QANAT, SAQQAJJA AND ROMAN AQUEDUCT SYSTEM AT RABAT, MALTA

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Water was and always will remain mankind's most vital element. Man's advancement from a wandering group of people to a settled farmer community, tribe, people, then civilization depended on the abundant availability of this substance. Until the time that man could bring water to the most arid and inhospitable lands, his progress was hampered. One may dare to travel through such lands, but habitation and control of a region or an immense space of land would only come through engineering means to bring water to these places. Before the time of well digging, damming of watercourses, building of aqueducts, mankind depended completely on natural watercourses and natural oasis for survival. Homesteads, farms, towns and villages developed along these natural courses. Rome itself would not have channelled water until the year 343 B.C.¹

It would take millennia before civilizations would implement major projects to bring water to create fertile arable land and cities within desert and tundra regions. The deep wells of antiquity (such as Jericho)², with stairway running along the vertical shafts, together with deep underground cisterns meant to collect run off water, were the oldest attempts at building a fortified town at a vital but arid landmark. Still the Qanat water system would prove to be the most important development, bringing water to far away inhospitable lands and arid deserts.

The placing of altars, shrines, niches and even temples dedicated to particular gods, goddesses or nymphs close to or even surrounding a fountain site, go a long way to show with what esteem this life-giving substance was revered and fear of its absence appeased³.

Qanat

In Arabic and Spanish the technical term QANAT denotes the water system as a whole, madeup of underground or surface channels, and associated shafts. On the other hand the term QATTARA, katiaru, or lutttara, as used in Spain and North Africa, describes the tunnel (usually 10-12 m. in length) that extends from one shaft to the other. The process by which water is acquired in this system is practically that of “sweating” or oozing out of liquid from the water containing bedrock. Some sites around Malta still bear the toponomy of Qattara, one of these sites is located close to Is-Simblija, limits of Dingli.

Possibly the oldest type of water channelling in the world, originating and evolving in the Near East during the millennia Before Christ (B.C.) would be used extensively in the Near East during the 9th and 8th century B.C. Phoenicians and Greeks spread its use to the Western Mediterranean through settlement and colonization. Etruscans, on the other hand, were making use of similar water systems (cuniculi) in Central Italy by the 5th and 4th Century B.C. The Romans, who inherited most of their water system knowledge from the Etruscans and Greeks, would spread it throughout the Empire with considerable standardization and upgrading from the 2nd Century B.C. onwards. Works like Vitruvius and Frontinus would then standardize the architectural and engineering elements related to water systems for the coming centuries.

9 S. G. Frontinus, De aqueductu urbis Romae, 98 A.D.

The origin of the Qanat can be related to early attempts at mining during the Bronze and Iron Age. Digging vertical shafts into the ground caused ground water to seep down to the bottom of the shaft and within a few days, or even hours, the shaft would fill with water. These observations would have convinced the diggers/miners that a secondary horizontal tunnel, dug at the outset, would have relieved the mining shafts from water accumulation and the dangerous fumes that tend to form underground. Digging the mine from a horizontal point, with vertical shafts at regular intervals proved to be the most successful scheme.

Water-containing layers of rock would be cut through, producing permanent or seasonal springs that would ooze out along the channels. Miners would place their huts or small settlement at the entrance to the mine. Small settlements and arable land developed close to the water source. At the point where the Qanat would come to the surface oasis (Maltese Gnią) or fountains (Maltese: Ġhajj) would evolve.

The largest known Qanat project that is still largely preserved comes from the period of the Persian Empire, at Persepolis. It covers a long distance from the mountains to the plains of Iran and is made up of hundreds of vertical circular shafts. It created the fertile land that would make Persepolis the capital of the Persian Empire, until the destruction of the city by Alexander the Great.

A point to draw regarding the shafts in the qanat system is that they are not meant to serve as wells, but as ventilation and service access shafts should the need arise to clear cave-ins and the like. The function of the channel is primarily that of carrying the water to the exit or fountain, cutting through the water table, that may be located miles away.

