



**BLOCK &
HARDSCAPE**
Family Owned Since 1946

**NATURAL STONE
SOLUTIONS**

Installation Guide

ORCO Natural Stone Installation Guide (Non-Vehicular Applications)

Thank you for choosing ORCO Natural Stone products for your project. As you proceed with installation, the stone will soon become part of a *system* that is designed to both highlight the beauty of the stone surface as well as provide long term structural support. All the components of the system – specific site, native soil, drainage, base materials, bedding materials, joint spacing, edge restraints, and ORCO's stone – must work together to achieve and maximize the value of this sizeable investment. Proper installation is critical to overall customer satisfaction.

The cross sections and considerations described in this Guide cover most typical pedestrian, non-vehicular installations. They should be treated as best practices – based on experiences installing this natural stone throughout the world – and should serve as a starting point for developing a site specific design. Since every project is different, ORCO Block & Hardscape strongly recommends consulting licensed professionals to tailor installation to the particular site. Also, be sure to check with local permitting agencies to ensure proper permits are pulled and all special requirements are followed. With each site different, ORCO Block & Hardscape cannot guarantee or be responsible for any job site issues or failures attributed to use of this Guide.

Each installation method described here is a system, which provide different levels of performance and overall value. Mortar set with grouted joints is the recommended, default application. This Guide covers the most popular pedestrian-only application methods.

- **Mortar Set Over New or Existing Concrete** – The concrete must be crack-free, without defects, and sloped for proper drainage. Typically 3/8" grouted joints.
- **Up to 1/2" Mortar Set Over Existing Concrete** – When finish height is a concern, this option offers an alternative thinner application. The concrete must be crack-free, without defects, and sloped for proper drainage. Typically 3/8" grouted joints.
- **Mortar Set Over Compacted Base** – Minimum 4" compacted base over undisturbed native soil. 3/8" grouted joints.
- **Sand Set Over Compacted Base** – Minimum 4" compacted base over undisturbed native soil. Sand bedding course. 1/8" to 3/16" sanded joints. No polymeric sand.

Given that the stone is a premium product, ORCO strongly encourages using **Mortar Set Over Concrete** whenever possible. It provides the best long-term performance, pairing a premium stone and premium installation – creating outstanding value.

Setting the stone with either mortar or sand over compacted base are certainly proven installation methods too - though they do require more attention to compacted base construction.

For deck and rooftops, **Pedestal Installations** – with the stone sitting on top of pedestals – are gaining popularity. ORCO's Piazza 24"x24" squares with sawn edges spread loads evenly and are perfect for this application. Since each project is highly technical and a custom installation, ORCO provides site specific guidelines created for us by Bison Innovative Products.

PERSONAL PROTECTIVE EQUIPMENT (PPE):

Minimum standards for job site PPE must be followed: including hard hat, protective gloves, protective shoes and high visibility clothing. In addition, safety goggles, N100 rated dust mask and proper gloves are required when cutting any stone.

CRITICAL ITEMS TO CONSIDER

Regardless of installation method, the following items should be reviewed at the start of every project.

