

## Introduction:

This manual has been put together to be of assistance in achieving successful specification and use of Oamaru Stone, from Parkside Quarries.

Oamaru Stone is a natural material, not a manufactured article and its performance, durability and suitability as a building material has been proven over the past 150 years.

Although Oamaru Stone is used in the same way as many other building materials, being totally natural makes Oamaru Stone unique. Because of this, when specifying and planning to use Oamaru Stone, some special considerations need to be made.

Although the manual relies on the best knowledge and experience from the past 150 years, it must be read in conjunction with advice from specialists such as architects, designers, engineers, builders, stone masons, block layers, and suppliers of fixing and sealing products.

The building code E2/AS1 Masonry (2011) applies to concrete and clay bricks, Oamaru Stone requires 'specific design'.

This document is that specific design.

All technical drawings are available to download or print in Appendix 4.

## Standards and building code compliance:

Oamaru Stone meets or exceeds the requirements of natural stone as defined within NZS4210 Masonry Construction: Materials and Workmanship. The design and construction aspects for Oamaru Stone are the same as clay or masonry brick veneer.

### 1. What is Oamaru Stone?

Oamaru Stone is a natural lime stone, a calcareous stone composed mainly of calcium carbonate. A distinguishing characteristic of Oamaru Stone is the presence of shell and/or fossil impressions. Oamaru Stone is supplied with either a split or sawn face and is supplied with colour variations that do not constitute defects. Parkside Quarries can cut custom sized stones but do also have a range of standard block sizes. Refer to Appendix 1 for size chart.

### What is Oamaru Stone suitable for?

Oamaru Stone is used in a variety of indoor and outdoor spaces. Oamaru Stone is used as a cladding for commercial buildings, public spaces, as a building material in aged care facilities and in residential building applications. Oamaru Stone is often used to accent internal areas such as Oamaru Stone fireplaces, Oamaru Stone feature walls, Oamaru Stone is also commonly used in landscaping and sculptures.

### Physical properties:

The typical density of Oamaru Stone is 1700-1900kg/m<sup>3</sup>.

The colour variations run from white to cream to tussock to autumnal hues. Being a natural product, colour and texture can vary from stone to stone. Colour variations do not constitute a defect in the stone.

Parkside Quarries can cut the Oamaru Stone to various lengths and heights. The Oamaru Stone blocks are removed from the quarry at approximately 1400mm x 700mm x 1100mm. (Refer to appendix 1 for standard sizes)

When specifying larger stone sizes, utmost consideration should be given to how a block this size would be laid.

For handling and practical laying considerations, standard sizes at the time of this version of the technical manual (May 2019) are 650mm length x 390mm height x 90mm depth or 650mm x 290mm x 90mm.

Veneer cladding is normally supplied at a minimum 90mm thick. Doors and Window sills are custom cut, while Oamaru Stone slips are typically cut to 30mm thick.

When the stone is removed from the quarry, it does contain moisture, and when the milling of the stone is complete it may remain damp and soft for some considerable time.

When milling of the stone has been completed it is placed on timber pallets up to 1.60 tonne in weight. These pallets have the top covered when they leave the quarry but are not usually wrapped to allow air movement around the stone and to allow the dispersion and evaporation of water. If the stone has been shrink wrapped for transportation purposes, the wrapping should be removed immediately the stone is placed on site. It is important to remember that as the stone dries it becomes harder.

On site pallets should be stacked clear of mud and have any shrink wrap removed. This will allow for side ventilation to continue the drying process. The top covering of the pallets can remain in place to stop weather penetration.

## 2. Oamaru Stone veneers:

Oamaru Stone veneer cladding must be designed and constructed according to this Specific design document. If an aspect of the design is not covered, in this document, then the design and construction should be in accordance with the following:

E2/AS1: Masonry

NZS3604: Timber Framed Buildings

NZS4229: Masonry Buildings not requiring specific design

NZS4210: Masonry construction: Materials and Workmanship

AS/NZS2699: Components for masonry Construction Additional information: John Oliver's Brick Book 2014.

Specific engineering design may assist with any other aspect not covered.

### **Laying Instructions**

Stone laying is a specialised trade and only trade qualified brick layers or stone masons should be engaged to install Oamaru Stone products. (refer to Appendix 2 installers and partners page)

Store the Oamaru Stone in a safe manner and protect it from being damaged.

Check that a minimum 40mm cavity can be achieved. A cavity of between 40-75mm is acceptable, 50mm is recommended.

After the foundation has received the damp proof coating and all lines set out and prepared, spread mortar as for normal brick or block work.

Lay the first course to line, do not wet blocks, perpendicular joints to be no greater than 5 mm.

In laying the next course, only spread sufficient mortar bed for one stone at a time. Before placing this mortar bed, the stone shall be wet by pouring water from a dipper.

Bedding mortar shall not be used for pointing.

All joints shall be raked to a depth of approx. 8 mm to allow for pointing.

Prior to pointing it is possible to take a tool such as a rasp and straighten all horizontal and perpendicular joints. This gives nice clean edges to the stone and removed any minor chipping.

Once these joints and lines are straight, pointing may continue.

At no time shall the veneer bed width be less than 90 mm.

