



13th – 16th June 2016

Basic Training

PACES: Preparedness for Appropriate Accommodation in Emergency Shelters

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U.S.A.R. CPD MALTA



Project co-funded by the EU Humanitarian Aid and Civil Protection



MALTESE BUILDING AFFECTED BY SEISMIC

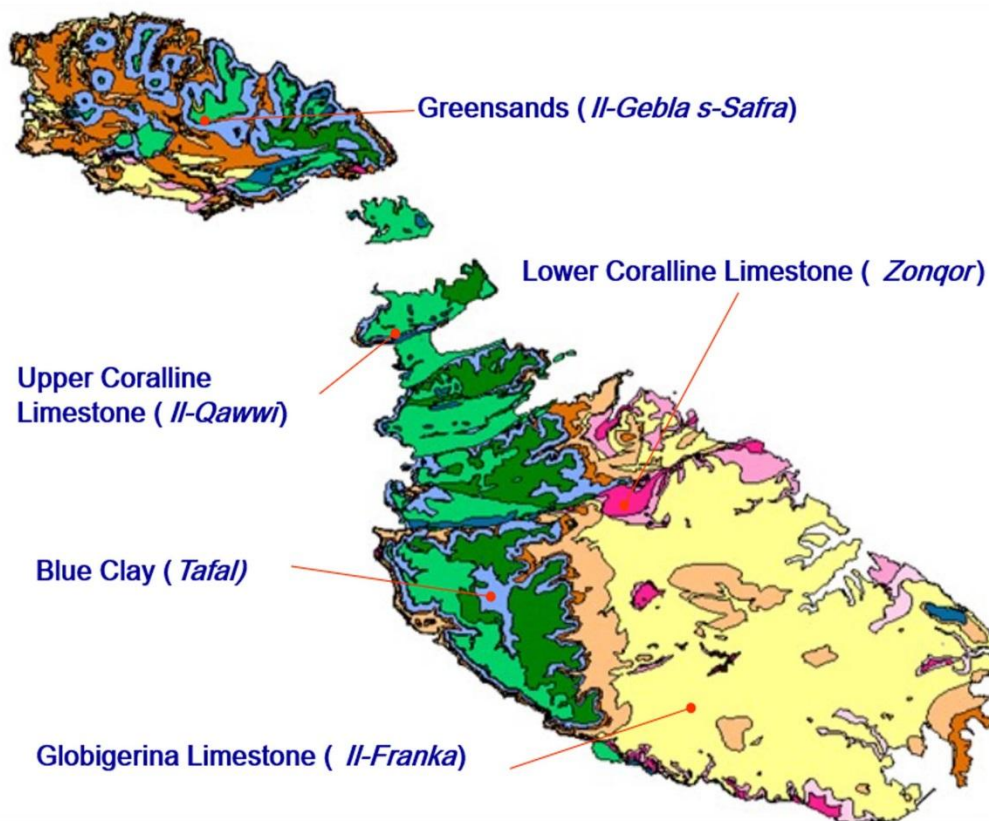
- Geology of Maltese Island
- History of Maltese Architecture
- Maltese Building affected by Seismic