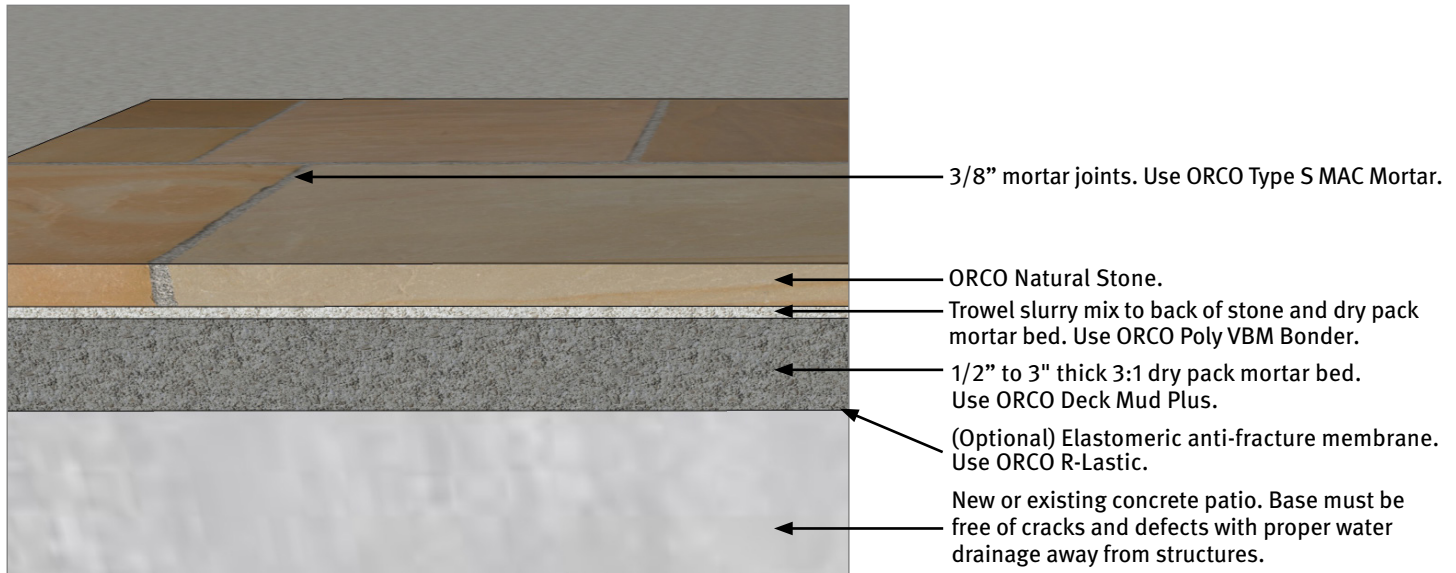
- Stone is a natural product from the earth. Its beauty comes from natural forces and minerals dispersed randomly throughout. Therefore, stone will vary in size, thickness, texture, color, shades of color, and degree of veining. Stone may crack, flake, shed material, and rust. Chips and broken corners are present in natural cleft stone. And colors may change post installation. None of these variations are considered defects in material and workmanship. See Limited Warranty for additional information. All measurements and weights are approximate. Dimensions are typically nominal.
- ORCO installation cross sections show typical base, concrete, and bedding thicknesses. Actual design specs should always be determined by qualified professionals. Never install stone over topsoil. It is the installer's responsibility to ensure all site and structural factors are properly addressed.
- Expansion joints may be required – typically 20' to 26' sections.
- Stone should be installed in areas that drain completely – avoid high water table and “ponding” areas. Stone that stays wet promotes organic growth and discoloration. Use of liners and membranes can trap water coming from the surface, creating the same moisture problems.
- The surface of the installed stone must drain – sloped toward drains, running off the stone surface, and away from any building structure.
- Always wet cut the stone and rinse residue from both sides. Use segmented diamond tipped blades. High strength brick blades and high density stone blades work best.
- Natural stone with sawn edges requires spacers for tight applications – minimum width is 3/8" (6mm) for mortar and 1/8" (3mm) for sand set installations.
- Most damage to natural stone occurs during handling on the jobsite. Do not remove product from the shipping pallet until ready to install.
- During installation, clean the stone surface as you go using clean water and sponge. Do not let the cementitious material set.
- High pressure washing can damage the stone's surface. Use low pressure instead (less than 1600 psi).
- Never clean sandstone with hydrochloric or sulfuric acid-based cleaners that are intended to remove cement residue. Sealers used must be designed for natural stone. Remove all puddles of excess sealer from the stone surface.
- Never use wire brushes or other abrasive metallic products to clean the surface. Nylon bristle brushes with soap work best.
- Post installation use of cleaners and sealers should always be used per manufacturer's guidelines and first tested in an inconspicuous spot.

STONE CLEANERS AND SEALERS

ORCO supports our natural stone product line with cleaners and sealers designed for this specific stone. United Stonecare cleaners and sealers have a long history of protecting this high-end quality stone in applications throughout the world. These products are unique and certainly not the same as readily available DIY products, which can create more problems – rather than solve them.

For more information, visit unitedstonecare.com. While on this site, check the box for ORCO and you will see cleaning and sealing recommendations for each type of ORCO Natural Stone. In addition, United Stonecare offers customized support that allows users to upload photos of any problem they may encounter and receive back site specific recommendations direct from United Stonecare experts.