Shafts in Persia and the Middle East are mainly circular, unlike the square or rectangular shafts developed by the Etruscans and the Romans. The Arab Period shafts, dating from the 8th Century A.D., located in North Africa and Spain are also circular, except where re-adaptations of pre-existing water systems are not found. It may be deduced that circular shafts are preferred since they are easier and cheaper to dig. Material extracted in the process is abandoned around the wellhead. Most sites may still be identified through aerial photography from the rubble mounds collected around the shafts.

Typically the qanat’s horizontal channel/tunnel goes downhill at a very steep gradient, unlike the Roman water system that preserves a shallower and more level gradient. For this reason it suffers less from sinter deposits but may suffer more through...
erosion due to the fast running water. Water moves down the system by gravity and air pressure derived from the numerous shafts. The shafts in a Qanat are placed around 10 to 12 metres apart.

Digging out the qanat would have demanded that work starts on a horizontal shaft, with one or more vertical shafts being dug contemporaneously at regular intervals, as the tunnel progresses. Once the tunnelling was finished, the floor level of the qanat would be modified to give the necessary gradient so as to allow the water to flow smoothly through the whole system.

Saqqajja

The term Saqqajja in the Maltese archipelago, SIQAJA, Saqula, seqqava, sikeja, saqaya, yazaqaya in Spain, or Siqaya or Siqiyat in North Africa have closely related meanings that may refer according to the century or the regions it is used in. In Spain, during the period of the Caliphs, the term is mostly employed as synonymous to QANAT. A system of underground or surface channels, that at times are related to the purification rites within a Mezquita (or mosque) precinct. Early on Qanat and/or Saqqajja are related to the surface channels that are located within the courtyards of the mosque. This water flow was meant for ritual purifications and cooling of the congregation (Gemgha) space.

In North Africa the term SEQIJA eventually came to mean a fountain. This fountain is quite particular for it is the town or village’s East-facing water source, often located next to the main gate or entrance. Even though the term becomes specific, by implication a fountain always has a qanat supplying it with water.

In this context the site of Telgha tas-Saqajja, at Rabat would qualify both as a fountain; actually it is facing south-southeast, located next to one of the entrances going into the town of Rabat, and also confirms the existence of the Qanat, which is providing it with water.

Roman Aqueduct System

Usually we tend to ascribe the term Roman Aqueduct to those massive arched structures that still extend over deep gorges or valleys throughout Europe, and are the pride of a bygone age. This misconception, based on what we see, is still very common. An in-depth study has confirmed that a good percentage of the Roman Aqueduct system tends to be located underground; most of the time hewn into live rock or built up with masonry and pozzolana. A substantial percentage of water from these aqueducts is still supplying the present needs of some of the major towns and cities in Italy.

The first experience with aqueducts for the Romans must have been the colossal Etruscan drainage projects. Known as cuniculi, these are dated to the 4th Century B.C., they are found concentrated to the North of Rome itself, especially Veii. The tunnel is usually 1.75m. high and 0.50 m wide. The shafts are located between 33-34m apart, revealing a very high degree of engineering. The vertical shafts are rectangular and average 1.2/1.6m by 0.55/0.75m. The depth of a shaft is usually 6m, but is known to reach 30m. Their gradient varies from 1.2% or 12m/km, to 2.6%, or 26m/km. This is considerably steeper than the gradient within the Roman aqueduct system.

Rather than channelling water to towns and villages, Etruscan cuniculi were used to drain mainly marshlands or lakes, creating arable land in the process. The waters would be diverted into other valleys and natural water systems. The longest known Etruscan Period channel of this type is 4.5km.