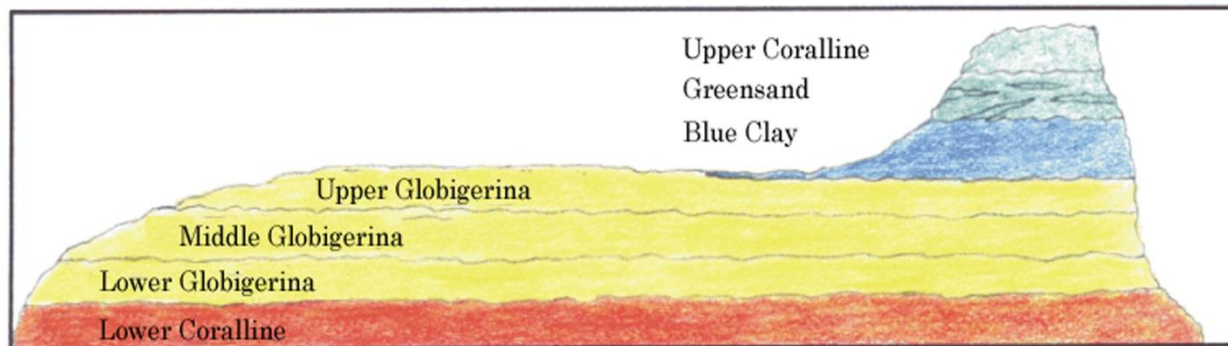
Geology of Maltese Island

- The Maltese geology is not an island composed from a large stone which crops out of the surface of the sea water.
- The island is for the most part composed of marine sediment rocks.
- Maltese island geology date back to some 30 to 35 million years ago and the resultant rock formation are relatively simple consisting to five basic layers laid on top of the other in a layer cake sequence.

Geology of Maltese Island



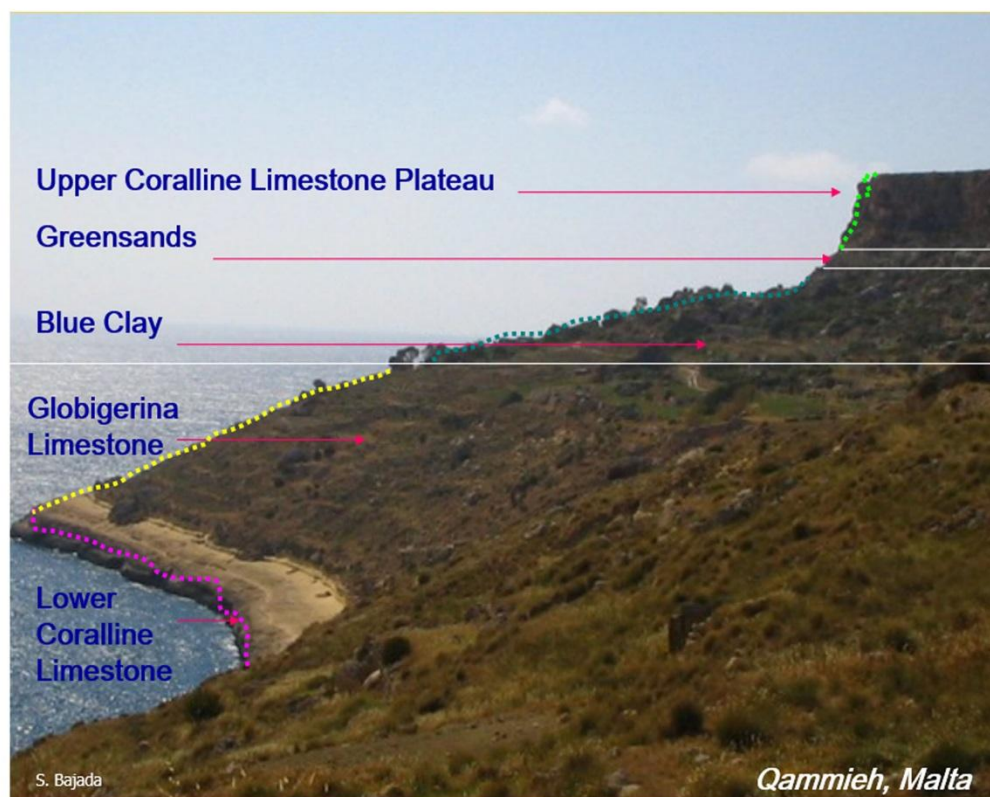
Geology of Maltese Island



The Five Rocks of the Maltese Island

- 1 - Lower Coralline Limestone (*Zonqor*)
- 2 - Globigerina Limestone (*Il-Franka*)
- 3 - Blue Clay (*Tafal*)
- 4 - Greensand (*Il-gebla s-safra*)
- 5 - Upper Coralline Limestone (*Il-Qawwi*)

Geology of Maltese Island



Geology of Maltese Island



Geology of Maltese Island

GLOBIGERINA LIMESTONE





Geology of Maltese Island

GLOBIGERINA LIMESTONE

Most of the Maltese buildings are constructed from **GLOBIGERINA LIMESTONE**

The only Vernacular stone suitable for construction stone, aside from the modern bricks made from imported cement.