MORTAR SET OVER NEW OR EXISTING CONCRETE FOR PEDESTRIAN USE ONLY



Installation:

Native Soil Condition – Poor soils (clay and disturbed) may result in surface deformation, unwanted settlement, and/or cracking. Engineer consultation is recommended.

Layout:

Plan layout prior to starting installation. Paint outlines and spot all elements – planters, stairs, transitions, etc.

Site Drainage:

Final pavement elevations should slope away from any structure a minimum of 2%. Drains or other means of site drainage must be employed in areas where proper slope cannot be achieved. Max slope for pedestrian accessibility is 8%.

New or Existing Slab:

Must be free of cracks and defects with proper drainage away from structures. Avoid areas prone to water migration through the slab. Slab must be built according to local authority having jurisdiction.

(Optional) ORCO R-Lastic:

Elastomeric anti-fracture membrane. Apply per manufacturer's recommendations. Roll or trowel.

ORCO Deck Mud Plus:

3:1 dry pack mortar bed. Dry pack methods. Use a concrete mixer to achieve proper consistency. Follow manufacturer's recommendations to create a "brown sugar" consistency that is clump-free and 100% hydrated material. Place and screed material to a minimum of 1/2".

ORCO Poly VBM Bonder:

Mix bonding mortar to slurry consistency. Use a trowel to completely cover back of stone and dry pack mortar bed.

ORCO Natural Stone:

Stone should be washed with sponge and clean water to remove dust and residue.

Placement:

Use mortar tool or spacers to carefully align and place stone. Tamp, level, and ensure proper drainage fall as you build.

Expansion Joints:

All expansion control joints must be brought to the surface. "Hidden" joints can crack the stone.

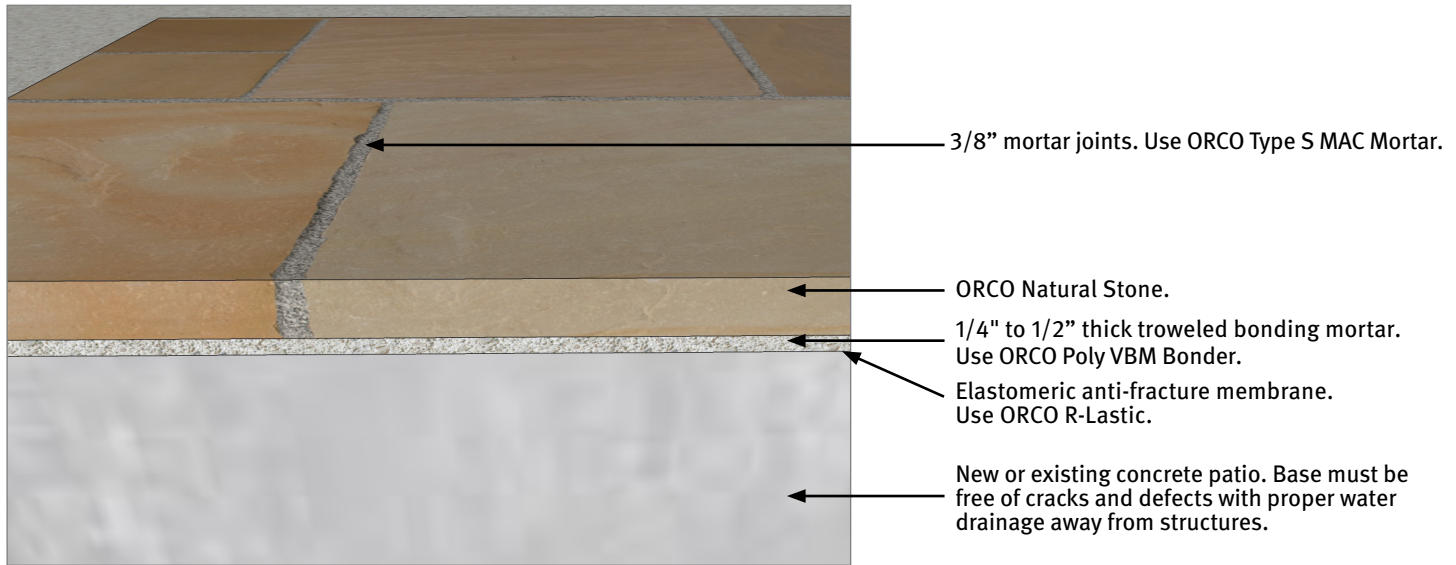
ORCO Type S MAC Mortar:

Mix mortar per manufacturer's recommendations.

