

Table 1 - The geology of Malta

| MALTA'S GEOLOGICAL SUCCESSION | MAX. THICKNESS | USE |
|--------------------------------------|-----------------------|---|
| Upper Coralline Limestone (U.C.L.) | 175m | lime production or known as Gozo Marble |
| Greensand | 16m | deteriorates but may be found in rubble walls |
| Blue Clay | 75m | |
| Globigerina Limestone (G.L.) | 227m | easily working used as a building block |
| Lower Coralline Limestone (L.C.L.) | 120m (visible) | crushed for concrete aggregate or road-base |

Table 2 - Types of Building

| Type | Description | Base shear design % of gravity |
|----------------|--|--------------------------------|
| A | Building of fieldstones, rubble masonry, adobe, and clay. Buildings with vulnerable walls because of decay, bad mortar, bad state of repair, thin cavity brick walls, etc., | - |
| B | Ordinary unreinforced brick buildings, buildings of concrete blocks, simple stone masonry and such buildings incorporating structural members of wood; | - |
| C | Buildings with structural members of low-quality concrete and simple reinforcements with no allowance for earthquake forces, and wooden buildings the strength of which has been noticeably affected by deterioration; | - |
| D ₁ | Buildings with a frame (structural members) of reinforced concrete | 2-3 |
| D ₂ | Buildings with a frame (structural members) of reinforced concrete | 3-4 |
| D ₃ | Buildings with a frame (structural members) of reinforced concrete | 6 |
| D ₄ | Buildings with a frame (structural members) of reinforced concrete | 12 |
| D ₅ | Buildings with a frame (structural members) of reinforced concrete | 20 |

TABLE 3 - Mean Damage Ratio (Mdr) For Building Type Against Earthquake Intensity

| BUILDING TYPE | A | B | C | D ₁ | D ₂ | D ₃ | D ₄ | |
|----------------------|------|-------------|-------------|----------------|----------------|----------------|----------------|--|
| EARTHQUAKE INTENSITY | MDR | MDR | MDR | MDR | | | | |
| V | 4% | 2% | | | | | | |
| VI | 10% | 4% | 1% | | | | | |
| VII | 45% | 20% | 10% | 3% | 2% | | | |
| VIII | 60% | 45% | 25% | 12% | 6% | 3% | 1% | |
| IX | 80% | 60% | 45% | 30% | 17% | 12% | 6% | |
| X | 100% | 80% | 65% | 55% | 35% | 25% | 17% | |
| XI | 100% | 100% | 100% | 85% | 60% | 50% | 35% | |

The present majority range of Maltese buildings fall within types B-D₁

TABLE 4 - Amended Damage Ratio Matrix for Higher Irregularity & Asymmetry

| BUILDING TYPE | C | D ₁ |
|----------------------|------|----------------|
| EARTHQUAKE INTENSITY | | |
| V | 10% | 5% |
| VI | 30% | 18% |
| VII | 60% | 40% |
| VIII | 100% | 72% |
| IX | 100% | 95% |



TABLE 5 - Damage probability matrix for buildings (DPM)

| Damage class % of value | | | Mean Damage Ratio (%) (MDR) | | | | | | | | | | | | |
|----------------------------|--------|-----|-----------------------------|----|----|----|----|------|----|----|----|----|--|--|--|
| | | | 1.5 | 3 | 5 | 10 | 25 | 37.5 | 50 | 60 | 70 | 85 | | | |
| 0 | - 1.5 | (A) | 83 | 73 | 60 | 36 | 9 | 2 | | | | | | | |
| 1.5 | - 3 | (B) | 17 | 25 | 26 | 23 | 9 | 3 | | | | | | | |
| 3 | - 6 | (C) | | 2 | 10 | 18 | 11 | 5 | 2 | | | | | | |
| 6 | - 12.5 | (D) | | | 3 | 12 | 18 | 12 | 6 | 2 | 1 | | | | |
| 12.5 | - 25 | (E) | | | 1 | 8 | 24 | 24 | 15 | 7 | 3 | | | | |
| 25 | - 50 | (F) | | | | 3 | 19 | 28 | 29 | 23 | 18 | 10 | | | |
| 50 | - 100 | (G) | | | | 1 | 10 | 29 | 48 | 68 | 78 | 90 | | | |



TABLE 6- Percentage of Buildings with 80-100% damage depending on MDR

| | | | | | | | | | |
|------------|------|-----|----|----|----|----|----|----|----|
| MDR | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| Percentage | 0.25 | 3.5 | 10 | 20 | 30 | 45 | 56 | 70 | 85 |



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TABLE 7 - The % death rate for earthquake intensity against moderately irregular building type founded on rock

| BUILDING TYPE | B | C | D ₁ | D ₃ | D ₄ |
|----------------------|-------------|------------|----------------|----------------|----------------|
| EARTHQUAKE INTENSITY | | | | | |
| VII | 0.03 | - | - | | |
| VIII | 1 | 0.4 | 0.05 | | |
| IX | 12 | 6 | 2 | <i>0.07</i> | <i>0.01</i> |
| X | 35 | 18 | 10 | <i>2</i> | <i>0.2</i> |
| XI | 75 | 45 | 25 | <i>18</i> | <i>1</i> |

Table 8 - Population Density by Region (Census 1995)

| REGION | LOCALITY | POPULATION/KM ² |
|--------|------------------------|----------------------------|
| A | INNER HARBOUR | 5,258 |
| | OUTER HARBOUR | 3,389 |
| | OUTLYING AREAS | 1,146 |
| B | RABAT - DINGLI UPLANDS | 475 |
| C | - | 298 |
| GOZO | | 422 |