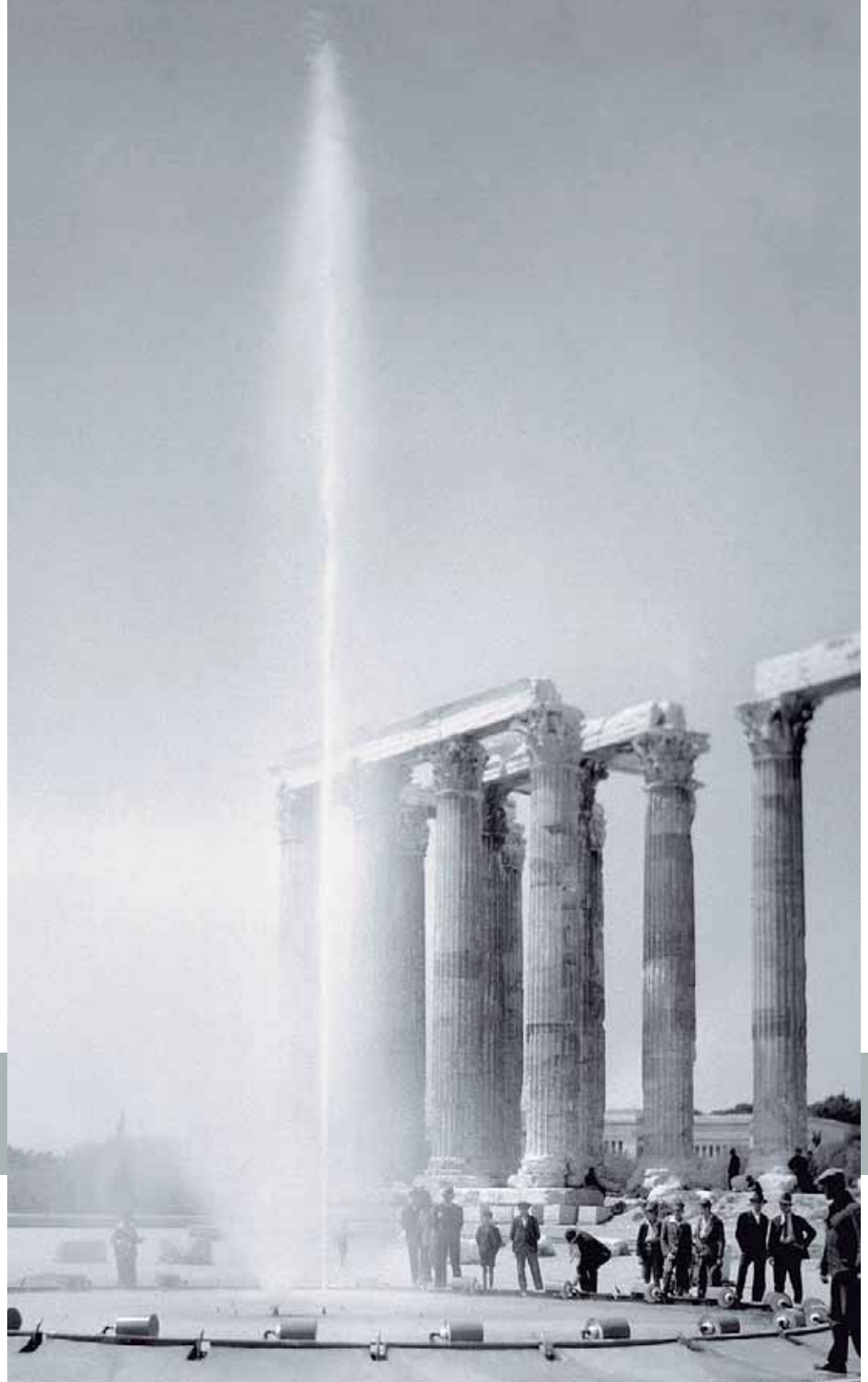


The water cycle of the Attica soil

EYDAP

The water cycle of the Attica soil

EYDAP

There is an indissoluble bond of life between man and water. Water is not only the essential commodity for man's survival on the planet, but also his eternal ally in his struggle for the continuous amelioration of the quality of his life. This bond soon made clear, that the development of a rational management system of the water cycle is indispensable, especially in areas where this good had been a scarce resource.

Attica has always been an area with limited rainfall, and therefore, water resources have never been adequate. Thus, from the very early days, its inhabitants had to develop basic water collection and distribution systems for the water supply of the city, which were improved with the passing of time and the progress of technology. Thousands of years ago, a lot of historic projects were constructed to secure the water supply, hygiene and, consequently, the high living standards of the inhabitants of Attica area. Among these projects are aqueducts, fountains, wells, reservoirs, distribution networks of the early times, and dams, water treatment plants, quality control laboratories as well as sewerage and wastewater treatment plants, irrigation and anti-flood projects of the more modern era.

This book turns our memory and love to those people who willingly offered their spirit, soul and efforts to ensure that the inhabitants of Attica will never be in shortage of this precious good. It is devoted to those people, whose work obtained a special interest, as the history of Attica water was linked to the life and expansion of a city, destined to become a fountain of knowledge and the cradle of our modern civilization.

We wish to honor those pioneers through this recording of the existing historic knowledge and the photo-album representation of moments of their lives, acknowledging their age-long creative route, and their efforts filled with anguish.

Prehistoric Times – Classical Era

According to the Greek Mythology, **Poseidon** and **Athena** were two Olympian Gods who both wished to donate their name to the city founded by Theseus on the plain of Attica. In an effort to convince the city on his favor, Poseidon offered the gift of **water** while Athena offered the **olive tree** instead.

The city inhabitants rejected Poseidon's gift and decided in favor of Athena. Their decision infuriated Poseidon the God of Water, who felt the value of his gift was underestimated, and so he condemned the city of Athens to be plagued eternally by water shortage. Thus, according to Greek Mythology, Athens «paid» and continues to «pay» dearly even today for the ingratitude it showed to the easily offended Olympian God.

This myth of course is only a metaphysical interpretation of the actual «curse» that has threatened the lives of the citizens of Athens for thousands of years. This myth basically illustrates how water shortage has been threatening Athenians since the ancient times.

Rivers

Only two rivers throughout the Attica plain, the **Ilisos** and the **Kifisos**, have waterflow all year round.Although their riverbeds are deep, their flow is very low. **Iridanos**, **Cyclovoros**, and **Podoniftis** Rivers are more accurately described as torrents with waterflow observed only after periods of heavy rainfall. However, regardless the scarce water resources, the water of Athens was always of excellent quality and so, those who consumed it were known to be «of good voice», «with good memory» and «friendly» in general.

Springs

Ancient Athens was primarily supplied with water from springs and local wells.

One of the most famous springs was the **Spring of Kalliroi** (the source of the Ilisos River). There were many springs around the cliffs of Acropolis, such as **Klepsidra**, **Aglavros**, the **springs of Asklipios** and the **Erechthieda Sea**.

Fountains

Many springs or fountains around the city of Ancient Athens were decorated with beautiful monuments that are famous for their artistic value. One of the most famous was the **Eniakrounos**, an artful construction with nine streams of water where newlyweds reputedly washed their hair. Other famous fountains were the Fountain of **Pan**, the **Panopos** Fountain, the fountains in the **Attalos Gallery** and at the foot of the **Areios Pagos Hill**.

Wells

As already mentioned above, local wells also played an important role in the water supply of Ancient Athens, some of the most famous being the **Wells of Freatida**.

Pelasgiko Aqueduct-Theseus Aqueduct

In their continuous effort to satisfy demand for water, the ancient Greeks relied heavily on an intricate system of small aqueducts, which also supplied with water the many aforementioned fountains.

The oldest aqueduct on the Athenian Plain was the **Pelasgiko** Aqueduct that supplied the Ilisos River basin with water from the Hymettus Mountain. The second oldest aqueduct was constructed by **Theseus**, whose name it bears. This aqueduct brought water from the Penteli Mountain to the ancient city of Athens.

Pisistratos Aqueduct (540 B.C.)

Later, between 540 - 530 B.C., Pisistratos constructed an underground aqueduct about 2,800 m. long that collected water from the Hymettus Mountain springs. Pisistratos also created the first water distribution network from which the famous Eniakrounos Fountain and others were supplied with water. Thanks to the projects completed by Pisistratos, water reportedly flowed in abundance and efficiently met the citizens' needs.

Other aqueducts

Other aqueducts that operated during these times were the **Pnika**, **Thesian**, and **Loutro** Aqueducts.

Water reservoirs - Rain catchment basins

In their effort to achieve a more effective water supply system, the ancient Greeks soon recognized the significance of water conservation to ensure water availability during times of drought. Small reservoirs and rain catchment basins were constructed. The rain catchment basins were mainly long term underground storage facilities (either natural or manmade) while the reservoirs were primarily short term storage facilities directly linked to the distribution network. Some of the most famous reservoirs where the **Hamosterna** and **Pikrodafni** Reservoirs.

Water and Laws

Despite the constant threat of water shortage looming overhead, the ancient Athenians not only constructed works to ensure sufficient quantities of water, but also took measures to preserve water quality and promote rational usage of the scarce resource. In the history of the city of Athens, the earliest recorded regulations refering to water usage can be found in the **Legal Code of Solon**, which remained in force for a long time despite minor changes brought about by Pisistratos. A special body was established at the time to ensure that the regulations were enforced. All the above simply reinforces the fact that despite the permanent threat of water shortage and the limited water abundance, local authorities secured the city's constant water supply through the strict enforcement of the relevant laws and rules and no major protest was ever recorded.

Hellenistic and Roman Period

During the Hellenistic period (4th - 2nd B.C.), water works focused primarily on the effective distribution of the limited local resource and not on methods to increase its quantity.

With the fall of Athens to Rome (1st B.C.), the city is conquered by the Roman General Sulla and some progress in the systematic water supply of Athens is noted. In **2nd A.D.** the Roman emperor **Hadrian**, a great admirer of Greece, during his reign constructed significant works among which, was the **Hadrian Aqueduct** and the **Hadrian Reservoir**.

Hadrian Aqueduct (134-140 A.D.)

At this point, it is worthwhile to interrupt the historical account of events concerning water issues and the city of Athens, in order to give a brief description of the Hadrian Aqueduct, which is without doubt the first large-scale water supply project in the history of the city. The construction of the aqueduct began in 134 A.D. and was completed in 140 A.D. The purpose of the project was not to supply the ancient city of Athens with water, as many believe, but to supply the Roman quarter of the city referred to as "Hadrian's City". The Roman quarter was located in the area where the National Garden and the Zapeion Area is presently situated, roughly expanding from the marble Olympic Stadium Kallimarmaro up to the Parliament building.

The Hadrian Aqueduct consists primarily of a 25 km long manmade underground tunnel constructed from solid rock by hundreds of slaves using simple tools such as chisels and hammers. The aqueduct was designed not only to transfer water towards the city but also to collect it through a number of smaller catchment works along the way as well. These catchment works consisted of smaller scale underground tunnels or surface aqueducts that supplemented the main aqueduct's supply with water from nearby local aquifers or springs. The auxiliary catchment works and supplementary aqueduct systems collected water primarily from the areas of Halandri, Kokkinaras, Kithara, and Monomati. The Hadrian Aqueduct began at the foot of Mount Parnitha in the area of Tatoi and carried water by gravity to a stone reservoir on the hill of Lycabettus in the city of Athens. This reservoir was referred to as **Hadrian's Reservoir** and had a storage capacity of 500 cubic meters of water. The Hadrian Aqueduct and Reservoir mainly provided water for the city of Athens, operating without major changes up until the time of the Turkish Occupation. From this point on, the roman aqueduct and reservoir were left to deteriorate.

After the liberation of Greece from the Turks, the local authorities of Athens, in an effort to address the city's water supply needs, discovered and reused the ancient aqueduct. The aqueduct was cleaned of debris, repaired, and put into operation again in 1840. In 1870 the remains of the Hadrian Reservoir were also uncovered and a new reservoir was reconstructed in its place, with a storage capacity of 2,200 cubic meters of water. The new Hadrian reservoir operated up until 1940.

In 1922 with the huge influx of refugees from Asia Minor, Athens experienced a sudden increase in population that had a serious effect on the city's water supply. An American Company by the name ULEN and Co was commissioned to renovate and increase the water capacity of the Hadrian Aqueduct system, as well as to reconstruct the city's water distribution network. In 1929 with the completion of the Marathon Dam and the Boyiati supply tunnel, the Hadrian aqueduct ceased to be the main provider of water for the city of Athens, although it continued to be a supplementary source for many years.

Following this brief digression, regarding the history of the Hadrian Aqueduct, let us continue the historical retrospective of the water supply of Athens. After the Roman times, during the **Byzantine Era** (324-1453 A.D.) and the subsequent period of **Frankish Conquest** (1205-1456 A.D), there is no mention of any major water supply works constructed in the city of Athens or any maintenance works. In fact, there is only historical reference on the pollution of the Ilisos River by the Franks.

Turkish Occupation Period

The period of the Turkish Occupation of Athens is impoverished in achievements of civilization or works of any cultural significance or public works in the area of water supply for that matter. As already mentioned, the Hadrian Aqueduct and Reservoir, as well as a number of minor aqueduct systems that operated from antiquity, were left to deteriorate. Only in the last decades of the Turkish Occupation were the aqueducts of **Haseki**, **Tsakoumakou**, **Aga**, and **Goudi** constructed. Up until this time, due to the lack of interest of the local authorities to construct any water supply works, Athenian citizens depended heavily on privately owned wells for drinking water and irrigation. They also used local springs and fountains, such as the **Fountains** of **Aga**, **Boubounistra**, **Haseki**, and **Tsakoumakou**.