Globigerina weathers elegantly to the color of natural stone and its plasticity allows to be sculpted down to chair pin detail.

Geology of Maltese Island





History of Maltese Architecture

Maltese Architecture is amongst the earliest in the world, long before the pyramids were built in Egypt.

Large stone temple structures were built between 3500B.C. & 2500 B.C.

Today's mixed Maltese Architecture reflects the different periods which the Maltese Island was governed by before we declared Independence in 1964 and Republic in 1979.



History of Maltese Architecture

Maltese History Timeline :

- 1 - Prehistory
- 2 - The Medieval Era
- 3 - The Knights
- 4 - British Colony
- 5 - Modern & Contemporary Architecture



History of Maltese Architecture

PREHISTORY

The **Neolithic** people started building their temples from hardy Upper Corraline Limestone 5600 years ago.

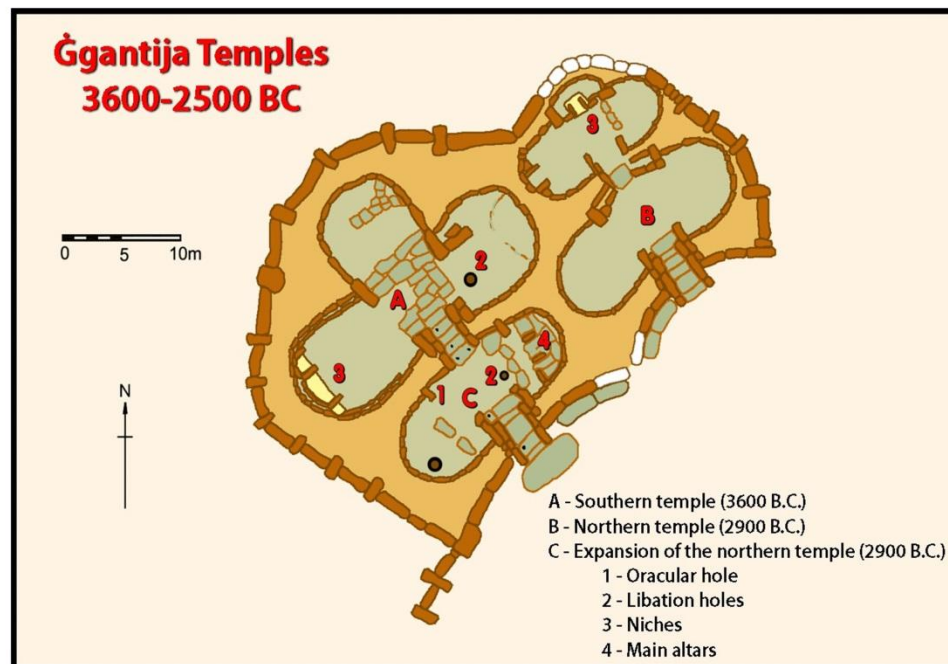
These temples are the oldest built structures on earth, and the neolithic community became the first known Architectural Civilisation.

History of Maltese Architecture

Ggantija Temples



History of Maltese Architecture



History of Maltese Architecture

Mnajdra Temples



History of Maltese Architecture

Mnajdra Temples



History of Maltese Architecture

Hagar Qim



History of Maltese Architecture

Hagar Qim





History of Maltese Architecture

THE MEDIEVAL ERA

Medieval Architecture was more closely tallied with **Climatic** and **Lifestyle** need, rather than esoteric, Philosophical and Divine principles.

Development emerging around 870A.D. with the Arabic influence and its characteristics prevailed until the last century in farmhouses.

History of Maltese Architecture

THE MEDIEVAL ERA



History of Maltese Architecture

One room churches at **Tas-Silg** & **San Pawl Milqi** are the earliest churches built having small or no openings in the external walls



History of Maltese Architecture



History of Maltese Architecture

Farmhouses





History of Maltese Architecture

THE KNIGHTS

On their arrival in Malta, the Knights were still using the medieval style and in-fact, their earliest buildings in Birgu & Valletta included features of this outdated technique.