The Roman aqueduct system is more complex and multi functional. The system was employed both as drainage systems (to drain lakes or marshland areas), but primarily as collectors of spring and ground water to be conveyed through a complex of channels, tunnels, aqueducts, reservoirs, water towers, from numerous distant

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14 ibid. 188. "el problema lexicografico de las voces Qanat y Siqaya en la edad Media"
regions to established towns, cities, villas and estates. One of the most magnificent and best preserved of these systems is the *Aqua Augusta* aqueduct system that served, amongst others, the towns of *Herculaneum* and *Pompeii* up to 79 A.D. The monumental *Piscina Mirabilis* reservoir, served the Roman fleet stationed at *Misenum*, to the North of the *Bay of Neapolis*.

When compared to other water systems the Roman aqueducts may be considerably longer, achieving distances of hundreds of kilometers. The gradient is gentler, and practically level. This helps slow down the wear and tear of the channel base, but encourages the formation of sinter, especially where water contains a particularly high concentration of lime and debris.

The main channel or specus could be 1.65/1.80m. high by 0.65/0.85m wide. The vertical shafts or *puteus/putei*, spaced out at 20 to 30m., could either be square (1.45m by 1.45m) or rectangular (1.70m by 0.65m). Foot holes hewn into shaft wall allowed access and exit for servicing. These shafts could reach considerable depth, at times deeper than 30 or 40 m.

Engineers making use of different implements, including a *groma*, would have initiated the project with a thorough survey of the area. A T-board (*chorobates*) would then give out the exact levels on a steep gradient. Shafts would be measured out and digging would begin simultaneously on as many shafts as possible. A type of measure (possibly made of rope/hemp) would guarantee that all shafts reached the desired depth. Horizontal tunnels would then be hewn out simultaneously. The greater distance of the shafts, than those to be found on a qanat site, would show that there was a greater degree of certainty through standardized engineering.

Converging traces of picks or other implements confirm this hypothesis. In a number of cases the rock still preserves traces of mistakes, abortions and corrections during the same work. The sound of the picks and listening to the voices of co-workers were the only means of orientation in these narrow and low tunnels systems. The tunnels averaged 1.70 m. in height and 0.60m. in width.

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18 Sinter is practically lime scale forming along the tunnel walls. Comparable to fat build up blocking arteries, this lime scale eventually clogged and obstructed a good number of the water systems. Sinter is quarried in certain parts of Northern Europe, most of the time recovered from deposits within Roman tunnel systems.

The perennial spring within this tunnel moves in the general direction of North West, had at some time or other, been modified and redirected to the Ghieriexm fountain. The general direction of this tunnel is moving towards the North East. This site has been investigated up to c. 30m. and runs parallel to the Roman Ditch; preserved under the Santa Rita Road, at a constant distance of 15.45m.

The other part of tunnel investigated is situated under Santu Spirtu Hospital (now The National Archives); this has been investigated up to c. 60m. The general direction of this tunnel is moving towards the North East. This site has been much ruined through the hewing of a Second World War shelter and underground hospital. Still discernible elements of the original water system are present in the blocked up wells that are regularly spaced out (c. 9/12m. apart) within the confines of the main hospital hall. Presently the site is inaccessible due to drainage infiltrations.

The channel next to St. Paul’s Church is linked directly to the Santu Spirtu Hospital site\textsuperscript{12}. The tunnels and shafts enclose a large rectangular area that corresponds to the fortified perimeter of the old Roman Melita. It has been discovered that the rectangular shafts run parallel to the Roman Ditch that still exists between St. Paul’s Parish Church and the former Teuma-Castelletti residence. The preserved Roman Ditch section behind St. Paul’s Church measures 30metres in width by 2 metres in height.