After the Liberation from the Turks - Modern Times

During the war of liberation from the Turks (1821) many water supply works were destroyed by the retreating Turkish army. Hence, at the time of the liberation of Athens in 1833 the city's water supply problem was critical and demanded urgent and immediate attention. The new city authorities commissioned a number of projects to rebuild and renovate local water supply works, including the aforementioned repair and cleaning of the Hadrian Aqueduct, as well as the construction of other smaller scale water projects. However, none of the above provided a real and effective solution to the water problem of Athens. **For almost one century after the liberation of Athens, the city continued to depend on wells and other local sources for water. The 55 local public fountains** that operated in Athens during the 19th Century were insufficient to provide for the city's daily needs. **Water bearers** made large profits by transporting water from springs outside Athens in Kifissia and on Amarousion and selling it to city dwellers. Up until 1924, nearby springs and the surrounding aquifer were the only sources of water for Athens.

In the early 1900's, Athens' growing population and the pressing need for the development and expansion of the city, demanded an immediate action to be taken. Thus, in 1925, a contract was signed between the Greek Government, the Bank of Greece and the American Firm ULEN and Co for the financing and construction of new water supply works. The result of the contract was the formation of a company, «The Greek Water Company S.A.» (with the greek acronym EEY), with the sole purpose to construct and operate water supply works for Athens. **It's first major construction was the Marathon Dam**.

Marathon Dam and Reservoir

The first major project was the construction of the Marathon Dam (1926-1929), an arch dam with a total height of 54 m., 285 m. length and maximum **water capacity of 43 mil. m³**. Over 900 people were involved in the construction of the dam which is worldwide considered as unique, because it is entirely paneled externally with white Pentelikon marble.

Boyiati Tunnel

The Boyiati Tunnel was constructed to transport water from the Marathon impounding reservoir to Athens. The tunnel has a **length of 13.4 km.** and over 450 people laboured for its construction. The Marathon Dam, the Boyiati Tunnel, the Galatsi Treatment Plant and the new water distribution networks of the cities of Athens and Piraeus were the first organized efforts to provide a total solution for the city's water supply needs.

In the years that followed (in the 1950s), other water works were constructed to augment the amount of water impounded in the Marathon Reservoir, such as the **Aghios Thomas** and **Kakosalesi Aqueducts** and the **Kiourka Tunnel**.

Yliki Lake and Aqueduct

As Athens' population continued to grow, the need for additional sources of water once again became pressing. Yliki Lake in the nearby prefecture of Viotia had a significant amount of available water; however, pumping (through operation of **submerged and on-land pumping units**) was required in order to transport raw water to Athens. It is worth noting that the central pumping station is one of the largest in Europe. All water pumped from Lake Yliki is transported to the Marathon reservoir by the **Yliki aqueduct**, with a total **length of 63.7 km.** The maximum water capacity of Yliki is

594 mil. m^3. The Yliki pumping station and aqueduct system began operation in 1959 and have a nominal supply capacity of 750,000 m^3/ day.

From EEY and OAP to EYDAP

In 1974 the ULEN Company turned over full control of the Athens water supply to the **Greek Water Supply Company (EEY)** which in turn stayed in operation up until 1980. At that time a new legislation framework called for the merger of the **Greek Water Supply Company (EEY)** and the **Athens Sewerage Authority** (with the greek acronym **OAP**), and resulted in the formation of a new water authority (with the greek acronym **EYDAP**) responsible for the operation of the city's water supply and sewerage networks. Consequently, for the first time, water related services, activities and works that up until then, were treated separately, were designed and developed by a single organization. As a result, a portfolio of new projects for the water supply and sewerage services improvement in the city is added to the existing infrastructure.

Mornos Dam and Reservoir - Mornos Aqueduct

The next new project that provided a new source of water supply for Athens was the damming of the Mornos River. The dam's construction began in 1969, but normal operation of the Mornos Dam and the new Mornos Aqueduct began in 1981. The Mornos Dam is the highest earth gravity dam in Europe with a height of 126 m. The Mornos impoundment reservoir has a **storage capacity of 780 million m^3 of water**. The **Mornos aqueduct** that transports water from the Mornos reservoir to Athens is the second longest aqueduct in Europe with a total **length of 192 km**.

Evinos Dam and Reservoir - Diversion Tunnel

The diversion of the river Evinos towards the Mornos reservoir along with the construction of a dam under the same name and a connecting tunnel is another major project that contributes to the water supply of Athens. Works on the Evinos began in 1992 and the dam was completed in the summer of 2001. The earthen dam is 124 m high, while the maximum water **capacity** of the reservoir is **140 million m^3**. The water drawn from the Evinos reservoir is transported to the Mornos reservoir through the **connecting diversion tunnel**, with a total **length of 29.4 km**. The construction of the tunnel was completed in less than two years time, which constitutes a world class achievement in the field of construction of long distance tunnels. The Evinos reservoir supplies Athens with a mean of approximately 220 million m^3 of water per year.

Connecting Aqueducts

The Mornos and Yliki Aqueducts are joined by a system of connecting aqueducts that provide alternative route supply schemes for the works maintenance and repair needs. Moreover, the network of connecting aqueducts also offers EYDAP greater overall control and water resource management capability according to the hydrological circumstances and the respective consumption needs.

EYDAP Water Treatment Plants

Via the Mornos, Yliki and connecting aqueducts (with a total combined length of 500 km.) raw water is transported from various sources to the four drinking water treatment plants in the Athens area: **Galatsi**, **Polydendri**, **Acharnes**, and **Aspropirgos**. The four water treatment plants have a total capacity of 1.9 million m^3 of water per day.

Treatment and Distribution of Drinking Water

Raw water undergoes **coagulation**, **sedimentation** and **filtration** and is finally disinfected with **chlorination**. Athens's drinking water is of excellent quality and is considered to be one of the best in Europe. Drinking water is transported from the four treatment plants to the **storage reservoirs** and tanks located throughout the city. From the storage reservoirs water reaches the consumers through an **extensive distribution network** with an estimated total **length of 9,500 km**, which is constantly expanding and being restored.

Quality of drinking water

The water offered by EYDAP for consumption is potable and safe, ranking its quality in top levels and among the best in Europe. The quality achieved is, on the one hand a result of the treatment process taking place in the Water Treatment Plants of EYDAP, and on the other hand assured by dozens of quality control parameters for both raw and treated water, on a daily basis.

All the required from greek and european legislation quality parameter tests are performed in raw and treated water daily to ensure its optimum quality. The samples obtained from all installation parts, i.e: raw and treated water reservoirs and the distribution network are tested in the chemical and biological laboratories of EYDAP. These tests are conducted on a daily basis at the chemical and biological laboratories of EYDAP.

The value of water as nature's gift to man is priceless. Its storage in manmade impounding reservoirs, its transport, treatment, and distribution involve huge amounts of money, with even more being spent on new works and daily operation costs. That is why **potable water is a valued commodity that is bought and sold**. This system ensures the uninterrupted supply of this valuable resource and the constant improvement of all processes associated with its journey from the source to the tap of our home.

From Ancient Times until the Turkish Occupation Period

In ancient times, there was no organized sewerage network in the city of Athens. The first references to **mixed-flow networks (for both rainwater and raw sewage), are recorded in 500 B.C.**, like Iridanos sewer, which along with the Central sewer, were servicing the areas of Ancient Market (Agora), Areios Pagos and Pnyka. The stagnant waters, due to these open sewerage systems, were sources of serious diseases and illnesses, such as cholera, plague, etc.

This practice was followed for almost 15 centuries, and was gradually abandoned in favor of the use and complete spread of a channeling system of waste to **septic drain tanks**. When the tanks reached their saturation point, either a second tank was made, or the waste was collected and discharged again in open recipients (torrents, streams). Naturally, this technique did not ward off either the threats to the public health or the pollution of the environment (contamination of underground aquifers).

Modern Times (since 1830)

Around **1840**, for the first time in the Greek State's modern history, a mixed-flow **system for the collection and channeling of rainwater and raw sewage was constructed**, along Kolokotroni, Ermou, and Ayiou Markou streets, as well as along Adrianou street, towards Thissio Area, both using as recipient a stream in the area of Kerameikos.

In the same period (1858), the decision to cover the stream existing along Stadiou Street, from Syntagma to Omonoia, was made. A **mixed-flow** main **along Stadiou Street** was constructed by a French group for Public Works. The same group proceeded with the construction of the sewerage networks (mixed-flow) along other streets in the old city of Athens.

The above main network of mixed-flow collectors was completed with the development of secondary networks along various streets in the center of Athens, thus realizing, for the first time, a basic sewerage network. The wastewater collected through this network was channeled via the Main Sewer in the open field, and into the stream of Profitis Daniel.

Until **1893**, the **total length** of mixed-flow network was **approximately 11.5 km long**, while the urban development, at that time, required a networks 90 km long. This meant that only 12% of the old city of Athens was serviced, while the actual need was eight times larger.

In **1929**, the Greek government invited **G. Fandoli**, Italian professor of hydraulics, who, after examining the sewerage problem of Athens, suggested the construction of a composite sewerage system, consisting of a mixed-flow system for the west part of the city (Kifissos Basin) and a separate system for the east part, with the future collector ending at the tip of Piraeus Peninsula, at Akrokeramos.

In **1931**, the «Societé Anonyme for the Construction of Sewers in Athens and the Suburbs» was established, and despite the breaking out of the World War II, it drew up the final designs for the construction of the basic infrastructure projects, based on the preliminary studies by Fandoli. One of these was the study for the **Main Interceptor Sewer** (greek acronym **KAA**), whose construction began in 1954 and ended in 1959. Rainwater and raw sewage, collected by the multi-flow system, through the KAA, running from the end of Patission Street to Akrokeramos at Keratsini, where it was discharged into the sea. During this period, namely in the 1950s and till the early 1960's, the construction company YDREX carried out the design and construction of the Athens sewerage network.

Sewerage Organization of the Capital (1960-1980)

However, the urgent need for the planning and construction of large scale sewerage projects, led to the founding of the **Sewerage Organization of the Capital** (greek acronym **OAP**), in the 1960s. OAP became the first well-organized company responsible for undertaking the design, construction, maintenance, operation, and exploitation of the Athens sewerage and rainwater network.

In **1963**, OAP submitted a **preliminary design for the sewerage of a 200,000,000 m² area in Athens**, providing for a separate system, beyond the center of the city. During the 1960s and 1970s, the Athens sewerage networks were developed on the basis of this design.

With OAP in charge, basic infrastructure projects for the sewage of the city were completed, such as the construction of the **Coastal Collector along the coast of Saronikos**. The pipe runs from the area of Varkiza to the area of Amphithea.

At this point, it should be clarified, that all the main collectors of the Attiki Basin run through areas, where the natural gradient sustains the gravity flow of the wastewater. The sole exception is the Coastal Collector, which cannot operate as a gravity sewer, due to its location in low altitude areas. For this reason, **a series of pumping stations** was constructed, which elevate wastewater to gravity sewer sections, bringing it finally to Akrokeramos.

At the same period, **the Collector of Raw Sewage along Kifissos River**, was developed. This Collector runs from KAA at Rendis Area (south of Athens), to Ekali (north of Athens).

Up to 1980 when the operation of OAP was terminated, a total of 1,700 km long sewerage network and 300 km long of stormwater collectors was constructed. This meant, that the sewerage network covered 55% of the Capital's needs, while the rainwater network covered 10% approximately.

Founding of EYDAP (1980)

In 1980, the responsibilities of OAP were transferred to a new joint organization for both water supply and sewerage requirements of Athens, called EYDAP.

In the sewerage sector, this new organization, undertook the disposal of wastewater and industrial waste. Its duty was also to monitor the wastewater treatment procedure and its final discharge into the sea.

In the 1980s, one more main collector of a large diameter, the **Supplementary Main Interceptor Sewer** (greek acronym **SKAA**), was added to the existing sewerage network of Athens. This collector, begins from KAA at Rendis Area, to discharge at Akrokeramos.

In the years that followed, EYDAP expanded the primary sewer network of Athens, including collectors of large diameter. Hundreds of thousands of meters of these collectors run underneath large roads and avenues in the city, and terminate at KAA. The construction of the secondary sewer network, consisting of smaller diameter pipes, is undertaken by the **Municipalities**. This network is finally connected to the primary pipes and the main collectors. The Municipalities also carry out the construction of the connection of the houses to the local network (branching).

The local secondary networks constructed by the Municipalities, following a scheduled procedure, became part of the entire system of sewerage administration, owned and managed by EYDAP. Today, the sewerage networks of approximately 65 Municipalities are owned by EYDAP. Since 1999, EYDAP has no jurisdiction for the construction and maintenance of the Athens rainwater network, except for the part of the combined network extended in areas of

central Athens, the length of which is approximately 80 km.

Apart from network construction, EYDAP is concurrently involved in the thorough and efficient operation and management of the system with regular maintenance and immediate repair in cases of failures. EYDAP uses **high technology control systems**, such as cameras for the monitoring of the sewage pipes, by which damages can be controlled, located and repaired.

Metamorphosi and Psyttalia Wastewater Treatment Plants

The application of anti-pollution technology with the operation of the two Centers for the wastewater treatment constitutes the last stage in the sewage management cycle in Athens. For decades, wastewater of the Athens Basin was dispelled at Akrokeramos straight into Saronikos Gulf, without any prior treatment, thus polluting the Gulf and degrading its ecological balance.

The two Centers for the wastewater treatment of EYDAP have been operating since 1994 in Psyttalia and 1985 in Metamorphosi. There, the wastewater of the capital is collected and undergoes treatment before being discharged into the environment, harmless and safe for the balance of the ecosystem. An almost complete **-up to 95%-removal of the wastewater** BOD load is achieved at both wastewater treatment plants. In other words, the water resulting from the waste treatment is almost completely clean.

The **wastewater sludge** resulting from the sewage treatment in Psyttalia undergoes treatment at the **Sludge Thermal Drying Unit** operating since June 2007. The final product is forwarded for energy cogeneration in other industry sectors, for example concrete production. Meanwhile, the design study for the construction of a unit exploiting the sludge's energy in situ is under way.

