Restoration Method Statement

San Tumas Tower, Marsascala.

San Tumas Tower and Battery

Restoration Method Statement

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Compiled by:

Perit Robert Grech
/2 Bologna Apts
Triq Dun Michele Balzan
Attard ATD2980
Malta

Tel (land line): +356 21 422404
Tel (mobile): +356 79 46 31 14
email: robert@iarchitects.com.mt

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1. Introduction

Saint Thomas Tower was built above the shore on the seaward face of the headland of il-Hamriga in Marsaskala. St Thomas Tower was one of the coastal fortifications built by Grand Master Alof de Wignacourt in the early seventeenth century and dates to 1614. The tower was erected on a headland separating Marsascala and St Thomas Bay after a Turkish razzia earlier that same year. The tower is designed in the form of 'fortino', that is, as a small fort-like structure strong enough to resist artillery bombardment and stable enough to mount and fire large cannon against enemy ships. With its four bastioned turrets, this tower was more than a simple lookout post - its massive structure was built to dominate the coastline, mounting batteries of heavy artillery on its roof and garrisoned by sizable detachments of troops in times of war. The tower was built to a square plan with four projecting corner turrets. Internally it consist of two adjoining casemates. Access to the tower was through a small gate opening on the ground floor which was served by a masonry flight of steps and a wooden drawbridge. The wooden lifting mechanism of this counterweighted drawbridge, known as a ponte levatoio à freccie e catena has survived, although the outer parts of the wooden arms were burnt. A shallow rock-hewn ditch surrounds the tower and its adjoining semi-circular coastal battery which was added to the tower in 1715/16.

The tower is a substantial fortification intended to prevent the landing of troops in the sheltered anchorages of Marsaskala Creek and St Thomas Bay. Construction of the tower was approved in July 1614, weeks after the raid of Żejtun, in which an Ottoman fleet managed to land at St Thomas Bay. The tower was named after a chapel dedicated to St Thomas which stood close to where the tower now lies. It cost 13,450 scudi, 6 tari and 4 grani to build, making it the second most expensive Wignacourt tower, after Saint Mary's Tower.

The tower's architect is unknown. There are claims that it was designed by Vittorio Cassar but these are disputed since Cassar was probably dead when work on the tower began.

The tower has very thick walls and has four pentagonal bastioned turrets projecting outwards on each corner. The tower's entrance was through a vaulted doorway with a wooden drawbridge. The drawbridge is still partially intact and it is the only original one to have survived in Malta. The tower is surrounded by a rock-hewn ditch.

This type of coastal defences which were opted for, and the manner in which they were positioned along the shores, were carefully chosen to fulfill a clear defensive roles for the need for continual vigilance with the capacity to offer some resistance to invasion. Wignacourt’s large towers were designed to act both as sentinels and physical barriers to incursions, capable of holding their own against attack as well as commanding the surrounding areas and seaward approaches with their heavy firepower. The cost of their construction and equipment, as a result, proved expensive. In all, seven large coastal towers were built during Wignacourt’s reign.

The presence of these corner turrets in these towers distinguished the first generation of dedicated Hospitaller coastal works of fortification. It was these minor bastion-like corner turrets which are different from other tower typologies to be found around the Mediterranean shores. The corner turrets were actually sprouting bastions, to provide for a limited degree of flanking fire along the faces of the intervening faces, making the towers, small bastioned forts. This quality is most evident and pronounced in this St. Thomas Tower where the turrets actually

project outwards from the base to form true corner bastions, unlike in the other towers where they rise from upper half of the faces of the scarped walls to form turrets

After the De Redin towers were built, St Thomas had Żonqor and Xrobb l-Għaġin Towers in its line of sight, but these are now either in ruins or completely demolished.

In 1715, St Thomas Tower was reinforced by the addition of a battery on the seaward face. Construction of the battery cost a total of 382 scudi, 8 tarì, 11 grani and 1 piccolo, which was less than the cost of construction of other batteries around the coast.

