – Tombul 2006, 65).

In this context, all the windmills of the Southern Marmara Islands should be protected and repurposed because of their historical, technological, and architectural value. Security measures should be placed in their surroundings since they may be affected by vandalism caused by fire/barbecue or treasure hunting, especially in the examples in Saraylar. Information panels should be installed as soon as possible. Cleaning and excavations should be conducted under the supervision of Ministry of Culture and Tourism, especially for Windmills 2 and 3 in Ekinlik as well as those in Saraylar, in order to unearth the original installations related to the function. Thorough restitution studies should be carried out with the detailed documentation and evaluation of the traces on the main walls. Temporary structural measures should be taken until a restoration project is implemented in order to prevent damage in potential earthquakes, especially in critical areas. Moreover, temporary protective shelters should be designed for the structures to prevent them from the effects of wind and rain.

Although it is difficult for these windmills to continue their original functions with the development of technology, they are rare structures on the Southern Marmara Islands that can be used to undertake or exhibit traditional production process; therefore, site-specific conservation approaches are important. Another suggestion is to repurpose these structures for different functions. In this framework, a project can be prepared in line with the principles of sustainable tourism and conservation.