Sewerage of Thriassion Pedio

EYDAP S.A. has undertaken the construction and operation of the project **«Main Wastewater Collectors and Wastewater Treatment plant in Thriasio Pedio»** in Attica Region. The purpose of the project is to upgrade the quality of life of the residents in Elefsina, Aspropyrgos and Mandra - Eidollia Municipalities, to restore the balance of the marine ecosystem at Elefsina sea and to contribute to the sustainable development in the area. The project will serve the needs of a total equivalent population of 117,000 inhabitants.

Sanitary Engineering Research and Development Center

The **Sanitary Engineering Research and Development Center** (greek acronym **KEREFYT**) operates in Metamorphosis. Research studies on the qualitative standards and treatment processes of waste, under certain environmental conditions, are carried out.

Alongside the main aqueducts, EYDAP constructed and operates small Hydroelectric Power Plants. In these plants the hydraulic energy of water is utilized and turned into mechanical energy by a water turbine and then into electric energy by a generator. The operation of these works ensures that the previously unexploited hydraulic potential of the aqueducts is utilized, providing clean, environmental-friendly electric energy with no emission of harmful pollutants. Presently, six small Hydroelectric Plants are in full operation in the geographical areas of Kirfi, Elikonas, Kitheronas, Mandra, Evinos and Kleidi.

Furthermore, on the island of Psyttalia, two **Electricity and Thermal Energy Co-production Plants** are in operation, the first one utilizing the biogas produced during treatment and the second one utilizing natural gas. The electricity produced at the biogas plant is primarily used by the Psyttalia WWTP, however surplus electricity is sold to the Operator of Electricity Market (greek acronym LAGIE). The natural gas plant covers the heat and power demands of the Psyttalia sludge drying plant.

The utilization of biogas has environmental benefits due to the exploitation of a renewable energy source and the reduction of atmospheric pollution, as well as financial benefits, such as the reduction of operation costs and profits made from the trade of electrical power.

Similar benefits will result from the **exploitation of solar energy**. EYDAP is designing the **development of photovoltaic systems** in selected areas on its premises.

Energy

This short journey, in the history of water cycle, which, for centuries has quenched the thirst of the Attican soil and regenerated all its living organisms, ends here.

However, water will and must, continue its perpetual journey, completing its natural, life-giving cycle. Man, however, must understand, that the preservation and improvement of his own life, requires both the rational management of this valuable resource and his prudent intervention in the hydrologic cycle, which is actually the very cycle of «life» itself.

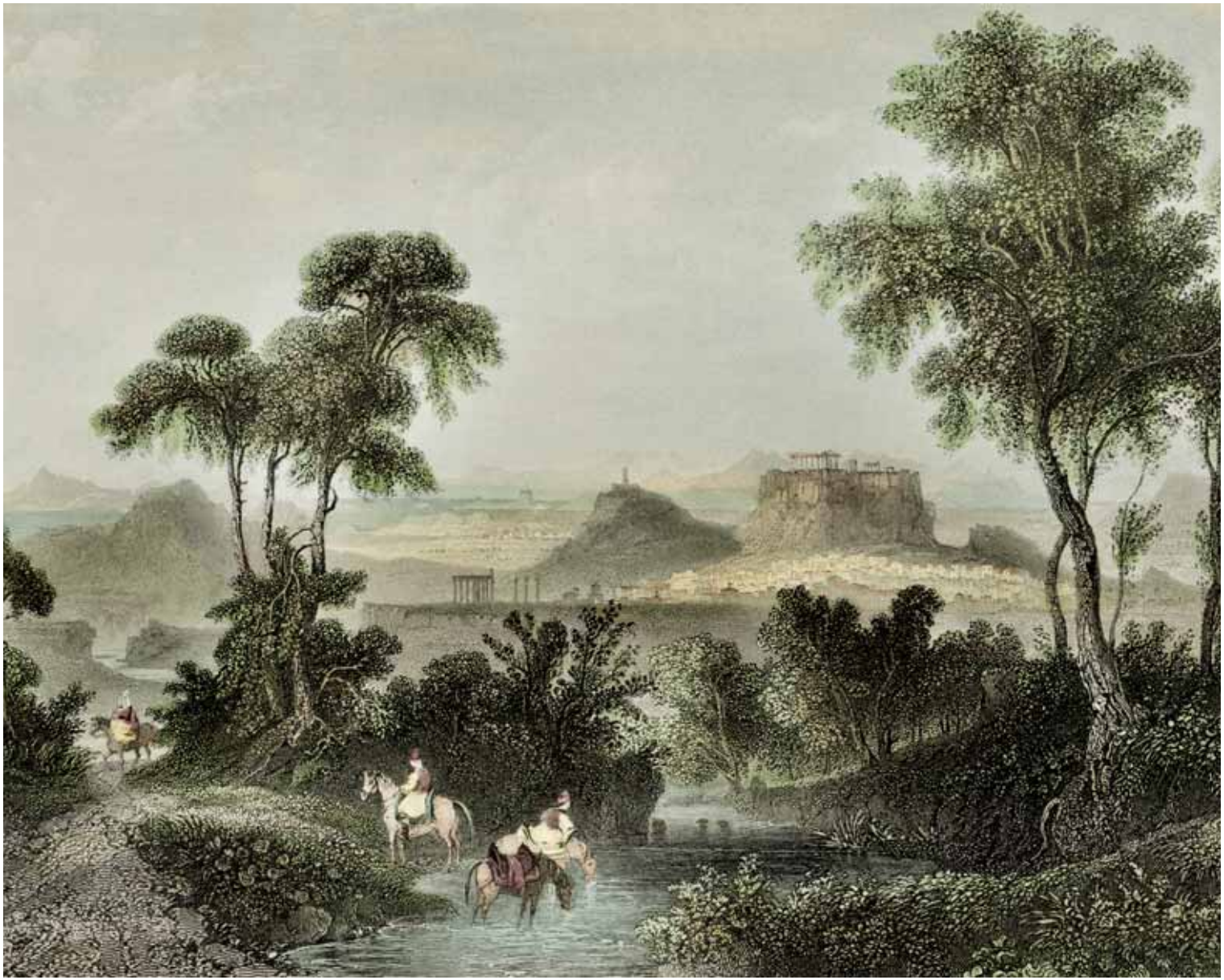
Conclusion

Engraved memory

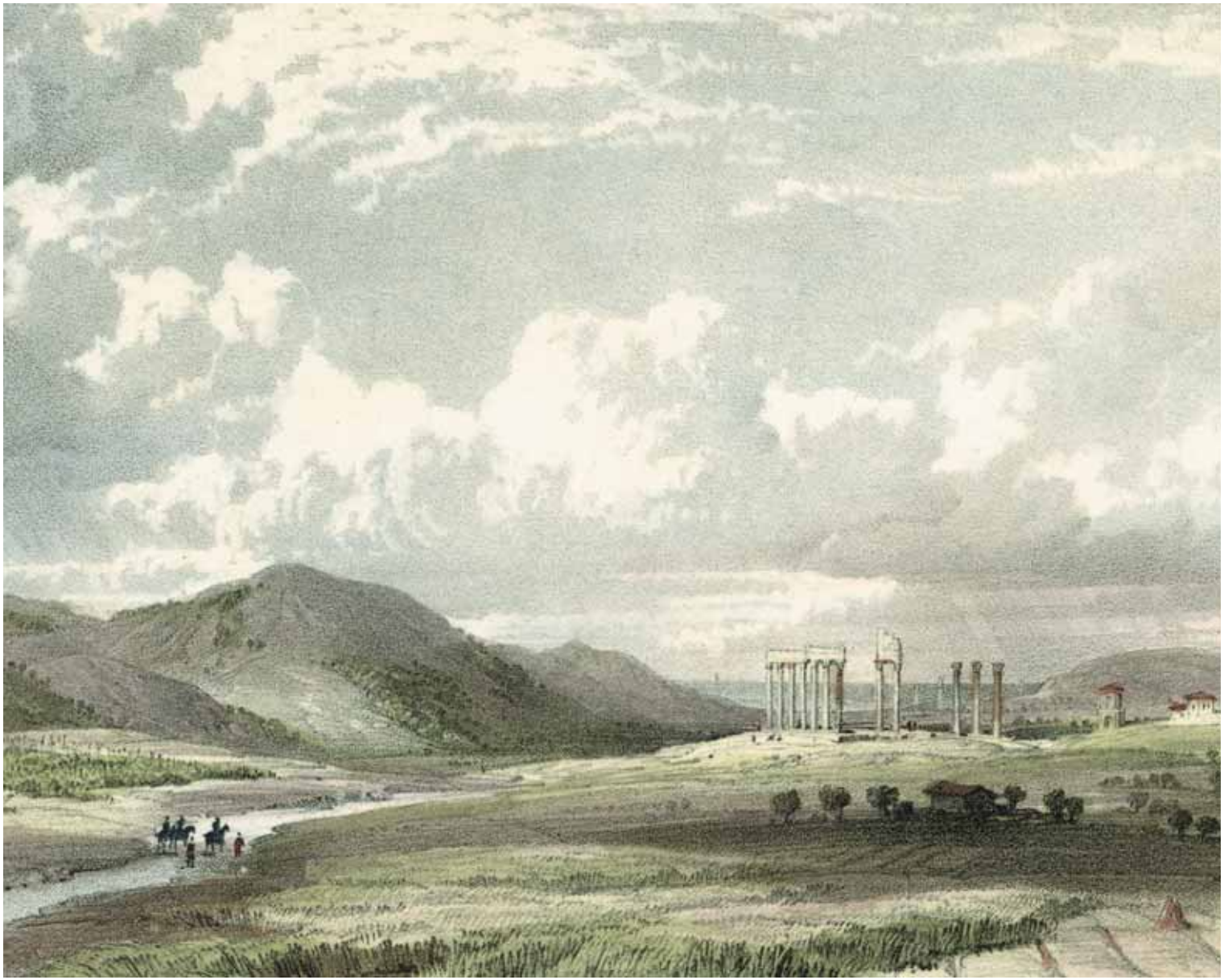
The city of Athens at the years of Emperor Andrianus. Imaginary wood-engraving, 1887

Poseidon and Athena, The city of Athens by their feet. Copper-engraving, 1797 by J. Cronovio

Water nymphs nearby a river of Athens. Imaginary Engraving, 1840



View of Athens from Ilissos river. Engraving, 1840 by Wolfensberger



View of Athens from Ilissos. Lithography, 1837 by G. Cochrane

Cyclovoros stream, running where Metaxourgion Sq. is today. Engraving, 1871 by A. Loeffler

The Adrian aqueduct *(the most important public work by the Roman Emperor, destroyed by Hatzi-Ali Haseki in 1778)*. Water-colour by Louis Francois Cassas

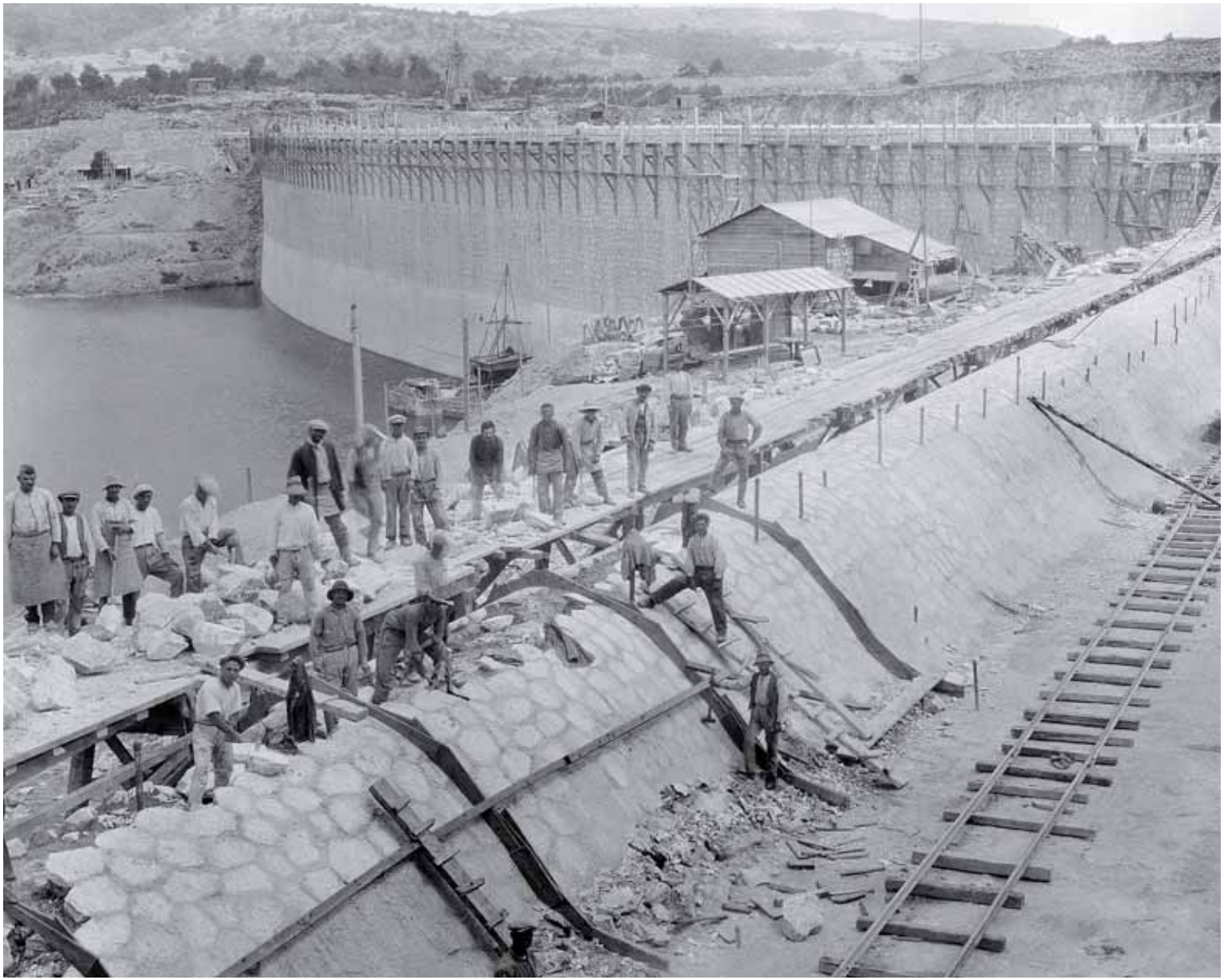
Boubounistra fountain. Water-colour. 1821 by E. Dodwell

