# Malta's Heritage in Stone : From Temple Builders to Today's Property Market

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# GEOLOGY OF THE MALTESE ISLANDS


UCL- Upper Coralline Limestone *(Tal-Qawwi): max ht 162m.*

BC - Blue Clay: max ht 70m.

GLS – Globigerina Limestone *(Franka):*
*max ht 250m porosity 40%*
*(Sol - bad) 27.5%.*

LCL – Lower Coralline Limestone
*(Taz-Zonqor) max ht 120m*
*porosity 16%*

*The Only location in Malta along Dingli Cliffs where all the geological formations are in view. Note the limited depth of the GLS formation, which in other locations can tend towards 100m in depth.*

# USES OF THE GEOLOGICAL FORMATION LAYERS - 1

*Tal-Qawwi* & *Iz-Zonqor* (hard stone > $4000T/m^2$) formations are the main local sources for crushed concrete aggregates & also used as aggregate in local concrete and bituminous macadam production road construction, although noted as being too dusty due to crushing in use.

Hardstones were also used as the lower course to minimize effects of rising damp.

# USES OF THE GEOLOGICAL FORMATION LAYERS -2

The Majority of Malta's traditional buildings were built of the Franka building block (compact stone 2000tons/m2), laid on a bedding mortar. The combination of masonry with the bedding mortar has given excellent service in use, as evidenced by major buildings/churches constructed around 400 years ago or more.

The best masonry building unit is located in the Lower Globigerina layer. Deeper down is found the *Soll* layer with a higher porosity - 3000 tons/$m^2$

# USES OF THE GEOLOGICAL FORMATION LAYERS - 3

*A typical Maltese  Franka Quarry of the lower bed.*

# FRANKA: MALTA'S BUILDING STONE – its layers.

## GLOBIGERINA LIMESTONE FORMATION

**Mug**

**Upper Globigerina Limestone Member:** A tripartite, fine grained planktonic foraminiferal limestone sequence comprised of a lower cream coloured wackestone, a central pale grey marl and an upper pale cream coloured wackestone. Pectinid bivalves and occasional echinoids are present. A ubiquitous phosphorite conglomerate bed containing fish teeth and diverse macrofossils occurs at the base of the member ( **Mc2**, Upper Main Phosphorite Conglomerate Bed). It is conformable in eastern outcrops but lies above a hardground and erosion surface in western areas. **Thickness 8-26m.** ( **Mug** MIOCENE, BURDIGALIAN TO EARLY LANGHIAN ).

**Mmg**

**Middle Globigerina Limestone Member:** A planktonic foraminifera-rich sequence of massive, white, soft carbonate mudstones locally passing into pale-grey marly mudstones. Fine bed laminae are frequent otherwise burrowing is ubiquitous. Thin-shelled pectinid bivalves and *Schizaster* echinoids are typical and coccoliths are abundant. The base of the formation is unconformable upon Lower Globigerina Limestone Member. Other minor breaks in the sequence are indicated in western outcrops by phosphorite clast beds. The sequence is thickest near Delimara. **Thickness 15-38m.** ( **Mmg** MIOCENE, AQUITANIAN TO BURDIGALIAN).

**Mlg**

**Lower Globigerina Limestone Member:** Pale cream to yellow planktonic foraminiferal packstones rapidly becoming wackestones above the base. Glauconite is common in western outcrops south of Fomm ir-Rih. Pectinid bivalves and *Shizaster* echinoids are frequent. The top of the member is marked by a ubiquitous hardground. This is phosphatised in western areas and carries a conglomerate ( **Mcl**, Lower Phosphorite Conglomerate Bed). Common fossils include fish teeth, molluscs, solitary corals and echinoids. **Thickness 0-80m.** ( **Mlg** MIOCENE, AQUITANIAN

# TEMPLE BUILDERS

Around 3600 B.C. before the Egyptian pyramids, a group of Stone Age hunters & gatherers on the Maltese archipelago shifted huge stone blocks (megaliths) to build their temples.

These megaliths could reach a height of 5.5m and weigh up to 50 tons. Was it village rivalry that compelled the construction of such remarkable monuments?

These temple builders, amongst a population probably not exceeding 5000 persons, just disappeared towards the end of the copper age.