During the French blockade of 1798–1800, the tower was stormed and captured by Maltese insurgents.

The tower remained in use by the British until the 19th century. The British did not make any major alterations to the tower (like they did in Saint Lucian Tower), and only some minor changes to the structure were made. At some point, the tower was also used as a prison.

2. Existing Condition Survey

The overall condition of the Tower, could be described as stable but in need of restoration. The structure is afflicted mainly by normal deterioration mechanisms, induced by natural and manmade phenomena, but some recent works on the external fabric have stabilized and restored parts of the lower external faces. The major works being considered in this report refer to the dismantling of the recently constructed semi-circular battery, and the reconstruction of same after examination of the underlying foundation, reconstruction of the battery platform in flagstones and embrasures, the formation of the original ramp to this battery, the restoration of the external fabric including the tower roof platform and rooms at platform, restoration of turrets, the reconstruction of the timber bridge, and cleaning and clearing of the ditch.

In order to assist in the proper evaluation and assessment of this, a visual and photographic investigation was carried out (Refer to Appendix A)

2.1 SEMI-CIRCULAR BATTERY

The gun platform was partially rebuilt recently in today's normal sized masonry blocks, with the formation of a stepped entrance, not showing in the original sketches where a ramp entrance is shown. These recent works shall be dismantled, and a thorough investigation shall be carried out to identify the original parts. Works shall include the rebuilding of the battery platform and reconstruction of the original embrasures of the Battery, in the same methodology and materials of similar existing Embrasures, utilizing stone work of similar size. The inclination of the top parts of the Embrasures shall be also reconstructed following similar embrasures.

2.2 DITCH

The ditch is filled with material which needs to be cleaned, including vegetation and overgrowth which is accumulating along all the external sides of the Tower elevations. This material and vegetation is causing both surface erosion, foundation problems, and chromatic alteration to the walls.

2.3 SURFACE EROSION

The principal cause of surface erosion is the combined mechanism of the presence of soluble salts and a wet-dry cycle which favours the migration of salts to the stone surface. Internal stresses build up just a few millimetres from the stone surface and because the stone is weak in tension, failure of the material occurs. This build-up of internal pressure within the pore structure is due to the drying of crystals in solution which is being transported to the surface.

Left untreated, the deterioration of the stonework through the action of salt crystallization is progressive. Every time a small layer of stone shears away from the rest of the fabric, a larger surface area is created, facilitating even further the process by which the stone can absorb more water and salts hence is increasing in the process the rate of deterioration.

2.4 VEGETATION

Overgrowth in ditch and battery platform, leads to roots ending up lodged within the masonry fabric. During the course of the years, these roots increase in size exerting internal stresses in the masonry, apart from leading water ingress along the same joints thus increasing the deterioration of the masonry fabric.

Overgrowth in ditch and battery platform, leads to roots ending up lodged within the masonry fabric.

2.5 CHROMATIC ALTERATION

An alteration which can appear as: a variation in lustre or gloss (brilliance), a variation in colour (hue) or a variation in colour intensity. This term was applied to limited areas of stone as a generic term when no other definition was seemed appropriate.

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2.7 DIFFERNTIAL DECAY

Deterioration which appears with varying intensity in different parts of the material, due to variations in composition or structure. It often accentuates the original textural or structural characteristics.

2.8 DISAGGREGATION / SEVERE DECAY

An advanced state of incoherence characterised by the detachment granules or crystals at the slightest mechanical stimulation; it involves a considerable decline in the original mechanical

strength and a notable increase in porosity. This term was applied when the weathered stone surface was heavily deteriorated but did not exhibit clear signs of powdering.

2.9 LOSS / LACUNA

The loss of parts -This general term is used when the form of decay cannot be described with other terms in the glossary. This term was applied to identify missing parts of cornices, corbels and worked stone.

2.10 METAL INSERTS

A number of redundant and extraneous metal fixings are lodged within the masonry fabric. During the course of the years, corrosion of the metal caused an increase of volume of the material that exerted internal stresses. This resulted in the formation of minute cracks surrounding the material. Water and air found its way easily to the metal surface.

