THE PORT OF NEAPOLIS: MEMORIES AND TRACES OF THE COASTAL LANDSCAPE IN ANCIENT TIMES

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Abstract – During the excavation for the construction of two new subway lines, which run from East to West along the city of Naples, traces and memories of the ancient Neapolitan coastal landscape emerged. Most of the ancient coast finds were discovered during the railway stations building in the historic center of Naples.
Moreover, thanks to geo-archaeological investigations conducted during the construction of the urban transport infrastructure, in Municipio square the Greek-Roman port of Naples has been brought to light. As confirmed by geognostic surveys, the transformations of the Neapolitan bay shore lines depended on anthropic and natural phenomena. Bradysism, silting of the coast with the accumulation of debris carried by the lavas, as well as the waters coming from the hills surrounding the plains where the Greek colonies of Parthenope/Palepolis and Neapolis were founded, were responsible of bay transformation. From the huge quantity of traces found it has been possible to reconstruct the urban layout of the ancient port re-emerged with its docks and ships.
The studies of archaeologists and geologists through the reconstruction of stratigraphy and data of geoarchaeological prospecting campaigns, have clarified how the bay has been disappearing over the centuries. This disappearance was caused by the overlapping of natural (subsidence, swamps, and coverings) and of anthropic phenomena, until the complete transformation of the coastline by the castings for the construction of the modern port.

Morphological evolution of the Neapolitan Coastal landscape

The geomorphology of the Neapolitan physical landscape in its main features is due to the volcanic and tectonic activity of the late Quaternary. The morphostructural features of the landscape are characterized by a hilly area, with the main river formed with the oldest phlegraean eruptive events, and by many reliefs connected to the eruptive centres of the Neapolitan Yellow Tuff. In the second part of the Holocene period the landscape began to take shape acquiring, on the western and eastern sides of the territory, a morphology characterized by depressions, aggravated by volcanoclastic sedimentation and by coastal plains partly artificially prograded [17]. Along the coast, the genesis of the Neapolitan landscape morphology originated in the middle and upper Holocene, as documented by the complex coastline and transition that marks the apex of the post-glacial transgression and subsequent progrades [1].

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The evolution of the morphology of the Neapolitan coastal landscape has been further documented by new geoarchaeological data obtained from cores and excavations carried out for the work of the new subway lines. The analysis of the coastal sediments that filled the final tracts of the torrential incisions, have integrated the useful data to reconstruct the course of the paleolines of the shore of the ancient coastal landscape. Studies carried out on samples of shoreline and beach deposits taken from the excavation wells of the Duomo (Nicola Amore Square) and the University (Bovio Square) stations documented traces of human activities attributable to the Middle Bronze Age [10]. It has also been documented a phenomenon of marine ingression and a subsequent rise of the seabed to be traced back to an environment that emerged near the shore, datable between the Bronze and the first Iron Age.

To complete the study of the genesis of the Neapolitan coastal landscape, related to events preceding the anthropization of historical times, contributed geo-archaeological data from the excavation wells of the Garibaldi, San Pasquale, and Arco Mirelli stations. These last two wells belong to the line 6 subway, which runs along the Chiaia Riviera, an area formerly occupied by the sea. In this area, geo-archaeological investigations have revealed the presence of subsequent deposits of a coastal environment, identifying the whole belt as a transition zone between a submerged and an emerged shore. The results of these researches have contributed to the knowledge of the progradation phases of the ancient coastline and of the anthropic presence in the neighbouring areas from the Neolithic to the Late-Ancient Age [6].