# STRUCTURAL ENGINEERING OF TEMPLES - 1

If the construction of these megaliths is impressive, the plan layout consisting of a series of parallel semi-circular apses connected with a central passage way is intriguing. In elevation the façade curves not only inwards in the horizontal plane but as it rises, the notched ends also curve outwards in the vertical plane.

The impression of comfortable stability is thus combined with a pleasant sensation of gentle motion.

# STRUCTURAL ENGINEERING OF TEMPLES - 2

*The Excavated Mnajdra Neolithic Temple. Note Outstands of the masonry blocks in the adjacent fields*

# STRUCTURAL ENGINEERING OF TEMPLES - 3

The details as described in plan and section together with the 3 layers of massive lintels in place could be conceived as a ring beam to take horizontal loading.

Timber was not easily available in Malta and was probably even more limited during the stone age period, and these massive masonry units in place could indicate that these temples were roofed over in thick masonry slabs.

# STRUCTURAL ENGINEERING OF TEMPLES - 4

*Note Large slabs – Example taken from Hagar Qim Temples*

# THE DURABILITY OF MALTESE FRANKA MASONRY

The durability of compact masonry is frequently gauged with respect to its resistance to salt-crystallization damage. It was assumed generally that the more porous masonry is, more prone it is to ingress and movement of water and hence to salts in solution within it.

It is now universally acknowledged that it is not the total porosity which really determines the durability of the stone but the interconnectivity, size and distribution of the pores.

# STRUCTURAL ENGINEERING + MATERIAL PROPERTIES OF THE TEMPLES - 1

Their knowledge was not limited to building principles but also included for the judicious use of building materials.  In older temples the rough more durable masonry was plastered over.

In the more refined temples of the Maltese Archipelago, the softer globigerina limestone was adopted for the interior chambers, as well as the façade.

The intention behind this softer but less durable limestone was that of providing for a smoother and more expert finish.

# STRUCTURAL ENGINEERING + MATERIAL PROPERTIES OF THE TEMPLES - 2

*Tarxien Temples with carvings* - The soft limestone as carved provided the handsome relief carvings of spirals as well as friezes with rows of animals.

# FROM TEMPLE BUILDERS 3000BC TO ARABS 870AD

1. Rubble Walls – a civil engineering project Bronze Age?
2. Giren in dry stone masonry *(Corbelled huts)*
3. Tombs – Punic 800 BC
4. Caves – residences!
5. Catacombs - Romans
6. Arab Occupation, poor on climatic design 870 – 1090:

The Syrian roofing system was not unknown to the Arab conquerors in 870 from Tunisia. Further whilst houses in Sicily generally had sloping roofs, those in Malta have always been flat like those in North Africa.

The Tunisian connection is reaffirmed by the Tunisian *ghorfa*, which employed a random mixture of cut stone and rubble and a barrel-vaulted roof requiring no timber. The overall effect is not dissimilar to the Maltese *razzett* compound.

# FROM TEMPLE BUILDERS TO THE ARABS - 2

*Note Rubble Wall construction – Hitan tas-Sejjieh Neolithic?*

*Perit Elizabeth Ellul*

# FROM TEMPLE BUILDERS TO THE ARABS - 4

*A corbelled hut (girna), constructed in dry stone masonry of locally sourced UCL – not common in Southern Italy.*

# FROM TEMPLE BUILDERS TO THE ARABS - 3

*St.Cataldus Catacombs – Roman Rabat: outside the walls*

# FROM TEMPLE BUILDERS TO ARABS -5

*Muxrabija – as an arabic element and a predecessor of the enclosed balcony. Found in some houses which date back to the 1300's*

*Retrieved from https://i0.wp.com/b-c-ing-u.com/wp/wp-content/uploads/2016/12/MalDia-03-07-12-16-Another-rustic-muxrabija-version-pre-dating-the-use-of-wood-on-building-facades..jpg?fit=186%2C209*

# NORMAN PERIOD 1090 UP TO THE KNIGHTS 1530

Late medieval buildings reserved ashlar for walls that were visible from the street and for the arches that supported the ceiling slabs. On the other hand, documentary evidence for ashlar-built country houses is extremely scarce before the year 1545.

Prior to 1530, there is evidence of houses with roofs that were thatched or made of reeds, similar to African huts.