The distance of 15.45m. has been measured for one set of the wellheads, from the ditch’s edge. These are located next to St. Mary Magdalene underground Chapel. Moreover surviving traces of fortifications from the Roman period have been measured at 41m. from the ditch’s edge. The thickness of the surviving fortification elements measure between 4.7m up to 5.10m and are embedded within the precinct of St. Francis Friary, at ta’ Segiu. The same distance of 41m has been measured between the underground entrance, with the cross and inscribed slab on top must be the opening corresponding to Abela’s map premise, were discovered, the well shafts that were dug further apart, circa 45.54m, and 42.45m respectively, rather than 18-20m. On the other hand a postern gate, facing South East, is still preserved vivid red and green stucco colouring, has unfortunately been redecorated recently. These archaeological vestiges have been destroyed.

The monument site would correspond to one of the gatehouse towers at the main city gate, already mentioned in this area by both Abela (1647) and by Ciantar (1740)\textsuperscript{23}. The particular octagonal tower feature corresponds to 3\textsuperscript{rd} up to 9\textsuperscript{th} Century fortification building techniques. Two very detailed and informative sketches by Schellinckx, drawn in 1664, portray the immediate area next to St. Paul’s Church\textsuperscript{24}. They depict a huge rubble mound (\textit{a tell}), with a “sacred well”, and entrances to underground features located close by. The ground is strewed with rubble and antique relics, including architectural features of clear Roman provenance, showing that the area immediately next to the ditch was uncultivated and uninhabited during the 17\textsuperscript{th} Century.

Tradition-wise the mound is interpreted as the location from where St. Paul the Apostle preached and converted the islanders, the “sacred well” was believed to have been used for baptizing the converts. Abela also recognizes the area as being next to the Forum.

Interpreting the sketches we find that the monument now occupies the mound site, while the “sacred well” must be related to the water system under investigation\textsuperscript{25}. The underground entrance, with the cross and inscribed slab on top must be the opening leading to St. Mary Magdalene’s Chapel.

\begin{enumerate}
\item In both works there is mention of the Roman perimeter wall and ditch at Rabat. Abela states that there were two main gates, one located next to St. Catald Chapel, the other in line with St. Francis Friary. In his map of Melita Abela places the main gates near St. Catald Chapel and St. Paul’s Church. Ciantar says there were four, one in line with Ta’ Qasha Chapel, the others in line with St. Catald, another in line with St. Paul’s Church, and the fourth through St. Francis Friary. Abela and Ciantar mention cart-ruts on the rocky surface next to St. Catald.

\begin{itemize}
\item When examining the tunnel’s two sites, corresponding to Abela’s map premise, were discovered, the well shafts that were dug further apart, circa 45.54m, and 42.45m respectively, rather than 18-20m. On the other hand a postern gate, facing South East, is still embedded within the walls of St. Francis Friary, where Ciantar states he saw cart-rut features going into the wall of the friary.
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\end{enumerate}

\textsuperscript{21} \textit{Measurements of water system from St. Francis Friary to Saqqajja Square: measurements taken September 1995}

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\textsuperscript{22} During the earlier part of 1990s, a number of individuals walked down the tunnels from Santu Spirtu exiting next to St. Paul’s statue. They came up through Santa Maria Magdalene Chapel, next to the large statue of St. Paul. They confirm encountering a deep well at some point of their walk.
Surviving underground elements in the immediate area of St. Paul’s Church most probably date to the late Roman or Byzantine Periods. One of these is the so-called Chapel of St. Mary Magdalena, a deep and originally circular bell shaped feature with a large central opening in the ceiling, now occupied by a small lantern. The site was used as a charnel house up to 1634, when it was cleaned up and turned into a chapel[26]. The elaborate workings of this feature would prove, under closer observation, to be something other than a water cistern. It may be a ROBUR, or immense grain silo, usually located on agricultural estates, but here placed at the entrance to the city.