2.11 CEMENT RENDERS

Cement renders applied on various areas of wall have a threefold contribution to the deterioration of the masonry fabric. In its initial stage of its application the cement render was an important source of salts. In the presence of water, these salts are free to migrate into the pores of the old limestone onto which the cement plaster has been applied.

The eventual hardening of the cement render forms a very rigid vapour barrier, impeding the drying of the rising damp, and shifting this natural process to other areas of the structure, shifting the salt crystallization process to other areas of the wall.

The distinct properties of thermal expansion of the cement render and it sub base, lead the former to develop extensive cracking, encouraging the penetration of surface rain water and other harmful substances in solution. Once behind the impermeable cement render, the acidic solution contributes to the disintegration of the stone fabric.

2.12 ROCK

This term is used to map out exposed rock faces. In certain instances other forms of deterioration would be combined over the rock surface such as chromatic alterations.

2.13 EXISTING VEGETATION

Deterioration mapping drawings and Photo survey showing areas of existing vegetation on the walls which should be removed and stone cleaned and where necessary consolidated.

3. PROPOSED INTERVENTIONS

3.1 PROPOSED INTERVENTIONS

The proposed interventions on walls will include:

- Cleaning of stone surface
- Removal of redundant metallic fixings and existing drain pipes
- Removal of old cement renders/ paints
- Replacement of deteriorated masonry fabric
- Removal of organic substance
- Consolidation of friable masonry fabric
- Pointing and Rendering
- Plastic Repairs & Re-Integration of losses
- Removal of badly done reconstruction of embrasures, investigation and rebuilding of battery platform and embrasures.
- Cleaning of Ditch
- Roof platform water tightness

3.2 CLEANING OF STONE SURFACE

Using methods approved by architect in charge, all redundant cables, rain water pipes and any other ferrous and non – ferrous objects nailed/fixed to the structure will be removed (refer to Section 3.2).

Carefully and using hand tools only, loose pointing, superficial layers of whitewash identified by architect in charge and any pointing deemed to contain relatively high percentages of cement will be removed.

The stone surfaces will be cleaned using a dry bristle/nylon brush to remove surface deposits. In areas where hard crusts are present, nylon brushes will be used after softening of the deposits by means of water. Persistent black crusts will be softened by the use of poulticing using paper pulp with a suitable agent such as EDTA. The area will be then washed down with clean water. During all cleaning operations, care will be taken to preserve the original patina of the stone.

3.3 REMOVAL OF REDUNDANT METALLIC FIXINGS

Firstly, redundant cables and wires, light fixtures, and other accretions must be removed from the stone surfaces of walls. Care should be taken to remove all metallic inserts, (especially iron and steel fixings) from the stonework. Such inserts will be carefully removed by hand, taking care to eliminate all of the rusted parts. The holes left behind will then be filled-in using a suitable lime-based/hydraulic-lime based mortar when the break is small or by piecing-in a piece of stone, if the gap is large.

3.4 REMOVAL OF OLD CEMENT RENDERS/ PAINTS

Where previous concrete repairs, plasters and pointing have occurred on the wall and on the bastion walls these will be removed manually, using hand-held tools. This method is slow but easily controlled, thus causing little damage to the underlying stone which may already be very fragile. Electrical tools as well as tipped metallic instruments with sharp edges, power tools (such as rotating disk cleaners) and sand blasting (dry or wet) must NOT be used since these damage the fabric surfaces. Wherever paint is directly on the stone it shall also be removed by manual means.

Oil based paint will be removed by a neutral paint-remover certified to contain no salts or other deleterious agent. Repeated applications in paste form may be necessary to remove persistent stains.

3.5 REPLACEMENT OF DETERIORATED MASONRY FABRIC

Some of the stones are severely deteriorated (differential decay), whilst more damaged stone may still be found beneath the layers of plaster and paints or cement based pointing. Before a decision is taken to replace a stone, the possible repair of the existing stone must be considered, as the latter method allows retaining original stone. The adequate intervention shall be determined after close inspection of the stones in question.

