

TUSHA HITI

Report of the Institute of Conservation (IoC), University of Applied Arts Vienna

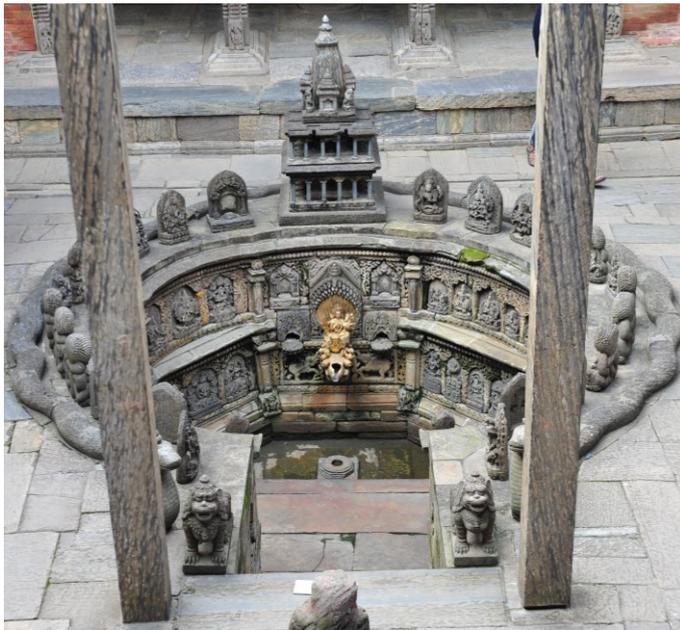


Fig. 1: Overview of the Tusha Hiti, 2022,

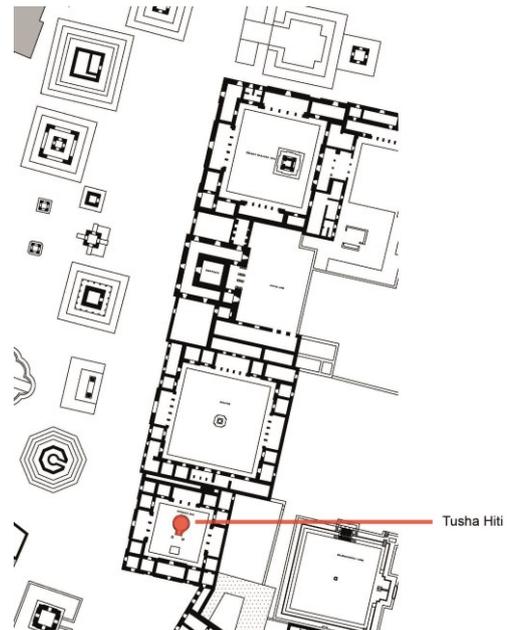


Fig. 2: Location within the Patan Royal Palace

Data Sheet

Description

The Tusha Hiti is located in one of the three primary courtyards of the Patan Royal Palace, the Sundari Chowk. Together with the Bhandarkhal Tank in the palace garden it is among the crowning achievements of the kings of the Malla dynasty and represents an extraordinary example of 17th-century Nepalese water architecture. Built under King Siddhinarasimha Malla of Patan in 1647, it is suggested that Tusha Hiti was intended as the king's ceremonial step well, which is why it is commonly also known as the Royal Bath. But this is scholarly debated, since neither the term "Tusha Hiti" nor its actual function is documented in historical sources.

Embedded in the centre of the courtyard, the octagonal Tusha Hiti is encircled by two stone serpents, 24 free-standing stone sculptures, two lions and a small model of famous Krishna Mandir. Eight steps lead down to the gilded water spout depicting Vishnu and Lakshmi riding on Garuda, which is placed in the central niche facing north on a heightened plinth. The entrance is further highlighted with two stone pillars with lotus-flower shaped capitals.

The inner wall segments are subdivided horizontally by a cornice into two zones, which contain a multitude of intricately carved relief stone slabs following an iconographic programme of deities of the Hindu Pantheon. Each deity is inserted into a niche framed by tree-like reliefs.

In 2009 two statues, a small deity and the gilt water spout, were stolen and later replaced with replicas.

Names

Dated	1647	
Measurements (H x W x D)	Octagonal shape	5,30 x 4,65 m
	Total height	3,15 m
	Sculptures at pelvic edge	45 x 31 x 15 cm
Materials/Technology	Stone, mortar, gilded metal	
Interventions (IoC)	Survey	2010, 2022
	Mapping	-
	Sampling	2014, 2022
	Analyses	2014, 2022
	Conservation	2010, 2017
	Maintenance	2014, 2017, 2022
Team (IoC)	Gabriela Krist, Manfred Trummer, Marija Milchin, Lisa Gräber, Martina Haselberger, Katharina Fuchs	
Academic Research (IoC)	Diploma Thesis by Katharina Fuchs	2014

Survey: Materials and Technology

- Three different kinds of stones were used: sandstone [1], calcitic schist [2] and a biotite [3]
- Ornamental decoration (leaves, trees, etc.) made out of sandstone [1]
- Deities made out of biotite [3]
- Constructive elements such as floor plates made out of calcitic schist [2]
- Individual stone slabs were attached with mud mortar to the soil with layers of bricks set between them
- Projecting rear ends of the cornice stone blocks are left roughly hewn
- Figural relief slabs are carved in openwork with many different-sized holes



Fig. 3: View from top on sunken hiti, 2017



Fig. 4: Replica of water spout, 2017



Fig. 5: Inner walls with deities, 2017

Previous (Conservation) Intervention

1958	conservation mentioned by J. Sanday (1982; p. 79)
Unknown	Application of a hydrophobic surface coating (analyses with FTIR reveal existence of fluoropolymere)

Survey: Condition and Causes of Decay

General remark: some damage patterns could be observed each year anew (e.g., biological colonisation, soiling), wet-dry cycles favoured salt efflorescence

- Loose and missing stone parts (theft)
- Cracked joint mortar and open joints
- Scaling, sanding and powdering of stone (sandstone)
- Biological colonisation
- Soiling
- Salt damage
- Inoperable drainage system



Fig. 6: Salt efflorescence on sandstone, 2022



Fig. 7: Biological colonisation, 2017

Conservation (IoC)

February 2010 / summer 2011:

