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TECHNICIAN TRAINING FOR THE CONSERVATION OF MOSAICS

PART 3
THE CONSERVATION OF ARCHITECTURAL REMAINS AND THEIR DECORATIVE SURFACES

Structures and decorative surfaces: stabilization interventions and their documentation

Livia Alberti, Ermanno Carbonara, Thomas Roby



Stabilization

The aim of these interventions is to re-establish the structural stability of walls and their surface decorations with minimum interventions using mortar.



The principle stabilization interventions using mortar

Structures

Repair of a structure with mortar and new elements of the wall, if needed.

Resetting in place of detached elements of the structure.

Surface Decorations

Repair of the surface decoration.

Grouting voids below the surface decoration.



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Structures

Repair of a structure with mortar and new elements of the wall if needed.

Resetting in place of detached elements of the structure.

Surface Decorations

Repair of the surface decoration.

Grouting voids below the surface decoration.



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Scott Warren 2011 © J. Paul Getty Trust

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Repair of a structure with mortar and new elements of the wall if needed.

Resetting in place of detached elements of the structure.

Surface Decorations

Repair of the surface decoration.

Grouting voids below the surface decoration.



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Characteristics of a mortar for the stabilization of Structures and Surface Decorations

Quality of the materials

For a mortar that is stable and durable over time, one should use binders and aggregates without soluble salts and that has only limited shrinkage and cracking while setting.

Compatibility with the original materials

A mortar should possess a hardness and porosity similar to the original materials.

Reversibility

A stabilisation mortar should be **reversible**, that is, it can be removed without damaging the original materials.

Visual impact

The color and texture of the mortar should be similar to the original materials in order that the original surface of the wall or surface decoration remains visually dominant.

The **Documentation** of Current Interventions

DATA FORM – CONSERVATION OF STRUCTURES AND DECORATIVE SURFACES

STRUCTURE/DECORATIVE SURFACE ID: _____

Abbreviations	building	room space	elevation top	section

This form should be accompanied by an overall photograph of the structure or surface decoration before and after conservation treatment, and by a plan of the building, indicating the location of the room. Mark also the location of the wall elevation if the object is a vertical surface.

PART OF THE STRUCTURE

<input type="checkbox"/> Wall	<input type="checkbox"/> Vault	<input type="checkbox"/> Steps	<input type="checkbox"/> Cistern/Basin	<input type="checkbox"/> Pavement
<input type="checkbox"/> Other:				

CONSTRUCTION MATERIALS

<input type="checkbox"/> Dry Stone	<input type="checkbox"/> Stone and lime mortar	<input type="checkbox"/> Stone and earthen mortar	<input type="checkbox"/> Brick
<input type="checkbox"/> Earth	<input type="checkbox"/> Other:		

TYPE OF SURFACE DECORATION

<input type="checkbox"/> Wall Plaster	<input type="checkbox"/> Painted Wall Plaster		<input type="checkbox"/> Crushed Ceramic Mor.	<input type="checkbox"/> Marble Plaque
<input type="checkbox"/> Stone Slabs	<input type="checkbox"/> Tile/Zellij	<input type="checkbox"/> Stucco/gyps. plaster	<input type="checkbox"/> Other:	

PREVIOUS INTERVENTIONS

PREVIOUS INTERVENTIONS		<input type="checkbox"/> <i>Graphic documentation map attached</i>
<input type="checkbox"/> Repairs of the structure	<input type="checkbox"/> Repairs of the surface decoration of wall or pavement	

CONDITION ASSESSMENT

CONDITION ASSESSMENT		<input type="checkbox"/> <i>Graphic documentation map attached</i>
<input type="checkbox"/> Loss of stones or mortar of the structure	<input type="checkbox"/> Cracks	
<input type="checkbox"/> Detached stones of the structure	<input type="checkbox"/> Deformations (bulge or depression)	
<input type="checkbox"/> Vegetation	<input type="checkbox"/> Loss of surface decoration of wall or pavement	
<input type="checkbox"/> Micro-organisms	<input type="checkbox"/> Detachment of surface decoration of wall or pavement	
<input type="checkbox"/> Incrustations	<input type="checkbox"/> Deteriorated surface decoration	
<input type="checkbox"/> Efflorescences	<input type="checkbox"/> Deteriorated previous interventions	