Joints:

Should be no larger than 3/8". Fill joints with ORCO Type S MAC Mortar and tool. Promptly clean all residue from the stone surface.

UP TO 1/2" MORTAR SET OVER EXISTING CONCRETE FOR PEDESTRIAN USE ONLY



Installation:

Native Soil Condition – Poor soils (clay and disturbed) may result in surface deformation, unwanted settlement, and/or cracking. Engineer consultation is recommended.

Layout:

Plan layout prior to starting installation. Paint outlines and spot all elements – planters, stairs, transitions, etc.

Site Drainage:

Final pavement elevations should slope away from any structure a minimum of 2%. Drains or other means of site drainage must be employed in areas where proper slope cannot be achieved. Max slope for pedestrian accessibility is 8%.

New or Existing Slab:

Must be free of cracks and defects with proper drainage away from structures. Avoid areas prone to water migration through the slab. Slab must be built according to local authority having jurisdiction.

ORCO R-Lastic:

Elastomeric anti-fracture membrane. Apply per manufacturer's recommendations. Roll or trowel.

ORCO Poly VBM Bonder:

Mix/install bonding mortar per manufacturer's recommendations. Completely cover back of stone using 1/4" notch trowel.

ORCO Natural Stone:

Stone should be washed with sponge and clean water to remove dust and residue.

Placement:

Use mortar tool or spacers to carefully align and place stone. Tamp, level, and ensure proper drainage fall as you build.

Expansion Joints:

All expansion control joints must be brought to the surface. "Hidden" joints can crack the stone.

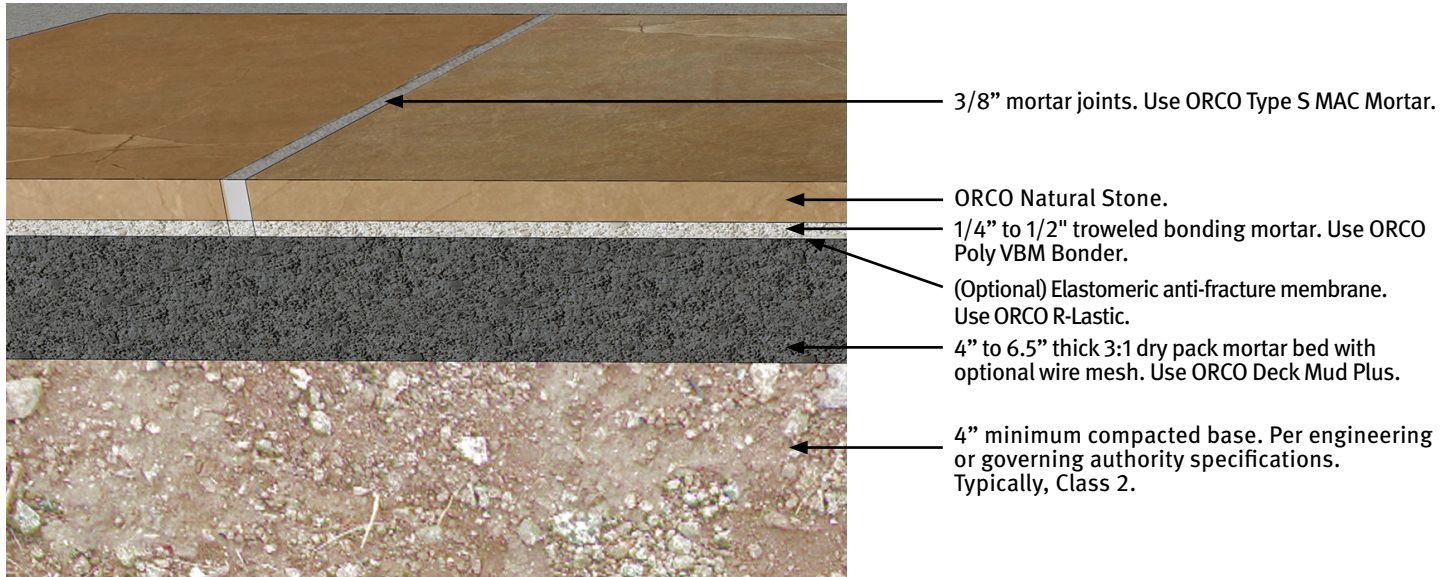
ORCO Type S MAC Mortar:

Mix mortar per manufacturer's recommendations.