In Garibaldi Square, a stratigraphic sequence was detected, attributable to a coastal marsh, an emerged beach and a black paleosoil with traces dating back to the recent Middle Bronze Age [1]. The successive chronological phases up to the Modern Age have been traced back to a silty sandy stratigraphy due to frequent flooding, perhaps coming from a nearby stream descending from the surrounding hills [5]. The discovery of some archaeological finds documents the anthropic presence in the Neapolitan bay since the Prehistoric and Protohistoric Age. More traces that are consistent indicate the existence of a naval port on the shores of the Megaride islet as well as the settlement of a Greek colony dating from the mid-7th century BC on the promontory of Mount Echia. Another Greek colony (between the end of the 6th and the beginning of the 5th century BC) was settled on the Pendino plain [19]. A sub-flat area carved by valleys and corrivation grooves, coming from the north and the west flowing to the sea, were spaced from the reliefs on which the colonies of Parthenope/Palepolis and Neapolis were founded [20]. Therefore, it can be assumed that the hills and environments near the shore were inhabited from the end of the Neolithic Age. In fact, numerous ceramic finds, dating from the Middle Bronze to the Iron Age, were found in N. Amore square [5]. In addition, in the wells dug for the construction of the Municipio, University and Duomo stations, respectively located in Municipio, Giovanni Bovio and Nicola Amore squares, were found deposits of seabed, emerged shores and humid environments dating from the sixth to the second century BC [13].

The geognostic and geo-archaeological coring carried out in the excavation well in Municipio square have highlighted the reconfiguration of the seabed of the bay (occurred between the end of the fourth and the second century BC) through dredging operations for port use in the innermost area of the square [12]. Between the 2nd century BC and the 3rd century AD in this sector of the inlet, the waterline underwent a slight expansion due to the submersion of the bay. This was evident due to the corrosion on the support poles of the two pontoons found, probably realized and abandoned during the 2nd century AD. Moreover,

the excavations have brought to the light of a busy boat, trace of the existence of a submerged environment between the 2nd and 3rd century AD. During the 5th century AD, dunes formed in the harbour basin that gradually became cordons transforming much of the bay into a lagoon [19]. Over time the subsequent progradation and the raising of the sediments barrier provoked the definitive burial of the bay and the closing of the port. In the University station excavation areas was ascertained that between the 1st century BC and the 2nd century AD shore sands were deposited, while in the excavation area of the Duomo station were found the remains of a monumental complex built at the beginning of the second century BC and refurbished in the third century AD. The peculiarities of this environmental context will have strongly influenced the methods of occupation by the inhabitants, appearing diversified in chronology, functions, and monumental consistency of the remains [5].

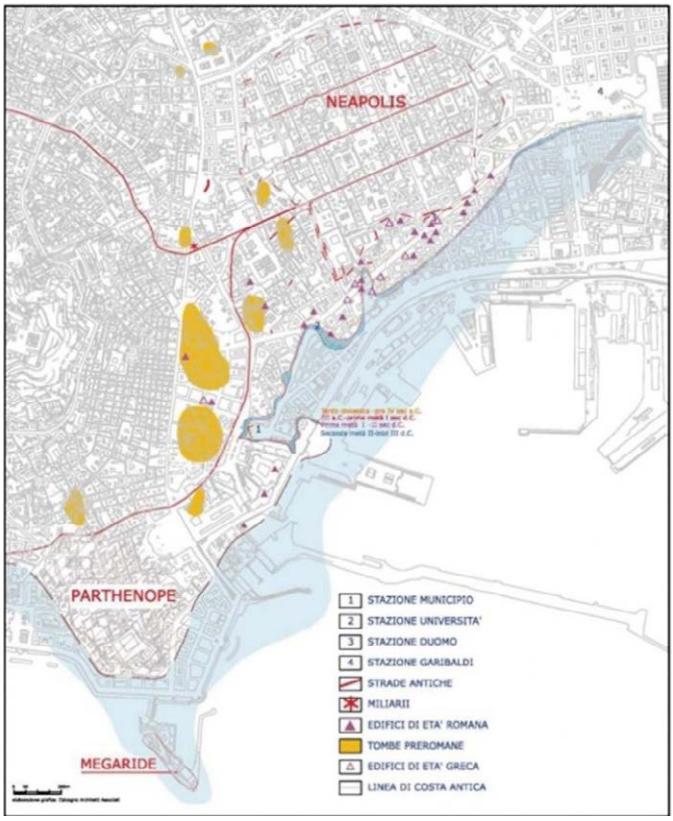

Figure 1 – Naples. Reconstruction of the coastline from ancient to late ancient times.
[www.researchgate.net/publication/40020600_Archeologia_e_citta_La_ricostruzione_della_linea_di_costa]