- Dismantling [done by the KVPT]
- Introducing a new foundation including a synthetic membrane between the foundation and the object in order to avoid rising damp; the foil was laid in lime-brick dust mortar
- Dry and wet cleaning
- Biocide treatment (formaldehyde in 2010 and QUATS in 2011)
- Repointing joints (mortar: 1 part slaked lime and three parts brick dust)
- Cutting stone slabs for stone-pins on the small stone deities and fixing on the bottom
- Fixing the deity-sculptures on top of the Tusha Hiti with epoxy resin and stainless-steel pins
- Restoration of the drainage system of the courtyard

2012

- Gilding of the newly casted deity

2014

- Mechanical removing of the biofilms and higher plants with brushes and scalpels

- Wet cleaning with water and brushes

Summer 2017:

- Opening and repointing of some joints
- Completions of missing edges at cornices

Summer 2022:

- Removal dust and other loose particles of the surface
- Removal of biological films by using shashlik skewers and wooden (not scratchy) tools
- Biocide treatment (QUATS)
- Cleaning with water and soft brushes

Conservation Materials used*:

- Formaldehyde, 2% in water
- QUATS (Alkylbenzyltrimethylammonium Chloride)
- Stainless steel pins
- Epoxy resin (type unknown)

Mortar 2010: 1 part slaked lime and three parts brick dust, small addition of cement

Mortar 2017: unknown

* All product / technical data sheets can be found at the additional file [A]



Fig. 8: Introducing a synthetic membrane, 2010



Fig. 9: Fixing the deities, 2010



Fig. 10: Pointing joints, 2017



Fig. 11: Structural reinforcement for mortar fillings, 2017



Fig. 12: Newly casted deity, 2017

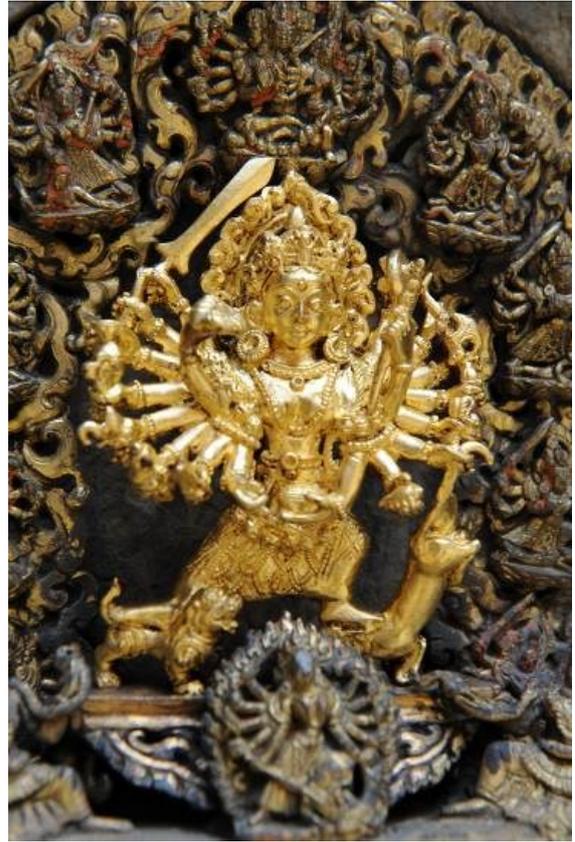


Fig. 13: Newly gilded Deity, 2017

Before and after Conservation



Fig. 14: Overview of the Tusha Hiti before conservation © KVPT.



Fig. 15: Condition after conservation in 2022



Fig. 16: Condition after conservation in 2022



Fig. 17: Condition after conservation in 2022

List of Publications / Reports (IoC)

Fuchs, Katharina. 2014. "The Royal Palace in Patan, Nepal. Evaluation of the Conservation Treatments and Recommendation for a Maintenance Program." Unpublished Diploma-Thesis, University of Applied Arts Vienna.

Trummer, Manfred. 2017. "The Tusha Hiti Fountain". In *Nepal. Patan Palace. The Restoration of Sundari Cok. 2006 – 2016*, edited by Niels Gutschow and Raju Roka, 326-328. Kathmandu: Kathmandu Valley Preservation Trust.

Supplements

[A] List of all product / technical data sheets

[1] Detailed material characterisation - sandstone

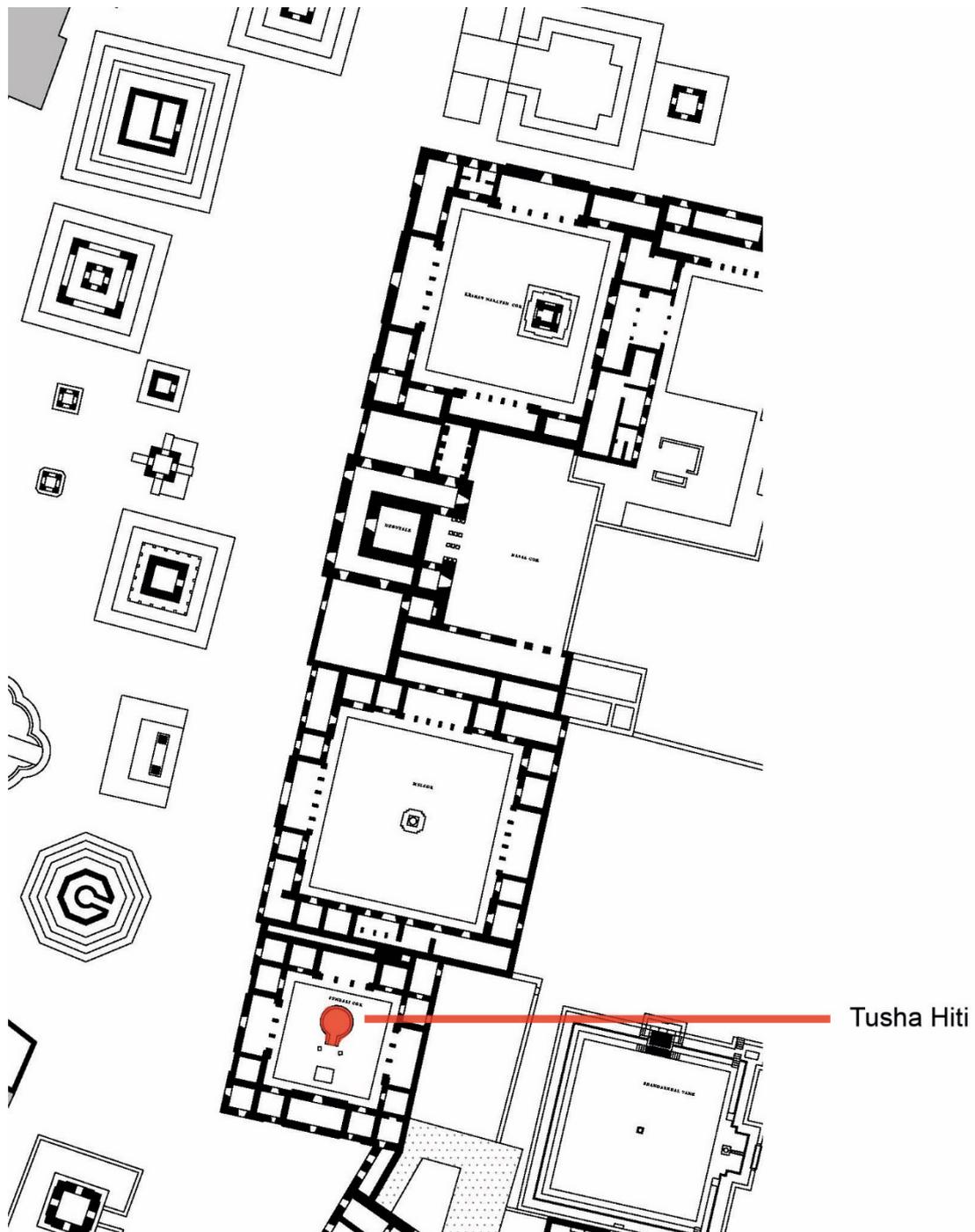
[2] Detailed material characterisation - calcitic schist