Seal all stone work after laying and pointing has been completed and after stone has dried to an even colouring. This is done with a waterproofing silicone such as Aquellux (Refer to appendix 3 Aquellux technical data sheet).

Other product suppliers are included in appendix 2 (installers and partners)

Any fungus or mould apparent before this application can be removed gently by wire brush and if necessary sprayed with a moss or mould killer

### Foundations:

On all foundations whether they be concrete or filled concrete block, three coats of D.P.C. such as Mulseal shall be applied to the tops to form a damp proof cover prior to the laying of the first course of stone. This is essential to prevent any dampness rising into the stone.

There may be a slight variation in the heights of the stone after milling, and the layer should have random checks on sizes prior to setting out story rods. Maximum bed depth shall be 6-8 mm.

### Mortar mix:

Many types of mortar are available and can be used effectively.

Bagged trade mortar can be used for consistency in strength and colour, low salt content.

Site mixed mortar could be manufactured using cement, dry sand and hydrated lime. The sand may be washed beach sand or clean sharp sand which has been passed through a 5 mm sieve. Using 6 parts of dry sand to 1 part hydrated lime, thoroughly mix and store dry until required for use. Use 9 parts of this prepared mix, add 1 part of cement, thoroughly mix dry, prior to adding water. Add sufficient water for the mix to become pliable.

### Mortar joints:

All stone shall be fully bedded in mortar as per NZS 4210. If a stone is moved prior to the mortar being fully cured, and the bond is broken, the stone must be re-laid using fresh mortar.

The standard mortar joint is 8mm. The minimum size for a mortar joint is 6mm, with the maximum being 10mm. All joints are to be a consistent thickness. The bottom mortar joint may be up to 20mm to allow for variations in the foundation.

Mortar joints can be raked to a maximum depth of 8mm.

Mortar joints must be compacted and surface sealed.

### Joggling

Oamaru stone has been laid with joggled edges successfully for over 100 years. Buildings using this method have stood the test of time. If joggling method is to be used, all stones over 100 mm high shall be joggled or have a vee cut in the perpendicular joint. This vee cut shall be a depth of approx. 12 mm and be approx. 60 mm wide in

the centre of the 100 mm blocks.

When all first course is laid in area where working, vee joints shall be filled prior to laying the next course of stone. To fill these vee joints take mortar and by adding water thin this mix to a grout. Pour this grout into the vee joint with the use of a dipper, topping up till completely filled prior to bedding the next course.

As each course is laid repeat the system to fill all vee joints.

### **Ties**

Ties shall comply with all provisions of NZS 4210. Ties must be heavy duty ties with a durability that complies with NZS 4210. The ties must be contained within the middle of the mortar bed. The ties must be located at a maximum horizontal spacing of 600mm and a maximum vertical spacing of 400mm. This equates to approximately 5 ties/m<sup>2</sup>. The ties must be fixed to studs and nailed to the stone at all times.

### **Pointing Mix**

Use 2 parts of dry sharp sand, to 1 part hydrated lime, to 1 part dry Oamaru Stone dust. Mix thoroughly and pass through a 1/6 sieve. Use 4 parts of this mixture to 1 part of white cement and add water to suit.

### **Weep Holes and Ventilation**

The normal method to provide weep holes is by omitting mortar from part of the vertical mortar joints. With this method, the weep hole should be at least 75mm high and be provided in each vertical joint on the bottom course. The spacing of the weep holes must not exceed 750mm. Ventilation must be provided around the top of the Oamaru Stone veneer. This may be achieved in a similar manner to that used to form the weep holes.

### **Control Joints**

Oamaru Stone does not require movement control joints under normal circumstances, however, on panels that are greater than 10 metres long without any openings, install 10mm joints at 5-6 metre intervals.

### **3. Oamaru Stone Slips**

'Slips' are available in various sizes and can be used as a veneer for a whole project. They are suitable for both internal and external applications. The thickness can range from 25mm to 50mm depending on the length and height of the stone

Oamaru stone slips are cut to order. The coursing pattern and ratio mix of stone sizes should be discussed with Parkside Quarries prior to ordering.

The slips may be affixed to the substrate by gluing with a proprietary adhesive. Substrate may include masonry, concrete or fibre cement boards as approved by the adhesive manufacturer. Oamaru stone slips may not be affixed to plywood sheeting.

Oamaru Stone slips must be used as part of a complete system. Parkside quarries only supplies the Oamaru stone slips component. The responsibility for the substrate lies with the substrate supplier.

When applying an Oamaru stone slip system it is very important to ensure that all surfaces where the adhesive is to be applied are free from dirt, dust, grease, releasing agents, or anything else that would limit the adhesive performance.

For external surfaces, substrate waterproofing must include both a suitable membrane along with the appropriate detailing and flashing components. The building must be 100% watertight prior to the Oamaru Stone slips being installed.

All adhesive, mortar, and waterproofing membrane suppliers will be able to provide accurate advice on surface preparation, application techniques, limitations and precautions that are specific to their products. In some cases they may require their products to be applied by specialist contractors. Follow all suppliers' instructions.

The adhesive and mortar components interact significantly and so must be the same brand, sourced from one supplier. Otherwise, both the adhesive and waterproofing membrane suppliers should confirm mutual compatibility of their products.

For a list of adhesive and waterproofing membrane suppliers, please refer to the installers and partners' page.