It was the resident Architect Francesco Buonamici introduced Baroque to Malta in 1635, when he designed the Jesuit Church.

History of Maltese Architecture

Jesuit Church





History of Maltese Architecture

The Knights Era

Military & Religious Order.

Design of the new City **VALLETTA**

The knights erected new churches, re-built auberges and public buildings and dressed the city with fortifications.

History of Maltese Architecture

St. John Co-Cathedral



History of Maltese Architecture

VALLETTA



History of Maltese Architecture

VALLETTA



History of Maltese Architecture

Auberge de Castille



History of Maltese Architecture

Auberge de Castille





History of Maltese Architecture

BRITISH COLONY

When we think of Historical & Architectural buildings in Malta, we think primarily on the Architecture used by the Knights of St. John.

The British Era left mark too

Adding and altering on the work of the Knights but also developing new buildings.

History of Maltese Architecture

Main Quard Valletta



History of Maltese Architecture

Villa Portelli



History of Maltese Architecture

Bighi Naval Hospital



History of Maltese Architecture

Bighi Naval Hospital





History of Maltese Architecture

MODERN ARCHITECTURE

The last two decades have witnessed more innovative, hybrid styles influenced by an increased appreciation of the islands' architectural heritage and current trends in Europe.

Farmhouses, whose design dates back to their medieval period, are now restored into highly-prized villas.