[3] Detailed material characterisation – biotite

Photo Credits

Unless otherwise stated, all photographs © Institute of Conservation, University of Applied Arts Vienna

GENERAL INFORMATION		
Monument Tusha Hiti	Orientation -	Size (H x L x W) 5,30 x 4,65 x 3,15 m
Date of Production 1647	Location Sundari Chowk	
Date of the last Treatment Conservation 2010, 2017; Maintenance 2014, 2017, 2022	Institutions of the last Treatment IoC	



Condition Assessment

Date of Evaluation

May 2024

Evaluation done by

Martina Haselberger
Fabian Sever
Sarah Moyschewitz

Recent Damages:

Stability Problems

Not detected

Major

Medium

Minor

Comment:

Broken / - into several Pieces

Not detected

Many

Some

Few

Comment:

Lose / Missing Parts

Not detected

Many

Some

Few

4th sculpture (from the middle to the left) is loose (Fig. 1).

Pearl-bead ornament frieze ("Perlstab") on the right from the middle, over the 5th Goddess, two pearls are missing, and epoxy residues are visible (Fig. 2). On the left from the middle, the second segment, near to ground, the pillar base is missing

Comment:

Joints

Not detected

Open

Cracked

Many

Some

Few

Many

Some

Few

Most of the joints were opened in previous conservation treatments

The grey cement mortar is mostly cracked (Fig. 3)

Comment: 3 diff. kinds of mortars (grey cement, grey mortar that might be tile glue or a similar material, lime-surkhi mortar)

Grey mortar is under the cement, lime-surkhi mortar can be found mostly under the upper cornice. The grey mortar is in worst condition.

Scaling, Sanding or Powdering

Not detected

Major

Medium

Minor

Mostly on the upper register (Fig. 4)

Comment:

Biological Colonization

Not detected

Microbiological
Growth

Major

Medium

Minor

Mosses

Major

Medium

Minor

Moss grows in open joints (Fig. 5)

Higher Plants x

Major

Medium

Minor

In open joints (Fig. 6)

Comment:

Mechanical Damage

Abrasion

Major

Medium

Minor

from salt efflorescence and maintenance measurements (watering and inappropriate tools)

Other

Major

Medium

Minor

Comment:

Salt Deterioration

Not detected

Efflorescence

Major

Medium

Minor

Upper register shows more intense salt deterioration (Fig. 7, 8; see mapping)

	<input type="checkbox"/> Subflorescence	<input type="checkbox"/> Major	
		<input type="checkbox"/> Medium	
		<input type="checkbox"/> Minor	

Comment:

<input checked="" type="checkbox"/> Soiling	<input type="checkbox"/> Heavy	
<input type="checkbox"/> Not detected	<input type="checkbox"/> Medium	
	<input checked="" type="checkbox"/> Light	

Comment:

<input type="checkbox"/> Other	Comment:
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Evaluation of the Condition

- good (no need for treatment)
- satisfactory (some minor treatments necessary)
- unsatisfactory (major conservation measures necessary)

Conclusion

**Below open joints, increased biological colonization is apparent due to water intake.
Surface loss caused by salt efflorescence.**

PHOTO DOCUMENTATION

Condition at Evaluation Date



Fig. 1: Panorama-picture: Overview of the reliefs, on the right outside two arches are missing on the picture.



Fig. 5: Overview from above.



Fig. 4: First wall segment, beginning on the right hand side coming downstairs into the bath.



Fig. 3: Second wall segment.



Fig. 2: Third wall segment.



Fig. 9: Fourth wall segment.



Fig. 8: Fifth wall segment.



Fig. 8: Sixth wall segment.



Fig. 8: Seventh wall segment.



Fig. 13: Thin, hard crust, brownish and flaking off. Underneath upper cornice.



Fig. 13: Brown, hardened surface.



Fig. 13: Crust on lotus ornament. The crust is thick, hard, white in the middle and on top yellow-brown-greenish, its surface shows little bumps.



Fig. 13: Dark-grey surface crust. Mostly in areas protected from rain.



Fig. 13: Biological colonisation in the crevices of the carvings.



Fig. 15: Missing piece at the top of the pillar.



Fig. 14: Scaling, stone piece falling down just by gently touching.



Fig. 17: Sanding areas (floral arches over figures).
Missing parts on the middle pillar.



Fig. 16: Salt efflorescence (white line).



Fig. 19: Scaling and sanding due to damaging salts.



Fig. 18: Cracked cement filling.



Fig. 20: Missing piece of cornice. The surface is showing traces from an angle grinder used to cut a drip edge into the underside of the cornice.



Fig. 22: Grey cement containing filling.