In Nicola Amore square a stratigraphic articulation has been recovered, dating from around the middle of the 5th century BC, which documented the presence of a shore grooved by naturally formed beds. Other finds have attested that at the beginning of the 4th century BC the area was occupied by a building probably of a sacred character, in which we recognize the origin of the settlement phenomenon that will culminate with the realization in the Augustan age of the Sanctuary of the Isolympics games [14].

The study of the University station excavation revealed that up to the beginning of the fifth century AD in the area the conditions of submerged environment persisted. The shoreline made a series of oscillations that brought in a condition of emerged shore. Starting from the sixth century AD the conditions of bad drainage were created, as already found in the area of the well of excavation of the Municipio station, but of such an entity that did not prevent the construction of an extramoenia district. Similar environmental conditions, attributable to the fourth and fifth centuries AD, have also been found in the excavation well of the Duomo station, where on the pavements of the Roman monumental complex sands and works of lifting the decks and traces of drainage canals have been found [1]. Therefore, from the beginning of the 5th century AD, the Neapolitan coastal landscape suffered widespread phenomena of swamping. In the inlet between the areas now occupied by Municipio and Bovio squares and where the port was located, episodes of stagnation of the waters began to occur, that increased during the fifth century causing the desertion of the area. The formation of a lagoon environment caused the abandonment of the port due to the silting of the inlet and the advancement of the coastline with the consequent displacement of the port to east [5]. The archaeological indicators shows that the activity of this second port, closer to the colony of Neapolis, was used in an ancient phase datable between the fifth and fourth centuries BC and continued until the chronological phase datable between the first and fourth centuries AD. In the following centuries, geomorphological analysis has indicated in Bovio Square the formation of an emerged shore between the fifth and the sixth century AD, with the advancement of the coastline detected at the southern limit of the excavation area [5].

In the stretch between Nicola Amore and Garibaldi squares, came to light the presence of an emerged shore connected to the depression of Sebeto River, the waterway delimiting the Neapolitan territory to the southeast in ancient times. Instead for the eastern area, in literature, was reported the presence of a necropolis connected to the road leading to the Vesuvian countryside, which must have belonged to the coastal road axis used from the second century BC to the second century AD and found in Garibaldi Square thanks to restoration work of the roadbed [5]. In the excavation of Garibaldi station, in the homonymous square, was found a road built in the second century AD, then raised following flooding episodes lasted until the fifth century AD. The geo-archaeological investigations have found that, despite the definitive abandonment of the road during the 2nd century AD, the frequency of man did not stop, as evidenced by the traces of cultivation and fencing [1]. The shoreline, in the Middle Ages, still shows a prograde, from the seventh to the twelfth century AD caused by bad drainage of the coastal belt in the area behind the formed shore. In the following centuries, the urban evolution tells of an intense urbanization of the coastal belt, with advances of the coastline of modest magnitude. In the Modern Age the coastal landscape of the bay of Naples, close to the line of fortifications, had a beach and a harbor basin in the area now occupied by Bovio Square, as can be seen in the historical iconography [11].

Between the sixteenth and eighteenth centuries, the coastline was subject to fluctuations due to the formation of shores on the eastern side of the coast, after breakwaters construction occurred in the middle of the eighteenth-century BC. Between the nineteenth and twentieth centuries, the profile of the coast was changed drastically from the jetties to widen the harbor docks and from the artificial fillings put into effect on the low districts of the city, to realize the sewerage infrastructures made necessary after the umpteenth epidemic that struck the city of Naples in 1884 [8].