# NORMAN PERIOD UP TO THE KNIGHTS - 2

*Construction in Gozo - note rubble infill walling with ashlar at the corners, together with the top ashlar course string.*

# NORMAN PERIOD UP TO THE KNIGHTS - 3

The first surviving basic structures date from the 13th – 14th century. It is not known whether the early houses of Mdina were in ashlar constructions, or in a combination of ashlar and rubble walling.

In this combination of walling systems to facades, the Catalan inspired elongated windows with round-headed double lights separated by a slim colonette, could have also been included to the houses of the merchants/nobility.

# NORMAN PERIOD UP TO THE KNIGHTS – 4

*Siculo Norman Birgu Townhouse*
*retrieved from https://www.gotaway.ca/wp-content/uploads/2019/01/birgu-norman-house-window.jpg*

"Siculo-Norman architecture was imported to Malta through Sicily during a period spanning circa 400 years from the early 12th century onwards. Siculo-Norman architecture is derived from Romanesque architecture, which then developed into Gothic architecture".
*–T.O.M. article dated December 6th 2012*

These architectural features were synonymous with buildings where nobility used to reside.

# NORMAN PERIOD UP TO THE KNIGHTS -5

The roofing technique employed by Maltese builders in the late middle Ages dates back to the 4th -7th century churches found in the Hauran district of Syria. It consisted of masonry slabs (*xorok tal-qasba*) of 115mm thickness that span 2.25m without cracking on a seating of about 7cm.

For a room width of 2.75m this was facilitated by sloping the walls slightly inwards and then decreasing the span further by adding masonry corbels (*kileb*), just below these masonry slabs.

# NORMAN PERIOD UP TO THE KNIGHTS -5

*Xorok tal-qasba spanning 2.75m between kileb*

# NORMAN PERIOD UP TO THE KNIGHTS - 6

For rooms wider than 2.75m, arches were constructed across the room at about 1.2m centres, with thinner masonry slabs (xorok) of 45mm thickness spanning onto these arches, on a seating of 2cm – 3cm.

The Maltese mason regained his skills from the Sicilian craftsmen, with the floor spanning system either copied from surviving Arab structures or adapted locally.

# NORMAN PERIOD UP TO THE KNIGHTS -5

*Xorok supported by arch construction at 1m centres.*

# DUZZINA – APOSTOLIC DELEGATE 1575 REPORT -1

430 churches reported on the Island.

Of these, most were in a bad state of repair, 49 were in ruins, 146 had floors of beaten earth.

The earlier churches had been planned as single-cell rectangular buildings, with the troglodytic element still evident. That these churches had the base dug in rock was due to the fact that the load path for the horizontal thrust created by the barrel vaulted roofs had not as yet been successfully resolved in its descent to founding level.

# DUZZINA – APOSTOLIC DELEGATE 1575 REPORT -2

The masonry course height for these early churches had already measured 26.5cm, which is the height still in use in Malta to this day.

This course height relates to the old cane (2.1m - qasba) measures, with a xiber k/a the Maltese foot, equivalent to 1/8th of a qasba measuring 26.25cm. The qasba measure is still in use today.

This uniformity in the course height has acted as unifying aesthetic proportions across the centuries.

# VERNACULAR TO CLASSICAL PLACES OF WORSHIP-1

The Maltese mason had at a point in time prior to the arrival of the Knights of Malta graduated to master builders for the construction of the single-cell troglodytic rectangular churches.

These modest churches in lightly loaded masonry had measurements averaging out at:
7.5m long X 4.5m wide to 3.6m high – Hall-Millieri
Within a short span of time increased to
14.5m long X 9.1m wide to 6.7m high – Gudja
the masonry slabs now spanning 2.15m instead of the previous 1.525m.

# HAL-MILLIERI VERNACULAR PLACE OF WORSHIP
# 4.5m arch on 3.6m height.

# VERNACULAR TO CLASSICAL PLACES OF WORSHIP-2

From the mid-16th century onwards, the plan of these churches now consisted of a wide nave with a choir at the far end and a series of chapels with saucer type domes on either side of the nave.

The span of the wide nave had now increased to:
57.5m depth X 15.5m wide* to 19.5m high.
* overall width with aisles of 36m.

Masons had furthered their knowledge on load paths, as by now they had resolved the problem of the horizontal thrust induced by the barrel vaults via sloping buttresses contained within the thick walls of the side chapels, now included in the plan layout.