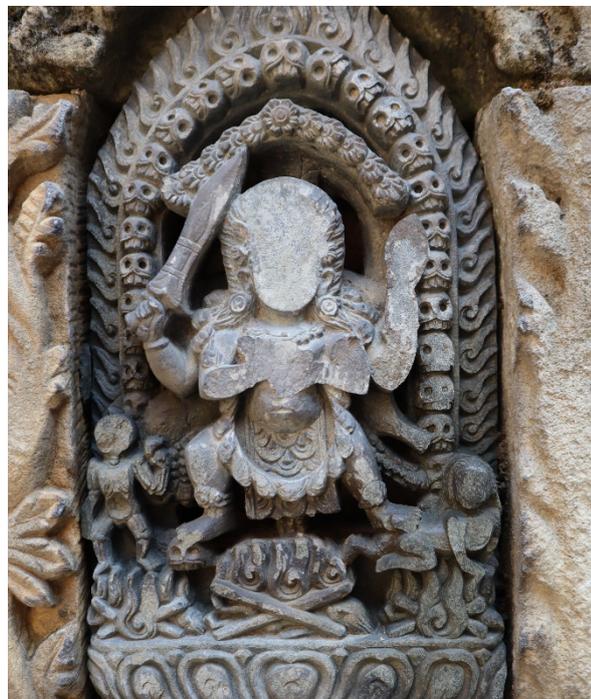
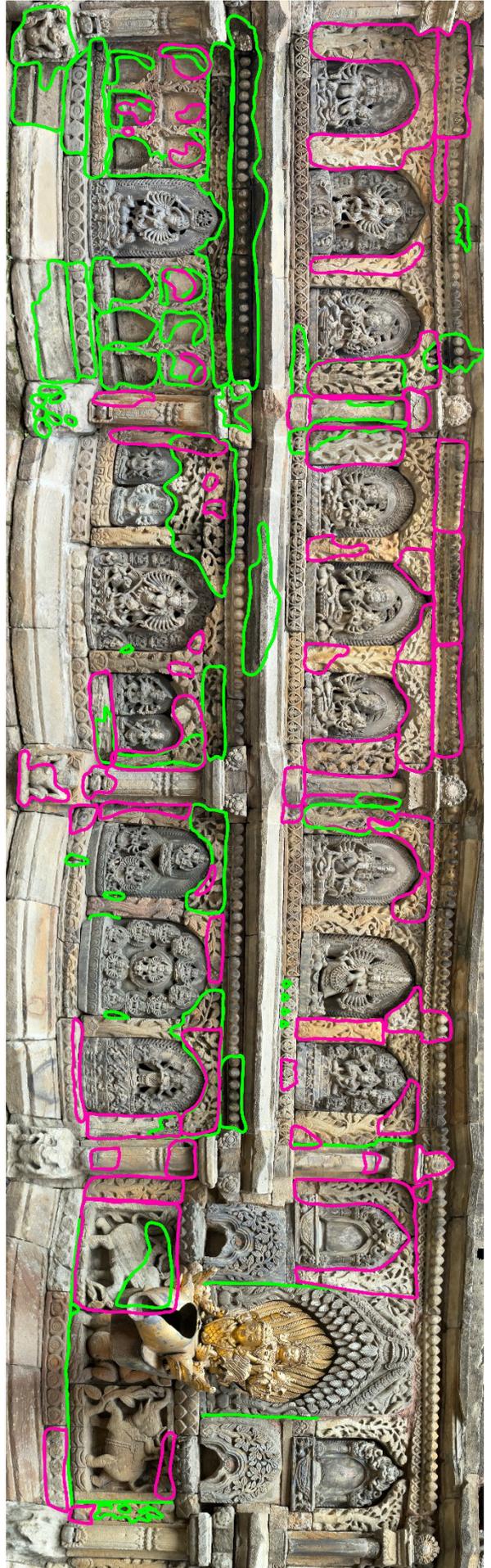


Fig. 21: Face and hands of the deity are missing.



Fig. 23: Scaling on one of the deities (probably calcite schist or biotite).



Mapping



High salinity and/or
Damage from salts



Biological colonisation

[A] Product Data Sheets – Links¹ to Suppliers/Manufacturers

AEROSIL® 200

https://products.evonik.com/assets/or/ld/AEROSIL_200_TDS_DE_DE_TDS_PV_52043839_de_DE_WORLD.pdf

Aviva Silikat Grundierung

https://www.adler-lacke.com/Canto/tmb/aviva-silikat-grundierung_tmb_4079_de.pdf

Alkylbenzyltrimethylammonium chloride

<https://www.sigmaldrich.com/AT/en/sds/mm/8.14858?userType=anonymous>

KluceI™ EF

<https://www.kremer-pigmente.com/elements/resources/products/files/63701-63713.pdf>

Aviva Tirokat-Color, Adler

https://www.adler-lacke.com/Canto/tmb/aviva-tirokat-color_tmb_4087_de.pdf

Mixtion Le Franc, Kremer

<https://shop.kremerpigments.com/elements/resources/products/files/98000e.pdf>

Waxes, Deffner und Johann

https://deffner-johann.de/media/datasheets/4186000/EN/Zusatzinformation_Wachse_DE_DJ.PDF

Injection mortar HFX

https://productdata.hilti.com/APQ_HC_RAW/ASSET_DOC_7567931.pdf

Kölner Classic Ölmixtion 3h; 12h; 24h

<https://www.kolner-vergolderprodukte.de/produkte/koelner-oelmixtion/>

KSE 500 E

https://media.remmers.com/celum/export/documents/Remmers_0715_KSE-500-E-_Technisches-Merkblatt_de_DE_26355.pdf

Lascaux 498 20 X acrylic adhesive

[https://deffner-](https://deffner-johann.de/media/datasheets/2051100/DE/2051100_Technisches%20Datenblatt_Lascaux%20Acrylkleber%20498%2020%20X_DE_DJ.pdf)

[johann.de/media/datasheets/2051100/DE/2051100_Technisches%20Datenblatt_Lascaux%20Acrylkleber%20498%2020%20X_DE_DJ.pdf](https://deffner-johann.de/media/datasheets/2051100/DE/2051100_Technisches%20Datenblatt_Lascaux%20Acrylkleber%20498%2020%20X_DE_DJ.pdf)

Marble dust

https://www.kremer-pigmente.com/elements/resources/products/files/58500-58580_59001-59690.pdf

Natural hydraulic lime

<https://www.preservationworks.us/wp-content/uploads/2019/10/NHL-Datasheet-Lafarge-23.5.pdf>

Plextol B-500 (acrylic dispersion)

[https://deffner-](https://deffner-johann.de/media/datasheets/2556500/DE/2556500_Technical%20Data%20Sheet_Acrylic%20Dispersion%20B%20500_EN_DJ.pdf)

[johann.de/media/datasheets/2556500/DE/2556500_Technical%20Data%20Sheet_Acrylic%20Dispersion%20B%20500_EN_DJ.pdf](https://deffner-johann.de/media/datasheets/2556500/DE/2556500_Technical%20Data%20Sheet_Acrylic%20Dispersion%20B%20500_EN_DJ.pdf)

Primal® SF 016

[https://deffner-](https://deffner-johann.de/media/datasheets/2543001/DE/2543001_Technical_Data_Sheet_Primal_SF_016_DJ_EN.pdf)

[johann.de/media/datasheets/2543001/DE/2543001_Technical_Data_Sheet_Primal_SF_016_DJ_EN.pdf](https://deffner-johann.de/media/datasheets/2543001/DE/2543001_Technical_Data_Sheet_Primal_SF_016_DJ_EN.pdf)

AKEPOX® 2010

https://data.akemi.de/fileadmin/user_upload/products/productdocuments/TMB/Akepox_2010_TMB_D.pdf

¹ All links were last accessed on 13 May 2025.