Where replacement is inevitable, than this must be carried out with great care and precaution. All deteriorated stonework will be carefully chiseled away to an average depth of 230mm, taking care in the process not to damage the surrounding sound old stonework to be retained. All re-instated stone will be of varying thickness such as to ensure a good interlocking effect with the adjacent area of the wall. All newly re-instated masonry will be grouted to the original wall with an appropriate lime-based grout. All newly re- instated masonry blocks will be hacked at the back and painted, at the back and sides, with a bituminous compound prior to grouting. All replaced stonework will be similar in size and configuration to the original, and will match with the existing course heights. Most of the replaced stonework will be special sized stone.

Cracked stones will not be automatically replaced unless they bear a structural weakness. Where the cause of a crack in a stone has been a result of mechanical damage, these will be grouted using inorganic materials such as hydrated or hydraulic lime. Where greater structural strength is required, grouting with epoxy or polyesters adhesives must be done, albeit in very limited areas.

3.6 REMOVAL OF ORGANIC SUBSTANCE

Biological growths, present on the parts of wall and bastion walls, that should receive attention, are the unsightly algae on vertical surfaces. A visual study of the composition of the biological patina may be needed. Unsightly and harmful biological patina covering masonry, when dry, shall be removed using and stiff bristle brushes and the area treated with a biocide.

3.7 CONSOLIDATION OF FRIABLE MASONRY FABRIC

From close, detailed analysis carried out during the progress of work, areas to be consolidated will be identified, and tests carried out to identify and quantify the salts present in the building fabric. Deteriorated masonry work certified to contain acceptable soluble salts level and situated away from any rising damp or source of continuous water absorption, will be consolidated.

Consolidant used will be approved by architect on site however this will consist of a volatile solvent such as acetone. The chosen consolidant will be applied in such a way as to guarantee an acceptable penetration exceeding 30mm. The consolidant will be applied generously and uniformly to the stone surface until the latter is fully saturated. Curing of at least 30 days must then follow.

3.8 POINTING AND RENDERING

On completion of the cleaning and stone repair, re-pointing works will be taken in hand. Original mortar, where this still exists and is in good condition, shall in general be preserved. The raking out of all the joints will be carried out as necessary, depending on the type of mortar found. In all cases any sound old pointing will be retained. The mortar will not be removed using a mechanical disk or any other method that might cause damage to the stone surface, or which might increase the width of the joints. The removal of hard, usually cement rich, pointing might cause more damage, and if the decision is made to remove it, this procedure will be carried out with particular attention.

The proposed mortars shall be as close as possible in colour, composition and properties to the original mortars. Test sample mixes should be carried out to determine the best mix for the situation at hand. Suggested mix to be used for pointing can be chosen from the following:

- 1 part hydraulic lime + 3 parts sand with stone dust as colour additive
- 1 part slaked lime + 3 parts sand with addition of stone dust
- 1 part slaked lime + 1 part pozzolana + 3 part sand with the addition of stone dust

Portland cement mixes shall NOT be used. The lime-based/hydraulic-lime mixes to be used must be compatible with the stonework in strength and permeability. The fundamental principle of having a mortar that is weaker that the adjacent stonework shall be respected.

Prior to pointing, all open joint shall be cleaned from dust and loose materials, and the surrounding stone shall be adequately wetted by clean water (avoiding tap water if possible as this is rich in chloride and nitrate salts). Mortar will be introduced to the joints using a mason trowel. All pointing shall be carried out in moist, warm conditions and in layers not exceeding 10mm thickness. Fresh pointing should be allowed to dry slowly and be adequately protected from excessive heat and direct sunshine, and should occasionally be wetted to avoid cracking.