# THE KNIGHT’S LEGACY 1530-1798 : 1

## Masonry Lodges - Gerolamo/Vittorio Cassar

The apprenticeships of the Maltese mason with Europe’s main military engineers & planners, aided their formation of capomastri. Hence the undertaking of Latin cross basilicas in the villages.

The building of Valletta is noted to have been undertaken in a very sustainable way. The masonry blocks were retrieved from the quarrying to form basements and reservoirs. Minimal material was thrown to waste, there was a significant reduction in the need to transport material, whilst reducing dust.

# THE KNIGHT'S LEGACY 1530-1798 : 2

During this period timber joists were imported and these replaced the arched masonry ribs in the upper floors. Room spans now increased to 6m.

Initially under the influence of military engineers main buildings were undertaken in the simple mannerist style in humble *melitan* fat mouldings decorating the windows, with the wall panels growing in importance, whilst rusticated corners decorated the facade.

The Maltese archipelago then in constant contact with its European neighbours had managed via its local periti to have produced a building style that is essentially Maltese, always under control, with its sights affording relief after the extravagances of Sicily and Southern Italy.

# THE KNIGHT’S LEGACY: AESTHETICS & PROPORTION

To design the piano nobile of plan dimensions 6m X 10m, by applying the golden rule (this proportion relates to the human body) to the diagonal plan dimension (8m) an aesthetically proportioned building height is calculated to be 5m.

The Maltese master mason well versed in the practice of stereotomy, was known to have a copy of Vignola’s 5 orders on architecture (1572). Considered one of the best architectural textbooks ever written.

Vignola (Jacopo Barozzi) had adopted most of the Roman architect, civil & military engineer Vitruvius's proportion principles in the publication De Architectura circa 50 BC.

# Statue of Jacopo Barozzi k/a as Vignola with the 5 Orders annotated plates in La Rocca (Castle) Vignola Italy.

# THE KNIGHT’S LEGACY: Construction & Aesthetics

*A typical timber joist ceiling supporting* xorok on a 6m span & 5m height, *the piano nobile dimensions increased height not just for climatic reasons but for aesthetical ones also*

# THE BRITISH PERIOD 1800-1964

Then late 19th Century various barracks for the soldiers' resident in Malta were undertaken, generally external portions were undertaken in rough-hewn *gidra* masonry a way to define solidity.

The British construction took heed of the climate with open arcades undertaken to protect the buildings form the heat build-up.

On these islands swept with the sea breeze, natural ventilation was considered to be beneficial to the internal temperature control of buildings.

# THE BRITISH PERIOD 1800-1964

The Code of Police Laws relating to the sanitary conditions of buildings was introduced in 1854.

This included for the laying of a damp proof layer at the base of masonry walling, thus improving the durability of the constructed masonry and dictated thicknesses of party walls & façade walls at 2’ 6” (76cm) thickness.

The British towards the mid-19th Century introduced steel joists which were then used in parallel with timber joists.

# THE BRITISH PERIOD 1800-1964

*A typical townhouse soffit from the British Period with embedded steel joists – note flaking xorok & rusty joists.*

# THE BRITISH PERIOD 1800-1964

Then came about the creation of backyards, together with internal yards, which resulted in the demise of the central courtyard type of house.

In 1837, His Majesty's Commissioners of Enquiry recommended the establishment of a Chair of Civil Architecture and Land Surveying at the University of Malta. By 1863, the courses had a three-year duration.

In the 1920 Ordnance, the perit now became known as Architect & Civil Engineer linked with a professional warrant

# FROM LOW TO HIGHLY STRESSED MASONRY BUILDINGS -1

Dating from the 20th Century a number of buildings within Valletta replicate the happenings in the historic centres of European cities. Within Valletta's fortified city congestion led to residences to building heights of 8 floors or more, inclusive of additional basement floors.

Even today Europe has not embraced the multi-storey constructions as undertaken in America and Asia. In Malta whilst aesthetics and proportion were guiding principles, the concept of adhering to low stresses could not still apply.