History of Maltese Architecture

Modern Farmhouses



History of Maltese Architecture



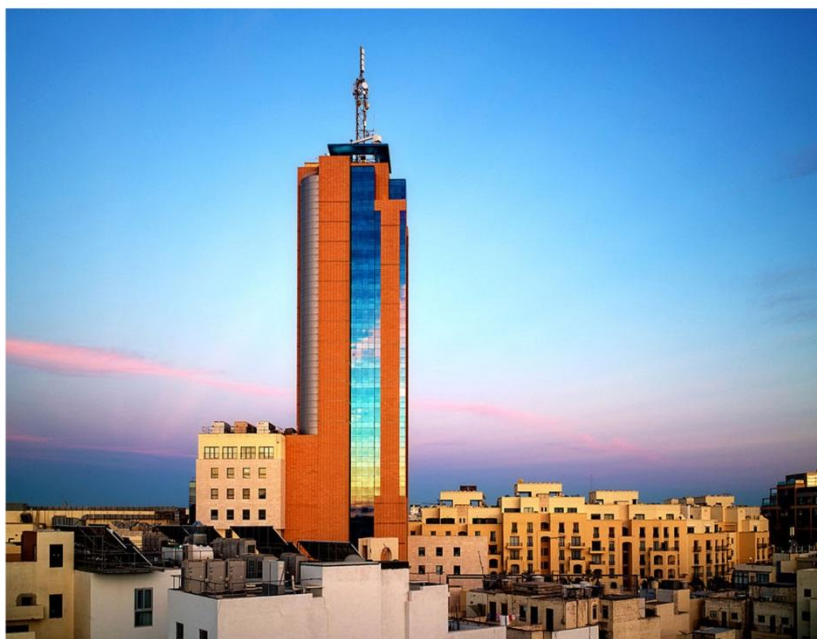
History of Maltese Architecture

High Rise-Buildings



History of Maltese Architecture

Portomaso Business Centre



History of Maltese Architecture

Apartments



History of Maltese Architecture

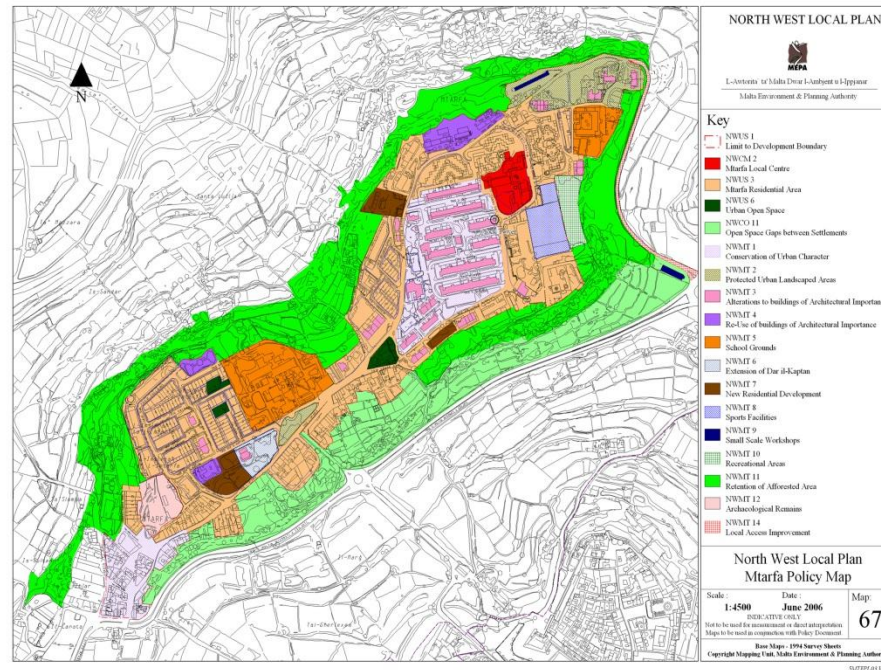
Design Policies 2015



- Design
- Sanatry Laws
- Conservation
- Building Height

History of Maltese Architecture

Local Plans





History of Maltese Architecture

SEISMIC LOAD

Maltese Buildings affected by Seismic

STRUCTURAL ELEMENTS USED



CONCRETE



CONCRETE BRICKS



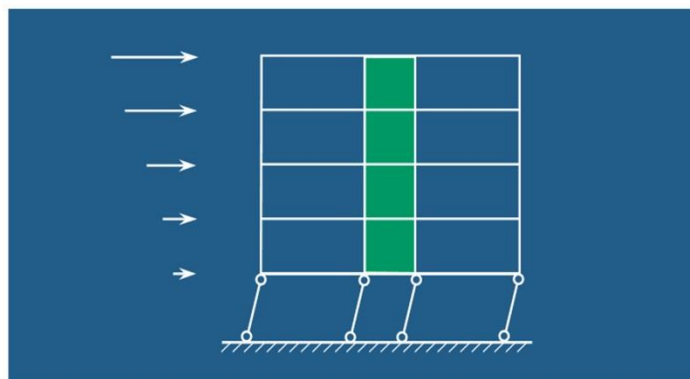
STONE BRICKS



STEEL

Maltese Buildings affected by Seismic