Figure 2 – Bartolommeo Capasso: Topography of the city of Naples in the eleventh century (reproduction from specimen preserved at the Library of National History). [https://journals.openedition.org/mediterranee/2943]

The archaeological discovery of Neapolis harbor inlet in Municipio square

The excavations for the subway construction were crucial not only to reconstruct the ancient coastline but also, above all, to solve the topographical problem of Greek-Roman Naples port localization. For centuries, the studies of historical topography formulated hypotheses that placed the harbor inlet in the areas today occupied by Giovanni Bovio, Nicola Amore and Municipio squares. Among these, Bartolommeo Capasso (1815-1900) and Mario Napoli [18] studies have been confirmed by the archaeological discovery in Municipio Square, in the underground station area located in the innermost part of the ancient inlet [4-2-3].

The port facility of the Greek-Roman Naples was built in a naturally protected cove, in the area now occupied by Municipio square, in a stretch of coast sheltered by the action of the winds and easy landing for boats. The data obtained from geo-archaeological investigations, carried out by the Superintendence of “Archaeology, Fine Arts and Landscape” of Naples, in line with the activities of "preventive archaeology", have allowed to provide information of a topographical, functional and chronological nature [12]. During the geomorphological surveys, the bottom of the harbor basin was identified, placed to 13 meters deep from the floor of the square, at that time occupied almost entirely by the inlet [16]. Below the stratigraphic sequence was found the existence of a shallow submerged environment in which were distinguished about four meters of stratified sediments belonging to different sandy depths of the port basin, reporting the existence of a protected environment in communication with the open sea and contaminated by fresh water [5]. The boundaries of the harbor basin identified, are marked to the south by a tuff promontory stretched towards the coast that reached the northeast in a sandy tongue and to the north the area now occupied by Giovanni Bovio Square [12]. This reconstruction of the sea basin morphology was confirmed by the investigations carried out during the excavations for Line 1 of the subway. Datable from the end of the 4th century BC to the first half of the 3rd century BC was identified a large inlet between Castel Nuovo and the church of S. Maria di Porto Salvo, with the construction of a landing place that remained in use until the beginning of the 5th century AD [15].

The most significant traces of the ancient port of Neapolis existence in Municipio Square, where the lowest point of the seabed was measured, are documented by the discovery of the remains of piers and docks. The infrastructure of the port resurfaced belong to different historical phases. The remains of the pier perpendicular to the coastline, made with poles contained by a cast of medium and large stones set in place dry, date back to the end of the first century AD. In the second century AD two bridges/ footbridges were built at the slope of the coastline. Between the end of the 2nd and the beginning of the 3rd century AD these docking structures were no longer used, until during the 3rd century AD the harbor basin resumed its activity, as documented by the ceramic finds and the remains of some small wooden poles used for the docking of fishing boats. A more intense use of the port was found in a period datable between the fourth and the beginning of the fifth century AD, with the discovery of small masts related to wooden walkways, used in fishing activities. Later, during the fifth century AD, the formation of a lagoon environment and the progressive cover-up of the sea basin, which lasted throughout the sixth century AD, led to the definitive abandonment of the ancient port [15]. To complete the picture of what should

have been the arrangement of the landing in the bay of Neapolis, contributed in a decisive way the discovery of the wrecks of ships of the Roman era, emerged during the work of the subway. The position of the boats helped to define the outline of the ancient landing place. The port, therefore, did not allow the landing and mooring of large draught ships and offshore boats, for this reason the loading and unloading of goods was facilitated by boats, such as those found, which took cargoes from ships anchored off the port. According to archaeologists, one of the boats found that was used for port servitude is unique in this part of the Mediterranean, two similar boats were found only in the ancient port of Toulon in France. The description of one of the boats is given by the archaeologist Daniela Giampaola, in charge of the excavations, observing that the wreck "has a very wide keel, with little high edges and the flat bow in order to favor the berthing to the pier and the loading and unloading of good" [13].