# FROM LOW TO HIGHLY STRESSED MASONRY BUILDING -2

*An 8-storey high apartment block constructed, as 1908 in compact globigerina limestone, Valletta*

# FROM LOW TO HIGLY STRESSED MASONRY BUILDING – 3.

Prior to 1948, thicknesses of load bearing walls were listed in the London Building laws, in existence since 1774. The laws of 1887 listed masonry buildings as high as 100' (30.5m), (8 stories high – this coincides with the European standards quoted earlier). This quotes wall thicknesses at the base being 26" (66cm) decreasing to 9" (23cm) thickness at the top. US building regulations existing in the US gave data for load bearing masonry buildings 15 – 17 stories in height.

Prior to the adoption of structural codes in Malta, the masonry wall strength had been based on longstanding empirical practice within the profession at an elastic strength of 10.5ton/ft$^2$. Today the structural codes note the strength of franka at 16ton/ft$^2$.

# ACOUSTICS & REVERBERATION TIME IN MASONRY

A short reverberation time in the region of 0.5sec - 1sec is more conducive to speech intelligibility. If in a lecture hall this is higher than 1sec, the listener will have to contend with multiple words at a time.

Whilst a long reverberation time in the 2 - 9sec region in Gothic Cathedrals improves on the quality of the music.

The simple equation established by Sabine in the early 20th century notes the reverberation time as being directly proportional to the space enclosed and inversely proportional to the absorptive characteristics of the enclosed surfaces multiplied by a factor of 0.161.

# SEISMIC VULNERABILITY OF MASONRY CONSTRUCTION IN MALTA -1

A historical catalogue of felt earthquakes in the Maltese islands has been compiled dating back to 1530.

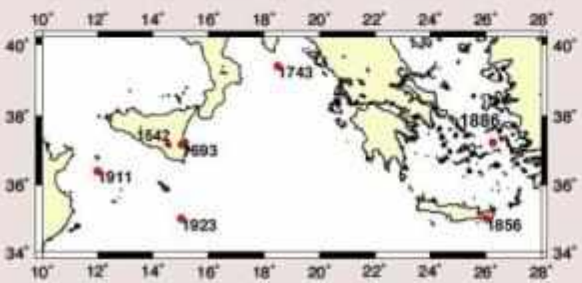
Although no fatalities were officially recorded during the period 1530 to date, as a direct consequence of earthquake effects, damage to buildings occurred several times.

The absence of adobe masonry construction, but of ashlar masonry, explains the no fatalities.

# SEISMIC VULNERABILITY OF MASONRY CONSTRUCTION IN MALTA – 2.

## When Malta shook

The seven tremors that caused damage in Malta & Gozo




| Date | Epicentre | Magnitude | Damage caused |
|---|---|---|---|
| 10 Dec 1542 | Eastern Sicily | 7.0 | Felt very strongly in Malta and a few one-floor dwellings (casupole) collapsed. |
| 11 Jan 1693 | Eastern Sicily | 7.4 | Most houses in Valletta damaged, some seriously;collapse of several church domes in Malta and Gozo; serious damage to Mdina, partial collapse of cathedral |
| 20 Feb 1743 | Ionian Sea | 6.9 | Damage to Mdina cathedral and numerous other churches |
| 12 Oct 1856 | Crete | 7.7 | Many houses in Malta and Gozo seriously cracked; several church domes and walls damaged |
| 27 Aug 1886 | Aegean Sea | 5.5 | In Valletta the Court of Justice, some churches and many houses suffered damage, as well as some buildings and the Cathedral in Mdina |
| 30 Sep 1911 | West of Gozo | 7.3 | Mostly felt in Gozo, where it produced significant damage to domes and houses; damage to Fort chambray; much less felt in Malta |
| 18 Sep 1923 | East of Malta | 6.4 | Mostly felt around harbour area, Malta; non-structural damage to churches and cracks in walls. |

Apart from the dates displayed, 1972 at magnitude 5 is the last serious tremor within present remembrance, resulting in no major damages.

*All data is retrieved from https://vassallohistory.wordpress.com/earthquakes-in-malta/*

# SEISMIC VULNERABILITY OF MASONRY CONSTRUCTION IN MALTA – 3.

The worst recorded damage was during the 1693 event, which caused 60,000 deaths in Sicily.

In Valletta it is reported that there was not one house that did not need some repair.

The facades of some major buildings were detached from the main structure, and needed immediate repair.

Some churches suffered major damage to their domes and severe cracks in walls.