The less worthy function that a Robur served for was that of doubling up as a prison and a place where death sentences were enacted. Prisoners would be thrown into the deep silo and left to die. It could be that the poisonous fumes emitted by the stored grain also played a part in their death. The closeness of the site to St. Paul’s grotto, the traditional location of St. Paul’s confinement during his three-month sojourn in Malta is remarkable. This ROBUR most probably is related to the massive fortification project that took place at Melita during the 4th or 5th Century A.D., when a considerable part of the perimeter of the original Roman town was divided by a wide ditch (30 meters wide), and the building of massive walls (5.10 meters thick) and tower fortifications. This compares to what was happening throughout the Roman Empire during the 4th and 5th Century, when practically all towns and cities, including Rome itself, were provided with defences, in most cases reducing by half the perimeter of the original town[27].

Contemporary to the Robur, and located close by, one finds two large rock-hewn chambers, measuring 11.20m by 5.76m. and 11.73 m. by 4.63m. respectively. For hundreds of years they were used as charnel houses, as the massive collection of bones and other artifacts collected within would show, but their “construction” design would indicate possibly Roman cisterns. They are hewn out of the live rock, leaving a thick layer of rock cover (1.5/1.8m.) to serve as ceiling. These are the last vestiges of a magnificent rock hewn reservoir complex that existed in the space left in between the city walls and the ditch. This is also typically Roman engineering; cisterns and wells were property of the state and were thus controlled by the state. A similar type of distribution may be observed in Byzantine Period Constantiople[28].

Yet another friar, Fr. Sebastian Scicluna O.F.M.Conv. told how one day, soon after the beginning of WWII, he was startled to hear voices coming up from the cloister well. It resulted that workers from Santu Spiritu Hospital were digging out a large shelter following the channels of the old water system. The Santu Spiritu underground shelter still preserves clear traces of the original channel. In the meantime both wells located within the friary perimeter, still continue to fill up with water, meaning that the tunnels being dug into were not the lower tunnels, but some type of service channel, located half way up the wells.

The conclusion drawn is that there are two levels of channels connected to each shaft. The surviving level is the “service” channel while located at a deeper level and there must have been another channel serving as water catchment and well. The only known functioning well shafts are the two that pass through the Conventual (Grey Friars’) Friary.

This service channel is today serving as main water channel for fountains located around Rabat: Ta’ Hammiiem (Turkish Baths), ta’ Gheriem (numerous huts), tas-Saqajja (East facing fountain). This would mean that the deeper wells were filled in to create this qanat type of water system. The clearly Arabic toponomy of the fountains mentioned would mean that the modification took place some time during the Arab Period (890 – 1130). The original rectangular shafts, that are typically Punic or Roman, are surviving vestiges of an older type of water system within a Qanat system.

Their orientation, which runs parallel to the original Roman ditch and fortifications, the rectangular putei, and the fact that they are straight and go round on all sides of a fortified city that no longer existed during the Arab rule would seem to imply a Roman or Byzantine origin. As we will see later rectangular putei, which correspond to the same measurements as the ones we find here, have been discovered elsewhere on the island directly related to Roman archaeological context.

A question that arises is why are these wells located in open ground some 15.45m infront of the main (surviving) fortifications. The solution will only be solved through proper excavations, but it may be that originally these “wells” were within tower structures placed half way between the ditch and the main defences. This is highly probable, since the defences of a number of towns and cities, including Byzantium itself, during the Byzantine Period did possess two or three lines of defences. The presence of abundant and endless reserves of water, would also explain why the


Greek garrison took such a long time to surrender in 870 A.D. It could also explain how the garrison took control of the city when the Arab troops were in control of the walls and the towers, using the service tunnel and shafts to gain access into the locked and “impregnable” towers and overcoming the guards.

Filling in the wells with stone and material would not have sufficed, seeing the immenseness of this colossal project, so after filling in some of the deeper wells with debris, the project was abandoned. Most of the wellheads were capped by immense blocks of ashlar, as can still be seen within the Santu Spiritu complex. Rubble and pozzolana walls, at the service channel level, blocked others.