→ **AVOID SOFT-STOREY GROUND FLOORS**



Maltese Buildings affected by Seismic



Maltese Buildings affected by Seismic



Maltese Buildings affected by Seismic

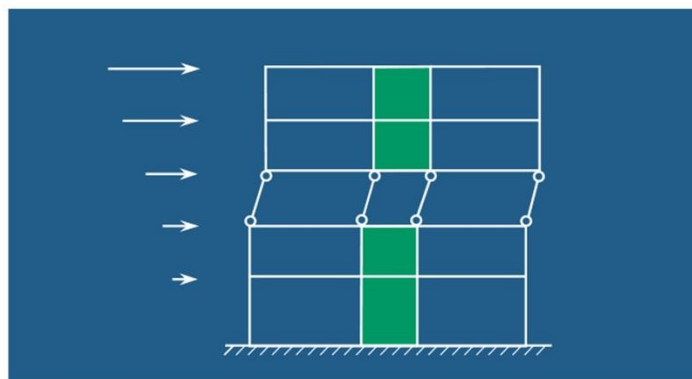


Maltese Buildings affected by Seismic



Maltese Buildings affected by Seismic

→ **AVOID SOFT-STOREY UPPER FLOORS**



Maltese Buildings affected by Seismic

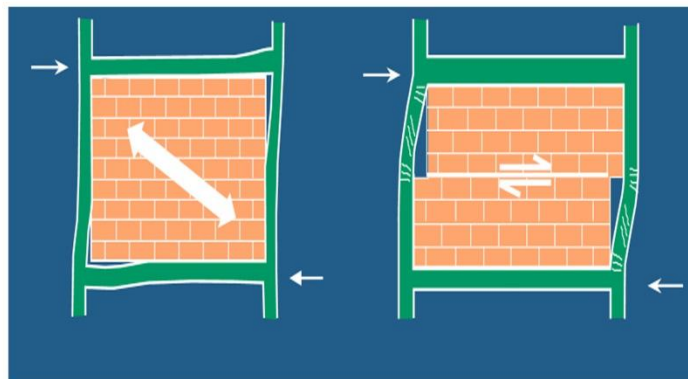


Maltese Buildings affected by Seismic



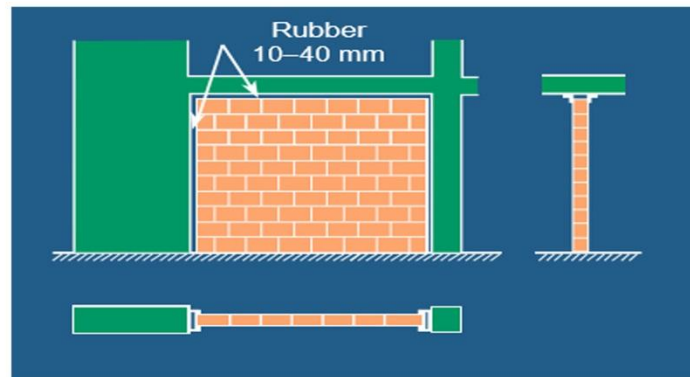
Maltese Buildings affected by Seismic

→ AVOID “BRACING” OF FRAMES WITH MASONRY INFILLS



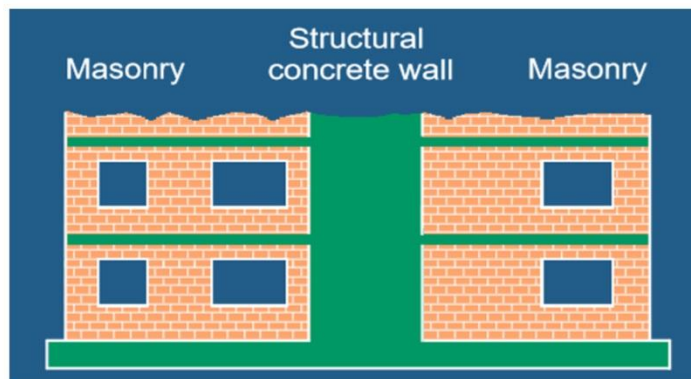
Maltese Buildings affected by Seismic

→ IN SKELETON STRUCTURES, SEPARATE NON-STRUCTURAL MASONRY WALLS BY JOINTS.