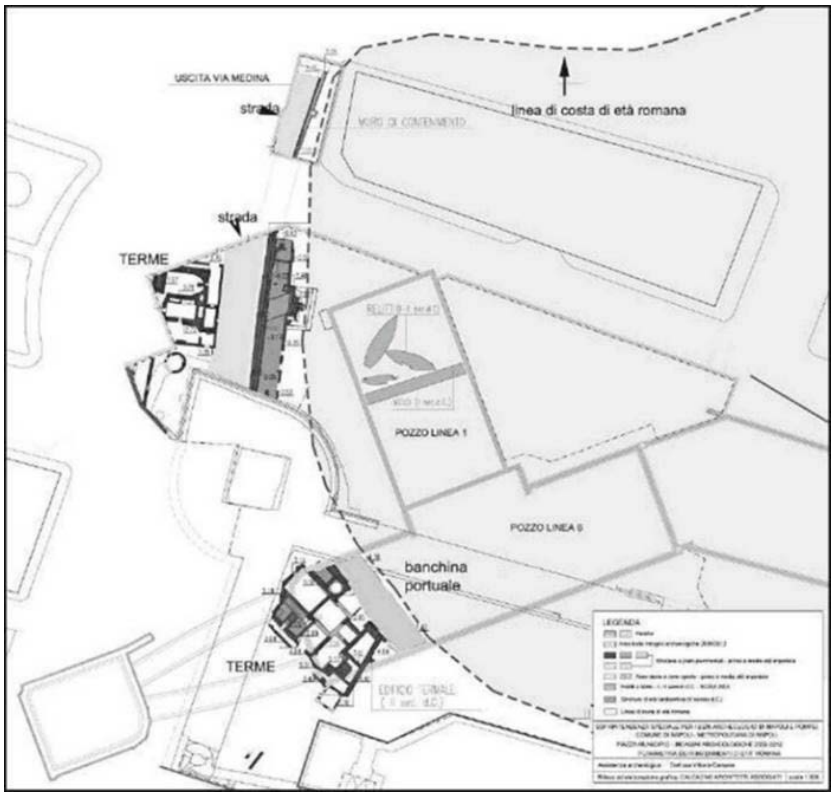

Figure 3 – Naples, Municipio Square. Plan of the Roman period.
[www.academia.edu/35328745/ATTIVIT%C3%80_SOP_SPECIALE_BENI_ARCHEOLOGICI_NAPOLI_E_POMPEI_ATTI_LII_CONVEGNO_STUDI_MAGNA_GRECIA_TA_2012_pdf]

In addition, the remains of what was transported by boats were also found buried in the muddy bottom of the ancient port. The finds consist of numerous amphorae and objects of various kinds including coins, bottles, shoes along with a variety of useful tools for sailors and huge quantities of extremely varied import materials, including ropes, anchors with wooden teeth, wicker baskets and mats, all testimonies of how much it was used in the activities that were carried out in the port. The archaeological excavations followed for the recovery of the ancient port, have allowed to find, under the boats, furrows of dredging operations carried out in order to contrast the phenomena of silting up that had to be repeated in the port with a certain frequency, creating problems to the boats landing. In fact, geo-archaeological investigations have found more than ten meters from the decking, a port basin characterized by a shallow seabed and poor exchange with the open sea [12].

The deeper levels inspection of the creek has evidenced remains of dredging works that have affected the seabed. These excavations, datable between the fourth and third centuries BC were made to lower the seabed, removing sand and excavating pyroclastic rock, to facilitate the mooring of the boats. These interventions of maintenance, protracted over the centuries by man, has altered the oldest stratigraphy related to the initial stages of anthropic frequenting of the bay, linked to the settlement of the emporion of Partenope founded in the seventh century BC and to the colony of Neapolis of the fifth century BC [5]. However, in the excavation in Municipio Square were recovered, at the deepest depths of the seabed, ceramic fragments from the early seventh century BC, and comparable with the oldest materials of the town of Parthenope, found in the areas of the necropolis of Pizzofalcone and the discharge of the Chiatamone [7].