CURRENT INTERVENTIONS

CURRENT INTERVENTIONS		<input type="checkbox"/> <i>Graphic documentation map attached</i>
<input type="checkbox"/> Vegetation removal	<input type="checkbox"/> Cleaning	<input type="checkbox"/> Removal of modern repair mortars
<input type="checkbox"/> Repair of the structure with mortar and/or stones <input type="checkbox"/> Resetting in place of detached stones <input type="checkbox"/> Other interventions on the structure:		Mortar compositions:

<input type="checkbox"/> Repair of the surface decoration with mortar (in-filling/edging repair) <input type="checkbox"/> Grouting voids below the surface decoration <input type="checkbox"/> Removal and resetting in place of parts of the surface decoration <input type="checkbox"/> Reintegration of area of loss with: <input type="checkbox"/> Other treatment of the surface decoration :	Mortar compositions:
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PREPARED BY

DATE _____

Data Form for the documentation of Current Interventions

STRUCTURE

DECORATED SURFACE

CURRENT INTERVENTIONS☐ *Graphic documentation map attached*☒ Vegetation removal☐ Cleaning☐ Removal of modern repair mortars☐ Repair of the structure with mortar and/or stones☐ Resetting in place of detached stones☐ Other interventions on the structure:

Mortar compositions:



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CURRENT INTERVENTIONS☐ *Graphic documentation map attached*☐ Vegetation removal☒ Cleaning☐ Removal of modern repair mortars☐ Repair of the structure with mortar and/or stones☐ Resetting in place of detached stones☐ Other interventions on the structure:

Mortar compositions:



Ermanno Carbonara 2018 © J. Paul Getty Trust

CURRENT INTERVENTIONS☐ *Graphic documentation map attached*

<input type="checkbox"/> Vegetation removal	<input type="checkbox"/> Cleaning	<input checked="" type="checkbox"/> Removal of modern repair mortars
<input type="checkbox"/> Repair of the structure with mortar and/or stones <input type="checkbox"/> Resetting in place of detached stones <input type="checkbox"/> Other interventions on the structure:		Mortar compositions:



Scott Warren 2011 © J. Paul Getty Trust

CURRENT INTERVENTIONS☐ *Graphic documentation map attached*☐ Vegetation removal☐ Cleaning☐ Removal of modern repair mortars☒ Repair of the structure with mortar and/or stones☐ Resetting in place of detached stones☐ Other interventions on the structure:

Mortar compositions:



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Type of mortar

Weakly hydraulic mortar with medium-sized aggregate. Workable, of similar hardness to the original mortar and of an appropriate color and texture.

Binder : Aggregate ratio:

1 : 2.5

Mortar mix example:

½ lime putty

½ hydraulique lime

1 white sand..... 0 – 2 mm

1 ½ yellow gravel... 0 – 4 mm

CURRENT INTERVENTIONS☐ *Graphic documentation map attached*☐ Vegetation removal☐ Cleaning☐ Removal of modern repair mortars☐ Repair of the structure with mortar and/or stones☒ Resetting in place of detached stones☐ Other interventions on the structure:

Mortar compositions:



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Type of mortar

Lime-rich mortar, weakly hydraulic and lime-based with fine particle aggregates.
Good adhesion properties and very workable.

Binder : Aggregate ratio:

1 : 2

Mortar mix example: $\frac{1}{2}$ lime putty $\frac{1}{2}$ hydraulique lime

1 white sand..... 0 – 1 mm

1 yellow sand.... 0 – 2 mm

CURRENT INTERVENTIONS

☐ Graphic documentation map attached☐ Vegetation removal☐ Cleaning☐ Removal of modern repair mortars☐ Repair of the structure with mortar and/or stones☐ Resetting in place of detached stones☒ Other interventions on the structure:

wall capping with a layer of mortar

Mortar compositions:



Livia Alberti 2018 © J. Paul Getty Trust

Type of mortar

Hydraulic mortar with large-sized aggregate to improve its mechanical resistance and reduce its shrinkage and cracking.