3.9 PLASTIC REPAIRS & RE-INTEGRATION OF LOSSES

Were possible, we recommend the reintegration of missing or severely deteriorated areas by using plastic repair, i.e., a mixture of a binder, (including inorganic materials such as hydrated or hydraulic lime) together with filler(s) and, if necessary, additional reinforcement (dowels, nylon mesh, etc.). Decayed material is to be cut out and filled using appropriate plastic repair methods. The plastic repair shall be finished to the original profile using the right tools, and stone colour grout is to be used.

The plastic repair will be built in layers, commencing with a coarse graded mix and finished off with a finer blend. Keying will be provided with carbon fibre anchors fixed to the structure with epoxy resin. Where the damage is extensive alkali-proof synthetic fibres will be added to the coarse graded mix to reduce the formation of plastic cracks.

This technique can also be used to repair stones that exhibit alveolar decay (probably found beneath the plasters/renders). The honeycombs shall be partly filled to act as a sacrificial layer and slows down the rate of decay of the 'original' stone.

3.10 RE-BUILDING OF BATTERY AND EMBRASURES

The gun platform was partially rebuilt recently in today's normal sized masonry blocks, with the formation of a stepped entrance, not showing in the original sketches where a ramp entrance is shown. These recent works shall be dismantled, and a thorough investigation shall be carried out to identify the original parts. Works shall include the rebuilding of the battery platform and reconstruction of the original embrasures of the Battery, in the same methodology and materials of similar existing Embrasures, utilizing stone work of similar size. The inclination of the top parts of the Embrasures shall be also reconstructed following similar embrasure

3.11 CLEANING OF DITCH

The excavation of inert material for the reinstatement of the ditch must be removed cautiously so that the side walls of the ditch are not damaged with tool marks. The machinery to be utilized for excavation shall be a rubber tracked mini excavator. The excavator bucket shall be without any teeth in order avoid scratch marks on the masonry fabric or exposed rock face.

The excavation of inert material should be carried in the following manner:

A) The clearance of topsoil, and where applicable breaking of concrete paving to uncover the sides of the ditch;

B) The mechanical excavation of fill material along the central axis of the ditch so that the material abutting the side walls would give away easily and fall off naturally;

C) The careful excavation of material at the bottom of the ditch using hand tools i.e. shovels, wheel barrows, etc. approximately depth of excavation of 0.5m

D) The cleaning of the ditch using brushes, trowels, etc.

The material excavated will be inspected by the archaeological monitor prior to carting away. In this respect large stone blocks uncovered during these excavation works must be carefully hoisted and stored on site in a location approved by the Architect and Civil engineer in charge of the works. This may halt/ slow the progress of works as the archaeologists may require to carefully uncover, investigate, record and/or remove any objects of archaeological interest that may be found during the excavation works.

Works shall also entail the building of a low dry stone wall trailing the edge of the same as a safety precaution, with a height of 500mm and 500mm wide. The wall is being built using solely traditional materials and methods.

3.12 ROOF PLATFORM FLAGSTONES AND WATER TIGHTENESS

Taking care not to damage the franka flagstones, concrete accretions shall be chiselled.

Using a stiff bristle/ nylon brush (no wire brushes or power tools shall be used), the flagstones shall be carefully dry brushed, one section at a time, from dirt. Care shall be taken to ensure that no damage is caused to friable, delaminated stonework. Any dismantled existing sound franka flagstones are to be numbered. Detailed Photogrammetric surveys of the platform terrace in digital format are being provided. The numbering methodology to be employed shall be determined by the Architect and Civil Engineer in charge. Carefully and taking care not to damage the original flagstones, pointing from joints shall be loosened and flagstones previously numbered taken up. Extents of masonry work to be dismantled shall be determined later on in a subsequent report.

Carefully, taking care not to damage the stonework by chipping, etc., the dismantled flagstones shall be stored on timber palettes. Care shall be taken to ensure that dismantled stonework is not damaged and original patina of the stone is respected. Expanded polystyrene sheets or any other similar material shall be used to pack dismantled flagstones on timber pallets for future use.