Fountain by the Forum Gate. Engraving, 1839 by Marchebeus

Greek women by a fountain. Wood-engraving, 1858 by M.A. Bida

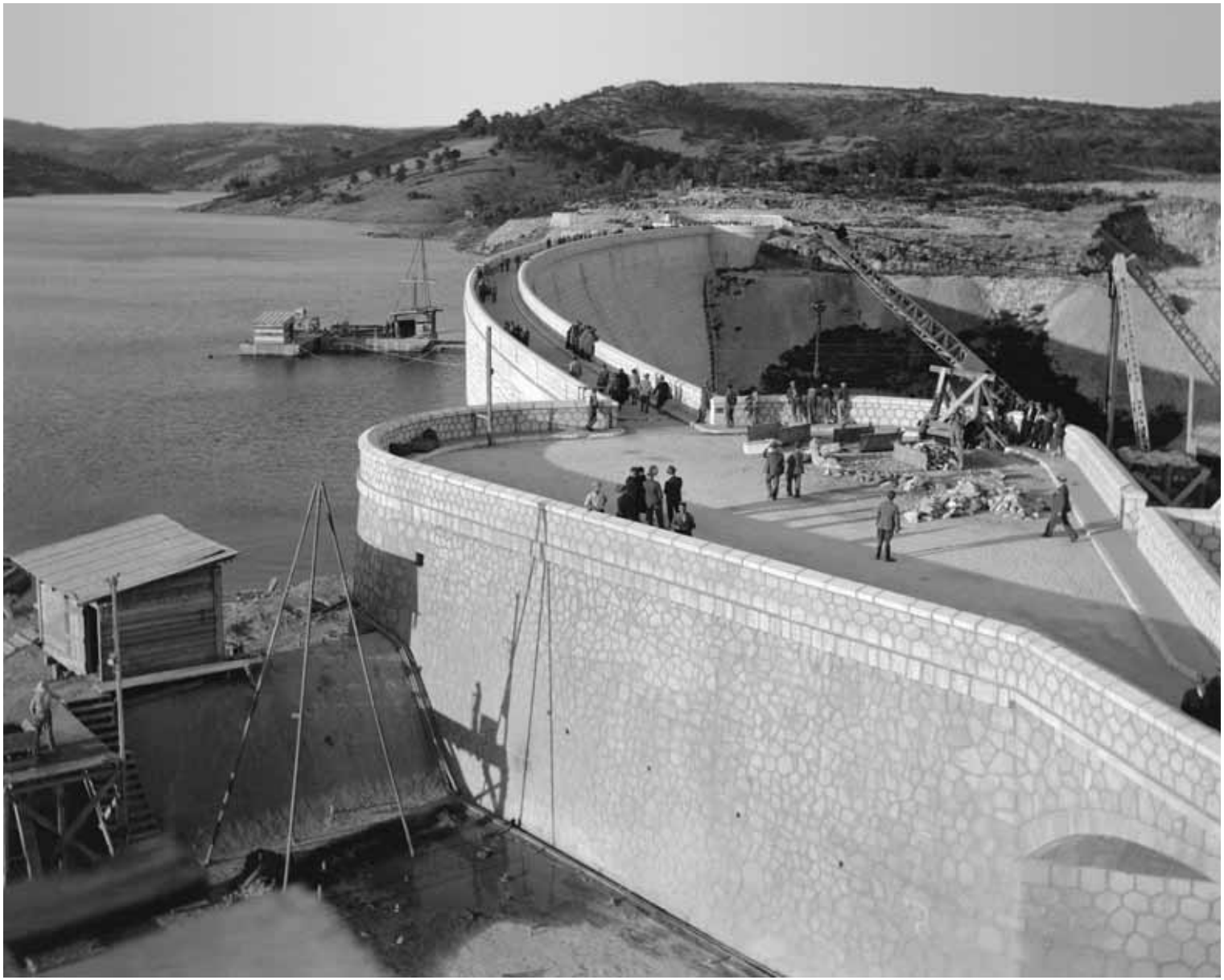
Reflections in black and white

Disastrous Marathon flood. 1926



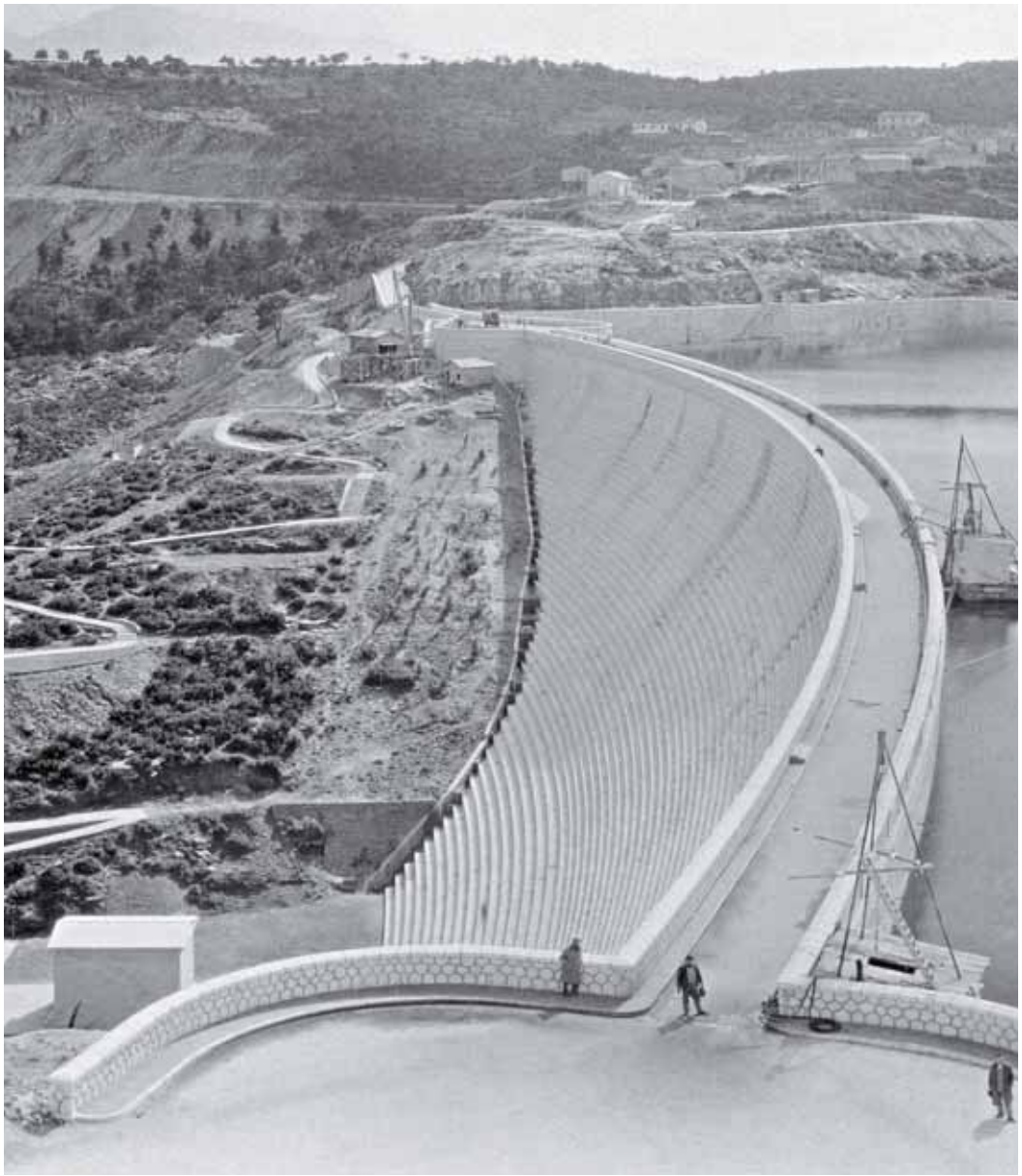
Marathon Dam construction. 1928

Marathon Dam construction. 1928



Marathon Dam construction. 1928

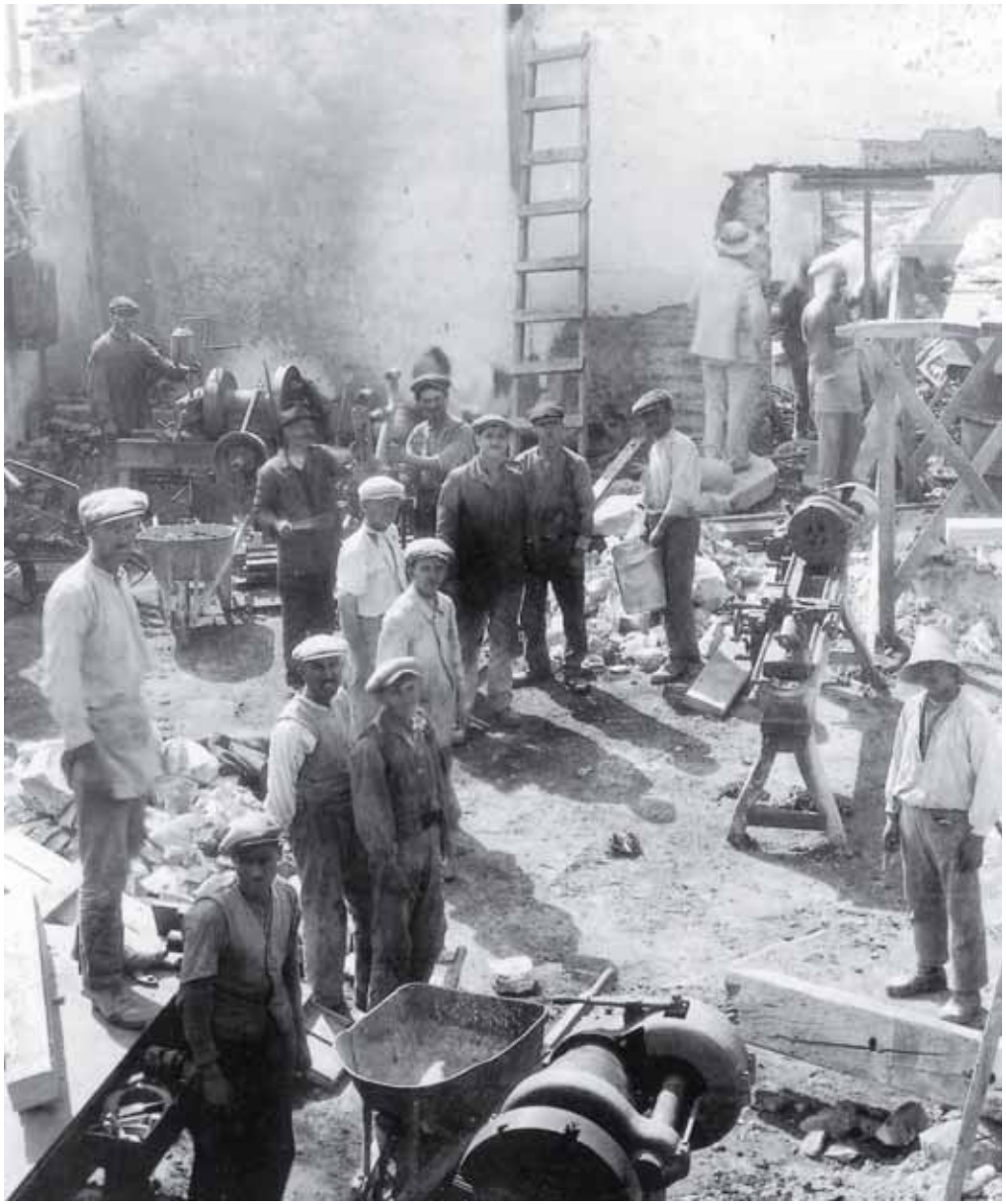
The Prime Minister of Greece, El. Venizelos at Marathon Dam. 1928