Geoarchaeological surveys have established that dredging activities in the basin of Municipio Square presumably ceased during the second half of the second century BC. Referable to that time, in fact, the sandy sediment of the bottom was little affected by dredging. Moreover, the protected position of this part of the inlet that has preserved the sandy stratigraphy from the disturbances of the wave motion, has allowed the discovery of seabed consisting of sand, silt, and marine plants. In these layers of sediment have been found numerous finds ascribable to municipal waste, objects lost during the loading and unloading of goods and equipment on board. The large amount of ceramics found dating from the end of the third century BC to the beginning of the first century BC are evidence of the intense attendance of the port of Neapolis in that period [5]. and tell uses and customs of the Greek-roman town.

Underground excavations: between remains and archaeological finds

In recent decades, urban mobility in the city of Naples has been made more fluid thanks to the construction of new metro lines. Integrated with the passing railway, a system of public transport on iron has been created that has reorganized urban mobility, making easier to move between the historic center, hilly neighborhoods and urban suburbs. Precisely the works for the construction of the new subway that crosses the historic center, allowed to bring to light the ancient vestiges of the city, preserved in the urban subsoil.

Most of the archaeological finds have been discovered in the wells for the construction of the stations of Toledo, Municipio, University and Duomo.

From the excavations of the Toledo station have emerged archaeological finds attributable to different eras, from prehistoric to modern. More exactly fields have emerged dating from the fourth millennium BC (Neolithic), while for the Imperial Age were found remains of a Roman quarter with relative thermal baths (2nd century AD) and dating back to the modern era are the Aragonese fortifications of the fifteenth century AD.

In Municipio station excavation, in addition to the Greek-Roman port, the remains of Angevin buildings and Aragonese and viceregal fortifications have come to light. The construction of the interchange station between Line 1 and Line 6 of the subway, next to Castel Nuovo, revealed the presence of remains of late ancient times related to a thermal complex built on the banks of the port. The most important evidence of the port existence in the area of Municipio Square was the discovery of five shipwrecks from the Roman era. As previously reported, geomorphological investigations have highlighted the evolution of the coastline, located below the current stations Municipio and University (Bovio Square), with the identification of a large inlet. This has led to the hypothesis of a single large basin extended between Municipio and Bovio squares, then divided into several creeks because of the phenomena of burial occurred over the centuries. In the bay of Bovio square there are traces of a secondary landing, located on the edge of the ancient port closest to the urban fortifications. Thanks to the discovery of a large amount of pottery of the fourth century AD, the presence of artifacts attributed to craft activities and a building of the seventh century AD, intended for storage goods, it was possible to document the shift of the port and its commercial activities to the east [14]. Among the many finds emerged during the excavations of the Duomo station, the remains of the Sanctuary of the Isolympics Games, erected in the city of Naples by the will of the Emperor Augustus, have been found.

The archaeological findings have confirmed how the sacred complex, of which part of the temple and the portico have been explored, fell in a competitive district located outside the fortified perimeter of Neapolis [14]. During the archaeological explorations conducted between the Duomo and Garibaldi stations were found abundant ceramic finds dating from the Middle Bronze Age to the Iron Age, documenting the anthropic presence in a coastal environment emerged very close to the shore [5]. All the explorations of the subsoil stratifications have been conducted by the Superintendence "Archaeology Fine Arts and Landscape" of Naples, in the context of the activities of "preventive archaeology", specialized research activity that is carried out in sensitive areas with diagnostic surveys of the terrain. Preventive archaeology, in fact, has a considerable importance, contributing significantly to the process of reconstruction of urban archaeology. Very often, this type of investigation allows archaeological knowledge that in many cases had escaped scientific investigation, as evidenced by the unexpected findings during the excavations for the construction of the new subway line. The important archaeological finds that occurred thanks to the construction of the metro line and its stations have given rise to a large museum, allowing, in addition to the construction of modern infrastructure, also the enhancement of the urban context. With the construction of the new metropolitan railway, the historic center has returned to be an important cultural attraction, easily accessible and which has an underground railway that travels through the ancient and wonderful memories of the city.