# SEISMIC VULNERABILITY OF MASONRY CONSTRUCTION IN MALTA – 4.

Serious damage was done to Mdina. Here the Cathedral suffered partial collapse and many other buildings suffered serious damage. However, many of the buildings in the city were very old and had been neglected for many years.

In particular, the 13th century cathedral was already showing serious signs of disrepair before the earthquake, and plans had in fact already been drafted for its rebuilding.

In Gozo, it was noted that the damage to the fortified Cittadella, was most probably due to long years of neglect, as was the damage to coastal towers.

# SEISMIC VULNERABILITY OF MASONRY CONSTRUCTION IN MALTA – 5.

*A depiction of Mdina before the 1693 Earthquake.*
*Retrieved fromhttps://vassallohistory.files.wordpress.com/2013/01/mdinaplan.jpg*

# STRUCTURAL ROBUSTNESS & BLAST DAMAGE – 1.

On 12 September 1634, a Hospitalier gunpowder factory in Valletta constructed around the late 16th or early 17th century accidentally blew up, killing 22 people and causing severe damage to a number of buildings.

The gunpowder factory was not rebuilt and around 1667, a new factory was constructed in Floriana, far away from any residential areas. This practice is still adhered to today with fireworks factories being located outside of villages.

# STRUCTURAL ROBUSTNESS & BLAST DAMAGE -2.

When a gunpowder factory blows up, the blast occurring is too great, with the stiff geometric properties of these small compact rooms not sufficient to counteract the blast effect, with many casualties occurring.

The following slide shows an arson event in a residential area, with the existing masonry construction reduced to a pile of rubble. Unfortunately 2 casualties occurred in this event.

# STRUCTURAL ROBUSTNESS & BLAST DAMAGE – 3.

*The devastation that resulted following the arson chemical explosion that went wrong, which brought down a block of apartments and shops (Paola 1992)*

# HOME OWNERSHIP & VACANCY RATES

## TABLE 1: HOME OWNERSHIP RATE AS OF CENSUS DATE

| YEAR | 1948 | 1957 | 1967 | 1985 | 1995 | 2005 | 2011 |
|---|---|---|---|---|---|---|---|
| % | 23.1 | 26.1 | 32 | 53.9 | 68 | 75.2 | 77.0 |
| Source: NSO | | | | | | | |

## TABLE 2: VACANCY HOUSING RATES OVER THE VARIOUS MALTESE

| YEAR | 1861 | 188<br>1 | 1891 | 1901 | 191<br>1 | 192<br>1 | 193<br>1 | 1957 | 1967 | 1985 | 199<br>5 | 2005 | 2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | 25 | 29 | 20 | 20 | 22 | 19.9 | 19.4 | 4 | 14.9 | 19.2 | 23 | 27.6 | 31.7 |
| Source: NSO | | | | | | | | | | | | | |