Marathon Dam construction. 1930

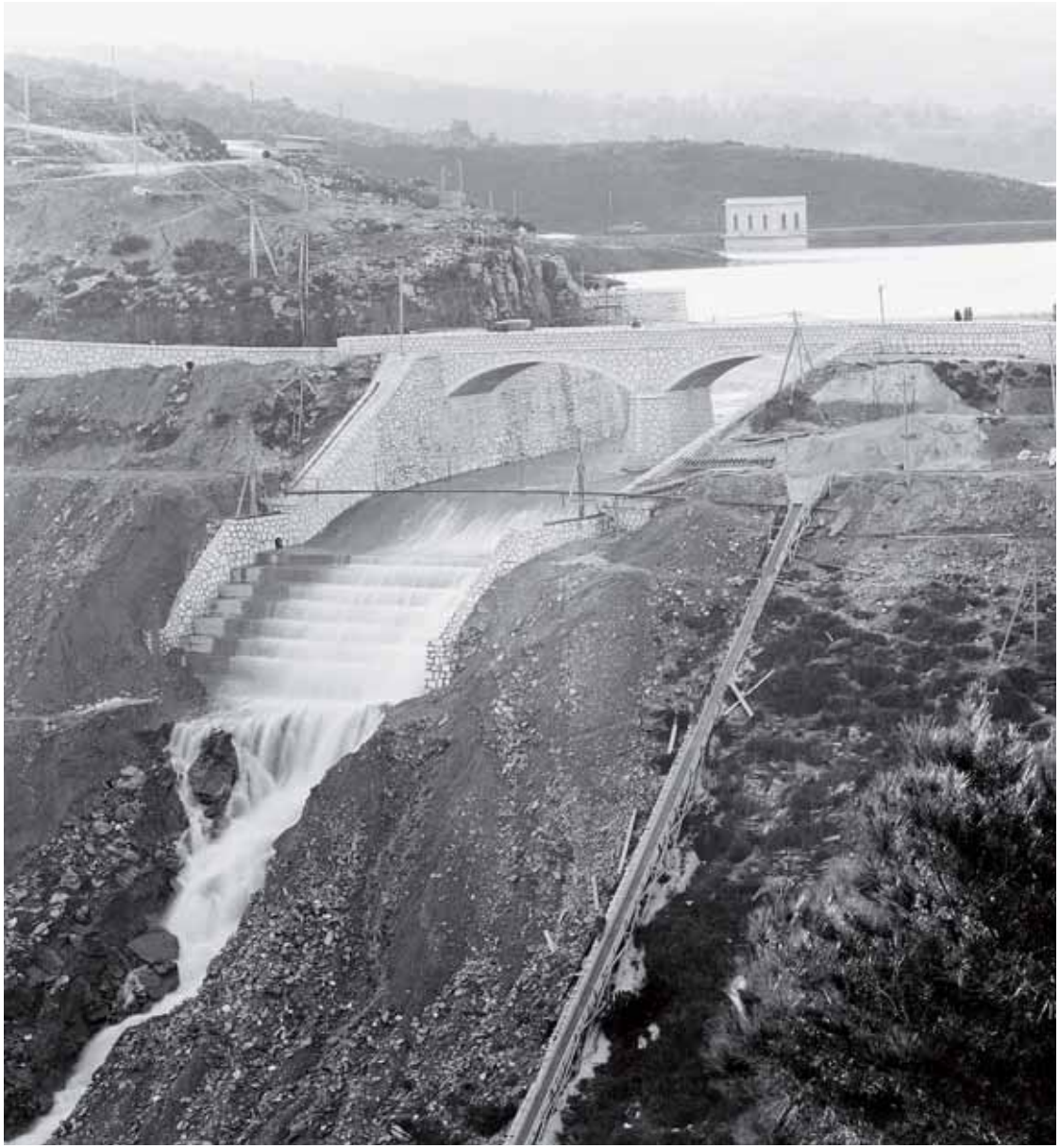
Midday rest. 1927

Marathon marble coating finishing. 1927



Marathon construction-site after the fire. 1929

Marathon panoramic view. 1930



Marathon Dam overflow. 1930

Marathon Dam inauguration. 1929

Boyiati tunnel construction. 1927

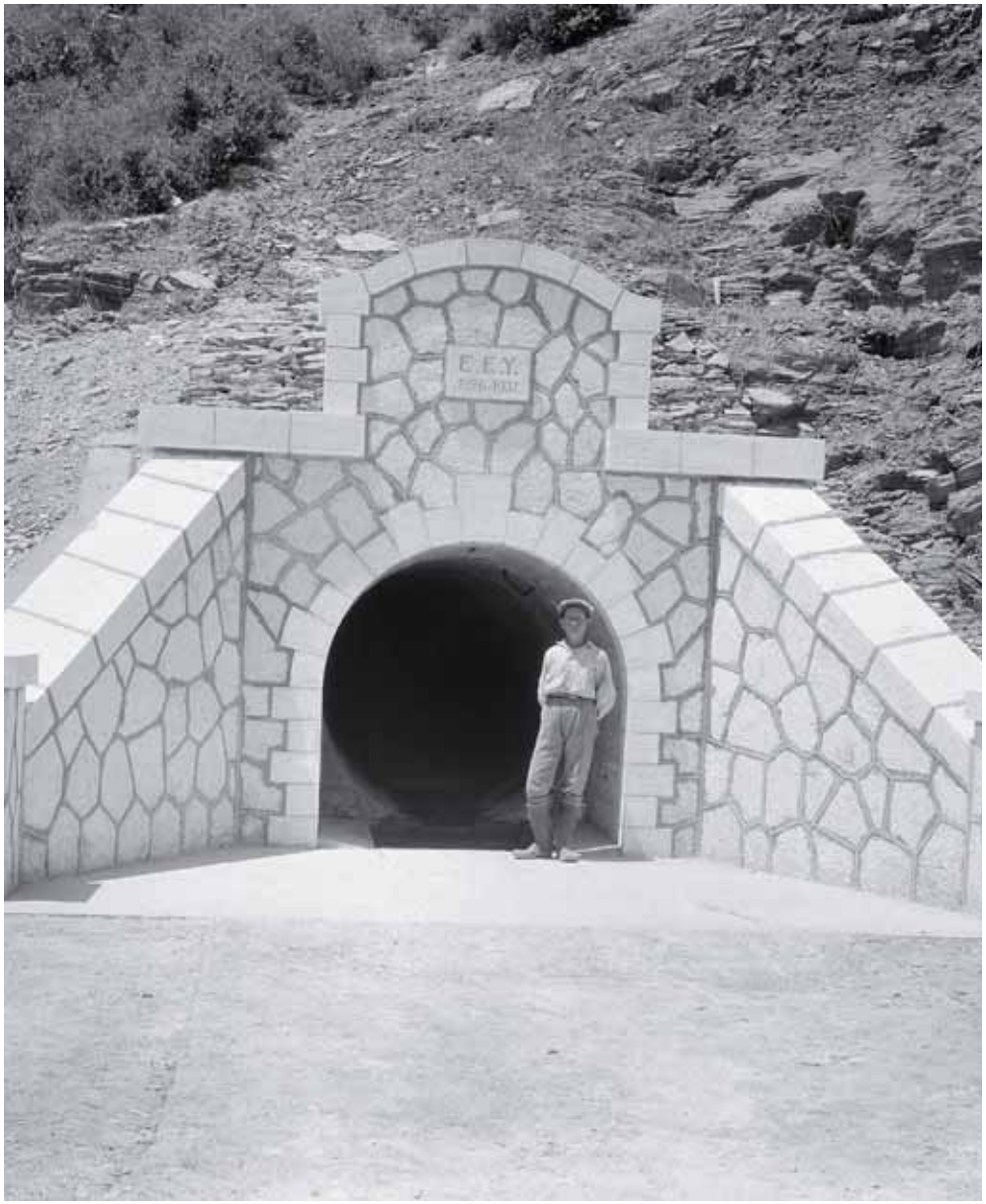
Boyiati tunnel construction. 1927

Boyiati tunnel construction. 1928

Boyiati tunnel construction. 1928

Boyiati tunnel construction. 1928

Boyiati tunnel inauguration. 1929



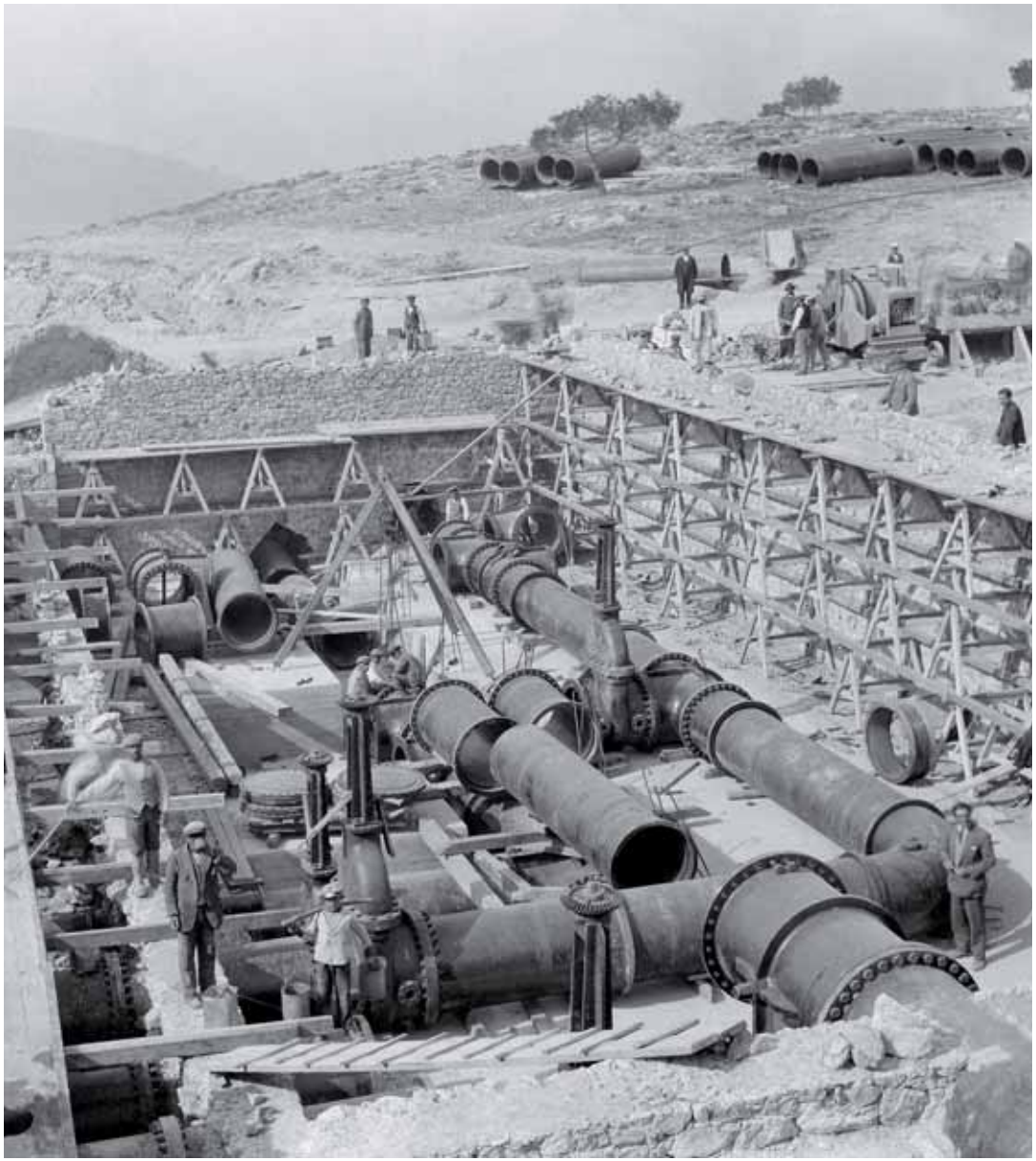
Boyiati tunnel. 1931

Adrian Aqueduct, construction of new water network. 1929

Galatsi Water Treatment Plant construction. 1927

Galatsi Water Treatment Plant construction. 1927

Galatsi Water Treatment Plant construction. 1927



Galatsi Water Treatment Plant construction. 1927

Water Pumping Station at Galatsi Water Treatment Plant. 1930

Water supply network construction within the city. 1932

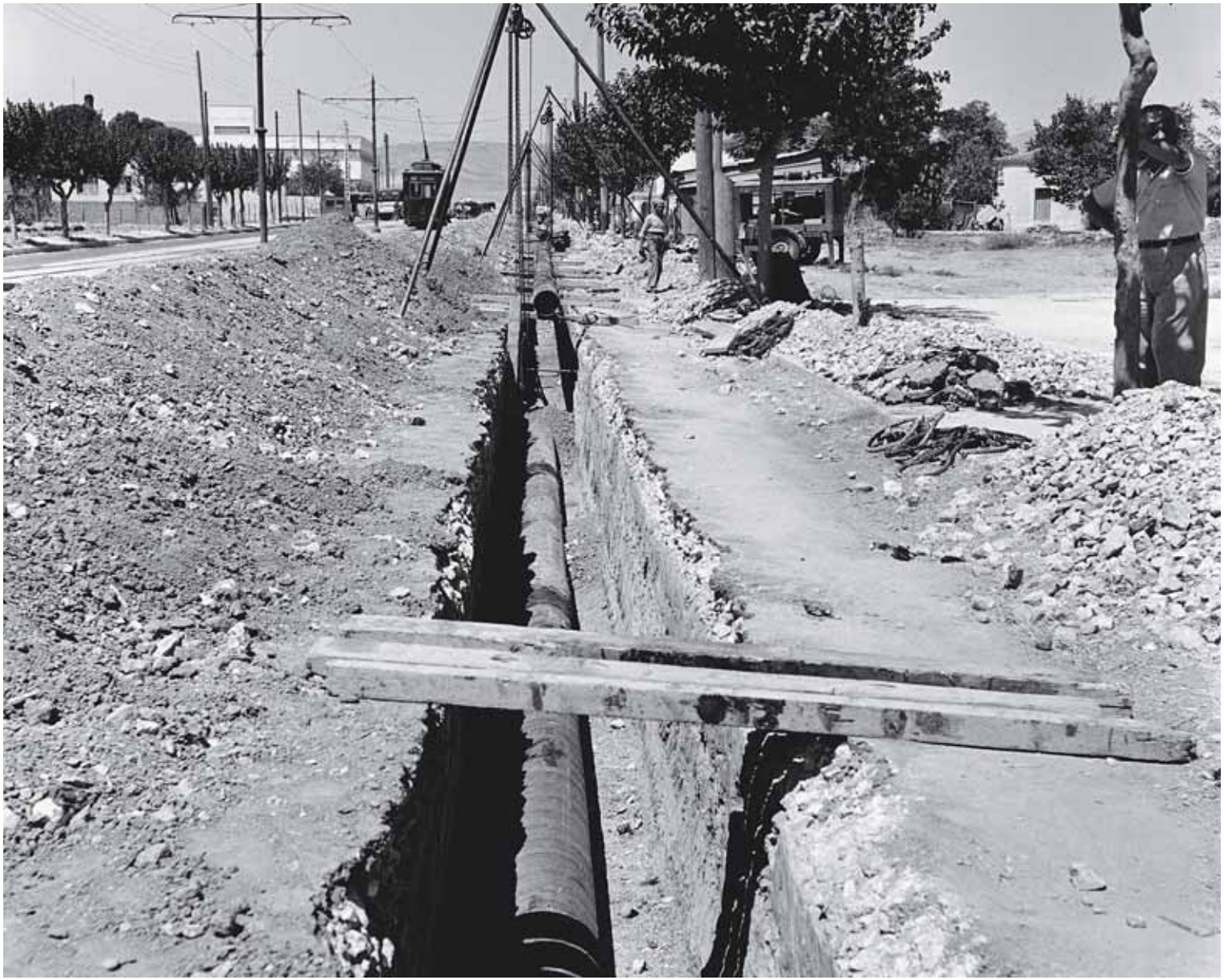
Fountain at the Olympian Zeus Pillars. 1935