EPO-TEK® 301-1

<https://www.epotek.com/docs/en/Datasheet/301-1.pdf>

Titebond Wood Glue

<http://sds.franklini.com/msds/1411.042k0nmo0020.pdf>

Paraloid™ B-72, Kremer

<https://www.kremer-pigmente.com/elements/resources/products/files/67400-67409.pdf>

Keim Granital®

https://www.keim.com/documents/de-AT/723/TM_Granital_DE-AT.pdf

[1]“Sandstone”	
Visual characteristics	<ul style="list-style-type: none"> - Fine and homogenous grain structure - Whitish to ochre colour
Samples taken (sample names and origin)	<ul style="list-style-type: none"> - KAT2, (Leiner 2010) Bhandarkhal Tank Pavilion Base (Fig. 3, 4) - KRP Original (Fuchs 2013), Stone Gate, Patan Darbar Square (Fig. 5–9) <p>Cross and thin sections of the samples were prepared and examined with light microscopy and SEM.</p> <p>Sources: Leiner, Susanne. 2010. "Der Pavillon am Bhandarkhal-Tank. Palastkomplex Patan, Nepal." Pre-thesis, University of Applied Arts Vienna. Fuchs, Katharina. 2013. "Bitumen Coating on Stone, a Nepalese Problem? The Conservation of Two Stone Relief Gates at the Nasal Chowk, Patan Royal Palace." Pre-thesis, University of Applied Arts Vienna.</p>
Petrographic/geological characterization	<ul style="list-style-type: none"> - quartz sandstone ("arkose" sandstone) - rich in feldspar - silica grains angular, interlocked and covered by layers of iron oxides/hydroxides and clay - clayey binder (contains mostly sheet silicates) - different amounts of iron-compounds with sheet structure - fine grained with average grain size of 50 µm, coarse grain fraction with 250 µm
Physical properties	<ul style="list-style-type: none"> - varying porosity but in general highly porous, 20–25% porosity (Leiner 2010, S. 62), intergranular porosity - capillary active - varying colours and weathering behaviour due to different clay and iron content - homogenous structure with some bedding - relatively soft
Use at Patan Darbar Square	<p>Scientifically confirmed:</p> <ul style="list-style-type: none"> - Stone Gates - Bhandarkhal Tank <p>By visual inspection only:</p> <ul style="list-style-type: none"> - Harishankara temple base - Vishveshvara temple base and elephants - Krishna Mandir - Tusha Hiti - Mul Chowk Lions
Origin of material	<ul style="list-style-type: none"> - unknown



Fig. 1: Visual inspection of the sandstone from Bhandarkhal Tank Pavilion Base, © IoC 2010.



Fig. 2: Visual inspection of the sandstone from Bhandarkhal Tank Pavilion Base, © IoC 2010.

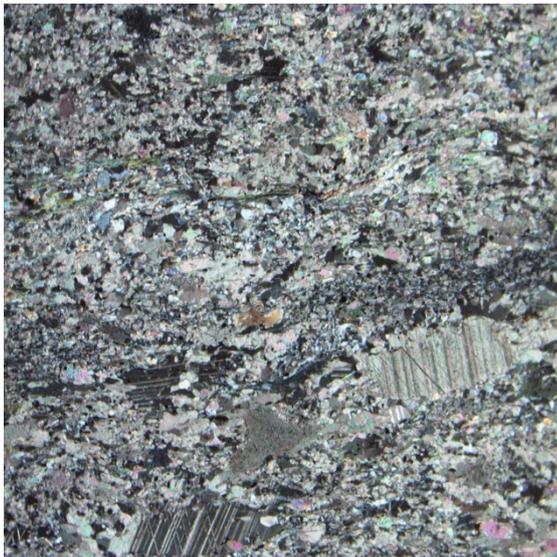


Fig. 3: Sample KAT2, thin section, optical microscopy, polarized light, x24.



Fig. 4: Sample KAT2, thin section, optical microscopy, transmitted light, x24.

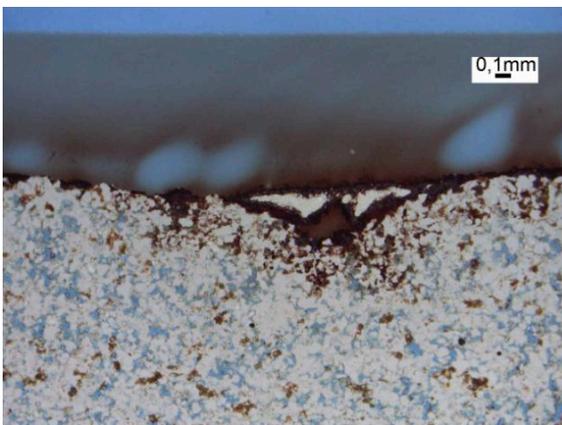


Fig. 5: Sample KRP Original, polished thin section, stereo microscope (Nikon SMZ 1500), reflected light, polarized light. The sample shows stone with bitumen coating.

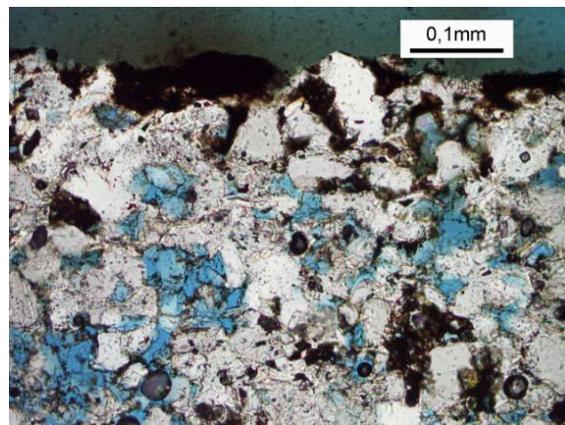


Fig. 6: Sample KRP Original, polished thin section, stereo microscope (Nikon SMZ 1500), reflected light, polarized light. The sample shows stone with bitumen coating.