## TABLE 3:VACANCY RATES OVER MEDITERRANEAN COUNTRIES

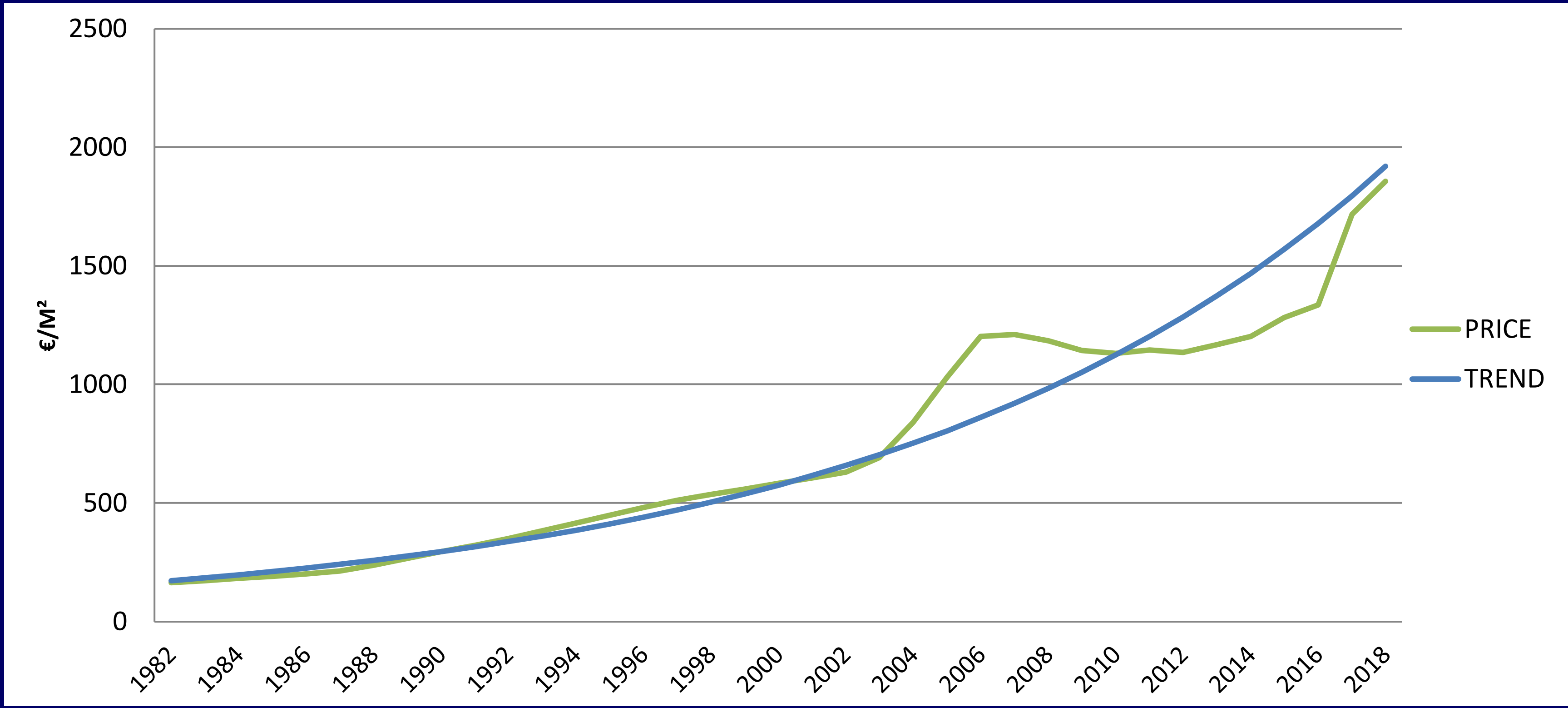
| COUNTRY | CYPRUS | GREECE | MALTA | PORTUGAL |
|---|---|---|---|---|
| % VACANCY RATE | 23.1 | 35.44 | 31.7 | 29.5 |
| Source: NSO | | | | |

# TABLE 4: AFFORDABLE PROPERTY RATES €/SQM FOR THE MALTESE ISLANDS OVER A 36 YEAR PERIOD

| Locality | 1982 | 1987 | 1992 | 1997 | 2002 | 2007 | 2012 | 2014 | 2015 | 2016 | 2017 | 2018 | %growth rate Pa 1982-2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fgura / Paola / Zabbar | 105 | 128 | 256 | 408 | 466 | 987 | 893 | 1038 | 999 | 1016 | 1137 | 1493 | 7.16% |
| M'scala | 116 | 175 | 373 | 373 | 505 | 1001 | 881 | 980 | 992 | 998 | 1260 | 1585 | 6.48% |
| Mosta / Naxxar | 186 | 198 | 291 | 478 | 524 | 1242 | 1167 | 1180 | 1337 | 1443 | 1545 | 1649 | 6.62% |
| San Gwann | 151 | 175 | 256 | 431 | 557 | 1092 | 962 | 1076 | 1022 | 1152 | 1558 | 1742 | 6.77% |
| Sliema inner prime | 210 | 338 | 443 | 710 | 883 | 1373 | 1402 | 1457 | 1720 | 1756 | 2459 | 2303 | 6.36% |
| St. Julians | 186 | 233 | 408 | 547 | 687 | 1321 | 1186 | 1311 | 1369 | 1447 | 1998 | 2360 | 6.63% |
| Swieqi | 198 | 245 | 419 | 641 | 785 | 1473 | 1443 | 1376 | 1535 | 1539 | 2070 | 1864 | 6.45% |
| **Malta** | **163** | **212** | **349** | **512** | **629** | **1211** | **1134** | **1203** | **1282** | **1336** | **1718** | **1856** | **6.62%** |
| **Trend** | **173** | **241** | **337** | **471** | **658** | **920** | **1285** | **1460** | **1521** | **1693** | **1802** | **1920** | **6.91%** |
| **Gozo** | | | | | **432** | **857** | **903** | **906** | **1029** | **1017** | **1106** | **1095** | **2.48%** |
| **Source: DHIperiti in-house valuations 2018** | | | | | | | | | | | | | |

Gozo has experienced a 4.32%pa increase over the past 5 years, as compared to Malta which experienced a 10.29%pa increase.