A physically stable layer of polyurethane foam shall be applied over exiting base to render impermeable, and, a level sub-base using a suitable graded compacted hardcore (coralline limestone) fill shall be provided to attain previous original levels. This shall be compacted using adequate means and surface prepare for the re-instatement of the previously removed flagstones.

Dismantled flagstones shall be re-instated in original place as previously numbered, substituting any deteriorated flagstones with new flagstones having similar dimensions and configuration. All flagstones shall be re-laid on a bed of hydraulic lime-rich mortars and great care shall be taken to ensure that flagstones are laid such as to avoid any ponding. Any replacement of damaged flagstones which are beyond repair shall be done in same material and style.

Using a hydraulic lime base mix, franka flagstones shall be grouted. Care shall be taken to ensure that franka flagstones are kept clean and no damage is procured to the original fabric.

4. Monitoring

Close monitoring of works shall be undertaken by a qualified architect and civil engineer who will ascertain that the proposed methodologies are adhered to. The contractor`s foreman will co-ordinate with the architect all works in phases and shall hold at least a weekly meeting to discuss progress of works. Where in doubt clarification will be requested as necessary.

The method of excavation and clearance of site shall be as approved in advance by the Superintendent of Cultural Heritage and the Heritage Planning Unit (MEPA).

Any further safeguarding measures which may be required shall be completed to an agreed programme, prior to the commencement of development and the approved development shall remain subject to the clearance from the Superintendent of Cultural Heritage if any archaeological findings are encountered.

The architect/client shall inform the Superintendent of Cultural Heritage, and the Heritage Planning Unit (MEPA) in writing at least two weeks before any works are taken in hand. The client/architect shall engage an independent and qualified archaeologist (hereunder referred to as the monitor) registered with the Superintendence of Cultural Heritage to carry out all the archaeological monitoring at the expense of the client. Prior to the commencement of the development, the client/architect shall forward the project work schedule to the monitor, the Heritage Planning Unit (MEPA) and the Superintendence of Cultural Heritage (so that the monitor may plan ahead the monitoring of the works), and shall thereafter facilitate access to the site to the monitor and any other person assigned to assist him. The monitor shall liaise closely with, and report on a weekly basis to, the officers of the Heritage Planning Unit (MEPA) and Superintendence of Cultural Heritage responsible for supervising/monitoring the development. The monitor shall produce and submit to the Heritage Planning Unit (MEPA) and the Superintendence of Cultural Heritage a written report (accompanied by relevant graphic documentation – photos, maps, illustrations and/or other drawings) on a weekly basis.

The provisions in the Cultural Heritage Act shall be observed at all times. Any infilled fissures (debien), caverns, hollows, Pleistocene deposits or other features of potential geological, palaeontological or archaeological interest which are discovered shall be reported immediately to the Superintendent of Cultural Heritage and the Heritage Planning Unit (MEPA) and no further works or activity shall take place which would disturb these features until the Superintendence of Cultural Heritage has completed its investigations.

5. Addendum

Drawbridge

FWA have done a thorough inspection of the existing original timber drawbridge and mechanism and it has been deduced that the timber is too rotten to be able to restore, and have the burnt part reproduced and affixed with the existing original part.

In this case it has been decided, that the existing remaining drawbridge part is removed from position and lowered. This shall be displayed within the same Museum, as an artefact.

A faithful reproduction shall be commissioned in red deal timber, as part of this project, as indicated in attached details, and installed within the existing openings.

Palisade

A timber palisade shall also be reproduced to match the original ones as indicated in the below photo. The Timber palisade shall be reproduced to match the iron tips shown in the below photos.

Photo showing 18th Century iron tipped Palisade at the Tower

Iron tips

Appendix A – Photo Survey

Perit Robert Grech
/2 Bologna Apts
Triq Dun Michele Balzan
Attard ATD2980
Malta

Tel (land line): +356 21 422404
Tel (mobile): +356 79 46 31 14
email: robert@iarchitects.com.mt