Andrian water reservoir in Kolonaki. 1936

Water distribution. 1933

Water reservoir construction in Athens. 1936

Ditch filling up. 1935

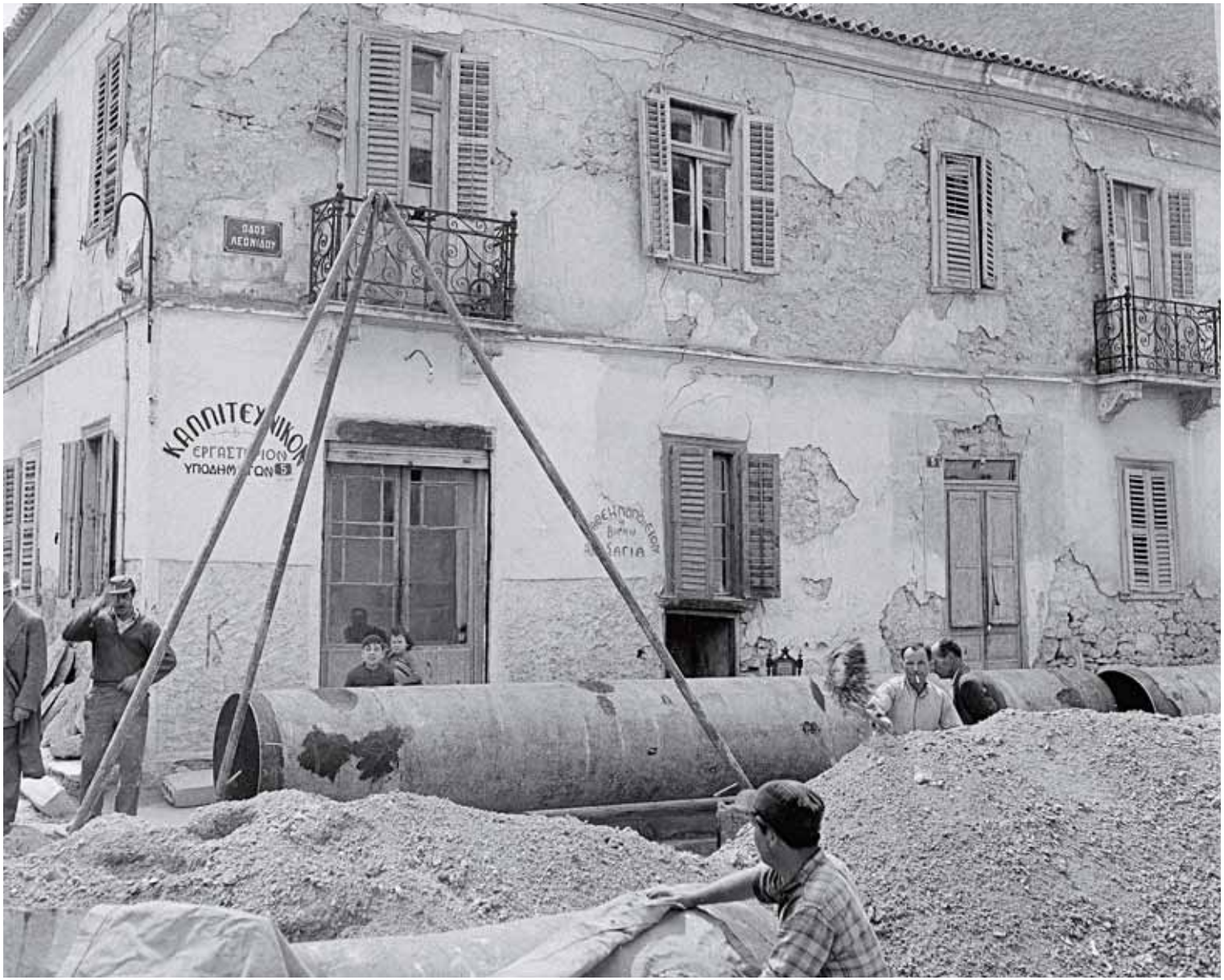


Water supply network construction within the city. 1935

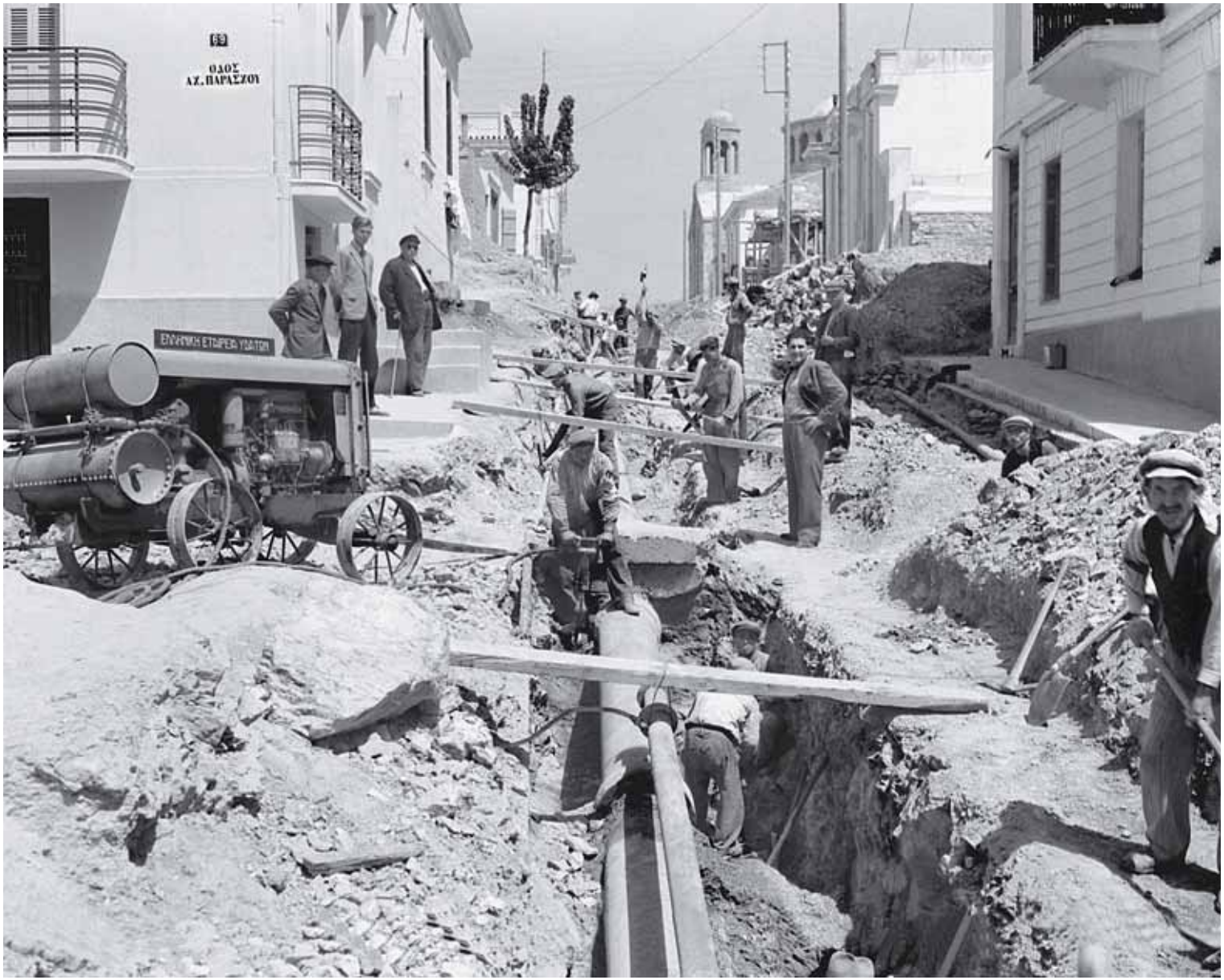
Water supply network construction within the city. 1936