The Caliph’s ultimate decision to destroy and demolish all the city and its fortifications, with a number of the shafts being blocked by large ashlar blocks, helped turn these channels into underground springs that would be eventually turned into fountains by the Arab settlers around 1054 A.D. The rest of the apertures at the tunnel level were blocked with rubble walls and pozzolana, so as to permit the water to go round and not down into the deeper wells; these would become bones of contention between private individuals, who regularly broke the seals to allow water from the system to pass into their wells and the local authorities, be it the Universita or the Order of Knights of St. John.

**Documentation**

The oldest mention of the fountains at tas-Saqajja and I-Gheriem come from 15th and 16th Century *Universita’ Council records*. Mention is made of the fountains and water systems that provided water to the public fountains. Specific mention is made of the abuses related to siphoning off of public water and the pollution of the same water system through dumping of rubbish and carcasses.

The fountains mentioned are Gheriem and Saqqajja, already imply/indicate an Arab origin for the term. Many locals today still think that ta’ Hammiiem Fountain means Fountain of the Pigeons, while actually its Arabic origin would indicate the site of a Turkish Bath (Hammen) (possibly preserving the memory of a Roman Bath


32 UNIV 187, 2r-12r.

The importance of these public fountains is further emphasized by reports dating from the knight’s period. Systematic if irregular reports relating to the condition and abuses encountered on site are to be found at The National Archives. Since the presentation of my paper a new documentary evidence has turned up. The file includes correspondence, appeals, and reports relating to the precarious conditions, the malfunctions and abuses relating to the fountains at Gheriexem and Saqqajja. These reports date from 1625, 1695 and 1718 respectively. One of the detailed reports, autographed by Blondel contains a very detailed map/plan of the water system under discussion, drawn by M. Blondel himself.

Together with the detailed report plan, Blondel’s sketch is the most interesting element since it shows in detail the channel, the circular features (spieri), and the blocked well shafts, encountered during our own 1995-7 investigations. Blondel observes that intentional openings in the rubble and “pozzolana” walls, blocking the shafts, were causing most of the water to be siphoned away from the public fountains into private wells and cisterns. These (his report implies) were watering the “large” gardens located within the Roman ditch. An important element revealed by the sketch is that the channel leading to the Saqqajja Fountain takes a 90 degree turn to link to the fountain. As in the case of Gheriexem, this would imply that the original channels were not meant as access to these fountains, and that the radical modifications had to be made to link the fountains to their water source. This also implies that the channels were not originally intended to provide water to the fountains, but must have made part of an older water-system. The most promising period for these modifications and the building of the fountains would be during the Arab period. All place names have original Arabic terms.

Archaeological Evidence

To give a date to the origin of this water system we must have some comparisons. What make this site important are the rectangular shafts (or putei) and the circular tunnels going round most of the well shafts. If we try to find comparisons for the putei we find that Roman Villa at San Pawl Milqi, Burmarrad has an identical...
Another important site that merits comparison is the excavation on Museum Esplanade, where a group of American archaeologists, have excavated the remains of Roman Melita. Their investigation had concluded that the town house investigated had come to a sudden and catastrophic end, with the walls being toppled outwards. The location was never inhabited again and fields replaced the site during the Medieval Period.

The discovery of a deep shaft, corresponding to ones investigated within the precinct wall, with the three large slabs in place, made them draw an unfortunate conclusion. They thought that this was a shaft leading down to a set of tombs. They believed that it was only during the Medieval period that this shaft was being used as a well. Unfortunately they did not remove the rubble walls within the shaft, this would have led them into a now defunct section of the water system investigated before. The measurements correspond in every way: the shaft is 1.60m x 0.65m.

This would show that at least the shafts date from the Roman Period. The other element is even more compelling. The circular tunnel that goes round behind the wellhead and their present collocation within the waterway renders them quite useless. So, why would someone expend such immense time and resources to create such elaborately worked collection of identical tunnels, located on a straight and level stretch of tunnelling?