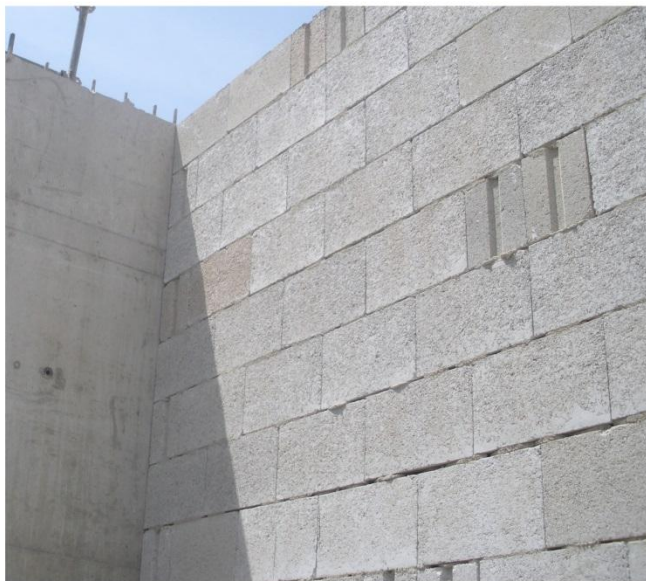


Maltese Buildings affected by Seismic

→ **BRACE MASONRY BUILDINGS WITH REINFORCED CONCRETE STRUCTURAL WALLS**

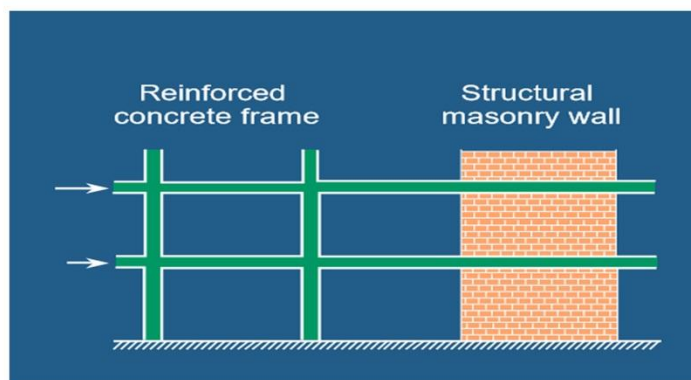


Maltese Buildings affected by Seismic



Maltese Buildings affected by Seismic

→ **AVOID MIXED SYSTEMS OF COLUMNS AND STRUCTURAL MASONRY WORKS**

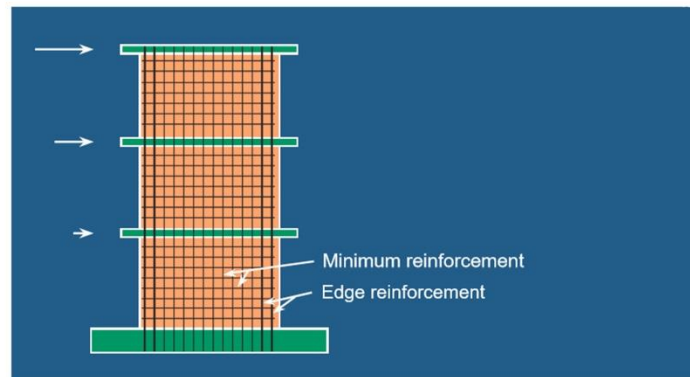


Maltese Buildings affected by Seismic



Maltese Buildings affected by Seismic

→ **REINFORCE STRUCTURAL MASONRY WALLS TO RESIST HORIZONTAL ACTIONS**

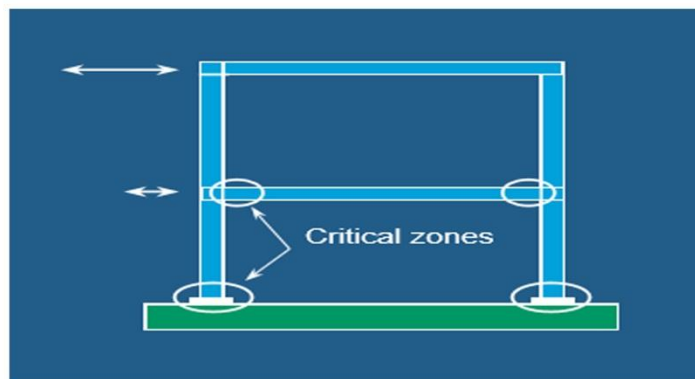


Maltese Buildings affected by Seismic



Maltese Buildings affected by Seismic