Water supply network construction within the city. 1935

Water supply network construction within the city. 1953



Water supply network construction within the city. 1953



Water supply network construction within the city. 1936

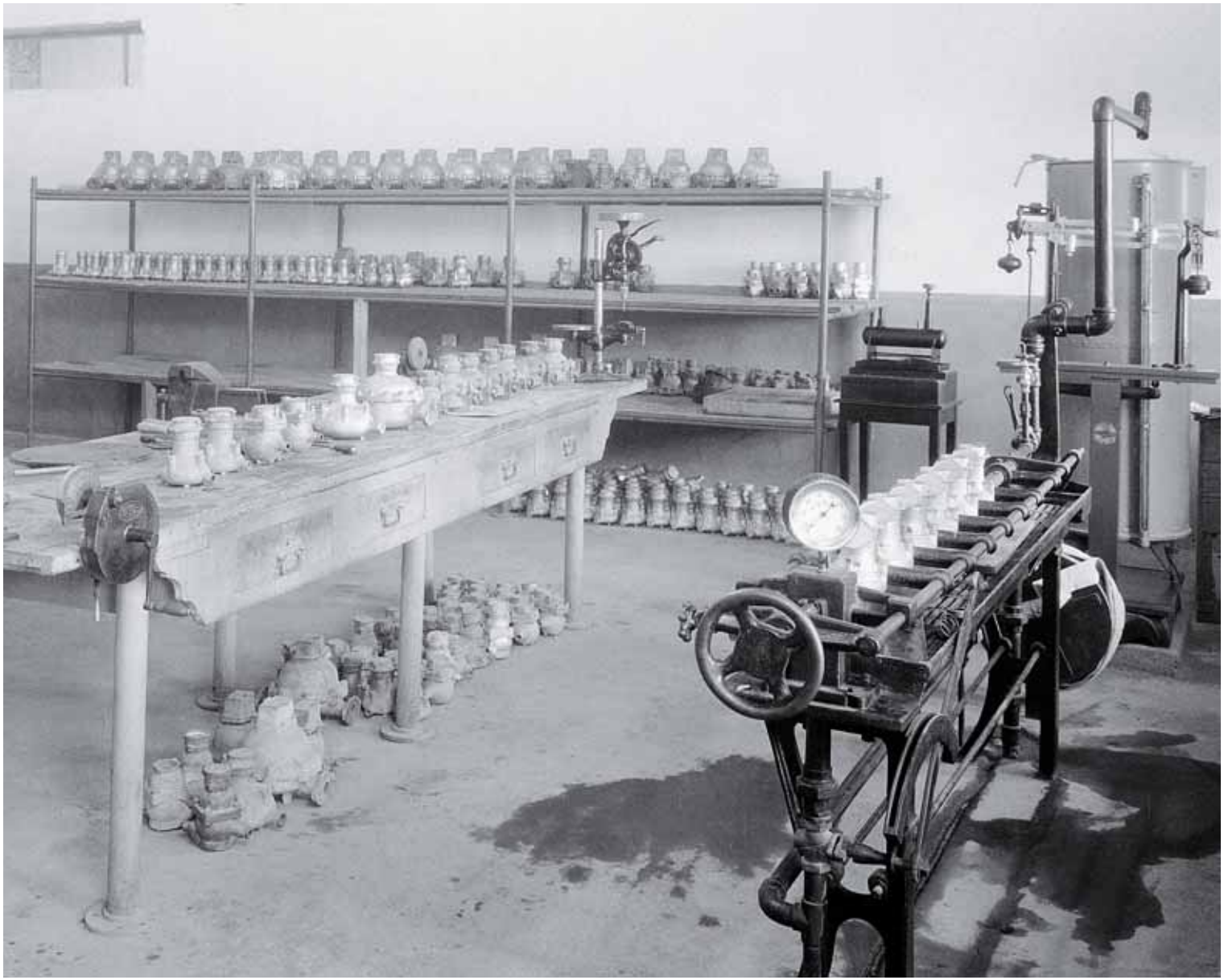
Pipe repair along Stadiou Avenue. 1936

Installing water meters. 1953

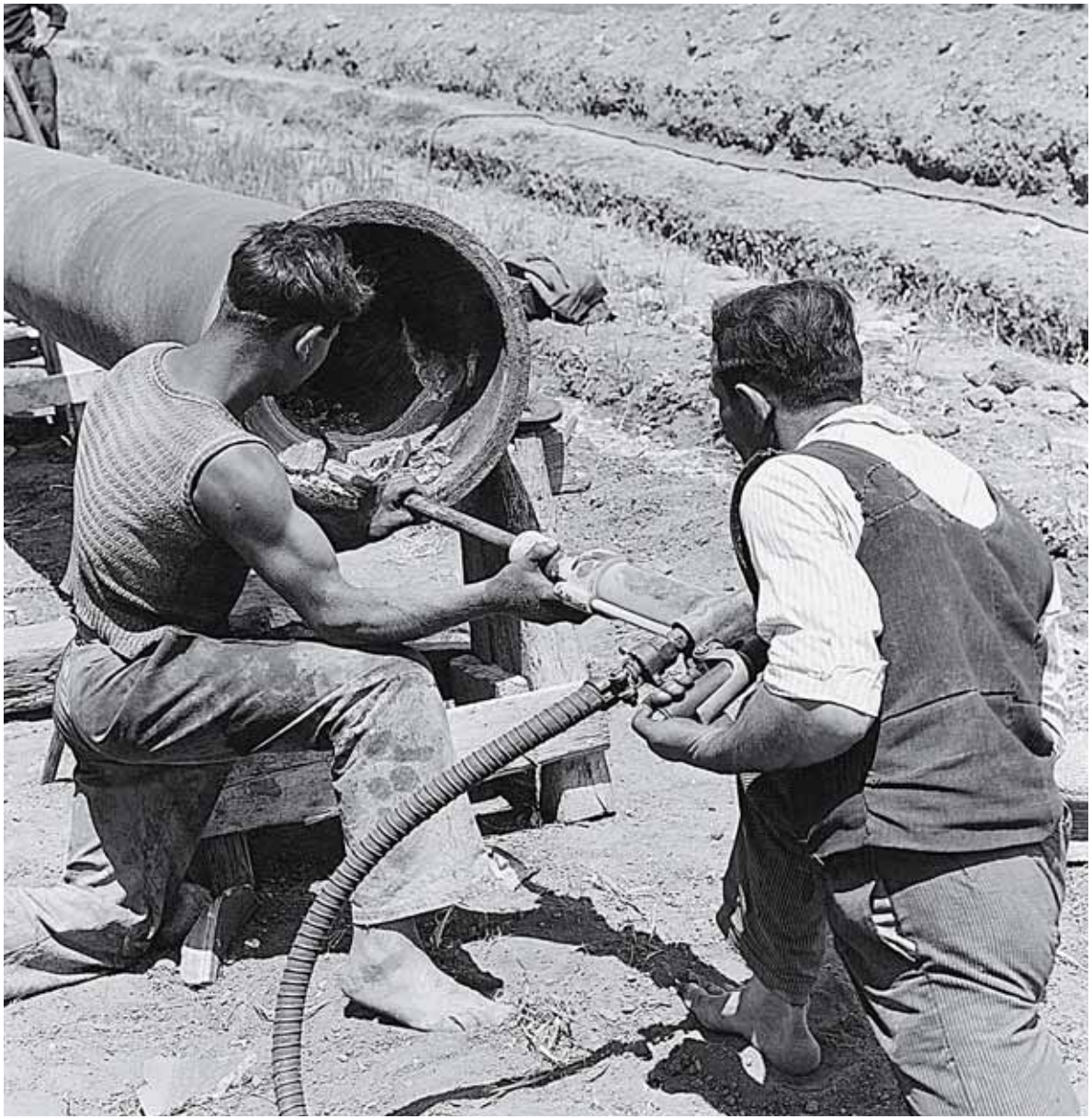
Pipe repair within the city. 1930

Pipe repair within the city. 1936

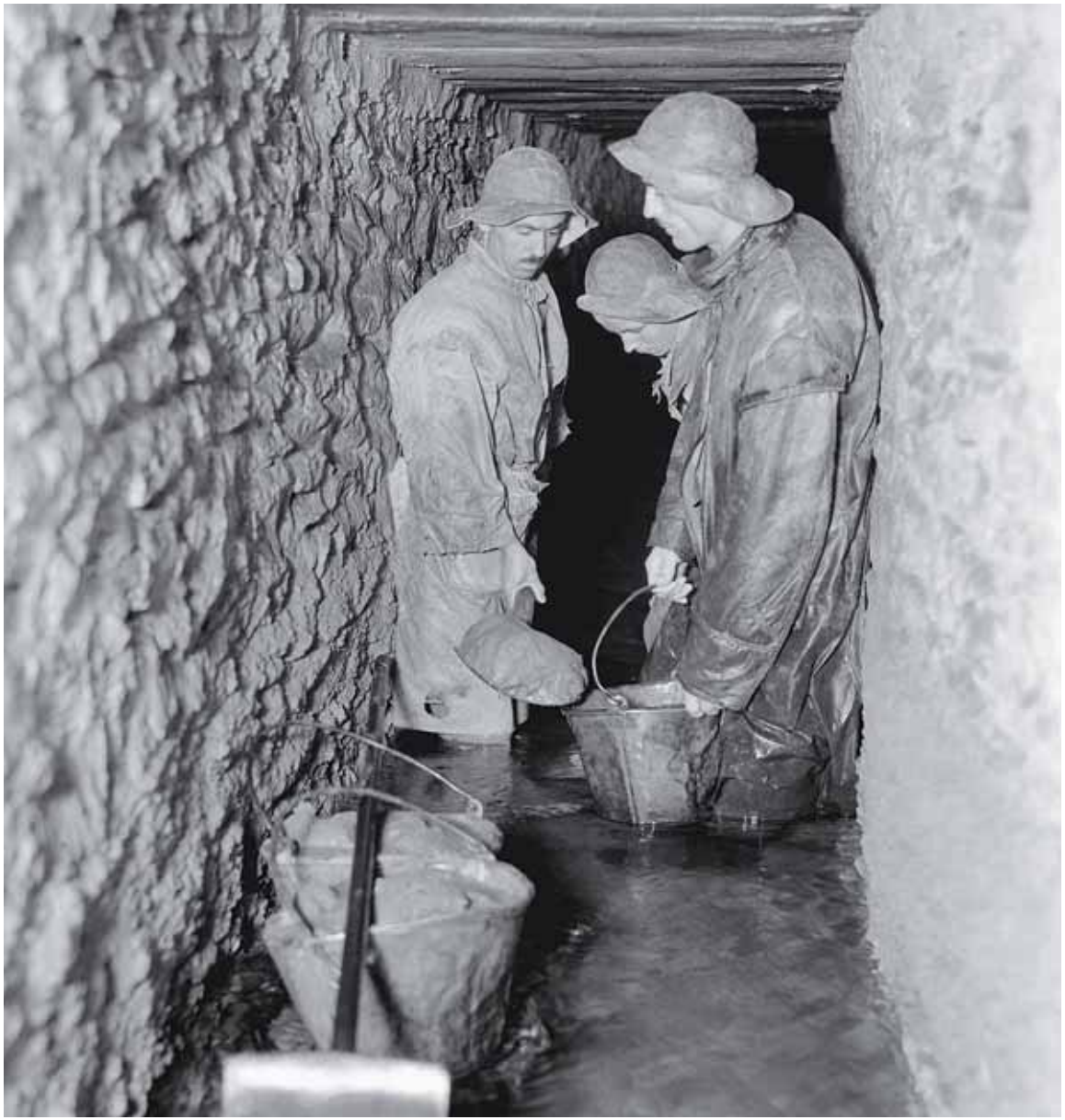
Work-site. 1935



Water-meter control laboratory. 1947

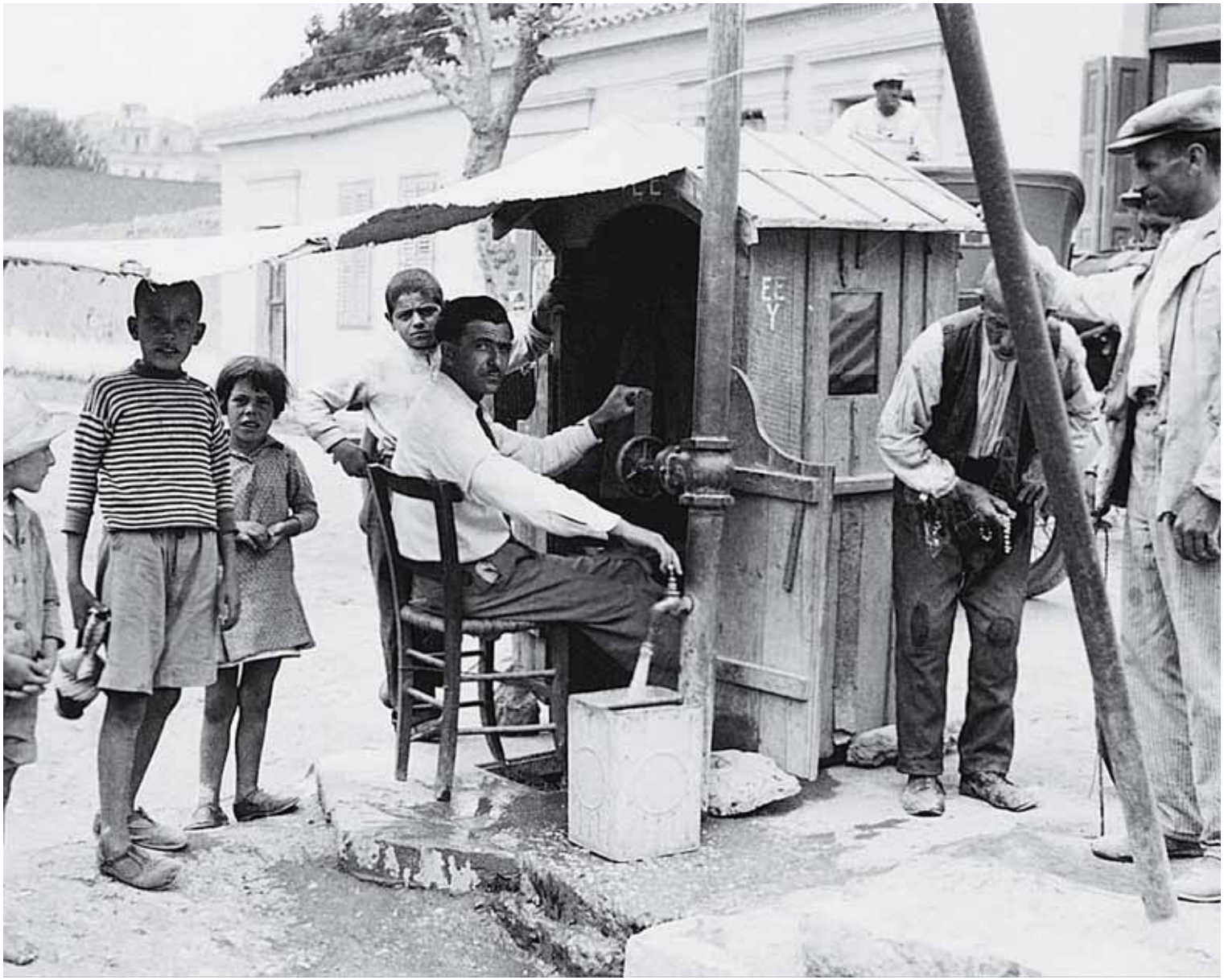


Cast iron pipe maintenance.1951



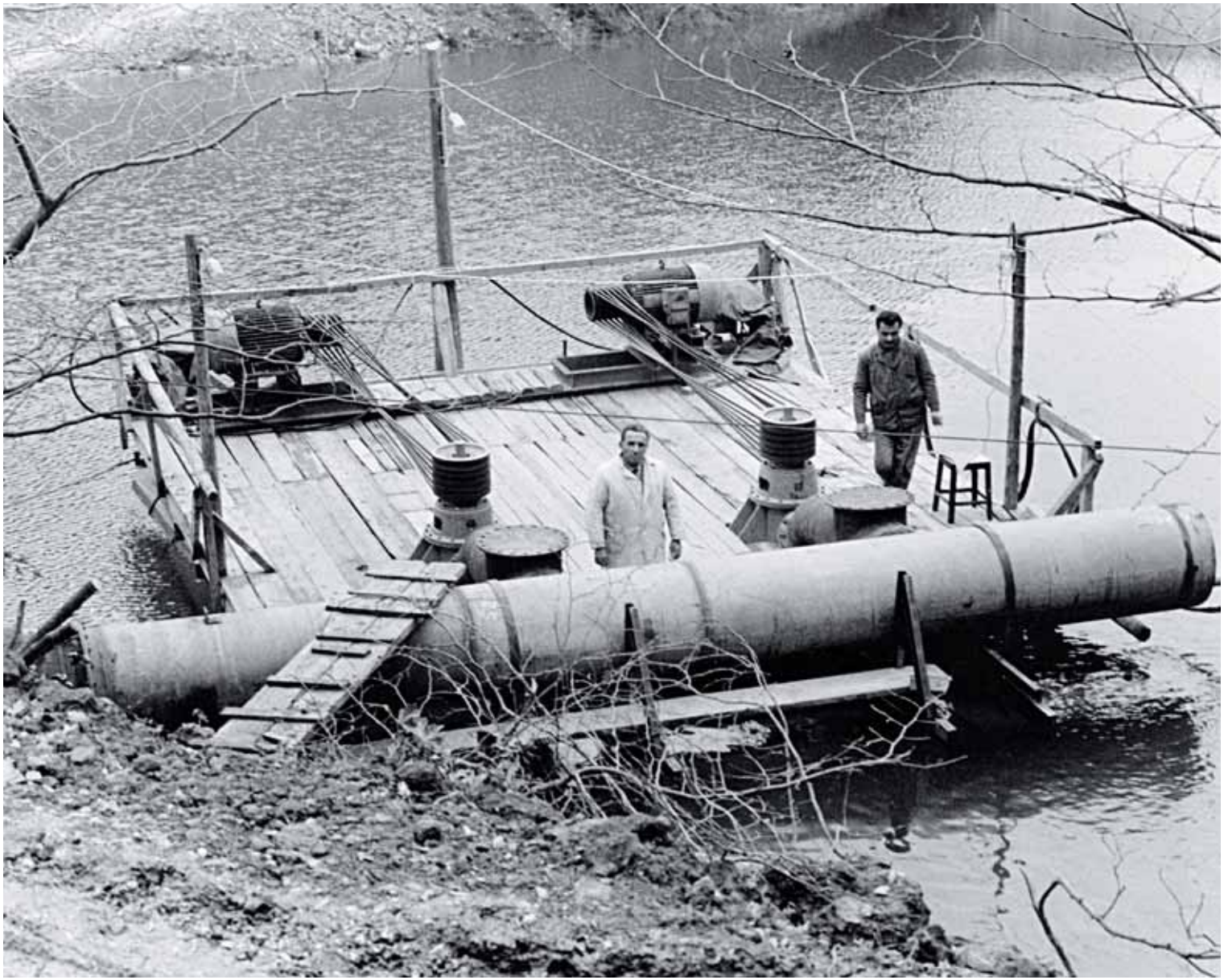
Aqueduct maintenance. 1936

Water distribution. 1940



Water distribution in Athens neighbourhood. 1933

Well in Athens. 1938

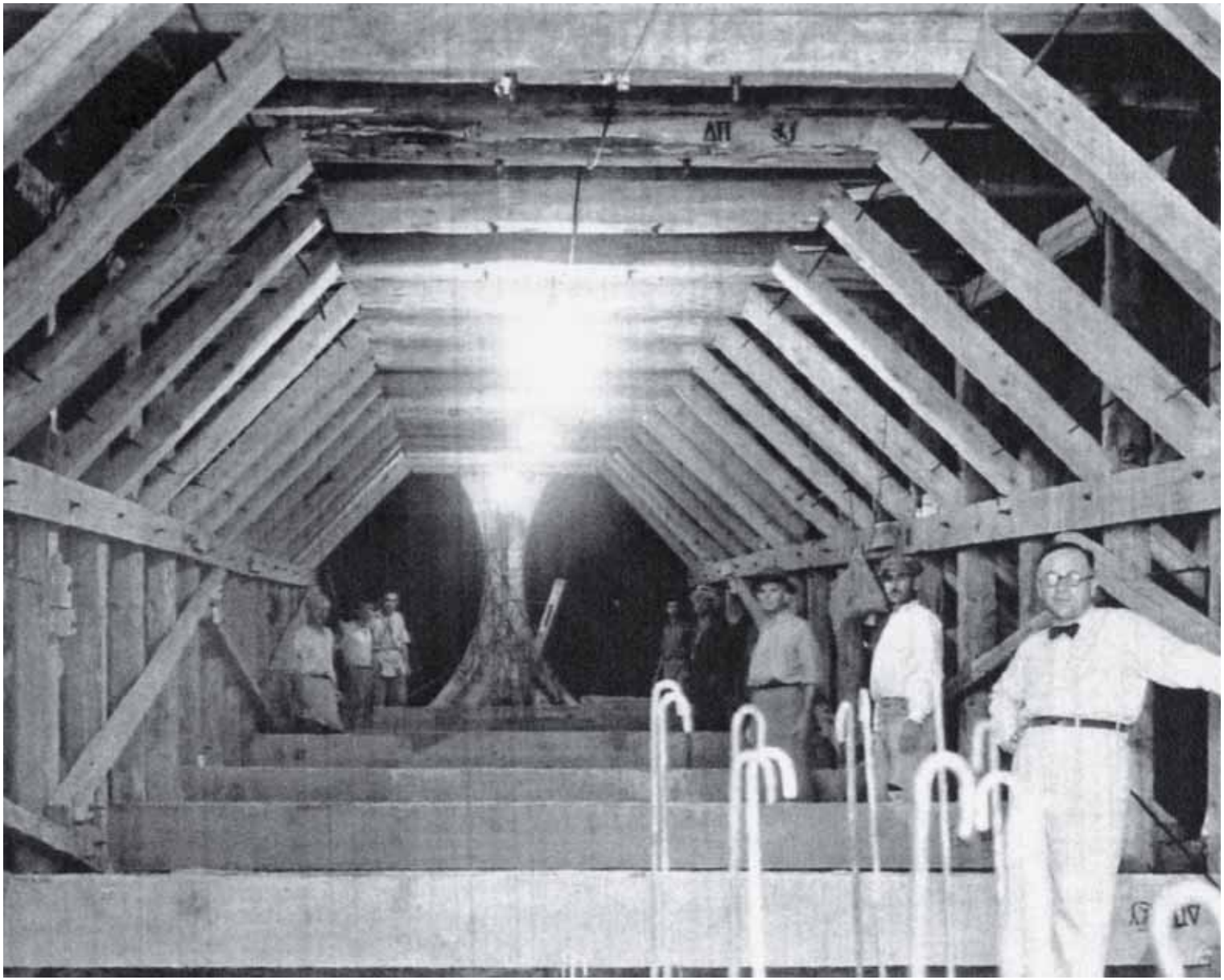


Floating pumping station. 1952

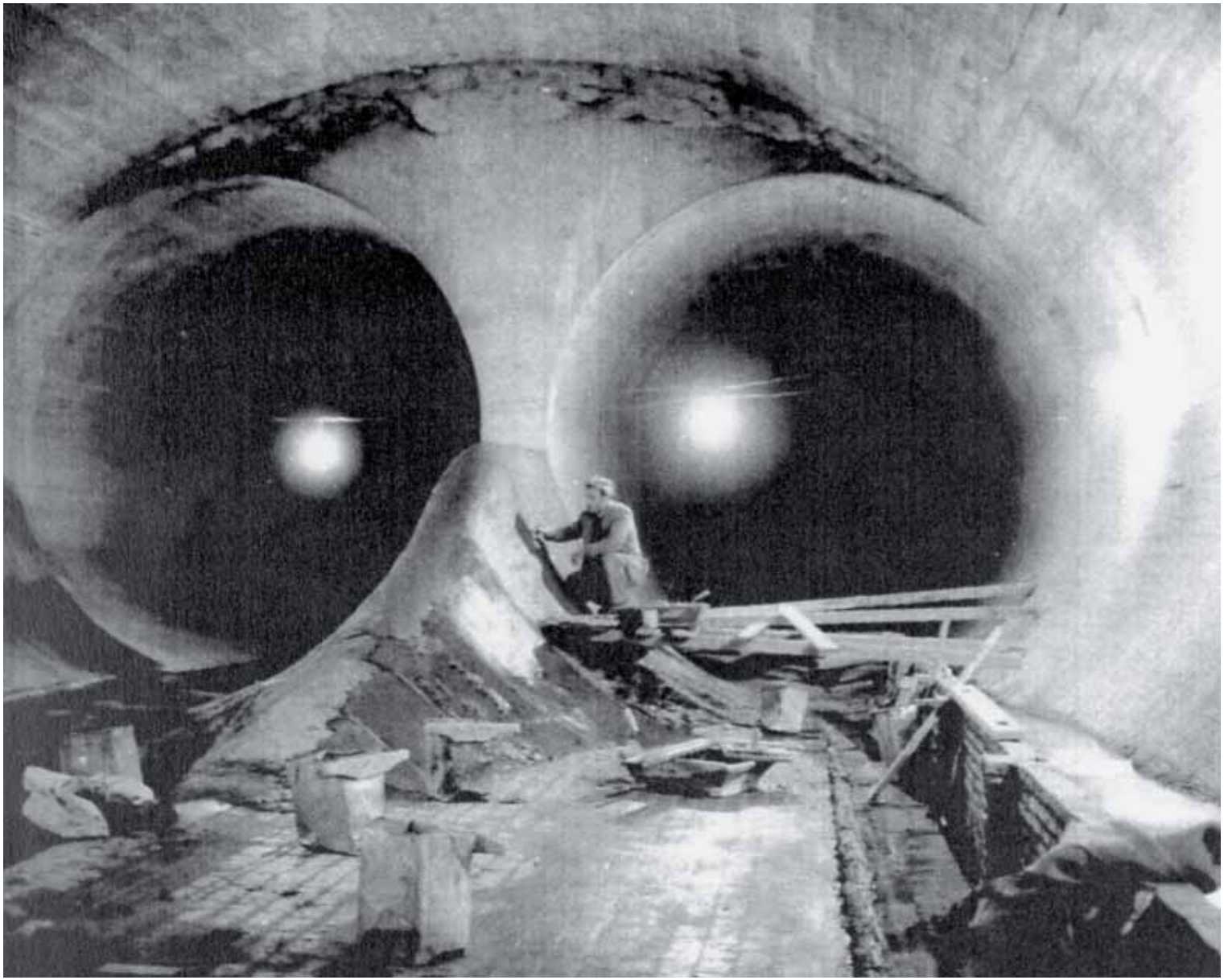
Visit of Konstantinos Karamanlis at the Yliki Aqueduct Tunnel. 1955

Visit of the Prime Minister of Greece, Konstantinos Karamanlis at water supply works at Yliki. 1956

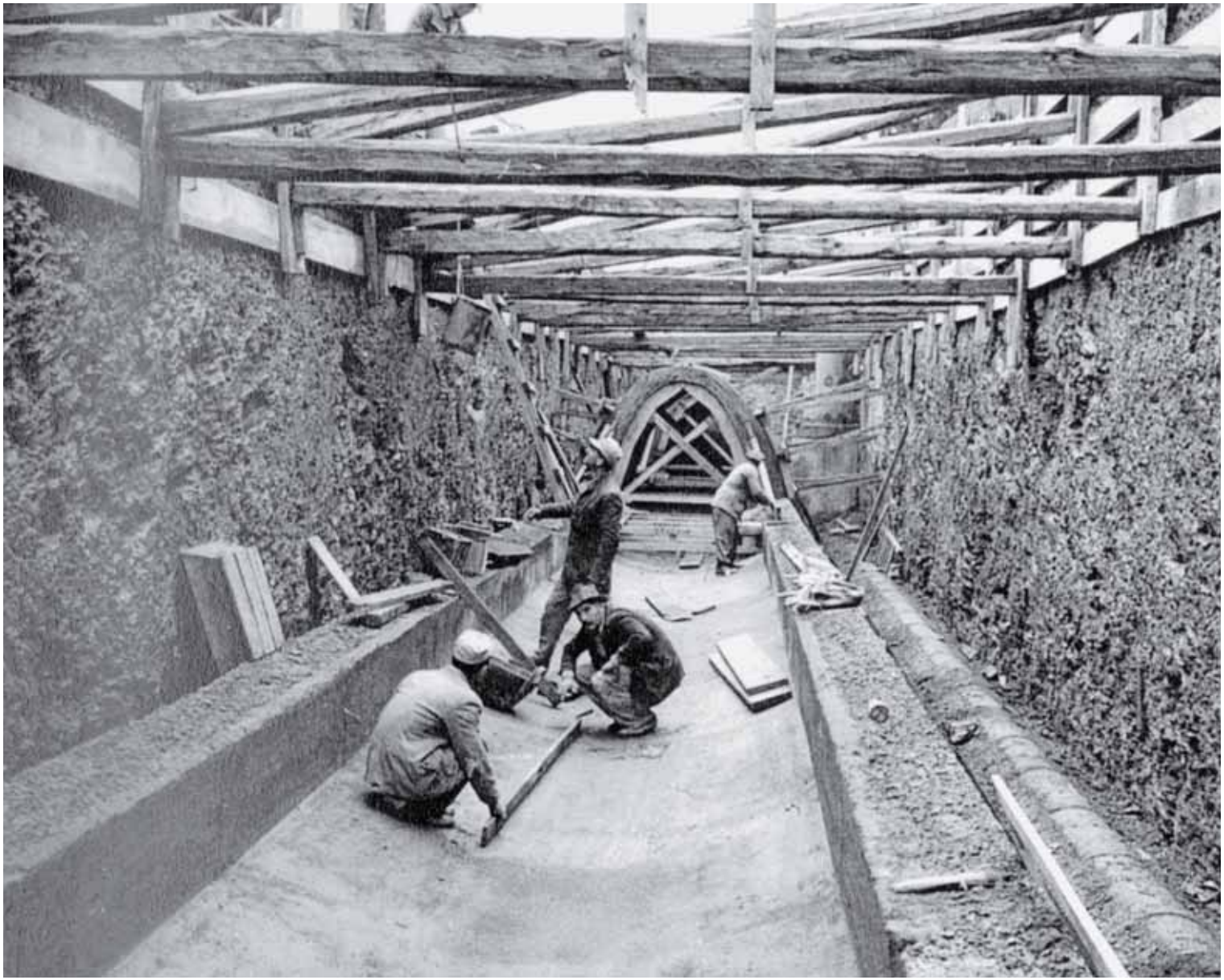
The Prime Minister of Greece, Konstantinos Karamanlis during the inauguration of water supply works at Yliki. 1957



Formwork Sewage collectors at Kaisariani. 1940



Sewage collectors. 1940



Sewage collectors. 1939

Main Interceptor Sewer inauguration. 1959

Contemporary flows

Mornos man made lake. 2000

Mornos Dam and water Reservoir. 2000

Mornos Dam and Water Reservoir. 2000

Mornos Water Reservoir. 2000

Evinos Dam and Water Reservoir. 2002

Yliki natural lake. 2000

Yliki natural lake. 2000

Yliki natural lake. 2000