Binder : Aggregate ratio:

1 : 2.5

Mortar mix example:

½ lime putty

½ hydraulic lime

1 white sand..... 0 – 2 mm

1 yellow gravel..... 0 – 4 mm

½ crushed ceramic..... 3 – 5 mm

- ✗ Repair of the surface decoration with mortar (in-filling/edging repair)
- ☐ Grouting voids below the surface decoration
- ☐ Removal and resetting in place of parts of the surface decoration
- ☐ Reintegration of area of loss with:
- ☐ Other treatment of the surface decoration :

Mortar compositions:



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Type of mortar

Hydraulic or non-hydraulic mortar with medium-sized aggregates with good particle size distribution and appropriate colors.

Binder : Aggregate ratio:

1 : 2.5

Mortar mix example:

2 lime putty
 1 white sand..... 0 – 1 mm
 1 beige gravel 0 – 1 mm
 2 beige gravel 1 – 3 mm
 1 crushed ceramic .. 2 – 3 mm

- ☐ Repair of the surface decoration with mortar (in-filling/edging repair)
- ☒ Grouting voids below the surface decoration
- ☐ Removal and resetting in place of parts of the surface decoration
- ☐ Reintegration of area of loss with:
- ☐ Other treatment of the surface decoration :

Mortar compositions:



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Type of mortar

Liquid hydraulic mortar (grout) with very fine-sized aggregates and a larger quantity of water.

Binder : Aggregate ratio:

1 : 1

Mortar mix example:

1 hydraulic lime

1 stone powder.... 0 – 0.25 mm

- ☐ Repair of the surface decoration with mortar (in-filling/edging repair)
- ☐ Grouting voids below the surface decoration
- ☒ Removal and resetting in place of parts of the surface decoration
- ☐ Reintegration of area of loss with:
- ☐ Other treatment of the surface decoration :

Mortar compositions:



Type of mortar

Lime-rich mortar, hydraulic and lime-based with fine particle aggregates.
Good adhesion properties and very workable.

Binder : Aggregate ratio:

1 : 2

Mortar mix example:

$\frac{1}{2}$ lime putty
 $\frac{1}{2}$ hydraulique lime
 1 white sand..... 0 – 1 mm
 $\frac{1}{2}$ yellow sand... 0 – 2 mm
 $\frac{1}{2}$ crushed ceramic .. 0 – 1 mm

- ☐ Repair of the surface decoration with mortar (in-filling/edging repair)
- ☐ Grouting voids below the surface decoration
- ☐ Removal and resetting in place of parts of the surface decoration
- ☒ Reintegration of area of loss with:
mortar
- ☐ Other treatment of the surface decoration :

Mortar compositions:



Ermanno Carbonara © 2012 Ermanno Carbonara

Type of mortar

Hydraulic or non-hydraulic mortar with medium-sized aggregates with good particle size distribution. Workable, hardness similar to the original mortar and appropriate color and texture.

Binder : Aggregate ratio:

1 : 2.5

Mortar mix example:

2 lime putty
 1 white sand..... 0 – 1 mm
 1 beige gravel 0 – 1 mm
 2 beige gravel 1 – 3 mm
 1 black gravel..... 2 – 3 mm

- ☐ Repair of the surface decoration with mortar (in-filling/edging repair)
- ☐ Grouting voids below the surface decoration
- ☐ Removal and resetting in place of parts of the surface decoration
- ☐ Reintegration of area of loss with:

☒ Other treatment of the surface decoration :
biocide treatment





Mortar compositions:















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Graphic documentation










Previous Interventions Map

	Not original parts of the structure		Edge of each repair mortar
	Repairs/reintegrations of surface decoration		Overlapping between mortars (new → old)

Condition Assessment Map

	Edge of surface decoration of wall or pavement		Efflorescences
	Loss of stones or mortar of the structure		Cracks
	Detached stone of the structure		Deformations (bulge or depression)
	Vegetation		Detachment of the surface decoration of wall or pavement
	Micro-organisms		Deteriorated surface decoration
	Incrustations		Deteriorated previous interventions