→ DESIGN STEEL STRUCTURES TO BE DUCTILE

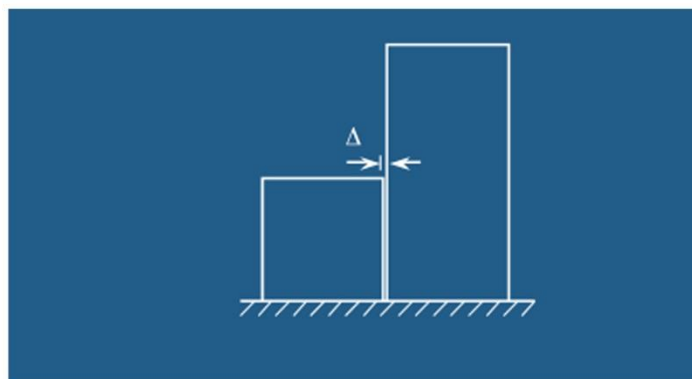


Maltese Buildings affected by Seismic



Maltese Buildings affected by Seismic

→ SEPARATE ADJECENT BUILDINGS BY JOINTS

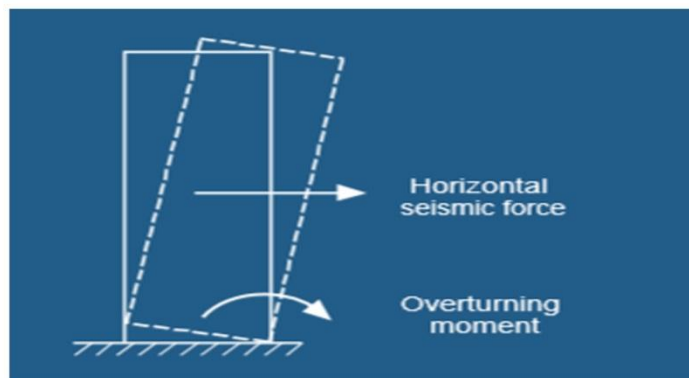


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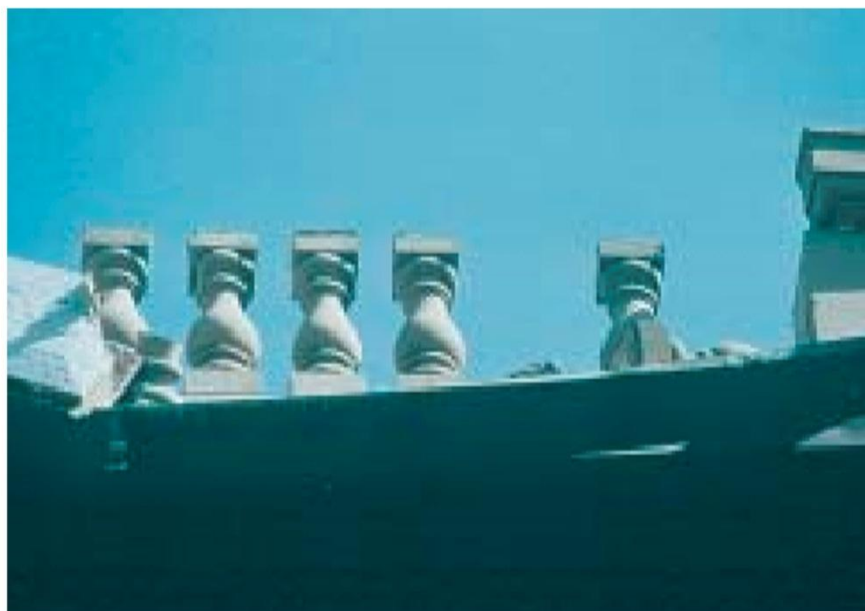


Maltese Buildings affected by Seismic

→ **ANCHOR FREE STANDING PARAPETS AND WALLS**

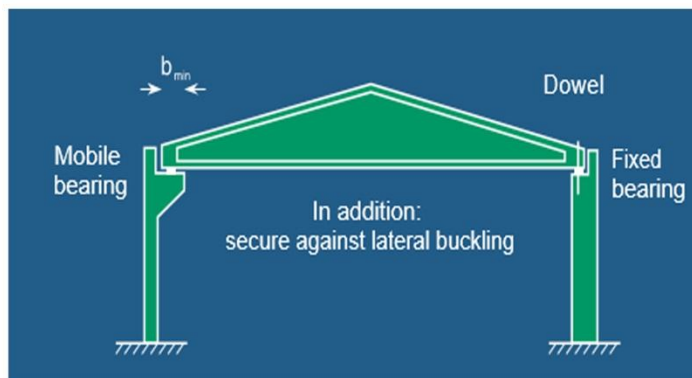


Maltese Buildings affected by Seismic



Maltese Buildings affected by Seismic

→ SECURE CONNECTIONS IN PREFABRICATED BUILDINGS



Maltese Buildings affected by Seismic



Maltese Buildings affected by Seismic