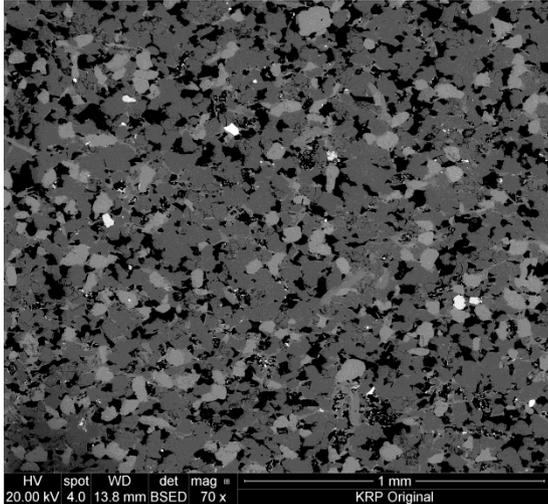


Fig. 7: Sample KRP Original, SEM; description: black = pores, dark grey = quartz, light grey = feldspar, white spots= Fe-(hydr)oxides.

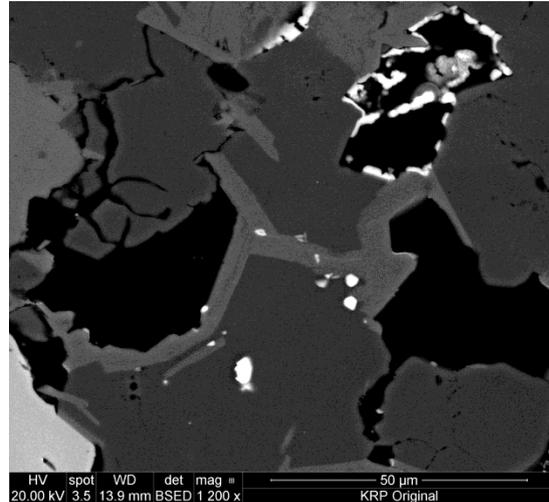


Fig. 8: Sample KRP Original, SEM; description: black = pores, dark grey = quartz, light grey = feldspar, white spots= Fe-(hydr)oxides.

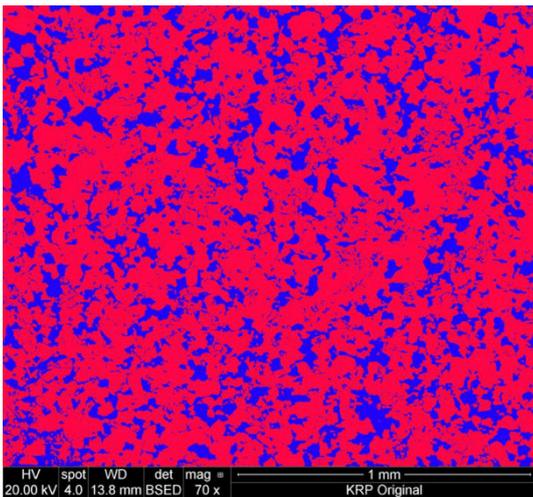


Fig. 9: Sample KRP Original, SEM photo of thin section in false colours (red = grains, blue = pores).

[2]“Calcitic schist”

Description of visual characteristics	<ul style="list-style-type: none"> - light grey to almost black colour - occasional white inclusions with reddish center - characteristic schist surface with homogeneous foliation and inclusions
Samples taken (sample name and origin)	<ul style="list-style-type: none"> - KAT1 (Leiner 2010), Bhandarkhal Tank Pavilion Base (upper covering) (Fig. 3, 4) - P06, P07 (Kaipf 2017), Yoganarendra Pillar (Fig. 5–16) - NEP_ST_1 (Haselberger/Fuchs 2023), loose material around Royal Garden workshop (Fig. 17–22) <p>Cross and thin sections of the samples were prepared and examined with light microscopy and SEM.</p> <p>Sources: Leiner, Susanne. 2010. “Der Pavillon am Bhandarkhal-Tank. Palastkomplex Patan, Nepal.” Pre-thesis, University of Applied Arts Vienna. Kaipf, Luis. 2017. “The Pillar of Yoganarendra Malla. Condition Survey, Conservation Treatment and Re-erection.” Pre-thesis, University of Applied Arts Vienna. Johannes Weber, Katharina Fuchs, Martina Haselberger. 2023. Scientific investigation of the stone sample NEP_ST_1 from Patan Royal Garden Workshop. Unpublished report, Institute of Conservation, University of Applied Arts Vienna.</p>
Petrographic/geological characterization	<ul style="list-style-type: none"> - weakly metamorphic schist, predominantly calcareous - high concentration of silicates arranged in foliations, surrounded by a very fine-grained siliceous marble - homogenous matrix and slight banding - average grain size of major calcite crystals between 0.03–0.05 mm; 0.05–0.25mm for silicate crystals - minor components of Phlogopite mica (grain size 0.1–0.2mm) - grain borders linear or curved - analyzed sample displays shear zone of ore minerals or graphite
Pyhsical properties	<ul style="list-style-type: none"> - relatively dense and heavy material - almost no water absorption
Damage patterns	<ul style="list-style-type: none"> - (hair) cracks and loss of material due to mechanical stress – probably stone intrinsic due to metamorphosis - almost no water related damage
	<p>Scientifically confirmed:</p> <ul style="list-style-type: none"> - Pillar Yoganarendra Malla - Bhandarkhal Tank Pavilion Base (upper covering)

<p>Use at Patan Darbar Square:</p>	<p>By visual inspection only:</p> <ul style="list-style-type: none"> - Lion Pillar - Garuda Pillar - Harishankara Temple Base (cornerstones with lion protomes, inner threshold) - Kings Throne - Stone Gates (inner profile) - Tusha Hiti - Visveshvara Temple Base (cornerstones with lion protomes, inner threshold)
<p>Probable origin of material:</p>	<ul style="list-style-type: none"> - Probably mined in the Kathmandu Valley – the alluvium filled Kathmandu Valley is bordered by a sequence of unmetamorphosed to slightly metamorphosed sedimentary rock in the east, south and west - Most probably from the southern part of the Kathmandu Valley, according to the geological map (Himalayan Maphouse [Ed.] Comprehensive Geological Map, GL701), possibly associated with the Chandragiri Formation. - According to the map, the stone from the Chandragiri Formation is defined as following: <i>“light fine grained crystalline limestones partly siliceous thick to massively bedded white quartzites in upper parts. Wavy limestones contain late ordovician schinoderms.”</i>



Fig. 1: Upper stone covering of Bhandarkhal Tank Pavilion Base, © loC, 2010.