Current Interventions Map

	Vegetation Removal
	Repair of the structure with mortar and/or stones Mortar composition:
	Resetting in place of detached stones Mortar composition:
	Repair of surface decoration with mortar (in-filling/edging repair) Mortar composition:
	Repair of surface decoration with mortar (in-filling/edging repair) Mortar composition:
	Grouting voids under the surface decoration or within the structure Mortar composition:
	Resetting in place of detached elements of the surface decoration Mortar composition:
	Removal and resetting in place of parts of the surface decoration with facing Mortar composition:
	Reintegration of areas of loss with:

The **Legend** for the graphic documentation of Current Interventions

Current Interventions Map



Vegetation Removal



Repair of the structure with mortar and/or stones

Mortar composition:



Resetting in place of detached stones

Mortar composition:



Repair of surface decoration with mortar (in-filling/edging repair)

Mortar composition:



Repair of surface decoration with mortar (in-filling/edging repair)

Mortar composition:



Grouting voids under stones

Mortar composition:



Resetting in place

Mortar composition:



Removal and resetting

Mortar composition:



Reintegration of ancient material



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Current Interventions Map



Vegetation Removal



Repair of the structure with mortar and/or stones
Mortar composition:



Resetting in place of detached stones
Mortar composition:



Repair of surface decoration with mortar (in-filling/edging repair)
Mortar composition:



Repair of surface decoration with mortar (in-filling/edging repair)
Mortar composition:



Grouting voids under the surface decoration or within the structure
Mortar composition:



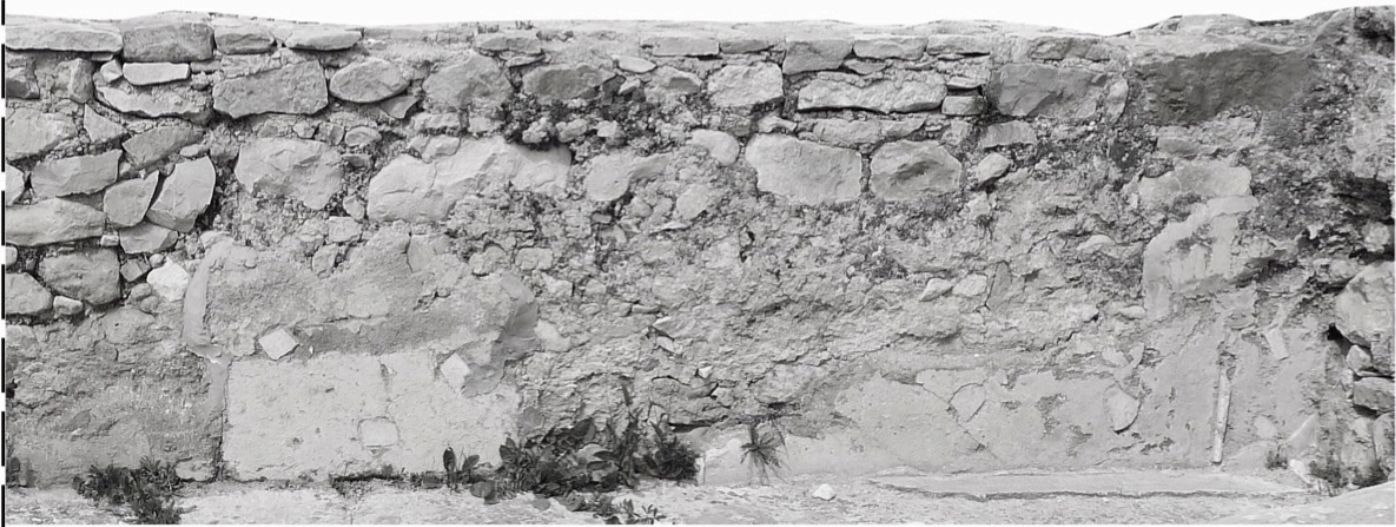
Resetting in place of detached elements of the structure
Mortar composition:



Removal and resetting in place of parts of the structure
Mortar composition:



Reintegration of areas of loss with:



Vol-MOr-02-d-2

0 50 cm

BASE MADE ON: 03/2018

TITLE:

DATE:

PREPARED BY:

Current Interventions Map



Vegetation Removal



Repair of the structure with mortar and/or stones

Mortar composition:

$\frac{1}{2}$ lime putty 1 white sand 0 – 2 mm

$\frac{1}{2}$ hydraulic lime 1½ yellow gravel 0 – 4 mm



Resetting in place of detached stones

Mortar composition:

$\frac{1}{2}$ lime putty 1 white sand 0 – 1 mm

$\frac{1}{2}$ hydraulic lime 1 yellow sand 0 – 2 mm



Repair of surface decoration with mortar (in-filling/edging repair)

Mortar composition:

2 lime putty 1 white sand 0 – 1 mm 2 beige gravel 1 – 3 mm
1 beige gravel 0 – 1 mm 1 crushed ceramic 2 – 3 mm



Repair of surface decoration with mortar (in-filling/edging repair)

Mortar composition:



Grouting voids under the surface decoration or within the structure

Mortar composition:

1 hydraulic lime

1 stone powder 0 – 0.25 mm



Resetting in place of detached elements of the structure

Mortar composition:

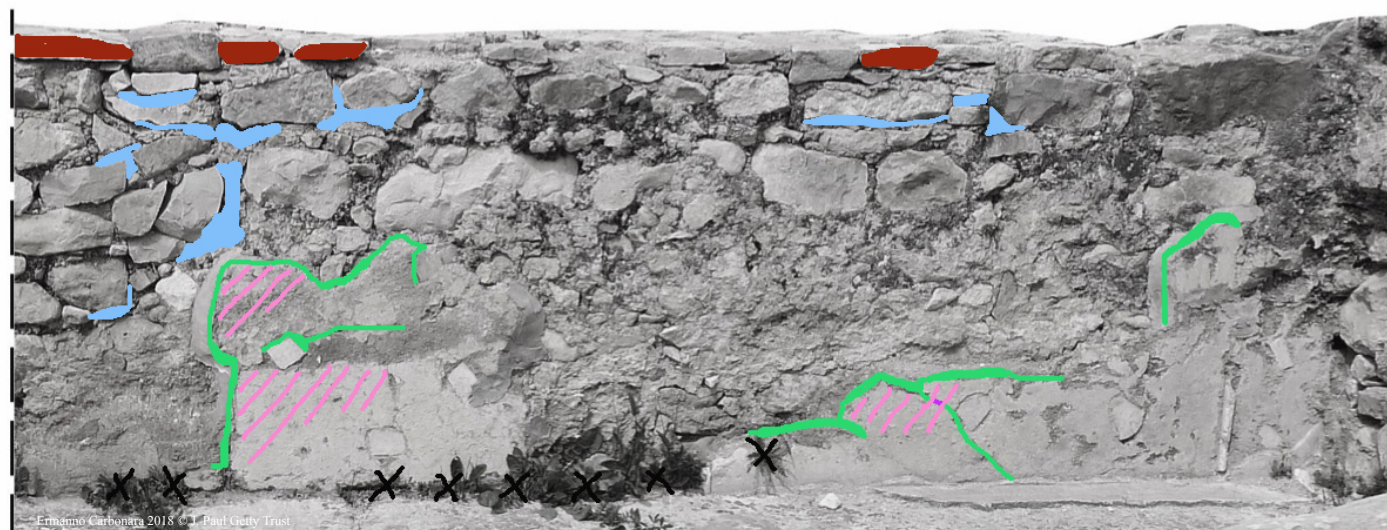


Removal and resetting in place of parts of the structure

Mortar composition:



Reintegration of areas of loss with:



Vol-MOr-02-d-2

BASE MADE ON: 03/2018

TITLE: Current Interventions Map

DATE: June 2018

PREPARED BY: Mohamed Zaki

0 50 cm

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MOSAIKON is a partnership of four institutions: the Getty Conservation Institute, the Getty Foundation, ICCROM, and ICCM.

The aims of the project are to strengthen the network of professionals concerned with the conservation, restoration, maintenance, and management of mosaic heritage in the southern and eastern Mediterranean region; provide training to a variety of individuals involved in mosaics conservation and, more generally, with the management of archaeological sites and museums with mosaics; work with national and international bodies to provide a more favorable legislative, regulatory, and economic environment for the conservation of mosaics in the Mediterranean; and promote the dissemination and exchange of information.