# CHART 1: MALTA AFFORDABLE PROPERTY IN €/M² OVER THE PAST 36 YEARS




Malta's affordable property annual increases for 2014/15 at 6.6%, 4.2% for 2015/16, 28.6% for 2016/17 & 8% for 2017/18 are to be compared with the past 36-year average at 6.6% pa.

Note the time lag between rental and property price increases.

# MONTHLY APARTMENT RENTALS

## TABLE 5 :DHI-TOM 2018

| | DHI | TOM | DHI | TOM | DHI | TOM |
|---|---|---|---|---|---|---|
| | 3 Bedroom | | 2 Bedroom | | 1 Bedroom | |
| 2007 | € 491 | | € 448 | | € 238 | |
| 2010 | € 492 | | € 422 | | € 258 | |
| 2012 | | € 833 | | € 618 | | € 137 |
| 2013 | € 541 | € 903 | € 522 | € 635 | € 331 | € 458 |
| 2014 | € 478 | € 984 | € 393 | € 693 | € 345 | € 490 |
| 2015 | € 752 | € 1,023 | € 615 | € 796 | € 493 | € 605 |
| 2016 | € 983 | | € 723 | | € 583 | |
| 2017 | € 1,329 | € 879 | € 1,147 | € 663 | € 859 | € 498 |
| 2018 | € 1,444 | | € 1,289 | | € 960 | |

Source: DHIperiti in-house valuations 2018

*Values in green are taken from The Sunday Times of Malta Article (20 August 2017) whose source is the Malta Bid European Medicine Agency.*

Table notes the average monthly rent for a 3-bed/rm hovering around €1,450 per month.

According to the Global Property Guide 2018, Malta’s monthly rental rate of €1,540 is to be compared with London with a rate of €8,213, followed by Monaco at €7,480, Singapore at €3,498, Hong Kong at €6,445, then France at €3,564, whereas Netherlands, Finland, Austria, Ukraine and Denmark average around €2,380 then Germany and Belgium, Portugal, Czech Rep. come in around €1,447 rounding off with Cyprus at €786.

# RESIDENTIAL DEVELOPMENT PERMITS

## TABLE 6: RESIDENTIAL UNITS AS APPROVED BY MEPA, TOGETHER WITH COMPLIANCE CERTIFICATES BEING ISSUED:

| YEAR | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of total Units | 5481 | 6128 | 6707 | 9081 | 10409 | 11343 | 6836 | 5298 | 4444 | 3955 | 3064 | 2705 | 2937 | 3947 | 7508 | 9822 |
| Apartments approved | | 4548 | 5265 | 7539 | 8961 | 10252 | 6184 | 4616 | 3736 | 3276 | 2489 | 2062 | 2221 | 3019 | 6316 | 8513 |
| Compliance Certificates | 2552 | 2719 | 4975 | 3884 | 3400 | 7169 | 7796 | 8055 | 7784 | 6438 | 6314 | 6703 | 6948 | 7358 | 8452 | 9250 |
| % Completed | 47% | 44% | 74% | 43% | 33% | 63% | 114% | 152% | 175% | 163% | 206% | 248% | 237% | 186% | 113% | 94% |
| *Source: PA* | | | | | | | | | | | | | | | | |

**Annual Marriages have hiked from 2500 up to 3072.**
**Whilst Separations/Divorces also from 500 up to 1350.**
**Annual property contracts also higher at 15000, from the previous 11500 annual contracts.**
**Private accommodation for tourists requires another 20,000units.**

**Total number of annual permits for additional residential units (2018)required:**
**2500 (marriages) + 1000 (divorcees) + 1500 (2nd homes) + 3000 (foreigners) + 1500(tourists) = 9500 annual permits**

**This as compared to that required for 2004 at 5000 permits.**

# THANK YOU

## FOR YOUR ATTENTION