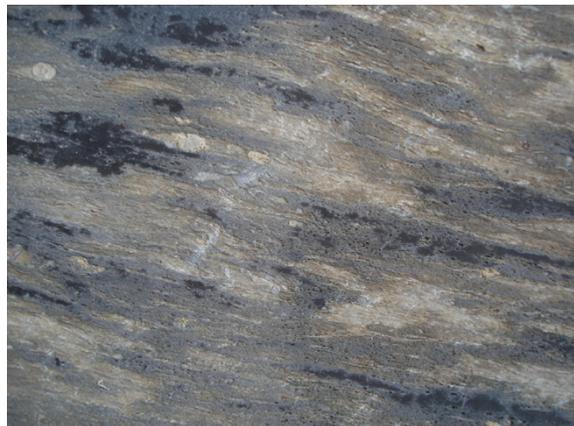


Fig. 2: Visual inspection of stone from Yoganarendra Malla Pillar, © loC, Kaipf, 2017.

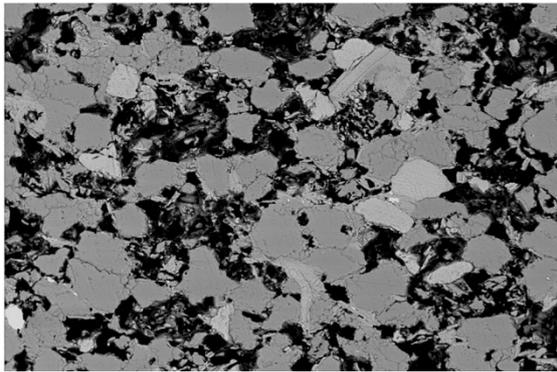


Fig. 3: Sample KAT1BS1, thin Section, SEM BSE.

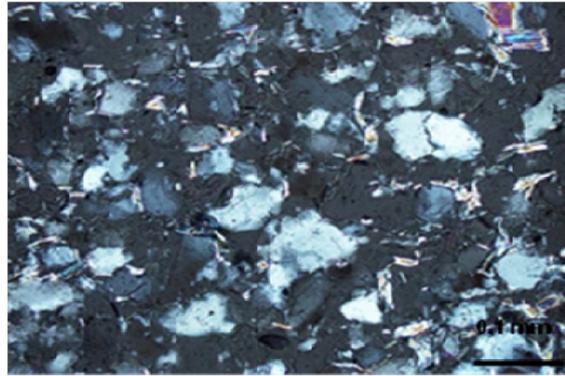


Fig. 4: Sample KAT1, thin section, optical microscopy, x200.

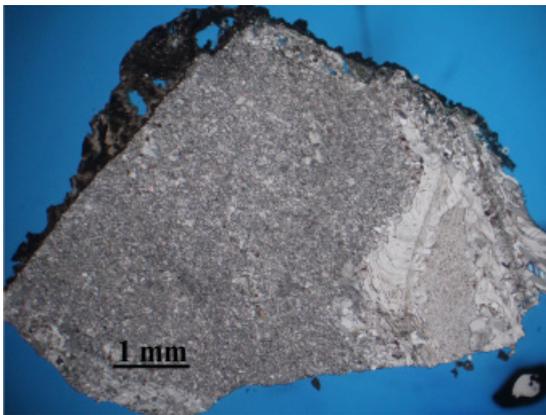


Fig. 5: Sample P06, thin section, optical microscopy, x24.

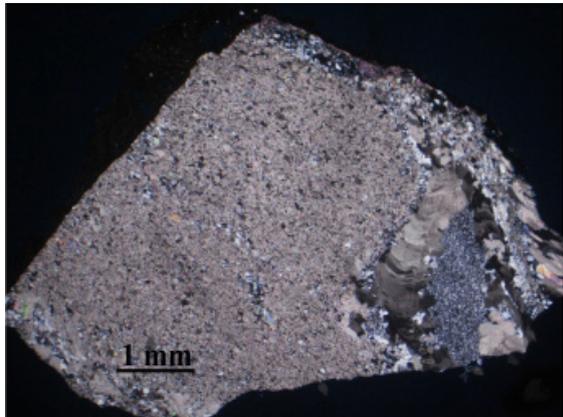


Fig. 6: Sample P06, thin section, optical microscopy, x24.

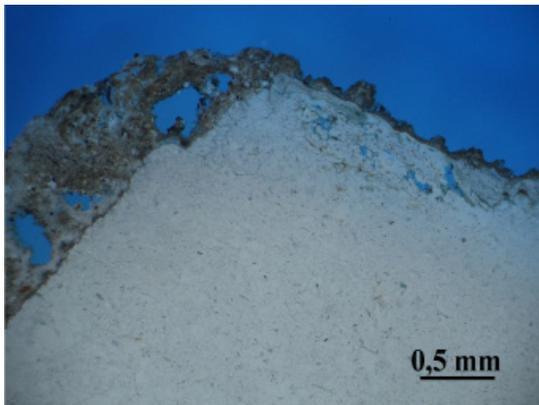


Fig. 7: Sample P06, thin section, optical microscopy, x48.



Fig. 8: Sample P06, thin section, optical microscopy, x48.



Fig. 9: Sample P07 taken in 2016, Lotus ring, Pillar of Yoganarendra Malla, Kaipf 2017.



Fig. 10: Sample P07, thin section, x72. Fabric with relatively homogenous matrix and slightly developed banding.

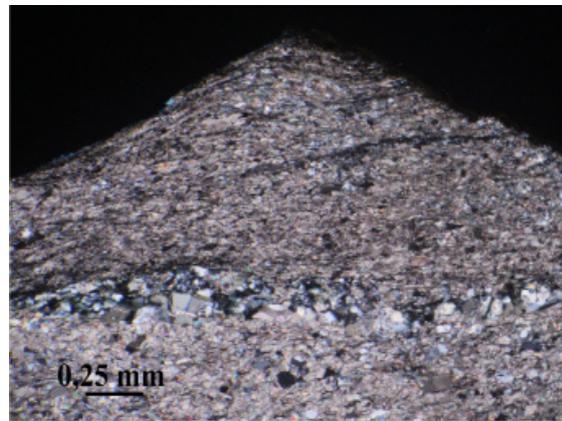


Fig. 11: Sample P07, thin section, x72.