Joints:

Joints should be no larger than 3/8". Fill joints with ORCO Type S MAC Mortar and tool. Promptly clean all residue from the stone surface.

MORTAR SET OVER COMPACTED BASE FOR PEDESTRIAN USE ONLY



Installation:

Native Soil Condition – Poor soils (clay and disturbed) may result in surface deformation, unwanted settlement, and/or cracking. Engineer consultation is recommended.

Layout:

Plan layout prior to starting installation. Paint outlines and spot all elements – planters, stairs, transitions, etc. Design area perimeter should be a minimum of 8" greater than edge of the stone to allow for placement of restraints. Use wood or steel stakes to mark excavation areas and check depth. Use a nylon mason's line to set the finished elevation of the stone. Measure all excavation and base thickness from the finish line marker. Laser levels are recommended for precise grading.

Site Drainage:

Final pavement elevations should slope away from any structure a minimum of 2%. Drains or other means of site drainage must be employed in areas where proper slope cannot be achieved. Max slope for pedestrian accessibility is 8%.

Excavation:

Excavation depth will depend on site conditions– particularly drainage, soil, and stone thickness. Pedestrian applications typically call for minimum of 4" Class 2 base.

Base Compaction:

Proper compaction is critical. Increasing base depth will provide greater stability. Compact subgrade to 98% Proctor Density. Avoid overly wet or dry soils.

ORCO Deck Mud Plus:

3:1 dry pack mortar bed. Dry pack methods. Wire mesh optional. Use a concrete mixer to achieve proper consistency. Follow manufacturer's recommendations to create a "brown sugar" consistency that is clump-free and 100% hydrated material. Place and screed material to a minimum of 4".

(Optional) ORCO R-Lastic:

Elastomeric anti-fracture membrane. Apply per manufacturer's recommendations. Roll or trowel.

ORCO Poly VBM Bonder:

Mix/install bonding mortar per manufacturer's recommendations. Completely cover back of stone using 1/4" notch trowel.

ORCO Natural Stone:

Stone should be washed with sponge and clean water to remove dust and residue.

Placement:

Use mortar tool or spacers to carefully align and place stone. Tamp, level, and ensure proper drainage fall as you build.

Expansion Joints:

All expansion joints must be brought to the surface. "Hidden" joints can crack the stone.

ORCO Type S MAC Mortar:

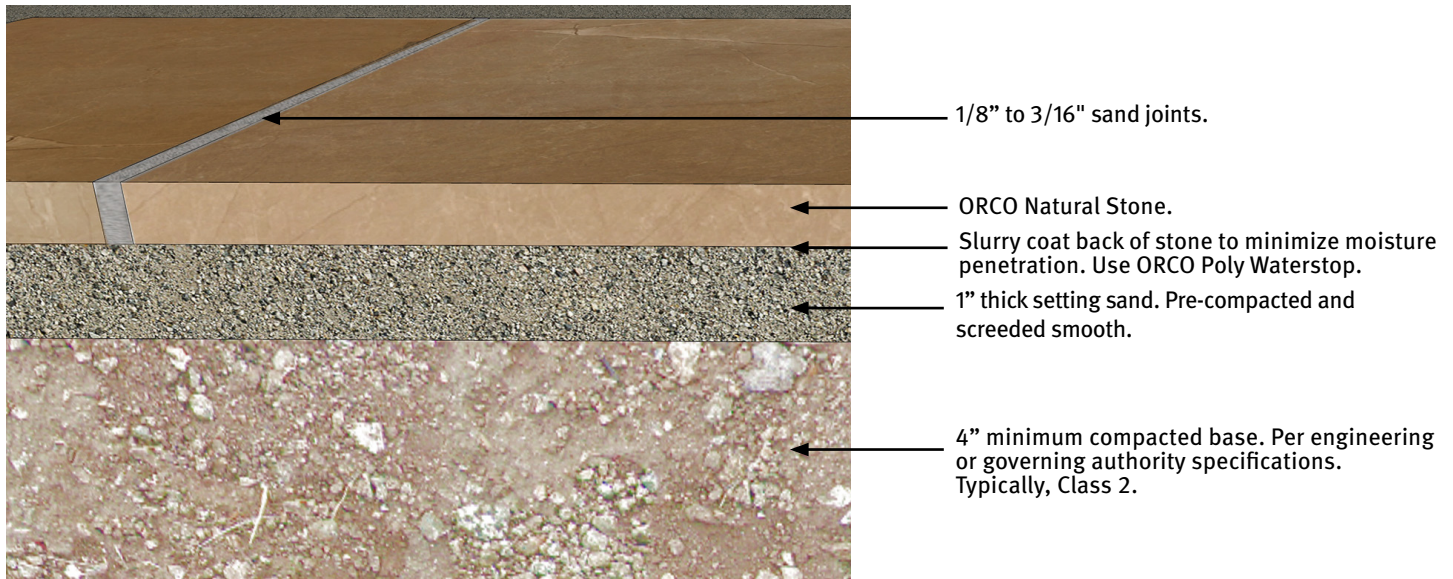
Mix mortar per manufacturer's recommendations.

Joints:

Joints should be no larger than 3/8". Fill joints with ORCO Type S MAC Mortar and tool. Promptly clean all residue from the stone surface.

ACTUAL DESIGN AND INSTALLATION SPECIFICATIONS SHOULD ALWAYS BE DETERMINED BY QUALIFIED PROFESSIONALS

SAND SET OVER COMPACTED BASE FOR PEDESTRIAN USE ONLY



Installation:

Native Soil Condition – Poor soils (clay and disturbed) may result in surface deformation, unwanted settlement, and/or cracking. Engineer consultation is recommended.

Layout:

Plan layout prior to starting installation. Paint outlines and spot all elements – planters, stairs, transitions, etc. Design area perimeter should be a minimum of 8" greater than edge of the stone to allow for placement of restraints. Use wood or steel stakes to mark excavation areas and check depth. Use a nylon mason's line to set the finished elevation of the stone. Measure all excavation and base thickness from the finish line marker. Laser levels are recommended for precise grading.

Site Drainage:

Final pavement elevations should slope away from any structure a minimum of 2%. Drains or other means of site drainage must be employed in areas where proper slope cannot be achieved. Max slope for pedestrian accessibility is 8%.

Excavation:

Excavation depth will depend on site conditions – particularly drainage, soil, and stone thickness. Pedestrian applications typically call for minimum of 4" Class 2 base.

Base Compaction:

Proper compaction is critical. Increasing base depth will provide greater stability. Compact subgrade to 98% Proctor Density. Avoid overly wet or dry soils.

Setting Sand:

Pre-compacted and screeded to 1" depth for 20, 22, and 30mm thick stone. Install per manufacturer's recommendations.

ORCO Poly Waterstop:

Minimize moisture penetration through the stone by slurry coating the entire back of the stone.

ORCO Natural Stone:

Stone should be washed with sponge and clean water to remove dust and residue.

Placement:

Use spacers to carefully align and place stone. Tamp, level, and ensure proper drainage fall as you build.

Joints:

Should be no larger than 3/16". Fill joints with paver joint sand that conforms to ICPI standards. Do not use polymeric sand. Promptly clean all residue from the stone surface.



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ORCO NATURAL STONE STANDARDS:

ORCO Natural Stone is tested per ASTM C616 Standard Specification for Quartz-Based Dimension Stone. This test includes: flexural strength, water absorption, compressive strength. Slip Resistance determined per ASTM C1028. Installation methods based on recommendations from Tile Council of North America (TCNA) and ANSI/CTI A108.1 *Installation of Ceramic Tile – Wet Set or Dry Set Methods*.

 **WARNING:** This product when cut or ground can expose you to Silica, crystalline (airborne particles of respirable size) which is known to the State of California to cause cancer. For more information go to <http://www.P65Warnings.ca.gov>.