42 UCLA Excavation Report (Museum Esplanade, Rabat, Malta), 1983. (DAG 16-10 – Box No. 6i – Ts (123)).
being encountered near St. Paul’s Church, the shallowest under Santu Spirtu. They are distanced some 13m to 24.2m. apart with two sets of wells being distanced respectively 42.55m. and 42.44m. The first reading corresponds to the site immediately infront of St. Paul’s Church while the other is located 38.75m. to the North West, in line with St Catald Chapel. These two readings could in practice indicate the town’s main gates, as already described by Abela in 1647. Another gatehouse, possibly a postern, is embedded within the perimeter wall of St. Francis Friary. Three immense waterspouts (mwieżeb) typical of Byzantine construction are embedded in the debris. Yet another gap between shafts (33.3 m.) was encountered just infront of Ta’ Casha Chapel.

The second site examined, running from St. Francis Friary to Santo Spirtu, measures 52.92m. This is only a small part of the whole tunnel system, but a good part seems to be blocked. Eleven shafts are traceable in this heavily modified area. They are spaced out between 8.17m. and 9.78m apart. The closeness of the wells could indicate that the “towers” along the South-East perimeter did not have a triple line of defence before them. Consistent traces of another fortified wall or terrace may be seen within the excavation site next to Santu Spirtu Archives. This Isodomum opus type of wall construction is cutting through, at right angles, the older Phoenician/ Punic casement wall. It must have formed the base for an outer fortified wall or terrace located some 23m. infront of the second line of fortifications and the wellheads.

The water system must have been in use up to the very end of the Byzantine Period, until after a long and destructive siege the whole city of Melita was demolished by the Arab conquerors. Most of the shafts were blocked and the channels were filled in with debris. At some time during the Arab Period the “service” channel was restored to serve at least three fountains: Hammien, Gheriexem, and Saqqajja. The major modification being the sealing up of the end of the tunnels leading to the wells, and making use of the circular channel going behind the shaft area. This aspect would prove to be the most controversial part of the project, for all future trouble, with siphoning off of public water and other abuses, would derive from these shafts. We know that the Universita and the Knights took care to curb abuses, cleaning and restoring these channels and public fountains.

45 Dictionary of Art and Archaeology, J.W. Mollett. London 1994. Isodomum or Isedomos: (equal courses) typically Greek or Roman construction technique where the surface of each stone is of one uniform size, and the joints of one layer are adjusted with those of another so as to correspond symmetrically.

46 Joseph M. Brincat, 1995, 16-17.

The system continued in use during the British Period, when the introduction of water mains and other services made the public fountains eventually redundant. Saqqajja Fountain was already dry by the latter part of the 19th Century, while drainage tainted water from Gheriexem and Għajn Hammiejd is today mainly employed for agricultural purposes.

Appreciation

During this research, which has taken the best of ten years, many persons helped out with the actual exploration of the water system and the planning of the site. I am indebted to Mr. Joe Dalli and Ms. Rachael Bugeja for accompanying me on a number of “field trips” into these dark, damp, humid and narrow confines of the Gheriexem track. Mario and Sylvia Galea for accompanying me through the Santu Spiritu Saqqajja section, the late Fr. Pacifico Zammit O.F.M. Conv., Fr. Sebastian (Bastjan) Scicluna O.F.M. Conv. Can. John Azzopardi, present Curator of Wignacourt Museum, Rabat, Rev. F. Fsadni, and successive Parish Priests of St. Paul’s Church, who encouraged me with information regarding the area.

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Qanat Type of Water System

Cross Section

Plan

Roman Water System at Rabat, Malta

Section

Plan

Qanat, Seppjija and Roman Aqueduct Systems
Hammeim (Turkish Bath) Fountain, located below Mdina

Byzantine Fortifications and Water System
during last phase of development (870 A.D.)
(artists interpretation from data collected on site)

Qarqat, Saqqaja and Roman Aqueduct System
Extent of Roman Melita from the 5th to 9th Century (interpretation of data collected by arch.)