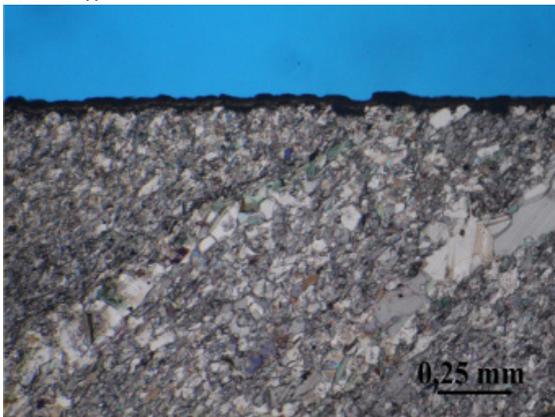


Fig. 12: Sample P07, thin section, x90.

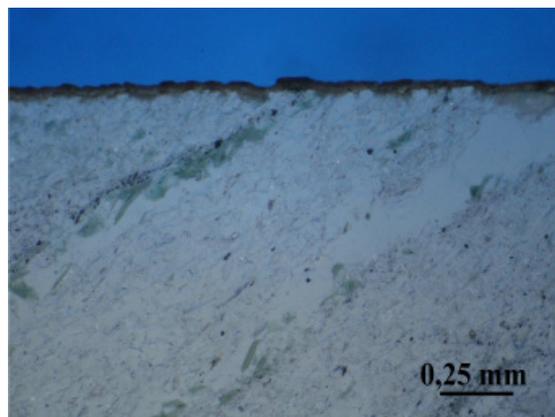


Fig. 13: Sample P07. thin section, x90.



Fig. 14: Sample P07, thin section, x100; Phlogopite.

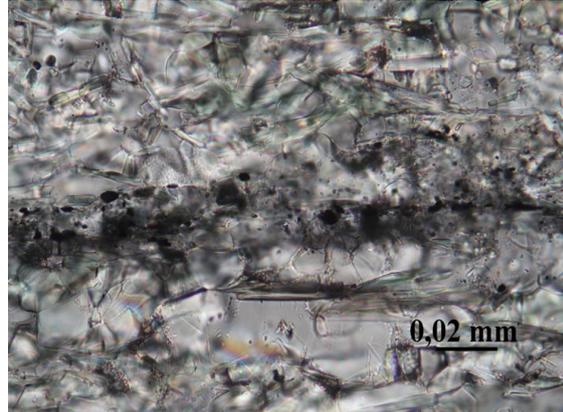


Fig. 15: Sample P07, thin section, x1000; Shear zone.



Fig. 16: Sample P07, thin section, x500. Equigranular grain aggregate with mainly polygonal grain forms.



Fig. 17: Sample NEP_ST_1.



Fig. 18: Sample NEP_ST_1.



Fig. 19: Sample NEP_ST_1, Nikon SMZ 500, transmitted light, crossed polarizers. Overview of the rock matrix with coarser and finer layers.



Fig. 20: Sample NEP_ST_1, Nikon SMZ 500, transmitted light, parallel polarizers. Detailed view of the matrix.



Fig. 21: Sample NEP_ST_1, Olympus BX40, incident light, bright field. Overview of mica inclusions (whitish spots).

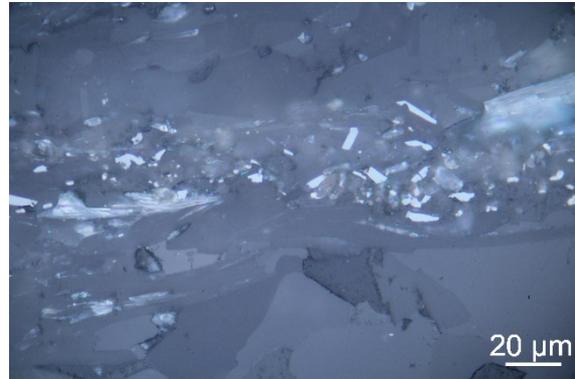


Fig. 22: Sample NEP_ST_1, Olympus BX40, incident light, bright field. Detail of a fine layer with mica flakes.

[3]“Biotite”

Visual characteristics	- (dark) grey colour
Samples taken (sample names and origin)	- NEP_TS_4 (Fuchs and Weber 2023) Tusha Hiti (Fig. 3, 4) Thin sections of the samples were prepared and examined with light microscopy (transmitted light in linearly polarized light and under crossed polarizers; Nikon SMZ 500; Olympus BX40, and digital camera Canon EOS 600D) Sources: Fuchs, Katharina and Johannes Weber. 2023. Stone Sample Analysis (unpublished), University of Applied Arts Vienna.
Petrographic/geological characterization	- Layered silicate (biotite) with occasional inclusions of magnesium silicate - Inclusions of muscovite mica, quartz-rutile and light iron oxide (presumably magnetite)
Physical properties	-
Use at Patan Darbar Square	Scientifically confirmed: - Tusha Hiti
Origin of material	- Probably Sarung Khola Formation, east, and southwest border of the Kathmandu Valley (Himalayan Maphouse (ed.). Comprehensive Geological Map, GL701)

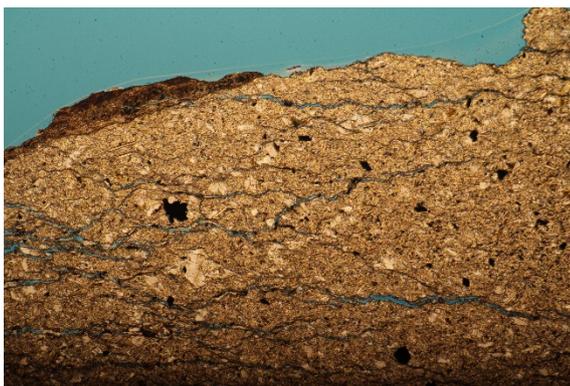


Fig. 1: Sample NEP_TS_4, Overview of stone matrix with visible cracks and partial existing surface coating



Fig. 2: Sample NEP_TS_4, Detail of parallel surface cracks



Fig. 3: Sample NEP_TS_4, Detail of stone surface with coating (hydrophobic layer?)