Conclusions

A new and important opportunity to explore the stratification of the soil in the historic center of the city of Naples has been possible thanks to the realization of the subway lines 1 and 6. The activities of "preventive archaeology" carried out by the Superintendence "Archaeology Fine Arts and Landscape" have allowed putting an end to the topographic diatribe on the precise location of the port of Naples in the Greek-Roman era.

The reconstruction of the profile of the ancient port of Neapolis has become possible thanks to the elaboration of the stratigraphic data and the information obtained during the geo-archaeological prospecting campaigns. The intersection of these studies has allowed the elaboration of precise hypotheses for the transformation of the coastal landscape occurred over the centuries and caused by the overlapping of anthropogenic and natural phenomena, such as subsidence and swamps.

The research work was aimed at the acquisition and structuring of the numerous information relating to the archaeological discoveries that emerged in Municipio square, during the works for the construction of the new underground stations. In particular, the methodologies to be used in ancient landscape studies were the subject of the work.

The intersection of information from existing literature and the data on the finds, made available by the Superintendence of “Archaeology, Fine Arts and Landscape” of Naples, allowed to define the archaeological landscape of Municipio square. This enabled finalizing the work to implement the transfer of scientific and historical cultural knowledge, as required by the objectives of the DATABENC (High-tech District for Cultural Heritage) district. It is therefore necessary for the city of Naples to optimize the use of cultural heritage, as it contributes to improving the quality of life of an entire community.

For the reconstruction of the ancient Neapolitan coastal landscape, a fundamental contribution has been provided by the investigations conducted in the wells of the underground stations. Most of the traces of the ancient coast were found during the works for the construction of lines 1 and 6 that run respectively the Rettifilo and the Chiaia Riviera, while the archaeological findings inside the excavation of Municipio station have made possible to define precisely the ancient inlet where the archaic port of Neapolis was located. Along the stretch of the metro that runs along the Chiaia Riviera, stratified deposits have emerged attributable to a coastal environment, identifying in this area of the city the existence in ancient times of a transition zone between submerged and emerged shore. Fundamental to outline the profile of the ancient coastal landscape of Neapolis was the contribution of geo-archaeological inspections during the completion of the Duomo and Garibaldi stations. These stations falling in the zone between the sea and the plane on which Neapolis was founded, have shed light on many testimonies useful to rebuild the coastal landscape, ascertaining the previous existence of a shore in a context of predominantly emerged coastal environment. The excavation work for the realization of the subways helped to outline not only the profile of the harbor inlet. The port occupied the area now become Municipio square, but also that of a large inlet located in the area of Borsa square, considered by the experts a marginal area to the ancient harbor basin that remained in function also in late ancient age, as documented by the archaeological investigations.

The exceptional quantity of memories and traces found have allowed the reconstruction of the urban layout of the ancient port. It appears with its docks and its ships,

clarifying the causes of the disappearance in the centuries of the creek, caused by the overlapping of natural and anthropological phenomena, up to the complete transformation of the coastline caused by works for the realization of the modern port. In conclusion, the geomorphological reconstruction of the coastline shows that the inlet identified in Municipio Square was the most suitable for landing boats and was probably used as a marina by the first Greek settlers. In this regard, it was observed that the coast to the south of the promontory, where the archaic settlement of Parthenope was founded, had a tuff coast more exposed to the sea while the west side was characterized by a long and thin shore. Moreover, the hypothesis of the harbor use in ancient times in the inlet explored in Municipio square is supported by the findings dating from the end of the 3rd – 4th century BC.

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