Small Hydroelectric Power Plant at Kirfi. 2007

Mornos - Yliki junction aqueduct. 2000

Marathon Water Reservoir. 2000

Marathon dam and Water Reservoir. 2000

Polydendri Water Treatment Plant. 2000

Galatsi Water Treatment Plant. 2000

Galatsi Water Treatment Plant. 2000

Galatsi Water Treatment Plant. 2000

Acharnes Water Treatment Plant. 2000

Aspropyrgos Water Treatment Plant. 2000

Aspropyrgos Water Treatment Plant. 2000

Construction of anti-flood project. 2000

Metamorphosis Wastewater and Septage Treatment Plant. 2000

Metamorphosis Wastewater and Septage Treatment Plant. 2000

Metamorphosis Wastewater and Septage Treatment Plant. 2000

Sanitary Engineering Research and Development Center (KEREFYT). 2000

Psyttalia Wastewater Treatment Plant, Pre-treatment at Akrokeramos. 1992

Psyttalia Wastewater Treatment Plant, Pre-treatment at Akrokeramos. 2000

Psyttalia Wastewater Treatment Plant. 2008

Psyttalia Wastewater Treatment Plant. 2008

Sludge Drying Plant at Psyttaleia. 2008

Mechanological Equipment at the Sludge Drying Plant at Psyttaleia. 2008

Mechanological Equipment at the Sludge Drying Plant at Psyttaleia. 2008

Psyttalia Electricity and Thermal Energy Coproduction Plant. 2001

Thriasio Wastewater Treatment Plant (model)

Thriasio Wastewater Treatment Plant. 2010

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Public Relations and Corporate Communications Division, EYDAP

Photographs
Public Relations and Corporate Communications Division Archive
Engravings from the archive of Ioannis Lamprou
Personal photographic archive of Adreas Smaragdis

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